Roadmap for Carbon Market Readiness: Identifying Concrete Actions

Professor Kelly Mua Kingsly
PhD/MBA, MPA, CFA, CFI, PMP, ISO
Finance engineer (Forensic finance and audits)
blog:www.kellykingsly.com
My Papers:SSRN
https://www.linkedin.com/in/kelly-kingsley-ph-d-2a5a1416/

Roadmap for Carbon Market Readiness: Identifying Concrete Actions

1. Introduction

Introduction: The Conference of the Parties, serving as the meeting of the Parties to the Paris Agreement (PA), at its first session (CMA1), requested the Interim Executive Board (IEB), in consultation with the CMA1 hosts, to organise an in-session workshop on the requirements for Article 6, paragraphs 2 and 3, of the Paris Agreement to strengthen cooperative approaches in December 2016. Decision 1/CP.21, paragraph 80 states that the Parties can voluntarily decide Article 6 to have modalities, procedures, and guidelines, which already include elements necessary for Articles 6.2 and 6.3 to become operational. The Interim Executive Board (IEB), in cooperation with the Conference of the Parties, serving as the meeting of the Parties to the Paris Agreement (PA), has recognised the pressing need for a comprehensive understanding of the requirements outlined in Article 6, specifically paragraphs 2 and 3. To address this, the Parties have mandated the organisation of an in-session workshop in December 2016 to strengthen cooperative approaches within the framework of the Paris Agreement. As outlined in the decision 1/CP.21, paragraph 80, the Parties exercise the authority to establish voluntary modalities, procedures, and guidelines for implementing Article 6. This progressive decision already encompasses essential elements that form the foundation for successfully operationalising Articles 6.2 and 6.3. Building upon this groundbreaking decision, the workshop seeks to delve deeper into the intricacies and nuances of Article 6, unravelling its potential and examining how it can facilitate enhanced cooperation among Parties. By thoroughly exploring the requirements stipulated in paragraphs 2 and 3 of Article 6, the workshop aims to shed light on the practical steps needed to harness the full potential of cooperative approaches within the Paris Agreement. Against mounting climate challenges, this workshop represents a vital opportunity to advance the collective understanding of the cooperative mechanisms embedded within the Paris Agreement. This collaborative endeavour aims to forge a path

towards effective implementation by bringing together key stakeholders and experts from diverse fields by fostering open dialogue and information sharing. Ultimately, the workshop's outcomes will contribute significantly to the ongoing efforts of the Parties involved in the Paris Agreement, enabling them to make informed decisions regarding the development of modalities, procedures, and guidelines for Articles 6.2 and 6.3. Through this comprehensive exploration, the Parties can collectively strengthen their capacity to address climate change and lay the groundwork for a more sustainable future.

The roadmap for carbon market readiness helps identify specific actions to advance the work of the Interim Executive Board (IEB) and the Parties in developing the market instrument, as well as other necessary guidance. A functioning carbon market mechanism consists of several components to mitigate and control greenhouse gas emissions sustainably. Assets must be created under and issued in compliance with stringent environmental and administrative regulations, ensuring that the transition towards a low-carbon economy is effective and impactful. All relevant actors, including governments, businesses, and organisations, must demonstrate unwavering compliance with these regulations at the aggregate level through meticulous monitoring and comprehensive reporting. At the organisational level, robust management systems must be in place to ensure the efficient implementation of carbon reduction strategies. At the individual level, each participant in the carbon market must adhere to contractual obligations, promoting transparency and accountability across the board. Furthermore, enforcers responsible for oversight and regulation play a crucial role in guaranteeing the integrity and credibility of the carbon market mechanism. Their unwavering commitment to upholding the highest ethical standards and enforcing compliance creates a level playing field for all participants. To achieve this, enforcers must have the necessary resources, expertise, and authority to carry out their duties effectively. Moreover, all actors regulated by the carbon market mechanism must be adequately prepared and market-ready. This entails developing a comprehensive understanding of the scope and intricacies of the carbon market component to ensure seamless integration into their respective operations. Continuous education and capacity-building initiatives are vital to empower individuals and organisations with the knowledge and skills required to navigate the complexities of the carbon market effectively. This document aims to outline a comprehensive approach that addresses these diverse requirements, thus paving the way for the successful

implementation of the carbon market instrument. By adhering to the roadmap for carbon market readiness, stakeholders can actively contribute to the global efforts to combat climate change while embracing sustainable practices and driving economic growth. (Ewing, 2022)(Sipthorpe et al., 2022)(Mata et al.2020)

2. Understanding Carbon Markets

A carbon market is a platform where companies and countries are denied the right to emit greenhouse gases (GHGs). They are eligible for the right to emit, called a carbon credit. The concept of a carbon market exists under the cap and trade policy of an emission trading system (ETS). It is a market-based instrument designed to deliver a cost-efficient emission reduction by limiting the emissions that are liable to be controlled. If a company operating within a country's cap (allocation) is equal to or less than the cap, the company hands over the excess permits to other companies to purchase. A carbon market is a mechanism through which countries and companies buy and sell units of emission savings that are allowable in the overall GHG emission. (Zhang et al., 2020)(Kreibich & Hermwille, 2021)(Shi et al., 2022)(Kim & Huh, 2020)

Types of Carbon Market: 1. Emission Trading System (cap & trade). 2. Policy Waterfalls: a mechanism for the cooperative reduction of emissions from deforestation and forest degradation in some developing countries (REDD+).

