Climate Warehouse
End-to-End Digital Infrastructure for Carbon Markets

Digital Infrastructure for Carbon Markets
2022
Post-2020 markets under the Paris Agreement will be built through a bottom-up approach, as each party to the Agreement is required to track the greenhouse gas (GHG) emission reductions (or removals) achieved—and has considerable leeway to determine how this will be done.

The bottom-up nature of future carbon markets comes with increased complexity and diversity of reporting and verification approaches for GHG emissions inventories and mitigation outcomes:

- Limited transparency
- Limited liquidity
- Market fragmentation and inaccessibility
- Quality variability
- Lagging methodologies

There is significant potential for digital infrastructure to underpin and streamline the functioning of post-2020 carbon markets.

Source: Adams, Tim, Winters, Bill, Nazareth, Annette and Mark Carney Taskforce on Scaling Voluntary Carbon Markets Phase 1 Final Report: January 2021, TSVCM, pg. 45
Data and trade infrastructure is a precondition to scale a transparent and inclusive carbon market. Climate Warehouse: piloting an end-to-end digitization of the carbon market ecosystem.
The World Bank’s Climate Warehouse Program tests, prototypes and develops digital infrastructure for carbon markets.
World Bank Climate Warehouse Program:
Building an End-to-End Digital Ecosystem for Carbon Markets

Pillar 1: Piloting and Developing Global Public Goods

Making digital infrastructure for carbon markets available to client countries through development, testing and prototyping of innovative digital infrastructure for carbon markets.

Work Streams:
- **Digital for Climate (D4C) Working Group.** Collaboration with EBRD, UNDP, UNFCCC, and WB for a modular and interoperable end-to-end digital ecosystem for carbon markets.
- **Digital Monitoring, Reviewing and Verification (dMRV) systems.** Piloting the connection between dMRV systems with national carbon registries and national MRV systems.
- **National Carbon Registries.** Development of opensource off- and on-chain transaction registries.
- **Tokenization instruments.** Development of tokenization instruments to tokenize carbon markets.
- **Climate Action Data Trust (CADT)**

Pillar 2: Global Knowledge and Capacity-Building

Support countries and jurisdictions to in implementation of digital infrastructure for carbon markets needed for GHG mitigation and NDC implementation through PMI Technical Assistance

Work Streams:
- **Develop knowledge base on digital infrastructure and facilitate information exchange through technical discussions and knowledge dissemination**
- **Assist** countries to identify and implement best practice approaches and, where relevant, achieve compatibility in design to support the development and linking of digital infrastructure for carbon markets
- **Encourage** international and national cooperation, and inform the domestic and global policy discussions on GHG mitigation by sharing lessons learned and providing a platform for collective innovation on digital infrastructure products
World Bank Climate Warehouse Program: Building an End-to-End Digital Ecosystem for Carbon Markets

Designing, prototyping, piloting and validating digital infrastructure for the scale up of carbon markets and finance

- d-MRV systems: Piloting
- National carbon registries: Designing & piloting
- Tokenization instruments: Prototyping
- Aggregating registry data in a blockchain-enabled platform: Launched!
A global public metadata layer to foster greater transparency, integrity and security in the carbon markets
Climate Action Data Trust – Value Proposition

Global public good that aims to empower a new global carbon market infrastructure. Metadata platform that aims to link, aggregate and harmonize underlying registry data to enable transparent accounting as per Article 6.

Designed as an open shared infrastructure with a common taxonomy of data that facilitates connection and communication between entities enabled by blockchain technology.

Registry service providers and countries share data to the platform and public and private sector market players can host a node and build out the service layer.

Provide visibility into corresponding adjustment procedures and the lifecycle of carbon offsets from issuances to retirement, which will safeguard against double counting and ease reporting requirements.
• Designed as an open shared infrastructure layer

• Common taxonomy of data facilitates communication between entities

• Registry service providers and countries share data to the Climate Action Data Trust (CADT)

• Public and private sector market players can host a node and build out the service layer
Climate Action Data Trust – Timeline of Testing Activities

Product development, Stakeholder participation and Governance model

- Simulation I: August 2019
- Simulation II: November 2019
- Simulation III: January 2022

- Climate Action Data Trust
- Timeline of Testing Activities
Developed operational prototype as a global public good that aims to empower a new global carbon market infrastructure through a decentralized information technology platform built on blockchain technology.

