Roadmap to Net-Zero Aligned Carbon Market Regulation

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Contents

Executive summary

- Carbon markets can be a critical tool on the path toward and beyond net-zero, with potential to unlock finance for mitigation and adaptation activities and bring additional benefits for sustainable development and just transition goals.
- To realise this potential, carbon markets must be effectively regulated. In recent years, there has been a rise in such regulation globally, ranging from voluntary guidance to national policy. Such regulation has varied in scope and design, creating a patchwork of carbon market regulation that often lacks consistency with the wider domestic and international regulatory ecosystems it is embedded in.
- More consistent and integrated approaches to designing carbon market regulation are needed. Such approaches can ensure that governments utilise different types of carbon markets effectively, bringing them closer to rather than further away from domestic and global net-zero targets. To facilitate the design and operationalisation of carbon market regulatory frameworks across jurisdictional contexts, we offer a 'Roadmap to Net-Zero Aligned Carbon Market Regulation'.
- This Roadmap identifies and builds on existing trends and gaps in the regulation of carbon markets and establishes six key pillars for its design or reform. It suggests that governments seeking to regulate their approach to carbon markets should first begin with identifying a clear role for carbon markets to ensure they provide (1) an efficient and effective financing framework and (2) align with an end state of domestic and global net-zero. Next, they should create or reform substantive regulation to ensure that the mitigation outcomes derived from engagement with carbon markets uphold (3) ecosystem (environmental and social) integrity, while delivering and respecting (4) equitable outcomes and responsibilities across relevant stakeholders. Lastly, governments should rigorously implement and oversee such regulation, establishing effective provisions for carbon market (5) enforcement and oversight, and promoting their (6) ease of use.
- Implementing such a Roadmap is an iterative and reflexive process that should reflect developments in the best available science and industry practice. Evidence of best practice implementation of different pillars has already begun to emerge across advanced, emerging, and developing economies, providing a window into the operationalisation of the Roadmap in practical terms and from a variety of local realities.
- Yet for a truly cohesive approach we encourage all governments to review how all six pillars can ground their design or reform of their carbon market regulation in a way that is primed to fully unlock the potential of net-zero aligned carbon markets.

Abstract

Carbon markets are currently at a critical juncture. With over 80 emergent carbon pricing schemes around the globe and 106 carbon crediting policies, interest is growing in carbon market activities that can help reduce or remove emissions.[1] There remains, however, uncertainty as to how countries can effectively manage the growing complexity and breadth of carbon credit transactions whilst ensuring they help rather than hinder the Paris Agreement goals. To date, carbon market regulation has emerged in an ad hoc manner, largely responding to integrity challenges, typically lacking harmonisation and integration with the wider regulatory and financial ecosystems it exists within.[2] Similar to carbon markets themselves, such regulation is not net-zero aligned by default. If the system does not robustly differentiate between emissions reductions and removals, and the different incentives to develop them, carbon markets risk being blunt tools to deliver net-zero.[3]

To address these concerns and unlock the full potential of carbon markets in catalysing climate action, governments can design and implement robust regulatory frameworks to support both broader domestic climate and economic goals. **To enable governments to effectively design and operationalise such regulatory frameworks, this working paper offers a "Roadmap to Net-Zero Aligned Carbon Market Regulation"**. To build this Roadmap, we first categorise existing types of carbon market regulation, highlighting existing trends and gaps. We then conceptualise six key pillars undergirding effective carbon market regulation, including (i) efficient and effective financing; (ii) end state of net-zero; (iii) ecosystem integrity; (iv) equitable responsibilities and outcomes; (v) enforcement and oversight; and (vi) ease of use. We further recognise that whereas these principles can be universally applicable, their implementation will differ across jurisdictional contexts and specifically explore the pillars' application across advanced, emerging, and developing economies. This illustrates that despite their different capacities and responsibilities for climate action, all jurisdictions seeking to engage with carbon markets can use the Roadmap to help to unlock the full climate and economic potential of net-zero aligned carbon markets in line with national priorities and realities.

1 Carbon crediting rules were tracked and surveyed across 37 jurisdictions globally by the 2025 Oxford Climate Policy Monitor (forthcoming). This includes the G-20 members plus several other countries covering a range of political economy contexts and geographies, and one sub-national jurisdiction (California).

2 For example, national public guidance developed in Global North jurisdictions to inform engagement with international carbon trading is voluntary and mainly creates principles for high-integrity engagement with such markets. See Mercer, L., Kuci, S., & Macquire, R. September 2025. **Policy Options for Voluntary Carbon Markets in Wales** (Wales Centre for Public Policy, Report) for a cross-comparison of carbon market policies in Australia, Finland, Portugal and Scotland.

3 Emerging standards, such as the Oxford Offsetting Principles, call for such a differentiation in ensuring net-zero aligned carbon portfolios. See Axelsson, et al. 2024. **The Oxford Offsetting Principles**.

1. Introduction

Carbon markets facilitate and scale efforts to reduce or remove carbon dioxide and equivalent greenhouse gases in a cost-efficient way. Allowance-based carbon markets, such as emissions trading schemes (ETS), typically compel actors to reduce their emissions in line with a declining cap with a provision to trade emissions allowances among entities within a given sector. Carbon credit-based markets, such as the voluntary carbon market and the emerging Paris Agreement Crediting Mechanism (PACM), by contrast, typically enable project-level financing of activities that avoid, reduce or remove greenhouse gases. In general, the former set mandatory targets and the latter are voluntary in their participation. Both types of markets can operate at a range of sub-state, national, regional, or international scales. The two domains do not exist in isolation but are increasingly converging. As Figure One illustrates, carbon credits can be surrendered instead of allowances under an ETS regime[4] or in lieu of paying a carbon tax obligation in some instances.[5] Such fungibility between different forms of carbon units has become increasingly pronounced with the rise in international carbon trading under Article 6 of the Paris Agreement.[6] Article 6 facilitates cross-border carbon trading, enabling governments to enhance the ambition of their Nationally Determined Contributions (NDCs) and other national targets, as well as corporates to meet their own climate goals.[7] As a result of the emergence of these increasingly dynamic carbon market types, we are seeing an increasingly interlocking web of carbon trading, creating complexity from a regulatory perspective.

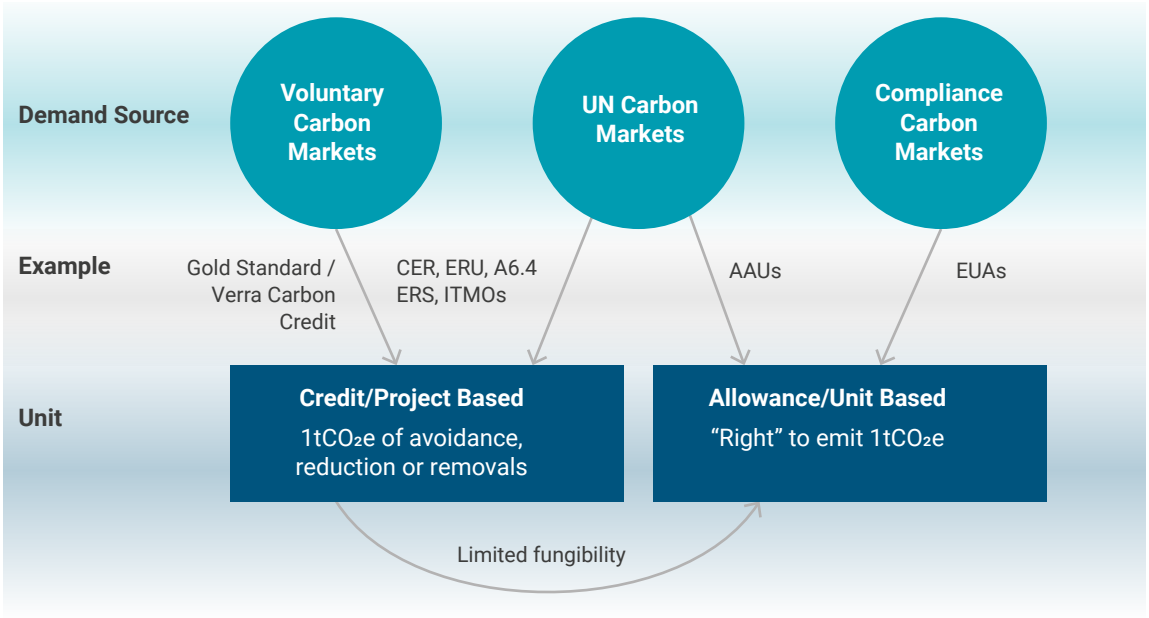
4 Such as in South Korea. See ICAP, 2025. **Korea Emissions Trading System (K-ETS)**.

5 Such as in Singapore. See Singapore's National Climate Change Secretariat. **Carbon Tax**.

6 Johnstone, I., Schneider, L., Michaelowa, A., Grandpré, J., Kuci, S., Ahonen, H., Probst, B.S., Lezak, S., Hale,T., La Hoz Theuer, S., Omukuti, J., Reséndiz, J.L., Fankhauser, S., Abebe, S., and Hepburn, C. Oxford Principles for Responsible Engagement with Article 6. Oxford: Smith School of Enterprise and the Environment, University of Oxford.

7 Including airlines via obtaining correspondingly adjusted mitigation outcomes required for adherence with the Carbon Offsetting and Reduction in International Aviation (CORSIA) scheme.

Figure One: The Carbon Market Ecosystem. Authors' own illustration.



If left unregulated, this lacuna may hamper the effectiveness of carbon markets as a financing mechanism for meaningful climate mitigation with development co-benefits. In fact, since the inception of the first voluntary carbon trading scheme in the late 1980s, integrity and misconduct issues have plagued carbon markets. From financial fraud[8] to a lack of additionality of projects,[9] and overestimation of their carbon benefits,[10] examples abound of actors 'gaming' carbon market infrastructure. Such concerns continue to exist, including throughout the 2025 operationalisation of the PACM.[11] These issues negatively impact not only the climate mitigation prospects of carbon markets but also the many co-benefits they can offer, including contributions to climate adaptation, broader development goals, such as poverty reduction, employment, health and gender equality,[12] as well as towards a just transition.[13]

8 In its early days, the EU ETS was subject to a VAT fraud scheme, in which a number of fake companies purchased carbon credits outside of the EU, free of EU VAT obligations, and resold them in the EU ETS. See Europol.2009. **Further investigation into VAT fraud linked to the carbon emissions trading system**.

9 In India, the vast majority of wind farms financed by the Clean Development Mechanism (CDM) were going to be built irrespective of funding from it and were therefore found to be not additional. Calel, R., Colmer, J., Dechezleprêtre, A., & Glachant, M. 2021. **Do carbon offsets offset carbon?** London School of Economics and Political Science Grantham Research Institute.

10 West, T.A.P., Börner, J., Sills, E.O., & Kontoleon, A. 2020. Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon 117 (39). Sustainability Science.

11 Mulder, I. 2025. **First wave of Article 6 carbon credits misfire spectacularly**. Carbon Market Watch.

12 See Macquire, R. 2023. **The voluntary carbon market and sustainable development**. LSE Grantham Research Institution. Policy Report.

