

# PROPOSAL

## PARTNERSHIP FOR MARKET READINESS

### CONNECTING REGISTRIES AND MRV SYSTEMS FOR CARBON MARKETS: SUPPORTING COUNTRIES WITH DEVELOPMENT OF INFRASTRUCTURE FOR IMPLEMENTATION OF CARBON PRICING INSTRUMENTS

#### SUMMARY

The PMR has supported implementing country partners in deepening their understanding of the market infrastructure requirements. Some countries have established the necessary infrastructure like MRV systems and national registries. However, to meet the requirements of the emerging carbon markets within the decentralized framework of the Paris Agreement, there is a need to support the implementation of the market infrastructure leveraging on the work done as a part of the PMR. This proposal suggests that the **market infrastructure** needs to be based on a **robust monitoring, reporting and verification system** that relies on a **national registry system** that is configured as a part of **peer-to-peer connected meta-registry system** for tracking of mitigation outcome to ensure the avoidance of double counting. Building on the learning of the PMR since its launch in 2010, this proposal seeks to leverage on the learning to put in place the connected market infrastructure that will permit the prompt start of implementation of carbon pricing instruments.

#### CONTEXT

The Paris Agreement, adopted in December 2015, promotes a collective global action that puts the world on track to avoid dangerous climate change by limiting global warming to well below 2°C. First time, the agreement, brings individual country action plans called as Nationally Determined Contributions (NDCs) to achieve the global goal set to reduce greenhouse gases (GHG) emissions. These NDCs and supportive actions to ratchet up the ambition of these will determine whether the world achieves the long-term goals of the Agreement and to reach global peaking of GHG emissions as soon as possible. To achieve the ambitious goals the Paris Agreement sets in place provisions for enhanced cooperation among nations on climate change mitigation, including through market-based approaches, such as carbon pricing<sup>1</sup>. Two-thirds of all submitted NDCs under the Paris Agreement consider the use of carbon pricing to achieve their emission reduction targets. This means 100 countries are looking into carbon pricing to achieve their NDC through international trading of emissions, offsetting mechanisms, carbon taxes, and other approaches.

As part of the Paris Agreement, all countries also agreed to an enhanced transparency framework for action and support through Article 13 which considers building mutual trust and confidence and to

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<sup>1</sup> These provisions are elaborated in the following articles of the Paris Agreement:

- **Article 6.2:** Establishes the mechanism for cooperation between nations or jurisdictions. This can encourage mitigation activities that result in the reduction of emissions by a magnitude greater than what is possible solely domestically or nationally.
- **Article 6.4:** Creates a new international mechanism to help countries reduce emissions and promote sustainable development. The mitigation engendered under this mechanism can also be used by Parties to fulfil their NDC. In other words, this provision allows for offsetting through the transfer of emission reduction credits.
- **Article 6.5:** Requires robust accounting measures to avoid double counting of emission reductions and increase transparency, thereby ensuring the integrity of the proposed market-based approaches.

promote effective implementation of the Paris Agreement and the NDCs. Implementation of carbon pricing instruments and meeting other requirements of the Paris Agreement – such as enhanced transparency framework – demands substantial and immediate progress in countries’ domestic monitoring reporting and verification (MRV) and national registry systems. This entails moving from fragmented, inconsistent and outdated methodologies to integrated and robust systems.

### **MONITORING, REPORTING AND TRACKING REQUIREMENTS UNDER THE PARIS AGREEMENT**

To participate in international carbon markets under Article 6 of the Paris Agreement, countries are *expected* to ensure tracking of internationally transferred mitigation outcomes (ITMOs) through a registry for creation, transfer, acquisition, hold, cancellation and use. Furthermore, under the Article 13 requirements, countries are required to submit biennial transparency report which should provide information on indicators<sup>2</sup> that should:

- Promote transparency, accuracy, completeness, consistency and comparability;
- Ensure that double counting is avoided; and
- Ensure environmental integrity.

To meet these requirements, countries need to develop and implement MRV methodologies. They also need to update, implement, and integrate new data and information flows with defined periodicity and develop a registry to meet requirements from the Paris Agreement to support implementation of various carbon pricing instruments. Further, to enhance transparency and environmental integrity, emission reductions or ITMOs should be properly tracked and monitored between national registries as well as domestic carbon pricing instruments being implemented or under preparation within country. This can be accomplished through connecting multiple country registries to a common infrastructure.