Implemented the recommendations from the governance consultations on the operational platform conducted by IETA and the Government of Singapore:
- Conducted fundraising
- Formation of governing bodies
- Set up independent legal entity anchored in Singapore
- Official launch in December 6-8, 2022

Testing activities:
- 75 individual testers
- 30 participating organizations
- 11 governments
- 40 weekly office hour sessions
- 58 testing sessions
- 30 kick-off and onboarding meetings
- 514 individual points of feedback, which helped identify 156 development actions, 139 of which were implemented during Simulation III and reflected in the final version of the operational prototype at the end of the simulation.

Key lessons learned and a complete log of all participant feedback shared with the governing body of the operational CAD Trust at the end of Simulation III in August 2022 (Climate Warehouse Simulation III – Final Report)

Participation in CADT Simulation III (2022)

22 full participants:
- Chile
- Japan
- Peru
- Rwanda
- Senegal
- Singapore
- Sweden
- Switzerland
- UK
- Uganda
- ACR
- CAR
- GCC
- Gold Standard
- Verra

8 observers:
- Spain
- EBRD
- UNDP
- UNFCCC
- Climate Ledger Initiative
- ClimateCheck
- IETA
- Open Earth Foundation
Feedback from participants of Simulation III

<table>
<thead>
<tr>
<th>Simulation III scope</th>
<th>Benefits &amp; Feedback</th>
<th>3 types of experts are needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sim III pushes participants to envision an interconnected ecosystem, beyond their own standalone system</td>
<td><strong>Benefits</strong></td>
<td><strong>Policy Setter</strong></td>
</tr>
<tr>
<td>• Data added to the Climate Warehouse must be able to bridge process flows across participants</td>
<td>• Increased transparency and data sharing</td>
<td>• Provides policies, guidelines, strategy for implementing, projections on future impacts on the inner workings of the organization</td>
</tr>
<tr>
<td>• Participants must validate the Climate Warehouse’s level of data granularity, status information and units transfer methodology</td>
<td>• Addressing double counting risks across registries</td>
<td>• Needs to understand how the data will be used internally and by partners in the future, what changes need to occur for this to happen, and what is possible due to technology advances.</td>
</tr>
</tbody>
</table>

**Feedback**
- Difficulty defining minimum standards needed to link registries
- IT complexity, upgrades to existing systems, building integration
- Ability to connect regional registry systems
- Multiple groups within the same organization will need to coordinate and play a role

**Policy Setter**
- Provides policies, guidelines, strategy for implementing, projections on future impacts on the inner workings of the organization
- Needs to understand how the data will be used internally and by partners in the future, what changes need to occur for this to happen, and what is possible due to technology advances.

**Registry Administrator**
- Create procedures for implementing policies
- Needs to understand how workflows will change in the future, implications for their technology tools and the data that needs to be available and captured.

**IT Support**
- Ensure data structure and registry functions are fit for purpose
- Needs to understand direction of policies, field definitions to figure out equivalencies for integration.
CLIMATE ACTION DATA (CAD) TRUST: Technical Architecture and Data Model
The architecture has 2 layers – the data layer and the public blockchain layer

Data Layer...