13 Ernst, E., Dhir, R. K., Harsdorff, M. 2024. **Carbon Markets and Their Implications for a Just Transition for All** International Labour Organisation. Research Brief.

From Brazil to Indonesia, regulations typically set up both domestic carbon schemes and set parameters for engagement with international carbon markets, including Article 6 and the voluntary carbon market.[14] They also seek to address concerns regarding the environmental and social integrity of carbon trading, placing guardrails and introducing new or endorsing existing best standards and practices for supply and demand side integrity.[15] To date, there are 106 carbon crediting regulations globally across 37 economically significant and high-emitting jurisdictions, as illustrated by the Oxford Climate Policy Monitor data.[16] Compliance markets, typically established by bespoke regulations are among the most significant in size and scope, generating considerably higher turnover than voluntary carbon markets.

However, attempts to regulate the development of carbon markets have been largely poly-centric and fragmented, as each jurisdiction adopts its own unique framework to regulate different types of carbon markets. For example, while some jurisdictions create internal compliance or voluntary carbon markets, such as the UK ETS or the Portuguese Voluntary Carbon Market, others only engage with international carbon markets schemes. This engagement differs based on the positioning of countries as net importers or exporters of carbon units. Adding to differences in approaches to carbon markets at a jurisdictional level is the lack of interoperability between public and private standards and guidance that set minimum criteria for the quality of carbon units.[17]

Existing attempts to regulate carbon markets are also not necessarily primed to deliver on the long-term goals of the Paris Agreement, particularly the global goal to reach net-zero greenhouse gases via balancing anthropogenic sources and sinks of emission per Article 4(1). This balance requires the durable storage of carbon in proportion to the lifecycle of emissions released in the atmosphere. To date, several major carbon markets, including Article 6, tend to amalgamate different types of carbon units to one fungible "mitigation outcome" despite key differences in the atmospheric impact of a reduction vs removal and differences in associated levels of confidence in their additionality and durability. This specification is necessary to guide uses and environmental claims made as a result of carbon market transactions, with guidance stating that only carbon units from projects with high levels of durability should be used to compensate for ongoing emissions.[18] This lack of clarity extends to carbon market regulation, the framework climate laws in which such regulation can be nested, and more broadly, to countries' NDCs and Long-term Low Emissions Development Strategies (LT-LEDS).[19]

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14 See Brazilian Government. 2024. **Law 15.042 establishing the Brazilian Greenhouse Gas Emissions Trading System**. See Indonesian Government. 2024. **OJK Regulation No.14 on Carbon Trading**.

15 See for instance, in the United Kingdom. Department for Energy Security and Net-zero. November 2024. **Principles for Voluntary Carbon and Nature Market Integrity**. Policy Paper.

16 This data is forthcoming.

17 Becker, M., McGivern, A. Axxelson, K., Buytaert, M., Collet, M., Kamenkovich, N., Thorn, J., & Lee., B. 2024. **Governing net-zero: Assessing convergence and gaps in the voluntary standards and guidelines landscape**. University of Oxford.

18 Axelsson, K., Wagner, A., Johnstone, I., Allen, M., Caldecott, B., Eyre, N., Fankhauser, S., Hale, T., Hepburn, C., Hickey, C., Khosla, R., Lezak, S., Mitchell-Larson, E., Malhi, Y., Seddon, N., Smith, A. and Smith, S.M. 2024. Oxford Principles for Net-zero aligned Carbon Offsetting (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford.

19 Lamb, W.F, et al. 2024. **Countries need to provide clarity on the role of carbon dioxide removal in their climate pledges**. *Environmental Research Letters*, 19 (12): 121001.

Existing carbon market regulation is often not net-zero aligned as it does not differentiate between distinct financing pathways for mitigation activities with different levels of durability, instead treating them as fungible. While some host countries, such as Ghana, identify the use of carbon finance predominantly for mitigation activities conditional on international support, these clarifications are otherwise largely lacking.[20] This absence of clarity on countries' intended use of carbon markets can cast doubt on the true material and financial additionality of carbon projects, thus jeopardising their integrity. This issue has become particularly pressing in light of the shrinking of Overseas Development Assistance (ODA) and the debt challenges developing and emerging economies – typically among the largest suppliers of carbon units –face.[21] While carbon markets should not substitute countries' climate finance obligations, they can help unlock private finance for the development of ambitious mitigation projects that would not have occurred otherwise,[22] in a manner that can support host countries NDCs and bring about development benefits.[23]

Considering the increasing importance of carbon markets within the global climate policy landscape and drawing from lessons learned over the past three decades of their operation, there is a need for more effective regulatory oversight of carbon markets to enhance their credibility and effectiveness as a tool to drive climate mitigation. To this end, this working paper provides a 'Roadmap to Net-Zero Aligned Carbon Market Regulation', identifying challenges, proposing fundamental principles and recommending best practices for different types of jurisdictions to create and reform their respective domestic carbon market regulatory ecosystems.

Section 2 defines carbon market regulation and unpacks its constituent components. Section 3 identifies six universal pillars to implement a universally applicable "Roadmap to Net-Zero Aligned Carbon Market Regulation". Recognising variation in the challenges and opportunities across different local contexts where such a Roadmap can be applied, Section 4 offers concrete guidance on its operationalisation across three types of jurisdictions: advanced economies, which are often key sources of demand for carbon units, developing economies, which are often key sources of supply and emerging economies, typically in flux between the two. Section 5 concludes.

20 Ghana Environmental Protection Agency. 2024. **Ghana's framework on international carbon markets and non-market approaches**.

21 See OECD. 2025. **Cuts in Official Development Assistance: OECD projections for 2025 and the near term**. Policy Brief.

22 Day,T. et al. July 2023. **Shifting Voluntary Climate Finance Towards the High-hanging Fruit of Climate Action. NewClimate Institute**. Report.

23 International Chambers of Commerce, November, 2024. **The Role of Voluntary Carbon Markets in Mobilizing Finance to Accelerate Climate Action**. Report.

2. The Existing Carbon Market Regulatory Ecosystem

This section analyses the existing carbon market regulatory ecosystem across different types of jurisdictions, exploring trends and identifying gaps.

2.1 What is Carbon Market Regulation?

Carbon market regulations can guide both state and non-state actors' engagement with carbon finance towards the most cost-efficient mitigation outcomes. In so doing, they can support countries' obligations under the Paris Agreement to reduce emissions and scale removals, in line with their common but differentiated responsibilities and respective capabilities.

In this Roadmap we define 'regulation' broadly to encompass laws, policies, or guidance issued by a relevant national authority, such as a ministerial body. We differentiate between *direct regulations*, the exclusive purpose of which is to create or operationalise one or more types of carbon markets, and *enabling regulations*, which include domestic or international regulations that address or operationalise features of carbon markets. An example of the former is Law 15.042 in Brazil which creates a domestic ETS and prescribes rules for international trading of carbon credits.[24] Direct regulations can typically instil higher confidence in carbon markets and provide more clarity to investors and other relevant participants. Enabling regulations also remain key for implementation, for instance, the UK Environment Act of 2021, which sets targets on air pollution and protection of biodiversity among others, and is directly applicable to any nature-based carbon project in the country, safeguarding against possible environmental harm.[25] Crucially, enabling regulations are often invoked in litigation cases along the carbon unit supply chain.[26] Regulations can also be substantively informed by a wider landscape of private or public standards and principles including from entities such as the Science Based Targets Initiative (SBTi) and the University of Oxford.[27]

24 Brazilian Government. 2024. **Law 15.042 establishing the Brazilian Greenhouse Gas Emissions Trading System**.

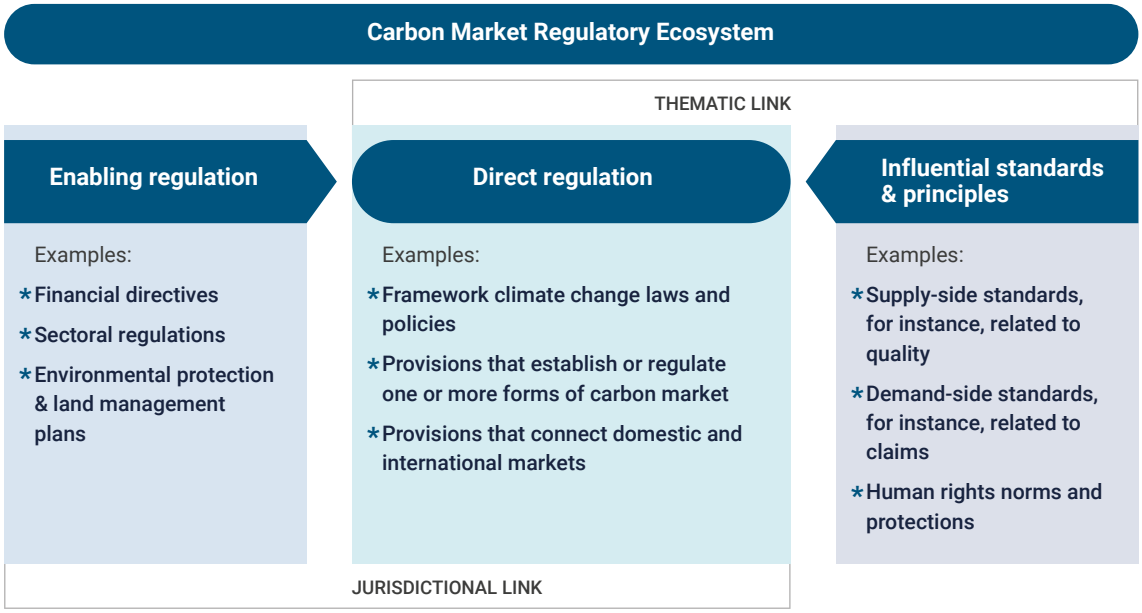
25 UK Government. **Environmental Protection Act 2021**.

26 This is particularly true of land right or human rights laws, which are invoked in case the implementation of a carbon project is in breach of impacted local communities' and Indigenous Peoples' land, carbon or FPIC rights. See Setzer, J. & Higham, C. 2025. **Global Trends in Climate Change Litigation: 2025 Snapshot**. London School of Economics Grantham Research Institute.

27 See **ICVCM Core Carbon Principles**; **VCMI Claims Code of Practice**; **SBTi Corporate Net-zero Standard**; Axelsson, K., Wagner, A., Johnstone, I., Allen, M., Caldecott, B., Eyre, N., Fankhauser, S., Hale, T., Hepburn, C., Hickey, C., Khosla, R., Lezak, S., Mitchell-Larson, E., Malhi, Y., Seddon, N., Smith, A. and Smith, S.M. 2024. **Oxford Principles for Net-zero aligned Carbon Offsetting** (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford.

Carbon market regulations can refer to a specific set of standards and principles as best practice domestic actors can follow to ensure demand- and supply-side integrity in carbon trading.[28] Taken together, direct and enabling regulations as well as informing principles and standards make up the overall carbon market regulatory ecosystem (Figure Two).