### **SUPPORTING CARBON MARKET INFRASTRUCTURE IN DEVELOPING COUNTRIES**

To meet the requirements of the emerging carbon markets within the decentralized framework of the Paris Agreement, there is a need to support the development of the market infrastructure building on the work done as a part of the PMR. This proposal suggests that the **market infrastructure** needs to be based on a **robust monitoring, reporting and verification system** that relies on a **national registry system** that is configured as a **peer-to-peer connected meta-registry system** for tracking of mitigation outcome to ensure the avoidance of double counting. The project will be implemented in two phases –

- Phase 1: Productization of MRV and registry systems
- Phase 2: Deployment of systems in identified countries

These are described in more detail below.

### **PHASE I: PRODUCTIZATION OF MRV AND REGISTRY SYSTEMS**

**Component 1: MRV Systems.** Developing robust measurement reporting and verification (MRV) system has been one of the core building blocks of the PMR support to countries. Robust MRV systems build mutual trust and confidence and promote effective implementation of countries’ climate change mitigation policies. The MRV systems have become even more critical in the context of the Paris Agreement; effective implementation of NDCs, carbon pricing instruments and, an enhanced transparency framework under the Paris Agreement depends on a reliable and robust MRV system.

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<sup>2</sup> These indicators could include, as appropriate, for example: net GHG emissions and removals, percentage reduction of GHG intensity, relevant qualitative indicators for a specific policy or measure, mitigation co-benefits etc.

MRV systems will also enable countries to meet international reporting requirements such as National Communications, Biennial Update Reports, and National Greenhouse Gas Inventories.

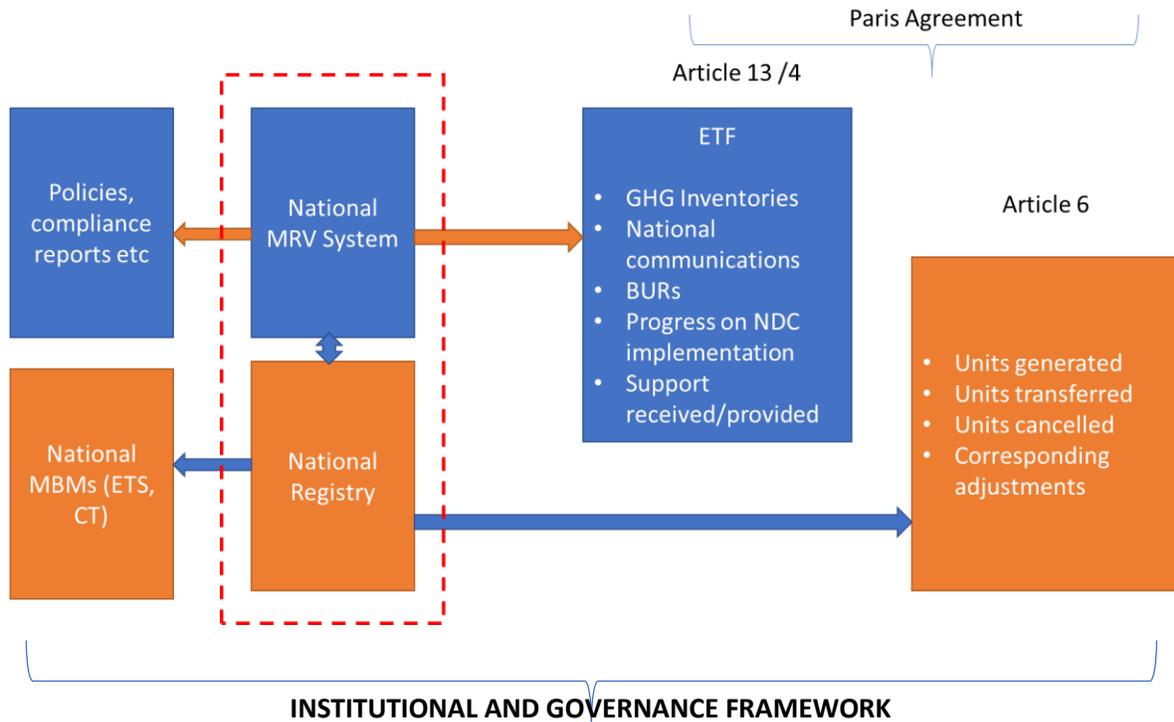
Countries with capacity, knowledge and know-how are designing MRV systems at different scales and scopes and are often implementing systems that have different coverage – the national level, sector-wide, and at the project/firm level. Implementing systems with multiple scales can add to the fragmentation of the system and complexity of design and implementation, particularly in countries with limited capacities.