• Defines a common data model and taxonomy
• Reconcile data across registries
• Identify potential double counting
• Enable auditing and reporting

... on a Public Blockchain Layer

• Transparent and Immutable Data
• Auditable
• Accessible and Inclusive
• Public and Transparent
• Open source
• Peer-to-peer governance
Updates to the Simulation III Data Model Based on Feedback

Project Location
- Warehouse Project ID* (FK)
- Project Location ID (PK)
- Country*
- In-Country Region
- Geographic Identifier*

Project Rating
- Warehouse Project ID* (FK)
- Project Rating ID (PK)
- Rating Type*
- Rating Range Lowest*
- Rating Range Highest*
- Rating*
- Rating Link*

Co-Benefits
- Warehouse Project ID* (FK)
- Co-Benefit ID (PK)
- Co-Benefit

Estimations
- Warehouse Project ID* (FK)
- Estimations ID (PK)
- Crediting Period Start* (FK to project loc ID)
- Crediting Period End* (FK to project loc ID)

Projects
- Warehouse Project ID* (FK)
- Current Registry*
- Project ID*
- Registry of Origin*
- Program
- Project Name*
- Project Description*
- Project Link*
- Project Developer*
- Sector*
- Project Type*
- Project Tags
- Covered by NDC*
- NDC Information
- Project Status*
- Project Status Date*
- Unit Metric*
- Methodology*
- Validation Body
- Validation Date

Related Projects
- Warehouse Project ID* (FK)
- Related Project ID (PK)
- Registry Type

 issuances
- Warehouse Project ID* (FK)
- Issuance ID (PK)
- Issuance Start Date*
- Issuance End Date*
- Verification Approach*
- Verification Report Date*
- Verification Body*

Units
- Warehouse Project ID* (FK)
- Warehouse Unit ID* (FK)
- Unit Issuance Location* (FK to project loc ID)
- Label ID* (FK)
- Unit Owner
- Country Jurisdiction of Owner*
- In-Country Jurisdiction of Owner
- Serial Number block*
- Serial Number Pattern
- Unit Block Start* (derived)
- Unit Block End* (derived)
- Unit Count* (derived)
- Vintage Year*
- Unit Type*
- Marketplace
- Marketplace Link
- Marketplace Identifier
- Unit Tags
- Unit Status*
- Unit Status Reason
- Unit Registry Link*
- Corresponding Adjustment Declaration*
- Corresponding Adjustment Status*

Governance (Picklist values)
- Registry values
- Project Sector values
- Project Status values
- Project Type values
- Methodology values
- Unit Metric values
- Validation Body values
- Country values
- Rating Type values
- Unit Type values
- Unit Status values
- Corresponding Adjustment Declaration values
- Corresponding Adjustment Status values
- Related Project relationship type values
- Label Type values
- Verification Body values
- Tag values
- Cobenefit values

Key:
- No change
- New field
- Updated picklist values
- Converted from required to optional
- Removed

Fields with an * are required form fields
PK denotes primary key for a specific table
FK denotes foreign key which links tables together

Each ID is globally unique, meaning no organizations will generate the same ID for any table
There are 3 ways to integrate data:

- User Interface
- API
- Spreadsheet import/export
CLIMATE ACTION DATA (CAD) TRUST: Governance & Next Steps
Governance and Finance consultation
September 2021 – March 2022

70+

Entities involved
• Governments
• Independent standards
• Exchanges
• Traders
• Project developers
• Private sector
• Financial institutions
• Technology providers
• NGOs
• Think tanks
• Law firms
• Multilateral development banks
• Observer: UNFCCC

5

Governance models reviewed
• Western Climate Initiative, Inc (WCI, Inc.)
• Integrity Council for Voluntary Carbon Markets (IC-VCM)
• EU-Swiss ETS link
• Joint Crediting Mechanism (JCM)
• British Standards Institution (BSI) & Enterprise Singapore (ES)

6

Focus groups conducted
• 4 on governance (46 entities)
• 2 on finance (45 entities)

+ polls and surveys for participant feedback throughout
2022 Governance

Council

Interim Period

Board of Directors

Technical Committee
Composed of 20-30 data providers and market practitioners to advise on technical development

Secretariat
Operational support

Operational, strategic and communications support

Mandates to implement workplan

User Forum
Composed of market practitioners and users of the data provided to advise on additional functionality and use