Carbon markets have the following benefits: Cost Efficiency, Increased environmental integrity, and promotion of investment in cleaner technologies.

Challenges of Carbon Markets: - Inimical Effects on Employment: Carbon market systems, particularly rationing systems, pose possible risks to employment. During the implementation of ETS in The European Union in 2005, a forgone argument from industry was, and in some instances remains, that limiting carbon emissions would result in thousands of job losses. - Costs: There is widespread anxiety in high-income countries that the costs of reducing emissions and achieving targets are high. Reforms such as the United States and Canada's Clean Power Plan and Alberta's Climate Leadership Plan are contested partly because of concerns about the costs these reforms will impose on the economy and consumers. - Use of Sector-wide or Single-Fuel Integrated Pollution Control Licensing: In the context of carbon markets, IPPC licensing is noted to increase transaction costs. - Risk of Leakage: Leakage occurs when efforts to reduce emissions in one area or create emissions shift to another area where pollution is

not regulated. This further leads to an increase in global emissions. - Inadequate Infrastructure: Research conducted found a timid aptitude in policies, structures, and frameworks to respond to climate change or probabilities surrounding emissions trading. This could be due to the unprecedented airstream of climate change issues among policymakers.

Carbon markets are complex, with different behaviours and volatility because of market participants, climate policies, technological changes or drought emissions, and regional economy being related to markets with increased market operation and management. To understand and react to these complexities and uncertainties and to have market readiness, capacity-building measures that develop nations, especially those of the market participants (private or government), must be identified. This, then, assists nations to rapidly and adequately adjust to new policies or technological improvements. A significant part of market readiness is understanding market participants' behaviour and identifying existing market operations and management performance and the challenges markets face. One critical facet of this information is the qualification of market participants. Qualities and capabilities must be identified to invest in material resources and which participants may need to be excluded from market participation. Without this in-depth understanding, a market provides a fertile environment for non-compliance. It can also handicap the operation and diminish its effectiveness. (Lyu et al., 2020)(Tan et al., 2020)(Sun et al.2020)(Asadnabizadeh & Moe, 2024)

2.1. Definition and Concept of Carbon Markets

2.1 Definition and Concept of Carbon Markets. Before launching a comprehensive discussion of the technical, organisational, legal, economic, and political aspects of constructing a carbon market, it is essential to clearly define its basic notion. The concept of 'carbon market' denotes a specific stock market segment where negotiable securities are traded. The securities making the subject matter of a carbon market are emission allowances or removal units, traded in the form of a particular type of security generally named a carbon bond. In the context of a stock exchange, carbon bonds are disposed of to buyers for an agreed price; however, they can also be considered an investment from which a monetary return is sought, much like any fixed-income asset. The auspices under which carbon markets operate are the typical example of an instrument or method for dealing with climate change adversities, as defined by the United Nations Framework Convention on Climate Change and its additions (Kyoto Protocol and Paris

Agreement). The primary aims of carbon markets are procedurally environmental. By setting ceilings or caps on allowable emission levels and then reducing these caps at agreed surprise times, the objective of a carbon market is to encourage technological innovation to prevent and minimise the negative consequences of climate change; the concomitant expectation is that the accrued savings in emissions pay for the investments in insulating the world from climate change.

The meaning of the terms 'emission removal units' and 'emission allowances' were sufficiently defined to permit a thorough discussion in various papers and to bring out quickly the underlying concept of hydrogen energy, specifically of a possible carbon market trading in the energy hydrogen obtained by the conversion of carbon-containing feedstock, the actual definition and characteristics of the fundamental markets in carbon units seem such a central problem that it appears helpful to raise specific fundamental points, in particular addressing such questions as: what are carbon markets actually for? What are the meaningful properties of a carbon market for their discussion? What is the current reality of carbon markets and their future as institutions and practical activities?