Integrating fragmented MRV systems is the best long-term solution. An integrated approach can provide countries with a richer data set, lead to better, more country-specific emissions calculations, and provide an important means to undertake quality assurance/ quality control procedures. Standardization and automation of the data collection system and process using the latest development in sensor technology and remote communication can further improve the reliability of the MRV system, often at a lower cost.

PMR has offered support for design and implementation of MRV systems in various countries to meet specific objectives and to support implementation of carbon pricing instruments. These systems, for example, standardize the data collection and reporting software which can start, for instance, as a database of ex-ante project related information. The system allows performance parameters of the project to be gathered through remote sensors and meters. The use of sensors and remote communication permits the automation of process of third-party verification, creating a seamless, automated work-flow environment. With design and implementation experience in several countries, functional and technical specifications for designing these systems can be standardized with a flexibility to customize for national needs, program requirements and NDC specificity. For example, the MRV system developed around the energy system in Jordan and other systems currently under development (for instance in Costa Rica) can serve a starting point for design and implementation in countries that need a similar system. Standardized design and implementation (or “Productization” in this note) of such system and offering it countries reduces developmental costs and execution time. Standardized design and implementation of a basic national registry system has similar benefits. **Productization of both MRV and national registry system** together could help countries significantly in meeting various requirements for operationalization of the Paris Agreement and is depicted schematically in the figure below and will serve as a building block of the decentralized market infrastructure proposed in this note.

**DOMESTIC REQUIREMENTS**

**INTERNATIONAL REQUIREMENTS**



**Component 2: The National Registry system.** Article 6 recognizes that Parties may engage in decentralized and bilateral cooperative approaches to implementing their NDCs. This will result in heterogeneity of approaches towards mitigation activities and the associated mitigation outcomes (MOs). While pilot mitigation activities are being implemented, information about MOs or emission reductions is currently collected in a variety of repositories including spreadsheets, databases reflecting pipeline activities, and registries at the country, regional, or institutional level. The differences in these processes and systems will constrain market integration and scalability and add to the complexity in conducting transactions. Tracking of the MOs, double-issuance or double-claiming and the avoidance of double counting will also be a challenge.

The Kyoto Protocol and the modalities and procedures developed subsequently provided comprehensive rules and regulations for the issuance, transfer, compliance or cancelling of international units through national and CDM Registry systems. The PMR has supported several countries in understanding the needs of registry systems linked to the proposed market instruments. Countries like Indonesia and Turkey have completed their registries while number of other countries are in the process of designing and implementing their registry system (see figure below).