Recommendation

Operational support
2022 Outlook and Next Steps

- **Aug**: Simulation III concluded
- **Sep**: Non-profit entity est. in Singapore
- **Oct**: MVP software & data model transfer, 26th Oct: Public launch (soft launch)
- **Nov**: COP, First registry commitments documented
- **Dec**: 7-8 Dec: Asia Climate Summit (official launch), First TC & UF meetings, 1st IC meeting
- **Jan**:
<table>
<thead>
<tr>
<th>INCEPTION PHASE 2022</th>
<th>INTERIM PERIOD 2023-2024</th>
<th>PERMANENT GOVERNANCE 2025 Onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOVERNANCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• IETA, World Bank, and Singapore Government provide governance and support</td>
<td>• Interim Council in charge of strategic decisions and transition to permanent governance</td>
<td>• Permanent Council elected and Council rotation established</td>
</tr>
<tr>
<td>• IETA provides Secretariat functions</td>
<td>• IETA provides Secretariat functions</td>
<td>• Secretariat transitioned to an independent entity</td>
</tr>
<tr>
<td>• Interim Council recruitment</td>
<td>• Data specification development</td>
<td>• Further adoption by registries and governments</td>
</tr>
<tr>
<td><strong>PRIORITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Establish a legal entity</td>
<td>• Adoption by independent standards and national registries</td>
<td>• Build a service layer</td>
</tr>
<tr>
<td>• Fundraising</td>
<td>• Marketing, user adoption</td>
<td>• UNFCCC reporting interaction</td>
</tr>
<tr>
<td>• IT platform handover</td>
<td></td>
<td>• Long-term strategy</td>
</tr>
<tr>
<td>• Engagement with independent standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Public launch</td>
<td>• Grant funding</td>
<td>• Grant funding</td>
</tr>
<tr>
<td><strong>FUNDING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Grant funding</td>
<td>• Grant funding</td>
<td>• Move to self-sustaining finance</td>
</tr>
</tbody>
</table>

Next Steps
## Data Provider Onboarding

<table>
<thead>
<tr>
<th></th>
<th>Q4 2022</th>
<th>Q1/2 2023</th>
<th>Q3/Q4 2023</th>
</tr>
</thead>
</table>
| **INDEPENDENT STANDARDS** | • ECOREGISTRY  
• PURO EARTH | • ACR  
• CAR  
• VERRA  
• GOLD STANDARD  
• GCC | • SMALLER INDEPENDENT STANDARDS |
| **NATIONAL REGISTRIES** | • INITIAL COUNTRY REGISTRIES  
(SINGAPORE, SENEGAL, BHUTAN, CHILE, JAPAN, UK) | | • ADDITIONAL NATIONAL REGISTRIES  
• MULTILATERAL BANK REGISTRIES |
| **MARKET** | • CHAINLINK API  
• RATINGS AGENCIES  
• EXCHANGES | | • FINANCIAL INSTITUTIONS  
• PROJECT DEVELOPERS  
• TRADERS  
• TECHNOLOGY PROVIDERS |
Climate Warehouse
End-to-End Digital Infrastructure for Carbon Markets

Q&A, Video & Demo

WORLD BANK GROUP  Climate Warehouse  PMIF
The World Bank National Carbon Registry Offering

Enabling Decentralized Climate Markets to Share and Track Climate Data
Digital infrastructure is a precondition to scale a transparent and inclusive carbon market

Climate Warehouse: piloting an end-to-end digitization of the carbon market ecosystem

**Digital MRV** (UNFCCC, ISO or Independent Standard)
- Program Level MRV
  - Equipment
  - Sensors
  - Meters
  - Satellite
- Facility Level MRV

**Registries**
- WB Core Registry
- WB Enhanced Registry

**Digital Carbon Assets (Tokenization Engine)**

**Services Layer**
- Climate Action Data Trust
- Compliance reporting
- Benchmarking
- Due diligence checks
- Certifications
- Conflict resolution
- Ratings
- Forecasting

**Metadata Layer**
- Exchange A
- Exchange X

**Centralized Database**
optionally to National MRV System

**National Inventory**

**Reporting for markets, UNFCCC**

**Digital work-flow**
project preparation from document development, approval, validation to registration in applicable standards
Registry systems enable countries to participate in the carbon markets

- Individual commitments through nationally determined contributions (NDCs). The Paris Agreement introduced a bottom-up approach for addressing climate change.