Figure Two: Categories of Carbon Market Regulations. Author's own illustration.



Within a given jurisdiction, regulatory frameworks for carbon markets can be disconnected from enabling regulation or other relevant laws and policies, as they can be siloed within the remit of a distinct institutional body.[29] There is also a lack of harmony between direct regulations across countries. To address inter- and intra-jurisdictional fragmentation, this Roadmap offers criteria pertaining to the design of *direct* carbon market regulations, including their **substantive** and **procedural** elements, and their implementation and operationalisation within the wider regulatory ecosystem they are embedded in.

Substantive aspects of carbon market regulation can include prescriptions related to unit quality criteria, such as specific methodologies or reporting, verification and monitoring (MRV) protocols, safeguards related to the environment, as well as benefit-sharing arrangements and/or grievance redress mechanisms for impacted stakeholders, typically Indigenous Peoples and impacted local communities. **Procedural** dimensions can include the governance of carbon market mechanisms, such as the appointment of overseeing authorities, as well as transparency and disclosure requirements for carbon transactions.

28 Governments are increasingly creating their own public standards and principles to ensure the quality of carbon unit demand and supply. As they are typically created by national authorities, we categorise these types of principles and standards as direct regulation. See for example: UK Department of Energy Security and Net-zero. November 2024. Voluntary Carbon and Nature Market Integrity. Policy paper.

29 Most commonly within ministries of finance and/or the environment.

2.2 Carbon Market Regulation across Jurisdictions

Figure Three: Examples of carbon market regulatory ecosystems across jurisdictional contexts. Authors' own illustration.

Direct carbon market regulation can apply to different jurisdictions, including those at the sub-state, national and regional levels, as well as to different types of carbon markets, including voluntary, compliance and quasi-compliance. Such regulation can (i) create sub-state, domestic, or regional carbon markets – such as an ETS or voluntary carbon market – or (ii) inform approaches to international carbon market frameworks, such as the PACM. Countries can create singular pieces of legislation for both uses. For example, Brazilian Law 15.042 creates both an internal ETS and informs Brazil's approach to international voluntary carbon trading.[30] In other cases, rules guiding the intersection and encounters between domestic, regional and international carbon markets are addressed in separate pieces of regulation. For example, the EU established its ETS through the EU 2003/87/EC directive, part of the 'Fit for 55' package, and will address the use of international carbon units to meet its emission reduction targets in its Climate Law.[31] Countries' approaches to international carbon trading hinge significantly on their status as net carbon exporters or importers of carbon units as illustrated by the respective examples of Indonesia and the UK (Figure Three).

2.3 Notable Trends and Gaps in Carbon Market Regulation

Carbon market regulation is continuing to scale and evolve as more is understood about the risks and opportunities they pose. Such regulation has typically been concerned with ensuring integrity and enhancing transparency and is increasingly reflective of efforts to connect various forms of carbon markets.

Integrity-centred regulation has stemmed in large part from recognition of pervasive integrity issues with carbon units. The extent of such issues (both credit and allowance based units)' are well-documented,[32] with numerous examples of inadequate MRV standards leading to pervasive over-crediting, particularly for avoided deforestation and cookstove projects.[33] Indeed, the largest systematic review of these programmes found that less than 16% of them had a real atmospheric impact.[34] The use of carbon units with low integrity can also risk mitigation deterrence and associated claims of greenwashing.[35] Consequently, market participants producing, trading in and utilising low-quality carbon units have increasingly faced litigation risks.[36] Such issues illustrate the need for integrity controls on both the supply and demand side of the carbon market.

30 See Brazilian Government. 2024. **Law 15.042 establishing the Brazilian Greenhouse Gas Emissions Trading System**.

31 European Commission, July, 2025. **EU's Climate Law Presents a New Way to get to 2040**. Press Release.

32 Berkeley Carbon Trading Project, 2023. **Repository of Articles on Offset Quality**.

33 Gill-Wiehl,A. Kammen, D.M., & Haya, B. 2024. **Pervasive over-crediting from cookstove offset methodologies**. *Nature Sustainability*, 7 (2): 191–202; West, T.P., Börner. J, Sills, E.O. & Kontoleon, A. et al. 2020. **Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon**. *Proceedings of the National Academy of Sciences – PNAS*, 117 (39): 24188–24194.

34 Probst, B.S., Toetzke, M., Kontoleon, A. et al. 2024. **Systematic assessment of the achieved emission reductions of carbon crediting projects**. *Nature Communications*, 15 (9562).

35 Chan, T., Higham, C., Setzer, J. Ford., L., & Pouget, L. 2023. **Corruption and integrity risks in climate solutions: An emerging global challenge**. LSE Grantham Research Institute.

36 Greenfield, P. May 2023. **Delta Airline Faces Lawsuit Over $1bn Carbon Neutrality Claim**. The Guardian.

Supply-side regulatory approaches[37] include for example, the Government of Pakistan's 2024 Policy Guidelines for Trading in Carbon Markets, which illustrates hallmarks of social and environmental integrity in carbon trading.[38] Demand-side regulatory approaches by contrast seek to regulate the use of carbon units and focus on disclosure and transparency requirements. Guidance on claims is slowly incorporating best practice principles, which suggest a gradual but full transition towards carbon removal offsetting for residual emissions at the net-zero target date.[39] However, despite the progress made in addressing integrity issues through fast emerging regulations and guidance, there remain ongoing gaps in direct carbon market regulation:

Lack of net-zero alignment: Net-zero alignment requires the creation of pathways to ensure a balance between greenhouse gas sources and sinks to reach net-zero, based on deep emissions reductions and a significant scale up in removal capacity.[40] Existing carbon market regulation is often not net-zero aligned as it does not differentiate between reductions or removals, nor the required financing pathways for mitigation activities with different levels of durability, instead treating them as fungible. While removals are increasingly being incorporated in carbon markets, including Article 6,[41] the project composition of these markets is still heavily skewed towards emission reduction projects,[42] which have worryingly exhibited low environmental integrity in the past.[43] As such, domestic carbon market regulation across jurisdictions is not primed to collectively contribute to a universal state of global net-zero.

Lack of robust social and environmental safeguards: Ensuring social and environmental integrity should be part and parcel of any efforts to reach net-zero alignment. However, to date, carbon market regulations have typically endorsed methodologies that lack robust environmental and social safeguard provisions, including meaningful, culturally appropriate benefit-sharing and grievance redress mechanisms.[44]

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37 While here we differentiate between supply- and demand-side approaches, these components are typically part of the same regulations.

38 Ministry of Climate Change and Environmental Coordination Pakistan. 2024. **Pakistan Policy Guidelines for trading in Carbon Markets 2024**; See also **Transparency International Pakistan. 2024**.

39 Axelsson, K., Wagner, A., Johnstone, I., Allen, M., Caldecott, B., Eyre, N., Fankhauser, S., Hale, T., Hepburn, C., Hickey, C., Khosla, R., Lezak, S., Mitchell-Larson, E., Malhi, Y., Seddon, N., Smith, A. and Smith, S.M. 2024. **Oxford Principles for Net-zero aligned Carbon Offsetting** (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford.

40 IPCC. 2022. **Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change**. Cambridge University Press.

41 UK Government. 2025. **Integrating greenhouse gas removals in the UK emissions trading scheme: main responses**; European Commission. 2024. **Carbon removals and carbon farming (CRCF) regulation**. EU 2024/3012; UNFCCC. 2024. **Requirements for activities involving removals under the Article 6.4 mechanism. Standard**. Version 01.0.

42 UNEP-CCC. 2025. **Article 6 pipeline**. Website.

43 Probst, B.S., Toetzke, M., Kontoleon, A. et al. 2024. Systematic assessment of the achieved emission reductions of carbon crediting projects. *Nature Communications*, 15 (9562). doi: **10.1038/s41467-024-53645-z**.

44 Haya, B. K., Alford-Jones, K., Anderegg, W. R. L., Beymer-Farris, B., Blanchard, L., Bomfim, B., Chin, D., Evans, S., Hogan, M., Holm, J. A., McAfee, K., So, I. S., West, T. A. P., & Withey, L. 2023, September 15. **Quality assessment of REDD+ carbon credit projects**. Berkeley Carbon Trading Project.

Lack of clarity and flexibility in standards: Most regulations lack clarity on standards, including MRV protocols, used to ensure unit quality. This lack of clarity might be due to general lack of interoperability between standards themselves, which often leads to inconsistent MRV protocols for different types of carbon projects.[45] This interoperability results in data fragmentation, especially for verification and ownership of mitigation outcomes, rendering it difficult to track carbon credits and their uses across jurisdictions.[46,47] Moreover, existing carbon market regulation often endorse fixed standards and protocols, which do not reflexively respond to or align with existing science in carbon unit quality criteria, particularly regarding additionality and durability.[48]

Domestic misalignment: Within jurisdictions, there can be misalignment between different types of carbon markets or regulations governing them, or between direct carbon market regulations and the wider national regulatory ecosystem they are part of, including enabling regulations.[49] For example, if a cap-and-trade system already exists, generous feed-in tariffs or renewable energy obligations can undermine the carbon price and emission reduction efforts. These misaligned regulations are sometimes made without coordination between the often differing institutions drafting them, due to a lack of mandated co-ordinating structure or due to inter-ministerial hierarchies that lead to overlapping and contradictory policies.[50] The uncertainty and inefficiencies that result from the lack of coherence between domestic regulations can increase risks for investors and deter investment. As such, within a given jurisdiction, carbon market regulation can exist in a state of fragmentation rather than harmony.

45 Mercer, L. & Burke. J. 2023. **Strengthening MRV standards for greenhouse gas removals to improve climate change governance**. London School of Economics Grantham Research Institute.

46 World Bank Group. 2024. A roadmap for safe, efficient, and interoperable carbon markets infrastructure. **Open Knowledge Repository**. Carbon Markets Infrastructure Working Group.

47 Furthermore, the absence of uniform terminology in different regulations can cause ambiguity and misinterpretation of specific functions of a term, e.g. a carbon crediting registry may be called a different name in different jurisdictions such as “register”, “issuance registry”, or “transaction registry”.

48 Haya, B. K., Evans, S., Brown, L., Bukoski, J., Butsic, V., Cabiyo, B., Jacobson, R., Kerr, A., Potts, M., & Sanchez, D.L. 2023. Comprehensive review of carbon quantification by improved forest management protocols. *Frontiers*, 6. doi: **10.3389/ffgc.2023.958879**

49 Fankhauser, S., Hepburn, C., & Park, J. 2011. **Combining multiple climate policy instruments: How not to do it, centre for climate change economics and policy**. London School of Economics and Political Science Grantham Research Institute on Climate Change and the Environment.