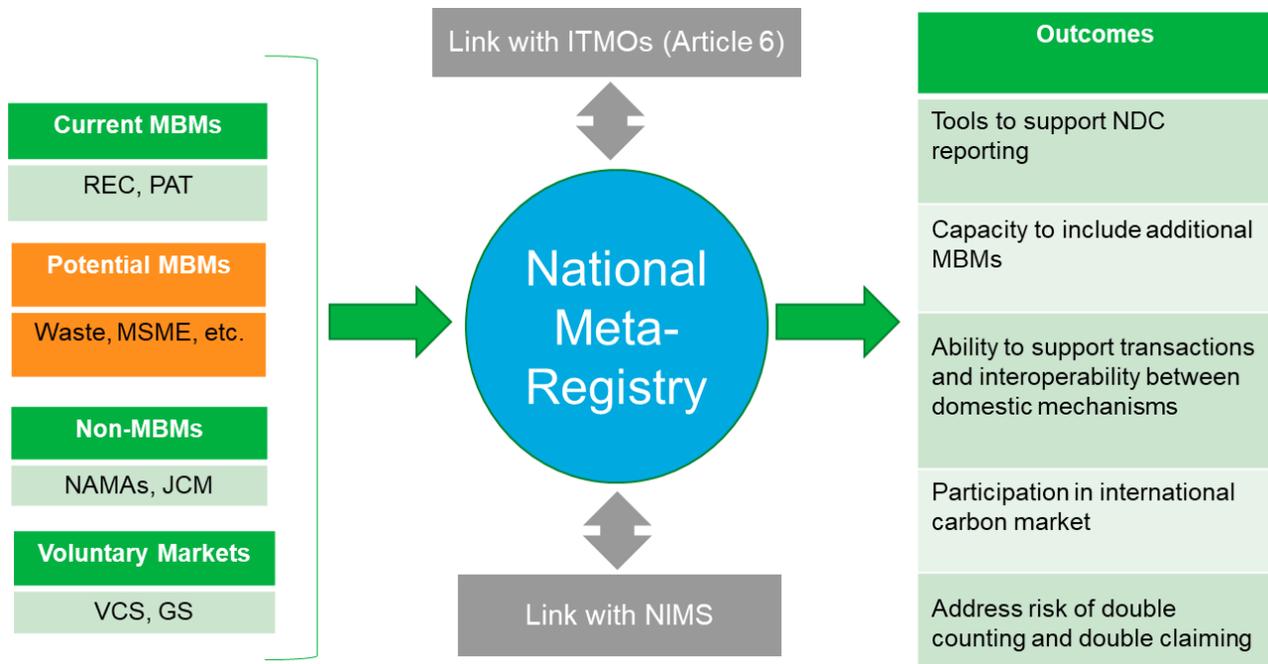
This dashboard monitors the progress of each country against its specific objectives.

	CORE TECHNICAL COMPONENTS					SUPPORTING WORK COMPONENTS					DEVELOPING CARBON PRICING			
	MRV	DATA AND REGISTRIES	BENCHMARKING	INSTITUTIONS AND GOVERNANCE	OTHER <sup>1</sup>	GHG INVENTORY	EMISSIONS PROJECTIONS/ NDC DEVELOPMENT	POLICY OPTIONS ASSESSMENT AND/OR POLICY INTERACTION	STAKEHOLDER ENGAGEMENT/ COMMUNICATIONS	OTHER <sup>2</sup>	CARBON TAX	ETS	CREDITING	OTHER PRICING INSTRUMENTS
ARGENTINA														
BRAZIL														
CHILE														
CHINA														
COLOMBIA														
COSTA RICA														
CÔTE D'IVOIRE (TP)														
INDIA														
INDONESIA														
JORDAN														
KAZAKHSTAN (TP)														
MEXICO														
MOROCCO														
PANAMA (TP)														
PERU														
THE PHILIPPINES (TP)														
SOUTH AFRICA														
SRI LANKA														
THAILAND														
TUNISIA														
TURKEY														
UKRAINE														
VIETNAM														

■ Preparation (scoping, developing terms of reference, hiring consultants)
 ■ In progress (project has started and is ongoing)
 ■ Completed

<sup>1</sup>China: Multi-stakeholder consultations.  
<sup>2</sup>Jordan: Work on developing a match-making platform for the private sector is in progress; Vietnam: Preparing for a financial mobilization plan and a mid-term action plan

There has been a significant progress and lessons learned gained on the design of appropriate registries since the launch of the PMR in 2010. For instance, India and Sri Lanka have recently completed comprehensive needs assessment based on the possibility of multiple markets instruments being used to meet the NDC requirements. Both the countries have completed the conceptual design of a national “meta-registry” system that support renewables based green certificate system along with energy efficiency white certificate program (see figure below).