- A registry is one of several prerequisites for the implementation of a carbon pricing mechanism for the purposes of carbon accounting and compliance with UNFCCC principles. Pricing schemes aim to reduce GHG emissions with the issuance of tradeable carbon credits and is an effective tool for countries to meet market mechanism requirements under Article 6 of the Paris Agreement.

- National Carbon Registry: The carbon registry system allows countries to administer various accounts, perform internal transactions and internationally trade with other registries, amongst other capabilities.


Why implement a national registry system?

- Help countries meet their NDC requirements
- Complying with Article 6 of the Paris Agreement
- Brings diverse participants into the global carbon markets
- Supports the move away from fossil fuels and towards a green economic transition
- Carbon markets reduce costs to smooth the low-carbon transition
- Guarantees transparency through auditable transactions
- Open-source registries promote inclusiveness
- Registry systems ensure integrity and security of project and unit data
What is the World Bank Registry Offering?

- The World Bank Climate Warehouse umbrella program offers a menu of digital infrastructure for carbon markets, including **two open-source national carbon registries** – 1. Core Registry and 2. Enhanced Registry.

- The registry systems **aim to follow the national and international regulatory requirements** as well as principles for carbon accounting:
  - UNFCCC principles: transparency, completeness, comparability, accuracy, consistency
  - Prevention of the risk of double accounting
  - Independent administration
  - Auditable accounting system
  - Compliance with applicable regulations
  - Suitability for use as evidence of ownership and transfer of ownership in respect of the recorded units

- The registries are **open-source public goods** and promote **interoperability**

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1. Core Registry

The Core Registry provides **national-level registry infrastructure** enabling member countries to issue digital carbon assets. Users can **manually upload projects and units' data** in sync with the World Bank's CADT Metadata layer.

2. Enhanced Registry

The Enhanced Registry provides **infrastructure to support domestic and international crediting market transactions**. It provides an integrated d-MRV system/automated entry mechanism to share projects and units' data, supporting global carbon market activity.
### What are the Key Characteristics of the Registry Offering?

<table>
<thead>
<tr>
<th>Functionalities</th>
<th>Required for Article 6</th>
<th>Core Registry (On-chain)</th>
<th>Enhanced Registry (with MRV system)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add/Remove Project</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Issue Units</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Use/Transfer Units</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Allow for Multiple Account Holders</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Label Issued ERs (e.g., ITMO Authorization)</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Dedicated Accounts for OMGE and SOP</td>
<td>Yes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Link to Climate Action Data Trust (CADT)</td>
<td>No</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Track and Manage Workstreams</td>
<td>No</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Create New Project Types and Methodologies</td>
<td>No</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Link to GHG Inventory</td>
<td>No</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Report Generation</td>
<td>No</td>
<td>X</td>
<td>✓</td>
</tr>
<tr>
<td>Distributed Ledger Technology</td>
<td>No</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Open-source Software</td>
<td>No</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>
Differentiating between Core Registry and Enhanced Registry

1. Link to Climate Action Data Trust (CADT)
2. Add, edit, and remove Emissions Reductions (ER) projects
3. Issue ERs to the projects
4. Add labels and approvals, with supporting documentation, to issued ERs
5. Retire, cancel, transfer issued ERs
6. Multiple accounts to allow for ER buyers to have an account in the country registry
7. Dedicated accounts for holding ERs as overall mitigation in global emissions (OMGE) or share of proceeds (SOP)
8. Track and manage unit verification process
9. Create new project types with underlying methodologies
10. Link registry to GHG inventory systems and key parameters (Grid Emission Factor, Non-Renewable Biomass fraction)
11. Automatically generate reports on ER projects
2. National Core Carbon Registry
What is the Core Registry?