50 Dubash, N.K. 2021. Varieties of climate governance: The emergence and functioning of climate institutions. *Environmental Politics*, 30 (1): 1–25. doi: **10.1080/09644016.2021.1979775**

Conflation of distinct financing pathways and obligations: Carbon market regulation does not often clearly indicate the financing ends toward which carbon markets are used. More specifically, they do not distinguish between the types of projects allocated to receive private finance by carbon market mechanisms. This can lead to misalignment of different climate financing streams, risking:

I. *Non-additionality of mitigation activities*, resulting in carbon finance being used for mitigation activities that were already financially viable, or indeed, had already been implemented;

II. *A lack of financing for ambitious projects*, by letting price rather than the mitigation quality of the project be the major determinant of market selection; and/or

III. *Misusing carbon markets to fulfil international climate finance obligations*, for example claiming engagement with Article 6 as a buyer country towards obligations under the New Collective Quantified Goal (NCQG) on Climate Finance under the UNFCCC, thus irresponsibly conflating climate and carbon finance.[51]

To address these gaps, this Roadmap seeks to guide policymakers and other relevant stakeholders in regulating sub-state, domestic or regional approaches to carbon markets, in a net-zero-aligned, financially efficient and effective, and high-integrity manner.

51 For example, such a conflation is evident by the Dutch Government. See Dutch Ministry of Foreign Affairs. 2024. **Estimating the GHG impacts of Dutch international climate finance efforts**. Trinomics.

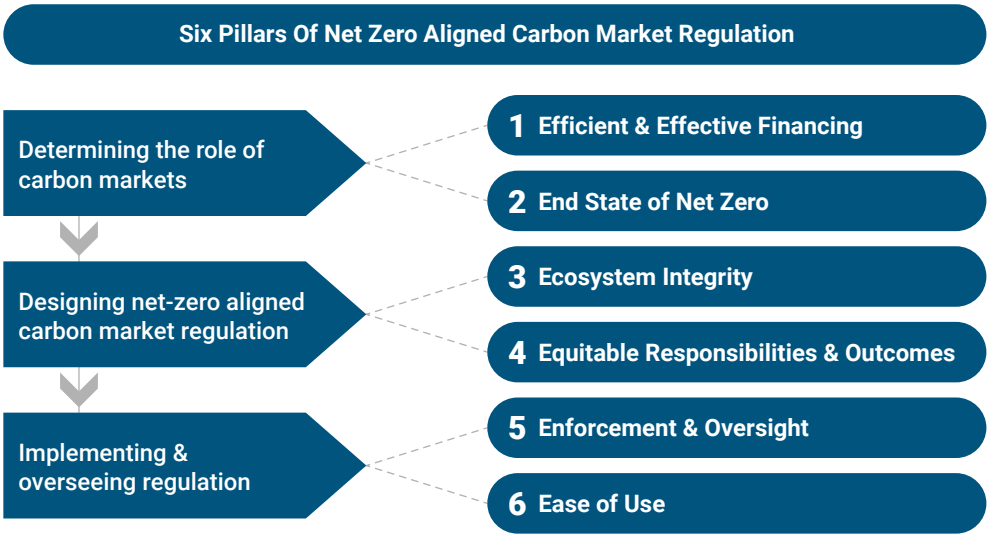
3. Roadmap to Net-Zero Aligned Carbon Market Regulation

The Roadmap to Net-Zero Aligned Carbon Market Regulation contains **six key pillars**: (i) efficient and effective financing, (ii) end state of net-zero, (iii) ecosystem integrity, (iv) equitable responsibilities and outcomes, (v) enforcement and oversight and (vi) ease of use (Figure Four). Each pillar informs criteria pertaining to the conceptualisation, design, implementation and oversight of direct carbon market regulation.

If governments seek to reform *existing* or design *new* regulatory approaches to carbon markets, they should first assess how these markets can be used as **efficient and effective financing** tools for additional mitigation activities, contributing towards an **end state of net-zero**, in line with national obligations, responsibilities and capacities. This initial assessment helps inform the role different types of carbon markets can play within national decarbonisation portfolios, how they interplay with other financing streams to fund mitigation activities, and which types of projects they can more efficiently and ambitiously finance. It can further determine what claims can be made by governments and non-state actors within specific jurisdictions when using carbon units, preventing low-integrity supply and potential use of such units. The remaining four pillars, namely **ecosystem integrity**, **equitable responsibilities and outcomes**, **enforcement and oversight** and **ease of use**, draw out the elements necessary to implement and oversee carbon market regulation. Crucially, these pillars determine the main substantive and procedural elements of direct carbon market regulations, and their implementation and operationalisation within wider domestic and international regulatory ecosystems.[52] The pillars do not exist independently but rather intersect with and reinforce one another, as Figure Four illustrates.

52 We recognise that whereas this Roadmap informs the design of direct carbon market regulation, its effective implementation hinges on specific domestic and international enabling regulations, such as robust environmental protection directives, anti-corruption measures or human rights provisions.

Figure Four: The Six Pillars underpinning the Roadmap to Net-Zero Aligned Carbon Market Regulation. Authors' own illustration.



3.1 Pillar One: Efficient and Effective Financing

Governments should situate carbon markets within an overarching efficient and effective investment framework for climate mitigation. To do so, they should outline domestic opportunities and capacities for the development of or engagement with carbon markets and articulate how carbon finance is additive for mitigation projects against other financing pathways or obligations. Based on the role they envision for carbon market mechanisms, governments can then create or engage with one or more forms of carbon pricing or carbon market design as appropriate. The establishment of allowance or tax based carbon pricing can help reduce domestic emissions and raise revenue to drive further decarbonisation efforts. On the other hand, carbon credit-based frameworks can unlock financing for project-based mitigation outcome opportunities.

The efficiency of carbon markets as a tool to deliver finance also needs to be considered, as they do not come free of transaction costs compared to more direct forms of climate financing. The use of third parties in carbon crediting projects, for instance, can be significant and has been estimated to make up at least 25% of a given project's revenue on average, which in some cases is the share going to the actual project implementation.[53] Such costs should be duly taken into account in any pre-planning for carbon market usage, particularly as these can vary significantly depending on the type of mitigation activity planned and the level of transparency through which the project's cost breakdown is communicated.

53 In this case which was forest carbon pricing. Hamrick, K. and Gallant, M. 2017a. **Fertile Ground – State of Forest Carbon Finance 2017**, Ecosystem Marketplace, Forest Trends.

Such financial considerations are particularly important when conceptualising the effective delivery of domestic climate mitigation strategies.[54] The use of carbon markets to finance mitigation activities should be integrated into, and informed by countries' carbon budgets, and more ambitiously, their carbon removal budgets.[55] Approaches to these markets should be duly integrated with wider national climate finance and action objectives, such as emerging climate framework laws.[56] Within the context of the Paris Agreement, climate financing frameworks should provide clarity as to how different types of carbon markets reinforce and support the Paris Agreement as a whole, including extending the ambition of NDCs and other climate commitments, such as LT-LEDS, and supporting broader development frameworks and objectives. To this end:

- All governments creating or engaging with carbon markets should consider creating robust domestic compliance carbon markets and/or pricing that accelerates progress towards reducing domestic emissions and scaling removals to ensure capital flows to effective and additional interventions.
- Governments that are net exporters of carbon units should clearly articulate the anticipated role of carbon markets, alongside other financing levers under the Paris Agreement[57] and development financing. Crucially, finance derived from carbon markets should not substitute international financial obligations, such as those under the NCQG. If engaging with carbon crediting-based schemes, governments should determine whether or not these mitigation projects would be most efficiently financed by carbon finance flows. These could include mitigation projects that due to their ambitious nature, can more readily demonstrate financial and material additionality and are thus very unlikely to be implemented without international support.

54 This recommendation was also highlighted in recommendations for Welsh policy design for voluntary carbon markets. See Mercer, L., Kuci, S., & Macquire, R. 2025. **Policy Options for Voluntary Carbon Markets in Wales**. Wales Centre for Public Policy.

55 Caldecott, B., & Johnstone, I. 2024. The carbon removal budget: Theory and practice. *Carbon Management*, 15 (1). doi: **10.1080/17583004.2024.2374515**.

56 Averchenkova, A., Higham, C., Chan, T., & Keuschnigg, T. 2024. **Impacts of climate framework laws: Lessons from Germany, Ireland and New Zealand**. London School of Economics and Political Science Grantham Research Institute on Climate Change and the Environment.

57 Such as Articles 5 and 9 of the Paris Agreement.

3.2 Pillar Two: End-state of Net-Zero

Carbon markets should be geared towards helping countries reach domestic net-zero targets and move closer towards a state of global net-zero. To this end, governments should design carbon market frameworks that are not unit-agnostic but instead draw appropriate distinctions between reduction and removal carbon units. This distinction is important as emission reduction opportunities will become increasingly less available whilst durable carbon removal must be urgently scaled up to reach a sustained state of net-zero by mid-century.[58]

To guide net-zero alignment, governments should use internationally recognised principles and standards, such as the Oxford Principles for Net-Zero Aligned Carbon Offsetting.[59] These Principles provide a framework to guide net-zero alignment of carbon market regulatory ecosystem,[60] by recommending the prioritisation of direct emission reductions and removals domestically, with carbon units used to counterbalance remaining and residual emissions for a meaningful timescale to limit warming.

To ensure that governments' use of carbon markets is net-zero aligned:

- Governments which are net importers of carbon units should align carbon unit purchases with their carbon budgets and aim to use only durable removal to address their residual emissions, otherwise prioritising investments in domestic emissions reduction and removals through other policy instruments.
- Governments that are net exporters of carbon units should chart the volumes of reductions and removal potential that exists on the path to global net-zero and carefully ensure the authorisation of corresponding adjustments[61] when trading carbon units internationally under Article 6.2 to ensure against default on their climate commitments from potentially over-selling mitigation outcomes that they cannot count towards their own domestic NDC.
- Governments worldwide should unlock the capacity of carbon markets to scale and fund mitigation activities by integrating their use with other existing or emerging regulatory efforts to promote net-zero alignment, including carbon takeback obligations.[62]

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58 For an understanding of the existing gap in removals see Smith, S. M., Geden, O., Gidden, M. J., Lamb, W. F., Nemet, G. F., Minx, J. C., Buck, H., Burke, J., Cox, E., Edwards, M. R., Fuss, S., Johnstone, I., Müller-Hansen, F., Pongratz, J., Probst, B. S., Roe, S., Schenuit, F., Schulte, I., Vaughan, N. E. (eds.) 2024. **The State of Carbon Dioxide Removal 2024 – 2nd Edition**.

59 Axelsson, K., Wagner, A., Johnstone, I., Allen, M., Caldecott, B., Eyre, N., Fankhauser, S., Hale, T., Hepburn, C., Hickey, C., Khosla, R., Lezak, S., Mitchell-Larson, E., Malhi, Y., Seddon, N., Smith, A. and Smith, S.M. 2024. **Oxford Principles for Net-zero aligned Carbon Offsetting** (revised 2024). Oxford: Smith School of Enterprise and the Environment, University of Oxford.

60 Johnstone, I & Kuci, S. Principles for Net-zero aligned Carbon Offsetting: Practitioners' Handbook. 2025. University of Oxford Smith School of Enterprise and the Environment Policy Briefing.

61 Such as those required for the trading of Internationally Transferred Mitigation Outcomes (ITMOs) under Article 6.2 of the Paris Agreement.