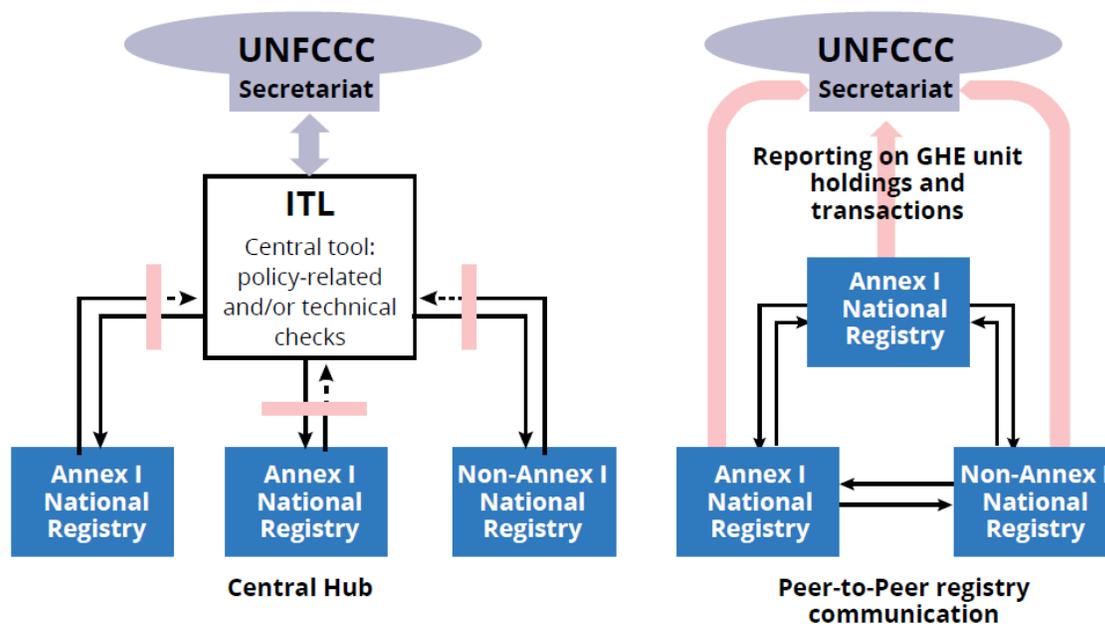
Market intelligence suggests that developing countries currently have a wide range of different databases or “registries” for collecting and reflecting pipeline activities to ex-poste, verified emission reductions in registries at the country, regional, or institutional level. These differences constrain market integration and scalability and will add to complexity of transactions and tracking to ensure market integrity. This component of the proposal will develop standard registry specification and software (together, a “Productized” Registry system) and implement these in selected countries to define minimum standard of market ready national registry systems that would make robust tracking of MOs and the avoidance of double counting.

The productized MRV and Registry applications will be scanned to identify *cyber-security* vulnerabilities during the development and finalization. All identified vulnerabilities will be addressed prior to release version for implementation. The implementation agency identified by piloting countries would continue to have the responsibility to secure the application and its operating IT environment. Guidelines for securing the application will be documented and provided to all implementation agencies.

The productized MRV and Registry application will also have minimum dependencies with proprietary or commercial off-the-shelf (COTS) software. The open-source for the MRV and the Registry system will embrace the principles of open exchange, collaborative participation, rapid prototyping, transparency and PMR community-oriented development and evolution of the system. There will be dependency on the operating system for the application – like Windows Server OS – which will be the responsibility and capability of implementing agencies. The MRV and the Registry applications will be designed to accommodate different type of database including proprietary and open source. All technical configuration and related documentations will be provided to implementation agencies.

In order to benefit from the learning by the PMR countries in designing and implementing MRV and registry solutions, a “steering group” of country nominated representatives will be set up. The steering group will provide guidance on design and implementation options for the productized MRV and Registry systems.

**Component 3: Connecting with other national registries and third-party registries (like VERRA, Gold Standard etc.).** In the Kyoto Protocol, Annex I countries established national registry systems that are linked through an International Transaction Log (ITL) while developing countries relied on the CDM Registry for holding accounts for issued CERs. In contrast, the Paris Agreement includes neither provisions for issuing international units nor centralized oversight on transfers of ITMOs. Article 6.2 simply requires countries to “ensure environmental integrity and transparency”, to apply “robust accounting”, and to “authorize” transfers (Articles 6.2 and 6.3). Thus, decentralized and heterogeneous systems for tracking ITMO may be expected. This poses a key challenge: in decentralized systems, the information reported by countries could be inconsistent – the transferring country may provide different information on a specific transfer than the acquiring country, for e.g. because the two countries use different approaches and rules to account for international transfers.