2.2. Types of Carbon Markets

Introduction

Sub-national markets are primarily driven by the commitments made at the state level to mitigate or eliminate greenhouse gas (GHG) emissions. As a result, many diverse models have been implemented to establish a linkage between these sub-national markets and a more extensive carbon market. These models, also known as nested approaches, are named so due to their resemblance to the idea of integrating one market "within" and under the authority of another. However, it should be noted that significant variations exist in how the carbon offsets or credits from one market are recognised and accepted in another jurisdiction. These variations, with their intricacies and subtle distinctions, substantially impact the overall effectiveness and efficiency of these interdependent markets. Therefore, a comprehensive examination and careful consideration are essential to ensure these interconnected markets' smooth and harmonious operation, considering all the critical factors at play. The successful operation of these sub-national markets relies heavily on the commitments made at the state level to combat climate change and reduce GHG emissions. These commitments are the driving force behind creating and implementing various models and strategies to establish a direct connection between the sub-national markets and the broader carbon market.

These innovative and dynamic models, known as nested approaches, derive their name from their inherent nature of integrating one market within the jurisdiction and authority of another. However, it is crucial to acknowledge that the recognition and acceptance of carbon offsets or credits obtained from one market can vary significantly when introduced into another jurisdiction. These variations, with their intricate details and subtle nuances, substantially influence the overall efficiency and effectiveness of these interconnected markets. Therefore, a comprehensive and meticulous examination, coupled with careful consideration, becomes imperative to ensure these interdependent markets' smooth and harmonious functioning. It is vital to consider all the critical factors to foster seamless coordination among these markets and promote their mutually beneficial operation.

2.1 Referring to what?

Sub-national markets and carbon registries function under several different models or mechanisms, each making various claims regarding the types of allowances or credits they are willing to accept. For instance, the province of Ontario offers a market-to-market linkages system in which participants can trade allowances from one market into the other, thereby promoting greater flexibility and efficiency in the carbon market. Meanwhile, California has adopted a more stringent approach, mandating that sub-national registries must undergo a thorough and rigorous review process to demonstrate the existence of "full MRV for the sub-national offset program" to be recognised for CCS. This careful evaluation clearly acknowledges the importance of credible assurances provided by a trusted third-party verification. Additionally, NSW has initiated discussions with California concerning the potential for linking CCS under the existing scheme. This exploration of possible linkages between market and voluntary schemes highlights the need to establish comprehensive and coherent actions applicable across industries in terms of readiness requirements, while also accounting for the unique nuances and considerations of specific linkage frameworks. By developing a set of guidelines and protocols that are versatile and adaptable yet still maintain a level of specificity, stakeholders can ensure a more streamlined and effective transition towards a connected and unified carbon market. It is essential to recognise that establishing robust linkages between sub-national markets and carbon registries can foster increased cooperation, coordination, and harmonisation across jurisdictions. This not only bolsters the

overall integrity and reliability of carbon market mechanisms but also enables the attainment of broader environmental objectives on a global scale. Through strategic collaborations and the exchange of best practices, governments and stakeholders can collectively advance towards a more sustainable future, where the boundaries of sub-national markets and carbon registries are transcended, and the shared goals of emission reduction and climate resilience are pursued with renewed determination.

2.3. Benefits and Challenges

Carbon markets offer a pay-to-pollute strategy by allowing excess emissions generated by countries to be offset by purchases of emissions avoided in other jurisdictions. Thus, the cost of climate change mitigation is minimised for developed countries, while developing countries can earn income from their emissions avoidance. The Kyoto Protocol implemented international carbon markets, and in 2019, 50 countries committed to using carbon markets under Article 6 of the Paris Agreement once they are functional. The EU, New Zealand, and Kazakhstan already have operational carbon markets.

Why carbon markets? Implementing international carbon markets is popular due to the potential to unlock NDCs' financing, generate revenues, stimulate technology transfer, enhance quantitative emission mitigation, and increase engagement and ambition from a broader stakeholder community. In addition to these benefits and the induction of ESAT, the MRV of other parts of the NDC are enhanced as countries are compelled to follow the UNFCCC and Paris Agreement 'rules'. The benefits of using carbon markets are foreseen for both parties of the trade offer. They can occur across the following areas: Supporting the achievement of NDC, spurring finance, Encouraging the development of markets, In-situ domestic NDC mitigation, Offsetting emissions, Parliamentary oversight, Stakeholder engagement, and Increased ambition. Several domestic and international issues need to be considered in the use of market mechanisms to meet a country's NDC. These include a range of concerns, mainly in the public domain, around the provision of it as an 'offset' to mitigate in-country emissions and the in-country governmental capacity to track and operate the arrangements effectively. With this roadmap, we seek to support steering discussions, planning concrete and action-oriented capacity-building activities, and developing relevant tools and guidelines, such as revising existing MRV systems. By looking at the experience of international and domestic carbon markets in particular, we have

identified a range of things countries might want to consider to be prepared for a variety of market-based mechanisms that can emerge in the future when the development and use of carbon markets officially commence in the context of international climate policy.