62 Boot. M., Sundvor., I., Jenkins., S., & Allen., M. 2025. **Markets and mandates: Policy scenarios for UK CCS deployment and exploring the role of a carbon takeback obligation**. Oxford Net-zero, Carbon Balance Initiative, and Carbon Capture and Storage Association.

3.3 Pillar Three: Ecosystem Integrity

Carbon market regulation should ensure ecosystem integrity. This encompasses integrity at the *unit level*, ensuring that all units represent real mitigation benefits, and at the *project level*, ensuring that carbon projects do not harm Indigenous Peoples and impacted local communities, or the environment.[63]

To guide developments on a carbon unit level, governments' direct carbon market regulations should require:[64]

- Strong MRV protocols with scientifically robust standards on durability, baselines, additionality, permanence and carbon leakage throughout the life cycle of carbon units.
- That the MRV protocols included in or created by specific carbon market regulation (i) undergo public consultation to the extent local capacity allows, (ii) actively incorporate local/Indigenous wisdom, particularly when accounting for the preservation of natural ecosystems and (iii) are harmonised throughout carbon pricing mechanisms within a jurisdiction.[65]

To ensure integrity at a project level, environmental and social safeguards must be robustly upheld. To date, these safeguards are lacking or not adequately implemented across carbon projects, particularly within the forestry sector.[66] However, best practice international frameworks are emerging, including the Article 6.4 Sustainable Development Tool.[67] Criteria for such safeguards should be part and parcel of regulatory frameworks governing carbon markets.

63 Ecosystem integrity includes taking into consideration propagation of error between the unit level, project level, and investable product to ensure environmental integrity in its delivery of a carbon unit. TÜV SÜD, 2025. Bilolo, C., Roy, B., Oswal, K., **White Paper: Unpacking uncertainty in carbon removal assets**, TÜV SÜD AG.

64 For a list of robust criteria to ensure quality of carbon units and accounting, see Johnstone, I., Schneider, L., Michaelowa, A., Grandpré, J., Kuci, S., Ahonen, H., Probst, B.S., Lezak, S., Hale,T., La Hoz Theuer, S., Omukuti, J., Reséndiz, J.L., Fankhauser, S., Abebe, S., and Hepburn, C. **Oxford Principles for Responsible Engagement with Article 6**. 2025. Oxford: Smith School of Enterprise and the Environment, University of Oxford.

65 For example, that the same MRV protocol is applied to projects with the same level of durability even if they fall under different domestic or international carbon schemes.

66 Haya, B. K., Alford-Jones, K., Anderegg, W. R. L., Beymer-Farris, B., Blanchard, L., Bomfim, B., Chin, D., Evans, S., Hogan, M., Holm, J. A., McAfee, K., So, I. S., West, T. A. P., & Withey, L. 2023. **Quality assessment of REDD+ carbon credit projects. Berkeley Carbon Trading Project**. University of Berkeley.

67 UNFCCC. **Article 6.4 Sustainable Development Tool V1.0**. Similarly to recommendations on best practice MRV criteria above, see the Oxford Principles for Responsible Engagement with Article 6 (footnote 60) which build on the above A6.4 SD Tool.

At a minimum, these criteria should ensure:

- The protection of Indigenous Peoples' right to Free, Prior and Informed Consent (FPIC), as well as their right to determine their own development needs;[68]
- Guardrails against environmental and social harm, such as prohibitions against violation of human, constitutional, statutory and customary rights, including against displacement, dispossession and coercion, under both relevant national and international laws; and
- That, wherever possible, mitigation activities support biodiversity, climate adaptation, and pollution reduction, in line with sustainable development goals and just transition principles.[69]

To ensure effective compliance with these provisions at a project level, governments should also seek to supplement direct regulation related to MRV protocols and environmental and social safeguards with relevant enabling regulations, including domestic or regional environmental protection acts, human rights provisions, and land and tenure rights. These enabling laws and policies should be clearly highlighted within national roadmaps to carbon market regulation to make clear the cohesive approach to ecosystem integrity.

3.4 Pillar Four: Equitable Responsibilities and Outcomes

To meaningfully and justly contribute to net-zero, any regulation on carbon markets should ensure that the responsibilities *for* and outcomes *from* the implementation of carbon markets should be fairly and equitably distributed between relevant actors.[70] In addition to ensuring sufficient guardrails from harm, any carbon market regulation should meaningfully treat impacted Indigenous Peoples and local communities as active agents in the design *of* and recipients of substantial benefits *from* carbon projects implemented in their territories.

To ensure this, any carbon market regulation should, at a minimum, prescribe:

- Meaningful and culturally appropriate consultations and public participation throughout the entire lifecycle of mitigation activities, from approval of methodologies to revenue-sharing;
- Recognition for and protection of labour rights of local community members who work directly in climate mitigation activities;
- Provision of safe, accessible, and culturally appropriate grievance mechanisms for all affected community members – regardless of sex, age, ethnicity, religion, ability, or other demographic markers – and ensure advance awareness of these mechanisms; and
- Clear rights to benefits from mitigation activities[71] including revenue-sharing provisions for different types of projects, and more ambitiously, to community co-ownership of projects where feasible.

At a global level, equity and justice should be the cornerstones of any engagement with

68 As stipulated under the 1989 **Indigenous and Tribal Peoples' Convention No.169 of the International Labour Organisation**.

69 International Labour Organization. 2024. **Carbon Markets and Their Implications for a Just Transition for All**.

70 This is particularly important for credit-based carbon markets.

71 These rights to benefits should not be limited to impacted communities and Indigenous Peoples but apply more broadly to all relevant stakeholders.

international carbon market frameworks. Benefit-sharing provisions should be considered and incorporated in cross-border carbon trading, particularly between Global North and Global South actors.[72] Benefit-sharing in international carbon trading can help ensure that Global South actors – typically exporters of carbon units – can also utilise a portion of the mitigation outcomes generated by carbon units they eventually sell, to meet their own climate commitments. This type of benefit-sharing can be implemented by using ambitious baselines set well below business-as-usual emissions, cancelling of a fraction of issued carbon credits, and/or choosing a crediting period that is shorter than the mitigation activity's lifetime.[73]

3.5 Pillar Five: Enforcement and Oversight

Strong enforcement and oversight are crucial to implementing and sustaining a high-integrity approach to carbon markets. To date, all types of carbon markets – from compliance to voluntary, from regional to international – have been subject to corruption and integrity risks.[74] There have been systemic conflicts of interests between actors operating in carbon markets, and an endemic lack of transparency at all junctures of the carbon unit supply chain including carbon pricing, transactions and revenue-sharing.[75] However, governments are increasingly strengthening their oversight of carbon markets through both direct and enabling regulation.[76] For example, following the EU ETS VAT fraud scheme[77] Germany has incorporated climate-related VAT fraud under the German fiscal code treating it as tax evasion.[78] To ensure robust enforcement and oversight in their engagement with carbon markets, governments can include such criteria in direct regulations and bolster them in enabling regulations.

72 Benefit sharing is a way to bridge the gap between OECD & EMDE actors. See: AFID, 2025. Green Finance Going Global. Bridging the Trust Gap for Financing Industrial Decarbonization Across Global Supply Chains, Alliance for Industry Decarbonization, Abu Dhabi.

73 Guidance on this can also be found in the Article 6.4 Methodologies Standard. See UNFCCC. 2024. **Standard: application of the requirements of chapter V.B (methodologies) for the development and assessment of Article 6.4 mechanism methodologies**.

74 Chan, T., Higham, C. Setzer, J. Ford, L. & Pouget, Sh. 2023. **Corruption and integrity risks in climate solutions: a global challenge**. London School of Economics and Political Science Grantham Research Institute on Climate Change and the Environment.

75 See for example, Coglianese, C., & Giles, C. 2025. **Third-party auditing cannot guarantee carbon offset quality**. University of Pennsylvania Law School.

76 For example, Pakistan's Carbon Credit Policy has substantially incorporated recommendations from Transparency International on transparency, accountability and environmental integrity. See **Transparency International**. Climate Governance Integrity Programme.

77 See footnote 8.

78 Chan et al. 2023. **Corruption and integrity risks in climate solutions: an emerging global challenge**. LSE Grantham Research Institute.

At a minimum, these criteria should:

- Develop the necessary infrastructure to ensure transparency and accountability in carbon unit transactions, including high-integrity governance structures for different types of carbon markets, nationally designated authorities (NDAs) and third-party auditors where applicable;
- Apply high-integrity enforcement mechanisms across the carbon unit supply chain, including the establishment of independent oversight and public disclosure mechanisms.

On the supply side, such mechanisms could ensure compliance with carbon unit quality standards and on the demand side, they could help prevent false claims and misrepresentation of the environmental impacts of carbon unit purchases. Such mechanisms can include Know Your Customer (KYC), Anti-Bribery and Corruption (ABC) and Anti-Money Laundering (AML) due diligence measures. Intermediaries must also be subject to disclosure obligations regarding profit margins in their transactions. Additionally, there should be an Investor-State Dispute Settlement (ISDS) mechanism that can be enforced in domestic legal systems, which can further enhance investor confidence by providing recourse in case of non-compliance or regulatory uncertainty. These safeguards can help prevent fraud, and other forms of misuse of carbon markets.

Lastly, to ensure transparency, all governments engaging with carbon markets should provide clarity on the legal nature, use case, financial mechanisms and security aspects of carbon units, creating an institutionalised asset class. This includes the careful regulation of the use cases of certain types of carbon units, promoting legal certainty as to their legal nature and creating the ability to take security thereon. Providing such clarity would help governments identify new mechanisms needed and other already existing regulatory frameworks that can be used for the enforcement and oversight of carbon markets.

3.6 Pillar Six: Ease of Use

Ease of use is essential to making carbon markets accessible to all potential participating stakeholders, both state and non-state actors.[79] Typically, vulnerable actors, from smallholders to less developed countries, see an increasing opportunity in carbon markets to unlock finance for necessary mitigation projects with significant adaptation and biodiversity benefits. However, these actors face the highest barriers to accessing carbon markets, due to a lack of technical knowledge on their operation as well as high initial and ongoing transaction costs.

79 The usability of a framework can substantially aid in its adoption. See: West, D., & Euler, D. 2023. **Agile sustainable development: A primer on corporate impact indicators and valuation factors via agile models**, SSRN, and Alliance for Industry Decarbonisation (AFID). 2025.Green finance going global. Bridging the trust gap for financing industrial decarbonization across global supply chains. Abu Dhabi, p.28.

To ensure ease of use, carbon market regulation should, at a minimum:

- Design approaches to carbon markets with low transaction costs and ensure visibility of costs and benefits across the supply chain;
- Ensure interoperability across registries, methodologies, standards, and platforms;
- Design carbon market systems that are user-friendly, easily accessible, and understandable for credit suppliers, buyers, and other actors across the carbon unit supply chain;
- Provide clarity on project development requirements and on the types of claims that can be made across different types of markets;
- Ensure continuous capacity-building efforts to assist domestic actors in effectively participating in carbon markets, from project design, monitoring, reporting, and verification, to registering credits in an emissions trading system.