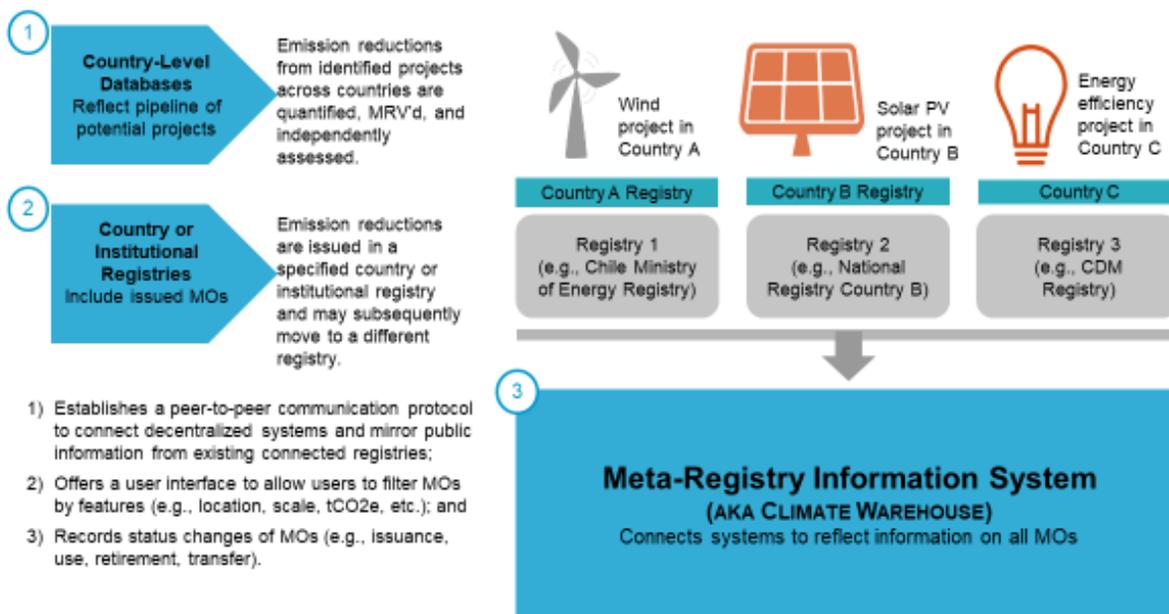


Source: Prag, A., C. Hood A. Asruned and G. Briner, “Tracking and Trading: Expanding on Options for International Greenhouse Gas Unit Accounting after 2012”

Hence, countries need to ensure consistency in information on international transfers of ITMOs under decentralized governance along with comprehensiveness of the information provided. While supporting countries establishing a standardized registry design is essential, it would be equally important to demonstrate the viability of connected, peer-to-peer national registry systems that is able to track MOs for avoidance of double counting. This may require *inter alia* establishing common interfaces, datasets and parameters to be captured and exchanged. API (application programming interface) specifications will be developed to facilitate communication between national registries and with other third-party registries like VERRA, Gold Standard etc. to ensure all relevant data on MOs is available in the agreed format and to agreed standards to create a peer-to-peer connected system of registries.

The proposed meta-registry system would connect to national registries to surface publicly-available information on MOs and record status changes to provide information on how MOs are used. Creating a robust tracking framework would enhance transparency and trust among market participants and enable tracking of MOs across jurisdictions.

## Connected Registry Ecosystem



After establishing the viability and appropriateness of using blockchain technology as the basis for a meta-registry through a prototype in June 2019,<sup>3</sup> through the Climate Warehouse program the World Bank has concluded a successful simulation of the blockchain based meta-registry concept. This involved partner institutions and countries that are implementing databases or registry solutions. With the support of the World Bank, partners were able to connect to the blockchain-based meta-registry to surface publicly-available information from their systems. The proof-of-concept established through the simulation phase will be used to pilot the connection of the national registries set-up as a part of this proposal.

### PHASE II: DEPLOYMENT OF SYSTEMS IN IDENTIFIED COUNTRIES

Once the systems are developed, customization requirements to suit the context and requirements of the countries will be identified and finalized in parallel to the Phase I. Along with deployment of the system, countries will be also supported with implementation of institutional and governance framework and capacity building described below in order to operate the systems successfully.