3. Key Elements of Carbon Market Readiness

The key elements of carbon market readiness include policy and regulatory framework, strengthening institutional capacity, and market infrastructure. GHG emission inventory is essential for monitoring and reporting GHG for trading. The government should be prepared to manage and monitor trade, meeting and reporting the Kyoto targets and other UNFCCC developments. An enabling policy and regulatory framework supports the market mechanism and defines the institutional structure of the market. Institutional capacity building involves training human resources in carbon finance and trading, who can also attract and train other professionals for trading. Market infrastructure, such as ICT for trading, spot markets, and market makers, is essential for building MRV. Creating a tradable sector and defining the unit to be traded are critical elements in building carbon market readiness. Tradable units are developed and managed by dominant partners for buying or selling. A GHG register is necessary to maintain the ownership and change of ownership of units. Fiduciary and audit services a third party provides help maintain the HR/GHG register.

3.1. Policy and Regulatory Frameworks

Establishing robust policies and regulatory frameworks for the successful launch of a carbon market is of paramount importance. Despite supporting research conducted by international organisations such as ICAP (Annual Reports, 2017–20), C-PLACe (2019), GIZ (2020), and academia, the lack of empirical and practical work about policymaking and policy implementation can hamper the pace of expansion for carbon markets. The two global standards national governments should offer are free allocation of allowances and timely banking facilities in line with international practices. Free allowances and banking ensure the neutrality and flexibility of the carbon markets. Furthermore, transparent licensure and registration will build investors' confidence in carbon credits. Leaving room for Confirmation of Verified Emissions Reduction (VER) units is also necessary to give a head start to the market and pique the interest of investors on a mass level.

National governments are heading in the direction of launching carbon markets. It is risky because they have to simultaneously manage the payment of industrial

compensation (carbon leakage), enlarge the carbon market, and grant FREE.VER permits the market to be hand-held and the inclusion of methane and oil refineries in the next phase of the enlargement of the carbon market. Therefore, rather than relying too heavily on a pure industrial compensation policy, the emphasis should be put on developing verified data for the industry, which will show that upgrading and expanding infrastructure result in reduced carbon footprints. This pragmatic approach can easily be managed through the fixation of clean benchmarks of product manufacturing. Verify that less GHG-intensive products are more accessible internationally and nationally. The next step is to include the preferred product in the government's procurement policy. Combining less GHG-intensive products and rewarding industrial infrastructure upgrades may ease the necessity of including methanol and refineries in the carbon markets.

3.2. Institutional Capacity Building

Institutional capacity for effectively engaging in carbon markets should be developed in both public and private sector organisations. Building expertise, knowledge, and organisational capabilities are key in ensuring the function is more effective and inclusive, providing better navigational support for all countries (and private actors) to move towards increased cooperation under Article 6. Meeting the information requirements of systematically identifying and removing all barriers impeding effective participation in any cooperative approach, mechanism, or market. Institutional capacities relevant to carbon markets include technical expertise in carbon accounting, emission reduction potential analysis, GHG modelling, process monitoring and reporting verification, mitigation policies and measures, regulatory and legal analysis, land use, land use change and forestry, renewable energy, energy efficiency, internal carbon pricing and setting, compliance management, project cycle management, and more. Beyond the skills and qualifications are the organisational and management capabilities to run portfolios of climate change mitigation and adaptation projects, capacity building and institution strengthening projects, develop sustainable private sector business models, and provide upskilling or targeted re-skilling.

Based on all of this, the task has identified a few of the many possible concrete activities designed to increase policymakers' general carbon market readiness and business advisors, traders, brokers and financial analyses in the long run. Without these stakeholders working effectively with the countries and the CDM body, the objectives of Article 6 and an increased pool of partners competent and confident

in using the Paris Agreement's cooperative approaches, which use market mechanisms, will not be realised.

3.3. Market Infrastructure and Tools

The level and effectiveness of market services depend primarily on market design, procedures, and rules. Today, financial markets operate and are developed with high automation. A trading platform based on state-of-the-art matching technology is at the heart of every financial market. This matching engine processes orders quickly, securely, and transparently. An open interface facilitates smooth connections with clients and system participants. For the physical settlement of any volume traded in the auction, we use interfaces to the central securities depository.

The trading system includes flexible components that assist the auction administration in pricing new products according to changing requirements. These allow a slower emergence of a price before the reverse phase starts, a more excellent opening price than any initial margin, and the setting of a maximum of the buyers' positions relative to supply before trading. Prima facie evidence from other power exchanges is helpful for the development of a competitive trading system. Congestion management and energy dispatch methodologies must be compatible with market operation to encourage a steady stream of trade terminations. In addition, congestion management that efficiently utilises existing infrastructure and methods to secure transmission will foster trade and, ultimately, liquidity in the New Zealand market. Building on secure and efficient transmission, an efficient dispatch arrangement will promote effective trade terminations at the wholesale level. It needs to balance the physical efficiency of power dispatch with the need to secure the supply margin. Such a mechanism should incorporate issues such as the economic dispatch of reserves and market arrangements that enable demand to play a role in resolution. This, in turn, encourages entry from the new generation.