Alignment with best international standards and practices to ensure carbon unit quality is key to render carbon units fungible across different types of carbon markets, which can provide liquidity, ensure scalability, and increase investor confidence across changing political priorities.[80]

80 A prime example of such an alignment is between the UK and the EU ETS schemes, both of which are respectively also exploring integrating durable removals into them while concurrently seeking to link such schemes. See European Parliament. July 2025. **Linking the EU and UK emissions trading systems**. Briefing.

4 Operationalising the Roadmap to Net-Zero Aligned Carbon Market Regulation

The way in which governments develop a cohesive approach to net-zero aligned carbon market regulation can vary across different types of jurisdictions. This section examines the Roadmap's applicability to a range of local contexts on the path to and beyond net-zero. For the purposes of this paper, we recognise three types of jurisdictions, namely advanced, emerging and developing economies, which both differ and converge on their approaches to carbon markets. To determine country groupings, we use relevant market classification metrics such as those developed by S&P Global[81] and MSCI,[82] which include economic development, size and liquidity, and market accessibility. To demonstrate how the Roadmap could be operationalised across these three jurisdictional contexts, we provide high-level indicators for the implementation of each of the six pillars above. We also highlight existing best practices, illustrating how this varies across national realities.

Typically, advanced economies have fallen on the demand side of the transnational carbon unit supply chain and developing economies on the supply side. The former have more actively created compliance carbon markets constrained within specific jurisdictional boundaries, whether national or regional, whereas latter have predominantly instituted regulatory frameworks for the utilisation of international carbon market frameworks, such as voluntary carbon markets or Article 6. Emerging economies have been both buyers and suppliers of international carbon units, demonstrating a range of engagement levels with carbon markets. Although these categorisations are not fixed, they represent historical and ongoing trends. We further recognise that, under a fair share approach, advanced economies have more capacity and liability to ramp up investments in costly but unavoidable mitigation activities, such as durable removals, than emerging and developing economies.[83] These differentiated liabilities should be reflected in any fair assessment of regulatory approaches to carbon markets as tools of finance for global mitigation efforts and efforts to ensure that the principle of common but differentiated responsibilities and respective capabilities is upheld.

81 S&P Global, 2025. **Market Classification**. www.spglobal.com.

82 MSCI, 2025. **Market Classification**. Msci.com.

83 Fyson, C. et al. 2020. **Fair share carbon dioxide removal increases major emitter responsibility**. *Nature*.

4.1 Advanced Economies

Advanced economies have been early adopters of carbon pricing and market mechanisms. They are often also the source of significant public and private demand for project-based carbon units traded through international carbon markets, including Article 6.2, PACM,[84] or voluntary carbon markets. Advanced economies are increasingly regulating their approaches to international carbon markets, but in doing so should have due regard for project realities globally. While we are witnessing developments in ecosystem integrity, enforcement and oversight and ease of use in the way developed economies are regulating their engagement with carbon markets, these efforts largely fall short of integrating considerations of **efficient and effective financing (P1)**, **end state of net-zero (P2)** and **equitable sharing of outcomes and responsibilities (P4)** (Table 1).

These latter three pillars are critical to informing the robust use of carbon markets by advanced economies, based on their respective capabilities, long-term temperature goals and equity considerations. Truly ambitious use of carbon markets rests upon equally ambitious climate commitments, such as NDCs and LT-LEDS.[85] Advanced economies should create regulatory frameworks that embed equity and benefit-sharing considerations in their use of flexible international frameworks to meet climate commitments, such as cooperative approaches under Article 6.[86] During this time, such economies should continue to support the global net-zero transition through innovative financing mechanisms that support investments in nature-based solutions, adaptation, and the energy transition, without compromising environmental integrity.[87] Furthermore, in designing or reforming carbon market regulations, there is a need for governments representing large sources of demand for carbon units to more cohesively align regulatory developments across the globe. Such alignment can be reached by promoting a higher standard of MRV and/or unit classification to enable robust interoperability that can be relied upon by market actors or demonstrating responsible use of trading mechanisms including under Article 6.

84 See AFID (2025), Green Finance Going Global. Bridging the Trust Gap for Financing Industrial Decarbonization Across Global Supply Chains, Alliance for Industry Decarbonization, Abu Dhabi.

85 For indicators to assess the highest possible ambition in NDC, see Rogelj, J. & Schönfeld, J.K (2025) **Operationalising Highest Possible Ambition in Nationally Determined Contributions under Article 4 of the Paris Agreement**.

86 Such a framework should inform Bilateral Agreements and Memorandums of Understanding, instead of these being developed in an *ad hoc* manner, which has been common practice to date

87 Van Raalte, D. and Ranger, N. (2023). Financing Nature-Based Solutions for Adaptation at Scale: Learning from Specialised Investment Managers and Nature Funds. Global Center on Adaptation and Environmental Change Institute, University of Oxford.

Table 1: Assessing the applicability of the six pillars undergirding a Roadmap to Net-Zero Aligned Carbon Market Regulation in advanced economies.

Pillar	Implementation	Specific Indicators	Existing Practices
1. Efficient and Effective Financing	• Efficient and effective financing should focus on implementing existing international climate obligations under all levers of the Paris Agreement and designing domestic project-based carbon mechanisms only in case of evident need and scope for financial additionality. This means that advanced economies should limit reliance on purchased international carbon units to meet their climate commitments and prioritise domestic emission reductions.	• Clearly separating use of carbon markets from climate financing obligations, including those toward the Newly Quantified Goal on Climate Finance. • Designing targeted voluntary carbon market schemes for specific uses.[88]	**The United Kingdom** Government provides project climate finance to REDD+ projects in its efforts to implement the Global Stocktake.[89] **Portugal** has created a domestic voluntary carbon market, which restricts the sale and use of units produced under it for voluntary domestic purposes only. These units are not allowed to be exported internationally or used for compliance with regional or domestic schemes.[90]
2. End Goal of Net-zero	• To shift towards global net-zero, advanced economies should maintain effective carbon pricing regimes that support the counterbalancing of all remaining sources of domestic greenhouses gases with durable carbon removal developed domestically or internationally. Advanced economies purchasing international carbon units should also ensure that these purchases can support rather than hinder supplier countries in reaching their own NDC goals.	• Distinguishing between reductions and removals in NDCs and LT-LEDS and identifying the level of removal needed to reach domestic net-zero targets and contribute to global net-zero according to country-specific capacities and responsibilities to guard against mitigation deterrence.[91] • Exploring mandating durable carbon removal purchases, including via ETS and/or the Voluntary carbon market. • Exploring complementary policy tools to scale carbon storage capacities.[92]	**Denmark** has quantified its reliance on carbon removal to meet its 2045 Climate Target. Both the **European Union** and **United Kingdom** are seeking to integrate durable removals into its ETS mechanism.[93]

88 EU 2017 Accreditation and verification processes under the EU ETS.

89 UNFCCC. 2024. COP29 UN Climate Conference Agrees to Triple Finance to Developing Countries, Protecting Lives and Livelihoods.

90 See Decree No.04/2024.

91 Lamb, W.F et al., 2024. Countries need to provide clarity on the role of carbon dioxide removal in their climate pledges. *Environmental Research Letters*, 19(12): 121001.

92 For instance, a carbon takeback obligation, which seeks to scale carbon storage through mandating "entities such as fossil fuel producers and importers to permanently store the CO2 emissions associated with their operations and products". Boot, M., Sundvor., I., Jenkins. S., & Allens, M , S., Allens, M. 2025. Markets and mandates: Policy scenarios for UK CCS deployment and exploring the role of a carbon takeback Obligation. Oxford Net-zero. Carbon Balance Initiative, Oxford Net-zero and Carbon Capture and Storage Association.

93 European Commission, 2025. 2040 Climate Target.

Pillar	Implementation	Specific Indicators	Existing Practices
3. Ecosystem Integrity	• Advanced economies should introduce unit quality and claims criteria related to carbon units they purchase internationally. Advanced economies should also incorporate adequate environmental and social safeguards for domestic carbon projects.	• Instituting robust accreditation and MRV cycles for ETS[94] as well as for their interconnection between jurisdictions and the advent of enhanced fungibility of different forms of carbon units. • Consulting on best practices for supply and demand related market practices[95] • Issuing, and keeping up to date eligibility lists of carbon credit project types for transactions.[96]	The **European Union** developed the Carbon Removal Certification Framework to ensure the supply of removal-based mitigation outcomes with integrity.[97]
4. Equitable Responsibilities and Outcomes	• Advanced economies should ensure equitable benefit-sharing arrangements with stakeholders for both domestic projects and international cooperative projects. Advanced economies should ensure robust due diligence of carbon projects from which they purchase carbon units.	• Instituting benefit-sharing arrangements across stakeholders. • Clear regulation of cooperative approaches under international carbon trading frameworks, to ensure benefit sharing with supplier countries. • Incorporating principles related to a just transition in the implementation of domestic carbon projects. • Creating robust due diligence requirements for domestic buyers of international carbon units.	**Japan's** Joint Crediting Mechanism establishes cooperative approaches with developing countries and aims to transfer decarbonisation technologies and infrastructure that might not be readily available in these countries.

94 See European Commission. Monitoring, Reporting and Verification Regulation.

95 UK Department for Energy Security and Net-zero. 2024. Raising integrity in the voluntary nature and carbon markets.

96 Such as those eligible for surrender against a carbon tax or ETS obligation. See Singapore Ministry of Sustainability and the Environment & Singapore National Environment Agency. 2024. International carbon credits guidance document: Surrendering international carbon credits (ICC) for the payment of carbon tax under the carbon pricing act. pp. 7-10.

97 European Commission, 2024. Carbon Removal and Carbon Farming (CRCF) Regulation. EU/2024/3012.

Pillar	Implementation	Specific Indicators	Existing Practices
5. Enforcement and Oversight	• Advanced economies should ensure that adequate enforcement and oversight systems are duly integrated in the design and operations of (or approaches to) carbon markets to prohibit abuse of such systems.	• Introducing penalties in case of a lack of integrity of units. • Introducing anti-corruption and good governance measures in the design of carbon markets. • Introducing independent review mechanisms on the effectiveness and integrity of carbon markets. • Implementing transparency requirements across the carbon unit supply chain.	**California** also imposes fine-based penalties for entities participating in the voluntary carbon offset market (whether as a seller/buyer/user) failing to disclose requisite information pertaining to the integrity of the transacted credits.[98] **Australia** has developed oversight of the Australian Carbon Credit Units scheme (ACCU) through independent expert review and by the Climate Change Authority, focusing on improving governance and effectiveness of the scheme.[99] Not only does the review emphasise integrity, but it also considers impacts on agriculture, biodiversity, and participation of First Nations, rural, regional, and remote communities.
6. Ease of Use	• Advanced economies should facilitate use of carbon markets by market participants through encouraging user-friendly approaches that reflect opportunities for fungibility.	• Introducing user manuals to aid in user implementation.[100] • Promoting robust interoperability between different types of markets.[101]	The European Union has established a practical, free-to-use resource, the ETS Reporting Tool to assist operators, competent authorities, and verifiers to comply with their obligations.[102]

98 State Legislature of the State of California, 2023. **Voluntary carbon market disclosures**. AB 1305.

99 Department of Climate Change, Energy, the Environment and Water of Australia, 2023. **Implementing reforms to the ACCU Scheme**.