**Component 4: Institutional and Governance Framework.** In addition to these, based on the ongoing work in standardized crediting framework on designing the implementation arrangements for operationalization of Article 6, also the lessons learned from implementation of carbon pricing

<sup>3</sup> World Bank, 2019, Blockchain and Emerging Digital Technologies for Enhancing Post-2020 Climate Markets, See [link](#).

instruments in PMR countries, **an institutional and governance framework** can be developed and offered to countries in need. This framework takes existing country level institutional and organizational structures and capacities of actors involved in, identifies the areas for strengthening, lays down the coordination needs between different actors and efforts needed to align different actions at domestic level and propose a framework to implement the structure needed.

**Component 5. Institutional Strengthening and Capacity Building and Training.** In many countries, the entities involved in the MRV system for the mitigation action have limited capacity and lack resources to comply with the requirements defined by the MRV system. Therefore, the institutions need to be strengthened and supported with capacity building activities. The capacity building and training activities developed under the PMR on MRV and registry systems can be offered to countries through different means (online course, face-face training, in-country workshops etc.).

The PMR Secretariat will capture the lessons learned from the experience and disseminate the findings to wider audience. A dissemination plan will be developed during the pilot implementation phase.

**Component 6. Development of a strategy to support countries participation in market mechanism under the Paris Agreement.** As the NDC implementation requirements and challenges become clear with the agreement on the Paris Rulebook, countries need to define a strategy for the use of Article 6 to comply and raise the ambition of their NDCs. In doing so, countries need to identify and understand the implications of carbon markets for NDC implementation (including impact on NDC, requirements of tracking and reporting, corresponding adjustment, etc.). Without proper understanding of these, countries may not be able to participate in the emerging markets and will not be able to fully utilize the infrastructure developed. The PMR has initiated activities with similar objective in Colombia and Turkey and the scope and terms of reference for the support to additional piloting countries will build on the experience from these countries.

**Selection of pilot countries.** Pilot countries will be selected by the PMR Secretariat from the PMR implementing Countries through a consultative process. Priority will be given to the interested Implementing Partner countries that have put in place MRV system and the national registry or have completed the needs assessment and the design of MRV or registry systems. Interest of the Implementing Partner country to develop and implement a strategy for market mechanisms (Component 6) will also factor in the selection of pilot countries. Clarity and specificity in the proposed national institutional and governance arrangements for the market mechanism will be also be considered. The assessment of the PMR Secretariat to complete all the tasks within the defined schedule and deadline (December 2020) will also be an important consideration.

## RESOURCES NEEDED

Based on above, resources are needed for the following tasks:

- Productization of the MRV system
- Productization of the National Registry system
- Connecting between national registries and other third-party registries
- Institutional strengthening and capacity building
- Development of a strategy to support countries participation in market mechanism under the Paris Agreement

Sl.	Activity	Amount (USD)
<b>PHASE I</b>		
1	Productization of the MRV system <ul style="list-style-type: none"> <li>- Productizing the MRV system</li> <li>- Multi-language support</li> <li>- Development of user manual and training material</li> </ul>	250,000
2	Productization of the National Registry system <ul style="list-style-type: none"> <li>- Development of functional and technical specifications</li> <li>- Development of the system that can be productized</li> <li>- Multi-language support</li> <li>- Development of user manual and training material</li> </ul>	450,000
3	API development for connection between MRV/database systems and national registry	50,000
4	API development for connection between national registries and third-party registries	50,000
<b>Total (upfront cost)</b>		<b>800,000</b>
<b>PHASE II</b>		
<b>Estimated Cost (for each) Pilot County Support</b>		
1	In parallel to the Phase 1 development, the Secretariat will identify, shortlist, and consult with the countries that express interest to identify the pilot countries based on the selection criteria. Once the needs and requirements of customization are confirmed feasible under the PMR Phase Period, countries will be finally determined in consultation basis and will be also supported at deployment stage with institutional strengthening and capacity building.	Up to \$250,000 per country
2	Development of a strategy to support countries participation in market mechanism under the Paris Agreement	Up to \$100,000 per country

## TIMELINE

November 2019 – December 2020

	Activity/Quarter	1	2	3	4
Phase I	1. MRV system	■	■		
	2. National Registry system	■	■		
	3. Connecting to Warehouse Meta-Registry		■	■	■
Phase II	4. Country identification	■	■	■	
	5. System deployment and institutional strengthening and capacity building		■	■	■
	6. Implication and strategy for markets and NDCs	■	■	■	■