4. Case Studies and Best Practices

Case studies and best practices feature in Section Seven of the COI Primer on Incorporating Carbon Pricing into NDCs and are revisited here in line with market readiness. Case studies are real-world examples that allow for lessons learned when implementing a new carbon pricing system. Best practices are full-scale examples of existing or expanding carbon pricing systems. Together, case studies provide a nuanced understanding of issues at the leading edge of development

and are instrumental in developing program design skills. For our market readiness-focused effort, this section provides practical wisdom, based on empirical evidence, to guide those embarking or engaged in activities to develop or reform their own carbon pricing endeavors.

Best practices are organized by components of market readiness; crosscutting best practices are also highlighted as relevant. The sector and topic organization align with those explored in the preceding sections, which analyzed current country engagement in developing or reforming carbon pricing systems specific to energy, waste, and LULUCF. The crosscutting best practices introduced in this section have served as starting points for countries laying stronger foundational engagement in carbon pricing. Together, the sector-specific and crosscutting best practices serve as reference materials for stakeholders involved in a carbon pricing program, including national government officials, international development bodies, and technical assistance providers.

4.1. Successful Implementation Examples

4.1. Successful Implementation Examples

After being reviewed and approved, there are many examples of successful implementation from both new and existing carbon markets. It should be noted that the examples listed are not exhaustive, and it is possible that there are examples which, for various reasons, are not in the public domain or not listed here. In addition, because this document is updated yearly, examples may also have become outdated.

There are many examples of implementation from existing carbon markets – many of which have been operating for over 10-15 years – which market participants can learn from. As such, the WCI Secretariat encourages readers to do their own research.

Quebec launches auctions: Quebec (Canada) conducted their first auction of allowances in November 2012, raising USD 153 million. Quebec emissions in 2015 were lower than anticipated, which resulted in most bidders placing fewer bids in the remaining auction. Decisions on how to handle this situation are likely to be of interest to market participants.

Nairobi Securities Exchange (NSE) becomes carbon neutral: The Nairobi Stock Exchange offset its emissions from 2008-2010 through the Clean Development

Mechanism (CDM). The NSE collected an estimated €147,000 from charging this percentage, which allowed it to offset its emissions and use a "carbon neutral company" label in its logo.

IntArray Comment: One of the significant benefits of this example is that other exchanges could use the NSE as an example to set up their own CER-markets, increasing the liquidity of CERs and stimulating more demand for CERs at the NSE.

4.2. Lessons Learned

As discussed in Section B, various challenges were reported by respondents from all institutions that were involved in the implementation of carbon markets. The results from the face-to-face meetings highlighted particular challenges that are important for the design for the strategy and audit. It is advised that the consultative approach and a format that allows for the sharing of experiences with others was found to be the overall greatest benefit for the implementation of carbon markets.

The development and implementation of guidelines, protocols, data exchange mechanisms, and general processes in consultation with potential program participants and stakeholders is absolutely critical to ensure that best practice methodologies are effectively mainstreamed. Prioritize the implementation of future projects to ensure an initial focus on harmonization and standardization. Thus, support is crucial for tracking up growth and standardization to ensure that the importance of participation in carbon markets is fully recognized. Furthermore, the analysis in Section B and from the face-to-face meetings suggests that it is important to ensure the harmonization of values and operational approach between different institutional units of the 'host' organization. In practice, this means that, given that climate change is a significant long-term, multi-disciplinary and globally significant concern, guidance of carbon market development should not be limited to the finance or technical units in an organization.

5. Concrete Actions for Carbon Market Readiness

Roadmap for Carbon Market Readiness: Identifying Concrete Cooperation Actions

Ensuring that Article 6 does bring a meaningful contribution to climate action and sustainable development objectives will require careful preparation from all

countries. Several countries have pointed out that the complexity of Article 6 and its potential consequences for national climate mitigation and sustainable development strategies make it difficult for many stakeholders to prepare for effective 6.2 and 6.4 engagement. This lack of preparedness may well lead to "bad deals" for some countries (and non-state actors) should Article 6 be opened for broad engagement in the coming years. Some countries are supportive of the idea and encouraged a dialogue on what cooperation actions include.

Inclusive and comprehensive capacity building programmes: Capacity building needs to encompass policymakers, technical experts, and potentially practitioners such as domestic MRV experts. The Swedish-Costa Rican Scientific and Technical Reviewer programme is a good example of an inclusive capacity building programme given the structured feedback provided by the Costa Rican government to the scientific reviewers.