100 As an example, see European Commission. **EU ETS handbook for non-experts**.

101 Such as through introducing cross-market credit fungibility. On interoperability, see also OECD, The Interplay between Voluntary and Compliance Carbon Markets: Implications for Environmental Integrity, OECD Environment Working Papers, July 16, 2024. doi: **10.1787/500198e1-en**, p.34.

102 European Commission, 2025. **ETS Reporting Tool**.

4.2 Developing Economies

Developing economies predominantly participate as carbon unit suppliers in international carbon market schemes. While most developing economies have substantially engaged with international markets in this capacity, including the voluntary carbon market and Clean Development Mechanism, the emergence of carbon trading under Article 6 has prompted new regulation to emerge. Developing economies are increasingly creating direct carbon market regulations, as evidenced by emerging regulations in Kenya[103] and Zambia[104] among others. Across these regulations, good practices can be found in ensuring ecosystem integrity, equitable outcomes and benefit sharing among domestic stakeholders, enforcement and oversight, and efficient finance. However, our research so far finds little evidence of inclusion of **end state of net-zero (P2)** considerations and **ease of use (P6)** provisions across these types of regulations (Figure Two).

A first step towards achieving domestic and then global net-zero is for developing economies to grapple with the nature and extent of carbon mitigation projects already present domestically or those that can be developed without international support, assessing alignment with NDC targets and associated NDC Implementation Plans. This initial assessment should be the basis for informing the role of carbon markets as an efficient and effective financing mechanism towards an end state of net-zero. Developing economies should develop NDCs that differentiate between conditional and unconditional projects, compartmentalising the use of international carbon markets increasingly towards conditional high ambition projects high ambition projects. Given the resource constraints such economies typically face it is important that a Roadmap to Net-Zero Aligned Carbon Market Regulation is primed to tap into and access all forms of climate finance in tandem with carbon markets, with the latter able to contribute increasingly high-value projects that create sustainable local industries.

103 Parliament of Kenya, 2023. The Climate Change Act 2016 as amended by the Climate Change (Amendment) Act of 2023.

104 Parliament of Zambia, 2024. The green economy and climate change act 2024.

Table 2: Assessing applicability of the six pillars undergirding a Roadmap to Net-Zero Aligned Carbon Market Regulation in developing economies.

Pillar	Implementation	Specific Indicators	Existing Practices
1. Efficient and Effective Financing	• Developing economies should design frameworks that maximise efficient and effective capital allocation across all climate financing streams, reflective of national capabilities and international obligations.	• Clearly specifying NDC implementation needs, including conditional and unconditional components. • Developing general purpose funds for results-based financing projects. • Ensuring that climate mitigation financing obligations are upheld by donor countries and the separation of climate finance from that of carbon finance.	**Ghana** stipulates in its direct carbon market regulation that it seeks to use Article 6 frameworks primarily to finance conditional mitigation activities.[105] **Rwanda** has a dedicated fund for leveraging investments for climate mitigation and adaptation projects through Rwanda Green Fund (FONERWA).[106] The fund is mandated to oversee resource mobilization and capacity development to fulfil the nation's conditional and unconditional NDC targets,[107] including by facilitating Article 6 compliant international carbon credit projects.[108]
2. End Goal of Net-zero	• Developing economies should design up-to-date and science-aligned approaches to carbon markets that enable them to meet their own climate commitments, with the goal of aiding the transition to global net-zero in the future.	• Ensuring new and additional projects are being developed that deliver mitigation outcomes, including those that unlock more high-value carbon projects.[109] • Issuing, and keeping up to date eligibility lists of carbon credit project types for such transactions. • Utilising safeguarding measures, such as conservative baselines or buffer pools to ensure that emission reduction and removal targets within an NDC are not missed as a result of Article 6 trading.	**Uganda** has a grandfathering provision in its 2025 law which phases out old projects to ensure new project development.[110] **Ghana** requires the creation of buffer pools for each transaction under Article 6 mechanisms to ensure that it does not default on its NDC targets.[111]

105 Government of Ghana, 2024. Ghana's framework on international carbon markets and non-market approaches Volume 1.

106 The Ministry of Finance and Economic Planning of Rwanda, 2024. National climate and nature finance strategy of Rwanda 2024-2030.

107 Ministry of Environment of the Republic of Rwanda, 2020. Updated Nationally Determined Contribution of the Republic of Rwanda (Minister of Environment of the Republic of Rwanda).

108 Rwanda Green Fund. Rwanda, Gold Standard, GenZero to Collaborate on Article 6 Carbon Credit Projects.

109 For instance, durable carbon removal which attracts a considerably higher price per ton than more conventional forms of climate mitigation.

110 Government of Uganda, 2025. The national climate change (climate change mechanisms) regulations. Crucially, these regulations are also known as carbon markets regulations. See UNDP. 2025. Uganda launches carbon market regulations to accelerate climate action and sustainable development.

111 Government of Ghana, 2024. Ghana's framework on international carbon markets and non-market approaches Volume 1.

Pillar	Implementation	Specific Indicators	Existing Practices
3. Ecosystem Integrity	• Developing economies should introduce unit quality measures related to carbon units, as well as adequate social and environmental safeguards at the site of project implementation.	• Ensuring adherence to global benchmarks of additionality, measurability, and permanence. • Ensuring that robust safeguards are in place against social and environmental violations at project sites. • Ensuring full adherence to the Enhanced Transparency Framework reporting procedures under the Paris Agreement, including in relation to the application of corresponding adjustments.	**Rwanda** adopts the World Bank's Standardised Crediting Framework (SCF) to support fulfilment of its NDCs by incorporating several components to their national crediting framework such as (i) streamlined MRV approaches and project cycle; (ii) transparent institutional governance arrangements to reduce transaction costs.[112] **Uganda** has endorsed the carbon crediting standards established under the United Nations Framework Convention on Climate Change (UNFCCC) as resulting in certified emission reduction units.[113]
4. Equitable Responsibilities and Outcomes	• Developing economies should ensure equitable benefit-sharing and meaningful consultation with Indigenous Peoples and impacted communities occurs throughout the lifecycle of a carbon mitigation activity.	• Ensuring FPIC is upheld at all project stages. • Creating robust benefit sharing regimes for all local relevant stakeholders, especially Indigenous Peoples and affected local communities.	**The Philippines** recognises FPIC in carbon projects located in ancestral domains as a constitutional right.[114] **Kenya**[115] and **Zambia**[116] have created specific benefit sharing provisions for carbon projects, for instance, including the distribution of a predetermined share of revenue to impacted communities through a community development agreement framework.

112 Republic of Rwanda, 2023. National Carbon Market Framework.

113 Government of Uganda, 2025. The national climate change (climate change mechanisms) regulations.

114 Republic of the Philippines, 1997. Act to recognize, protect and promote the rights of indigenous cultural communities/Indigenous Peoples, creating a national commission on Indigenous Peoples, establishing implementing mechanisms, appropriating funds therefore, and for other purposes. Pub. L. No. 8371.

115 Parliament of Kenya, 2023. The Climate Change Act 2016 as amended by the Climate Change (Amendment) Act of 2023. Section 23E.

116 Government of Zambia, 2021. The Forest (Carbon Stock Management) Regulations. Sec. 23.

Pillar	Implementation	Specific Indicators	Existing Practices
5. Enforcement and Oversight	• Developing economies should create comprehensive frameworks for monitoring and overseeing the development of carbon projects and the international trade of carbon units.	• Enforcing sanctions for project developers that fail to comply with project transparency requirements. • Implementing accessible dispute resolution mechanisms.	**Zambia** and **Kenya** have created specific dispute resolution mechanisms for carbon crediting projects.[117] **Viet Nam** has established a National MRV Body with responsibility for developing and enforcing MRV protocols.[118] **Uganda** has instituted criminal liability for project developers that do not meet transparency requirements from fines to imprisonment.[119]
6. Ease of Use	• Developing economies should ensure that carbon market frameworks reduce barriers of entry for suppliers and other market participants.	• Adopting a whole-of-economy approach to carbon regulation. • Leveraging the use of technology to improve transparency, traceability, and ease of access of national carbon registry.	**Viet Nam** has established regulation to encourage government departments to foster awareness of their carbon market framework in the communities.[120] **Zimbabwe** introduced the world's first blockchain-based national carbon registry to improve transparency and security of carbon credit transactions,[121] where market participants will be able to track and verify carbon projects through a national website.[122]

117 Parliament of Zambia. 2024. **The green economy and climate change act 2024**. Part IV, Art. 28.

118 Government of Viet Nam, **Decree No. 06/2022/ND-CP on Mitigation of Green House Gas (GHG) Emissions and Protection of Ozone Layer**.

119 Government of Uganda. 2025. **The national climate change (climate change mechanisms) regulations**.

120 Government of Viet Nam, **Decree No. 06/2022/ND-CP on Mitigation of Green House Gas (GHG) Emissions and Protection of Ozone Layer**.

121 The Ministry of Environment, Climate and Wildlife of Zimbabwe, 2025. **Statutory Instrument 48 of 2025 on Carbon Trading (General) Regulations. Sec.12 (15)**.

122 Zimbabwe Carbon Markets Authority, **Zimbabwe Carbon Registry** ZiCMA Portal.

4.3 Emerging Economies

Many emerging economies have historically been large suppliers in international carbon market schemes but are increasingly developing their own carbon pricing regimes to align industrial sectors with the goals of the Paris Agreement. Carbon market regulation in emerging economies typically encompasses the implementation of domestic compliance carbon markets and stipulates recommended or regulated approaches to international carbon market schemes by domestic actors. Existing regulation in these types of jurisdictions demonstrates good practices in ecosystem integrity, equitable responsibilities and outcomes, enforcement and oversight and ease of use (Figure Four). Though strides have been made in some emerging economies towards envisioning the role of carbon markets as a tool for **efficient and effective financing (P1)** primed to contribute towards an **end state of net-zero (P2)**, these pillars should be more strongly emphasised.

Similarly to developing economies, efforts by emerging economies to create their own domestic carbon market regimes should be developed in line with their current NDCs and NDC Implementation Plans. Emerging economies should likewise develop NDCs which differentiate between conditional and unconditional projects, prioritising the use of international carbon markets towards more ambitious projects, which can be domestically challenging to implement. While many emerging economies have robust domestic financial resources, an effective carbon market regulatory framework should be designed to tap into and access appropriate forms of catalytic climate finance in tandem with carbon markets. Whereas efforts are made to harmonise existing compliance schemes and voluntary carbon markets, more work should be placed in ensuring that the environmental integrity of carbon unit transactions across these schemes is ensured.

Table 3: Assessing applicability of the six pillars undergirding a Roadmap to Net-Zero Aligned Carbon Market Regulation in emerging economies.