Stakeholder Engagement. The most effective cooperation actions are likely to be driven by national stakeholders willing to apply foreign mitigation outcomes for their own national policy objectives. Therefore, stakeholder engagement facilitating the interaction between potential deliverers of cooperation outcomes and other actors is essential to maximizing the additionality of any outcomes resulting from the cooperation actions. International stakeholders, civil society, and private sector end-users of VCS annotated ITMOs can also potentially play a role in listing verified ESD.

Technology and Innovation Development and Adoption. Potential cooperation actions should ideally include the development and deployment of new and transformative technologies or "negative emissions" approaches. It would be beneficial to develop a supportive framework to list innovative and transformational technology approaches so that international projects aimed at developing and deploying technological solutions to work towards transformative and sectoral innovation can be developed and transferred.

5.1. Capacity Building Programs

Increasing global interest in carbon markets and public demand for practical, accessible information on global warming, clean car technologies, and emission trading drives the need for a range of new training for a variety of audiences. All of these audiences require sector-specific information addressing their role and interest.

Capacity building refers to initiatives and programs designed to enhance the knowledge, skills, and capabilities of individuals and organizations to actively and effectively participate or engage in carbon markets. Currently, carbon markets are dominated by project developers. The Department for Environment, Food and Rural Affairs (Defra), PRINWASS, the European Bank for Reconstruction and Development (EBRD), and their key partners are addressing the two priority audiences for capacity building in carbon markets:

Environment, finance, and project professionals working within Eastern Europe, the Baltic States, the former Soviet Union, and the Balkans who wish to develop a greater understanding of how carbon financing and the Clean Development Mechanism (CDM) can help to attract additional funding for sewerage and water-related projects within their countries, and Local Authorities or public sector professionals from the same geographic area and international financing institutions and development agencies engaged in sustainable water and sanitation services development would be interested in learning about 'Additionality' and CDM in relation to projects in the water supply, sanitation, wastewater, and solid waste management sectors.

5.2. Stakeholder Engagement Strategies

For carbon markets to be successful, the numerous and diverse stakeholders must have ownership and engage in the process of designing systems that work for them. Engaging stakeholders may initially be time and resource intensive, but meaningful participation in the design and implementation of carbon market instruments can generate important buy-in and create a sense of shared responsibility for success.

Inclusive stakeholder engagement in carbon market readiness processes can be strengthened and designed to appropriately address local interests, equity considerations, and jurisdictional governance principles. Strong stakeholder engagement, such as those achieved through established outreach networks and working groups, can also streamline government transactions, such as providing enhanced opportunities for getting buy-in as well as contributions from legal, technical, institutional, and other perspectives. Each of these outcomes may be relevant to different carbon market readiness contexts but enable an efficient process when gathered effectively. Key Message: An effective stakeholder engagement approach will be finely tuned to suit the local social and political context (considering factors such as systems of governance, cultural

understandings, and existing engagement practices). It should take account of the interests of the relevant audiences and be appropriately accessible. Feedback from stakeholders and the general public should be used to modify communications and activities over time. Every effort should be made to involve a broad group of stakeholders in a climate reform working group context.

5.3. Technology and Innovation Adoption

One of the features of a robust energy market is technology advancement in all segments, which changes the dynamics of the market. Under the developing country context, improved technologies are the cornerstone to create new offset project opportunities. Nationally Appropriate Mitigation Action (NAMA) is expected to be the driving force for the technological and managerial capacity improvements. Many developing countries already have 'first practice' operations and NAMAs, and future results from capacity and policy improvements should offer carbon credit opportunities in the future (in addition to immediate NAMA efficiency benefits).

Worldwide experience in various markets has shown that industry capacity, the adoption and adaptation of technology/innovation to suit industry requirements, feedstock supply, and market demand are key drivers of the change in the bioenergy market. Besides, the increased need for environmental protection and the potential use of Carbon Trading Schemes for future profits might further drive the fast technology and managerial improvements in bioenergy processing for the developing countries. Brazil is a considerable example; the level of technological innovation could open different markets to derived bioenergy products. On the other hand, Finland, being the relatively new entry to the bioenergy market and having the credits from comprehensive environmental policies including bioenergy trigger effect, technology license agreements, has received offers in other countries to purchase carbon credits (to mitigate the carbon obligations). This way, innovation and learning effects in bioenergy processing can be covered by all the stages from research and development to management of the software that governs the process optimization and equipment control.

6. Monitoring and Evaluation of Carbon Market Readiness

A comprehensive approach to the carbon market readiness mechanism includes aspects of both evaluation and monitoring for effectiveness and readiness. Monitoring includes a bottom-up approach through regular voluntary or mandatory reporting of data, and evaluation refers to an assessment of readiness,

demonstrating effectiveness and readiness to simultaneously consider assessment results as a prima facie case of eligibility. This section offers a set of indicators, positive and negative signals, to determine monitoring and evaluation against the assessment of minimum criteria and indicators or metrics to determine whether positive signals exist, so that readiness offsets any reservations against entry into the carbon market.