Pillar	Implementation	Specific Indicators	Existing Practices
1. Efficient and Effective Financing	• Emerging economies should clearly delineate financing streams for mitigation and adaptation projects, assigning a specific role to carbon market as financing tools. They should clearly separate requirements when engaging as buyers or as suppliers of international carbon units.	• Exploring innovative financing models to efficiently deliver nature and carbon co-benefits across a range of financing levers within and beyond the Paris Agreement.	**Costa Rica** has developed climate finance bundles for nature-based solutions which do not directly incorporate finance from carbon markets.[123] **Brazil** is currently developing a Tropical Forests Forever Facility to help efficiently finance forest conservation in a more direct way than carbon markets currently offer. **Egypt** has recognised carbon credits (certificate of carbon emissions reduction or CERCs) as a tradable financial instrument[124] within its voluntary carbon trading platform, Egyptian Climate Exchange to encourage investment in green projects.[125]
2. End Goal of Net-zero	• Emerging economies should ensure that carbon projects implemented within their jurisdictions, specifically those receiving carbon finance, are sufficiently ambitious projects and that there are safeguards against overselling mitigation outcomes at the expense of meeting their NDCs.	• Ensuring carbon market regulations are aligned with NDC targets and LT-LEDS. • Utilising safeguarding measures, such as conservative baselines or buffer pools to ensure that emission reduction and removal activities within an NDC are not missed as a result of international carbon market trading. • Piloting or launching or continuing to test localised compliance carbon markets to meet net-zero targets.	**Costa Rica's** carbon market mechanism seeks to directly align with the country's NDC.[126] **China** has created an elaborate compliance ETS the design of which is an aggregate of localised pilot schemes across cities and provinces.[127]

123 Porras, I.T., & Chacón-Cascante, A. 2018. Costa Rica's payments for ecosystem services programme. International Institute for Environment and Development (IIED).

124 Prime Minister of Egypt. Decree No. 4664/2022 amending provisions of the executive regulations of the Capital Market Law. Art (35 bis 7).

125 The Egyptian Exchange, 2025. Execution of a new transaction on carbon credits and rebranding market name to reflect broader sustainability instruments.

126 The World Bank Group. 2020. The Costa Rican offset mechanism (MCCR) (Partnership For Market Readiness – Costa Rica Program). Program Activity Brief.

127 Swartz, J. 2016. China's national emissions trading system: Implications for carbon markets and trade. ICTSD Global Platform on Climate Change, Trade and Sustainable Energy.

Pillar	Implementation	Specific Indicators	Existing Practices
3. Ecosystem Integrity	• Emerging economies should ensure unit quality criteria and claims integrity and create adequate social and environmental safeguards for domestic carbon projects.	• Adopting internationally recognised standards to ensure environmental and social integrity at a carbon unit and project level. • Ensuring full adherence to the Enhanced Transparency Framework reporting procedures under the Paris Agreement, including in relation to the application of corresponding adjustments.	**Costa Rica** utilises the ambitious San Jose Principles for High Ambition and Integrity in International Carbon Markets as a benchmark of project integrity.[128] Moreover, it recognises the use of carbon markets for contribution rather than only for compensation claims.[129] **India** integrates Sustainable Development Goals (SDGs) into its offset mechanism by asking project proponents to develop project-level SDG indicators (quantifying the positive socio-economic and environmental impacts of carbon offset projects), referring to its national SDG Indicator Framework.[130] **Egypt**,[131] **India**,[132] and **Indonesia** as well as others have adopted relevant ISO standards for the accreditation of Validation and Verification Bodies, and the process to conduct validation and verification of carbon projects.[133]
4. Equitable Responsibilities and Outcomes	• Emerging economies should ensure that all stakeholders invested in carbon projects benefit equitably from it. When engaging as buyers in international carbon markets, emerging economies should ensure equitable sharing of responsibilities and benefits with supplier countries.	• Ensuring meaningful FPIC consultations throughout the lifecycle of a carbon mitigation project. • Recognising sovereignty and rights of Indigenous Peoples. • Empowering impacted local communities to meaningfully participate in and benefit from carbon schemes.	In **Colombia** there is regulation that recognises Indigenous Peoples as the environmental authorities over their territories.[134] **Indonesia** includes indigenous peoples and local forest communities as project proponents in the forestry sector carbon offsetting activities.[135]

128 Costa Rica Government. 2022. Nationally Determined Contributions (NDC).UNFCCC.

129 UNFCCC. 2025. NDC Navigator 3.0: Technically Sound and Transparent Documents: Reflecting Article 6.

130 Bureau of Energy Efficiency, Ministry of Power of India, 2025. Detailed procedure for offset mechanism under CCTS March.

131 Egypt's Financial Regulatory Authority Board, 2023. Decree No. 163 of 2023 on the criteria for registering verification and validation bodies for carbon emission reduction projects at the Authority.

132 National Accreditation Board for Certification Bodies of India, 2022. Accreditation criteria for validation and verification bodies.

133 Minister of Environment and Forestry of the Republic of Indonesia, 2023. Decree No. 1131 of 2023 on the Indonesian GHG emissions reduction certification scheme.

134 Secretary General of the Major of Bogota. 2024. Decree 1275. Diario Oficial No. 52910.

135 Ministry of Environment and Forestry of the Republic of Indonesia. 2023. Regulation No. 7 of 2023 on procedures for carbon trading in the forestry sector. Art. 7 & 8.

Pillar	Implementation	Specific Indicators	Existing Practices
5. Enforcement and Oversight	• Emerging economies should ensure that adequate transparency requirements, MRV processes and penalties are in place to ensure integrity at a project level and regulate behaviour of actors across the carbon market ecosystem.	• Putting in place adequate registry/ tracking infrastructure for carbon units. • Creating a dedicated committee/body/ authority to regulate and oversee the implementation of carbon trading activities.	Most emerging economies, including **Colombia**, are developing national registries to ensure transparency in trading of mitigation outcomes.[136] Egypt created a cross-sectoral Committee for the Supervision of Carbon Credits chaired by the Financial Regulatory Authority responsible for drafting regulations related to the governance of the issuance, supervision and monitoring of carbon credits, including review procedures of Projects and selecting approved validation and verification bodies (VVBs).[137] **Turkiye's** new Climate Law establishes a Carbon Market Board, a dedicated national body to supervise carbon pricing and regulate transparency and fairness in implementing market-based mechanisms.[138]

136 Government of Colombia. Law 1753 of 2015, later amended by Law 2294 of 2023.

137 Government of Egypt. Financial Regulatory Authority Decree No. 57 of 2023 on the committee for supervision of carbon emission reduction units and its competences.

138 ICAP, 2025. Türkiye adopts landmark climate law, paving the way for national ETS.

Pillar	Implementation	Specific Indicators	Existing Practices
6. Ease of Use	• Emerging economies should create low barriers to access in carbon markets for all types of existing and prospective participants.	• Exploring interlinkages and learning from the design of other international systems.[139] • Leveraging the use of technology to improve transparency, traceability, and ease of access in carbon credit transactions. • Creating easy-to-follow, detailed guidance and business processes on carbon trading activities that companies and other relevant actors can publicly access.	When designing its ETS, **China** sought the state of California's expertise resulting in similar emission thresholds and reporting requirements, which may open the door for future linkages between the two systems.[140] **India's** compliance market (Carbon Credit Trading Scheme) has released detailed procedures for non-covered entities to issue credits voluntarily that can be used for offsetting.[141] **Kazakhstan** launched its AIFC Carbon Platform to facilitate the trading of environmental instrument by leveraging technology to reduce barriers to entry for overall market participation.[142] **India** has created detailed guidance for entities to voluntarily be involved in carbon offset projects under its compliance market (Carbon Credit Trading Scheme), regulated by the Bureau of Energy Efficiency.[143]

139 China sought the state of California's expertise while designing its ETS, resulting in similar emission thresholds and reporting requirements, which may open the door for future linkage by potentially allowing firms operating in China and California to swap or trade credits through structured financial deals, akin to California's Cap-and-Trade Program linked with the Cap-and-Trade System of Québec. See also Freedom-Kai, P., Martinez, R., Srinivas, V., & Gregorie, V. 2023. **How carbon markets should evolve to meet net-zero ambitions**. Deloitte Insights; Republic of the Philippines National Commission on Indigenous Peoples. **NCIP Administrative Order No. 3 of 2012 on the revised guidelines on free, prior and informed consent (FPIC) and related processes**; Climate Change Commission of the Philippines, 2025.News roundup 5 February: **House carbon pricing framework bill approved on 2nd reading**; Republic of the Philippines National Commission on Indigenous People, 2023. **NCIP and FFP FPIC benefit-sharing project launch**.

140 Freedom-Kai, P., Martinez, R., Srinivas, V., & Gregorie, V. 2023. How carbon markets should evolve to meet net-zero ambitions. Deloitte Insights.

141 Indian Ministry of Environment, Forest and Climate Change, 2025. **Detailed procedure for offset mechanism under CCTS**.

142 Astana International Financial Centre (AIFC) Authority, 2024. **AIFC Unveils Carbon Platform Development Plans on AIX**.

143 Bureau of Energy Efficiency, Ministry of Power of India, 2025. **Detailed procedure for offset Mechanism under CCTS**, p.8.

5. Conclusion

Carbon markets require cohesive regulation to scale their ability to deliver appropriate climate and development goals. Their expansion in recent years, evidenced by the increasing proliferation to domestic and international based carbon market frameworks of both a voluntary and compliance-based nature has created an increasingly complex backdrop against which regulatory approaches have not kept apace. The absence of standardised regulations that offer clear guardrails risks discouraging investment, lowering mitigation ambition and jeopardising the goals of the Paris Agreement.

The objective of reaching global net-zero can act as a powerful north star to change this. Calibrating the carbon market ecosystem to deliver real emission reductions and scale removals requires attention to the underlying stringency of the rules and policies governing substantive and procedural aspects of carbon market operations. Yet, the work to do this can also pay dividends by unlocking currently untapped domestic and global prosperity.

To help illustrate this pathway, this working paper provides a systematic “Roadmap to Net-Zero Aligned Carbon Market Regulation”. The purpose of the Roadmap is to help foster a more cohesive regulatory ecosystem for global carbon markets: a system that not only focuses on delivering efficient financing interventions that generate the required levels of emissions reductions and removals to reach net-zero target, but equally does so in an accessible and robust manner that upholds integrity and reflects equitable opportunities and responsibilities among market actors. The pillars presented in this Roadmap serve to help governments resolve deficiencies in existing market practice and calibrate their approaches both domestically and internationally towards Paris-alignment.

Crucially, while the high-level pillars proposed are universally applicable, this Roadmap advocates for customised regulatory approaches that align with national realities and economic priorities across three main types of jurisdictions: advanced economies, developing economies, and emerging economies. In such a way, it highlights that no regulatory blueprint is sufficient unless meaningfully grounded in existing local contexts. By doing so, it guides user countries to realise the benefits that net-zero alignment can offer to retool carbon markets towards meaningfully delivering on the public good of climate mitigation.


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