While one can agree that methods of assessment of ACMB can be highly sophisticated, the monitoring and evaluation must be simplified by trying to answer the basic question of whether the country is or is not ready. Indicators for monitoring and evaluation include readiness assessments and brief signals, rather than detailed performance and evaluation criteria. The MAS indicator refers to the degree of structuring of an on-the-ground program, including at institutional, design operational, and policy levels. The MAS levels sought to ensure the degree of representation in the standards development process, specifically that principles are representative of minimum criteria, and that other minimum criteria are reflective of complex PVS. IUC may also generate pools of MAS as part of its toolbox assessment of whether a country is advanced enough to even go through an in-depth SLM analysis. Monitoring and reporting may either be voluntary or mandatory. It is recommended that status identification should be perpetual. Identifiers of civil society and investors may seek to verify the information submitted by the candidate country. Identardless are mechanisms to assess real performance, including legislation and databases, which are impersonal and impersonally delivered wider outcomes to all countries. Monitoring involves potential costs and two aspects of voluntary or mandatory data collection. This can be raised with the host country.

6.1. Indicators and Metrics

The roadmap focuses on a systematic set of five dimensions to prepare national markets that could facilitate deep decarbonization meeting the Paris Agreement goals. Tracking and measuring progress with concrete indicators is crucial to verify the efficiency of the process. The dimension that should be developed to launch and operate a national carbon market is utilization, leaning on the relevant framework for action that has to be accomplished. These must vary from the design of the mechanism, accounting and reporting systems, the legislative and regulatory framework, capacity-building programs for national institutions and businesses, as well as public awareness and stakeholder engagement. The

implementation of an ideal scenario in a specific dimension can make that dimension "mature"; therefore, the indicators can be used to verify the state of readiness.

This chapter provides the reader an overview of possible indicators, metrics, and reports of readiness by focusing on those conditions that are necessary to be fulfilled to formulate, adopt, implement, maintain, and operate and national carbon market. In this section, we describe a new assessment framework to track the preparedness of national carbon markets that are about to start. From this framework, we systematically construct 22 indicators that cover 48 parameters within five readiness dimensions: market driving policy, legal framework, administrative and institutional capacity, awareness, stakeholder engagement and strategic program, and MRVA systems. The indicators and parameters are principles-based and, wherever appropriate, linkable to the more substantiated needs of market readiness. Our approach is primarily designed for national and regional (regional carbon clubs) policymakers, public authorities, and technical experts.

6.2. Assessment Tools

Currently, there are several different assessment tools and methodologies that are used in the carbon market readiness field. These methodologies are either project- or policy-level evaluations. Project-level evaluation focuses often on country-specific evaluations and is related to either investments made or implementation assistance. Information is collected through in-depth semi-structured interviews and desk studies and combined with the assessment results of workshops. Country as well as sector- and multi-stakeholder level assessments blend evaluations of "readiness" with those of "operating markets" at project and policy level, providing a taxonomy of functional "readiness" against a list of market character service-function expectations (standard assessment indicators).

Lastly, there is the consideration of the assessment timeframes. Nizer et al. defines readiness intervention as an immediate action that can be sustained. At the outset, diagnostics provide a "data reference point" and enable learning as readiness "moves from the relatively conceptually specific values". Framework assessments are also critically savvy as driving strategies and either ensuring the "original theory of change holds validity, or... recalibrating" designs. MARS, for instance, is not only a pre-feasibility "readiness" diagnostic. It also looks at key effects of the feasibility and the DTM. According to Obrecht et al., it helps one "understand why

the intentions of a specific REDD+ DTM design have - or have not - been achieved, and learn what and how these intentions had to be readjusted". Ethnographic analysis, on the other hand, is learning by doing, a mid-course or summative tool to measure DTM operations and impacts. Importantly, that kind of assessment can overcome the problem of MARS: quasi-experimental evaluations cannot disentangle the effects of the introduction of an intervention from time and variable impacts after the intervention has been launched - to do this one would need a control group. The impacts of such readiness measures cannot, therefore, be fully understood unless these other forms of assessment are tracked over time.

7. Conclusion and Future Directions

Conclusion: The Need for Concrete Actions towards Carbon Market Readiness

This roadmap aims to provide an ambitious yet realistic examination of the types of readiness actions and support strategies that are required to achieve a positive feedback for the carbon market and the Paris Agreement, and ensuring the workplace competencies of professionals and organizations with a stake in the carbon offset market.

2.1 Future Directions This roadmap is a first concerted effort to bring together meaningful and thought-provoking insights in order to extensively deliberate and envisage potential priorities that lay ahead. It aims to stimulate forward-thinking and ignite innovative actions proposed by an array of diverse stakeholders, including but not limited to humanitarian entities, finance and accreditation bodies, and investors who are actively engaged in forging new transactions. The overarching objective is to chart a course of action that embraces a comprehensive range of possible scenarios and hypothetical future developments. By delving into these potentialities, we unveil and explore various dimensions, acknowledging the existence of likely obstacles and hurdles that may arise on the path towards the fulfillment of these bold aspirations. Furthermore, we elucidate the pertinent stakeholders who are integral to the successful realization of these visions and emphasize the crucial timing of action requirements needed to achieve these aims. It is imperative to note that this roadmap serves as a valuable advisor, skillfully synthesizing the possibilities that could materialize through a top-down approach adopted by decision-makers who are already positioned within the international system of carbon markets and encouraging fruitful collaboration between diverse partnerships of organizations. With the unwavering goal of amplifying efforts to mitigate emissions, safeguard and fortify our natural environments, and

generously contribute to the advancement of human development through market-based initiatives, this roadmap for prioritizing readiness actions should be viewed as a catalyst for creative exploration, rather than a solitary course of action. It is paramount that these proposed strategies be conscientiously tested and evaluated across the esteemed platforms of the UNFCCC, IPCC, both on an international and regional scale.

3.0 Conclusion This comprehensive examination of potential priority readiness actions will, if pursued in aggregate, provide a significant competitive market advantage to businesses currently engaging in or entering carbon markets. Additionally, it will lead to a substantial boost in economic opportunities for workers and communities who are presently or will be involved in the production of offsets. Moreover, these actions will prove highly beneficial to businesses and individuals actively seeking to mitigate risks and make responsible investments through offsets. It is important to highlight that finance plays a crucial role in all of the seven actions outlined, therefore thorough investigations must be conducted into the outlook financing structures that will facilitate the expansion of offset producers, marketers, and trading ecosystems. This expansion is expected to result in immense growth and diversification of clientele within the offset market. To ensure the success and longevity of sustainable carbon, land, and water markets within the present global food-energy-water systems, it is imperative to continue efforts in engaging with a diverse range of private entities. This engagement will allow for a deeper understanding of their needs and barriers when it comes to adopting enterprise-level sustainable practices. By doing so, we can lay the foundation for a more sustainable and prosperous future that encompasses all stakeholders involved. Therefore, it is essential to foster collaboration between public and private organizations, enabling the development of innovative solutions that address environmental challenges at scale. This approach will not only strengthen the resilience of businesses but also contribute to the overall well-being of societies and the preservation of our planet. In light of this, it is vital to establish robust monitoring and evaluation mechanisms to track the progress and effectiveness of these actions. Furthermore, it is necessary to invest in research and development efforts to continuously improve the efficiency and effectiveness of offset projects. By leveraging advanced technologies and data-driven insights, we can optimize the impact of these initiatives and ensure the achievement of long-term sustainability goals. Together, through

collective action, we can build a greener, more prosperous future for generations to come.

References:

Ewing, J., 2022. Roadmap to a northeast Asian carbon market. asiasociety.org

Sipthorpe, A., Brink, S., Van Leeuwen, T., & Staffell, I., 2022. Blockchain solutions for carbon markets are nearing maturity. One Earth. cell.com

Mata, É., Korpal, A.K., Cheng, S.H., Navarro, J.J., Filippidou, F., Reyna, J. and Wang, R., 2020. A map of roadmaps for zero and low energy and carbon buildings worldwide. Environmental Research Letters, 15(11), p.113003. iop.org

Zhang, W., Li, J., Li, G., & Guo, S., 2020. Emission reduction effect and carbon market efficiency of carbon emissions trading policy in China. Energy. e-tarjome.com

Kreibich, N. & Hermwille, L., 2021. Caught in between: credibility and feasibility of the voluntary carbon market post-2020. Climate Policy. tandfonline.com

Shi, B., Li, N., Gao, Q., & Li, G., 2022. Market incentives, carbon quota allocation and carbon emission reduction: evidence from China's carbon trading pilot policy. Journal of Environmental Management. sciencedirect.com

Kim, S. K. & Huh, J. H., 2020. Blockchain of carbon trading for UN sustainable development goals. Sustainability. mdpi.com

Lyu, J., Cao, M., Wu, K., & Li, H., 2020. Price volatility in the carbon market in China. Journal of Cleaner Production. sciencedirect.com

Tan, X., Sirichand, K., Vivian, A., & Wang, X., 2020. How connected is the carbon market to energy and financial markets? A systematic analysis of spillovers and dynamics. Energy Economics. [HTML]

Sun, L., Xiang, M. and Shen, Q., 2020. A comparative study on the volatility of EU and China's carbon emission permits trading markets. Physica A: Statistical Mechanics and Its Applications, 560, p.125037. [HTML]

Asadnabizadeh, M. & Moe, E., 2024. A Review of Global Carbon Markets from Kyoto to Paris and beyond: The persistent failure of implementation. Frontiers in Environmental Science. frontiersin.org