- The World Bank is developing a simplified, open-source carbon registry using distributed ledger technology (DLT) to enable PMI member countries to directly participate in global carbon markets.

- The public blockchain enables inclusiveness, accountability (decentralized governance and peer-to-peer support), transparency (fully auditable record of transactions) and integrity (fully immutable, traceable and interoperable).

- The Core Registry is currently comprised of two main applications:
  - The Climate Action Development Trust (CADT), which will enable market participants to record data about projects and issued units
  - The Native Tokenization Engine (NTE) enables the issuance of tradeable instruments based on CADT data
  - Additional modules will be added to expand functionality

- The Core Registry aims to provide a seamless solution for registry admins to issue digital carbon assets.

Key Features

- Information about projects and issued units is published in a publicly viewable and auditable manner
- Tokenization of issued digital climate assets
- Automated recording of retirements detected on-chain in the CADT
- Disable detokenization for digitally native climate assets
1. **Climate Action Data Trust (CADT)**: RA submits project and unit information, which includes verified GHG emissions balance.

2. **Native Tokenization Engine (NTE)**: RA will be able to issue digital carbon assets (tokens represent carbon credits).

3. **Climate Wallet**: Digital carbon assets are issued into the designated Climate Wallet. Wallet owners are able to transfer tokens to other wallets or retire tokens as needed.

4. **Climate Explorer**: Module that monitors the blockchain for retirement transactions for audit and reconciliation purposes.
What are the Capabilities of the Core Registry?

Functionality Overview

1. Add, edit, and remove Emissions Reductions (ER) projects
2. Issue ERs to the projects
3. Add labels and approvals, with supporting documentation, to issued ERs
4. Retire, cancel, transfer issued ERs
5. Multiple accounts to allow for ER buyers to have an account in the country registry
6. Dedicated accounts for holding ERs as overall mitigation in global emissions (OMGE) or share of proceeds (SOP)
7. Link to Climate Action Data Trust (CADT)

Once implemented, a Registry Administrator will be able to:

- **Enter and update data** about projects, including:
  - Project name, project ID, and all CADT-defined project metadata
  - Project location GIS files
  - Links to any project information hosted outside of the Core Registry
  - Publish all data to the CADT
- **Issue carbon credits**, including:
  - Entering the data about the issuance into CADT
  - Issuing tokens to the project or their designee as tradable carbon instruments
- **Track retirements and their beneficiaries**, including:
  - Detecting retirements of issued tokens
  - Recording retirements into CADT
# What is the Core Registry?

<table>
<thead>
<tr>
<th>Actor</th>
<th>What will I need?</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Registry Administrator or Regulator | - Install Registry Software package (Climate Action Data Trust node, Tokenization Engine, Climate Explorer)  
- Software can be installed on local computer, data center, or a cloud-hosted environment                                                                                     | - No need to host registry website or manage users  
- Easy implementation - minimal hardware requirements  
- Registry can still manage credentialing (i.e. who can hold carbon units)                                                                                                           |
| Owner of Carbon Units           | - Install Climate Wallet  
- Software can be installed on local computer, data center or a cloud-hosted environment                                                                                                         | - Instant tokenization upon issuance  
- Can hold tokens from multiple standards                                                                                                                                         |
| The Public                      | - Internet access to view Climate Action Data Trust  
- No software installation needed                                                                                                                                                                           | - Complete transparency provided by Climate Action Data Trust                                                                                                                                                                                                     |
Climate Wallet

My Wallet

Sort by: Quantity - high to low

Requesting Detokenization
96,096,424 tCO2e
green project
Vintage Year 2009
Harry Gold Standard

3,049,971.942 tCO2e
chia project
Vintage Year 2009
ahwvei Gold Standard

chia project

Project Details
- Vintage Year: 2099
- Current Registry: ahwvei Gold Standard
- Project Link: www.goldstandard.org

Quantity Held
3,049,971.942 tCO2e

Transactions History

<table>
<thead>
<tr>
<th>Type</th>
<th>Status</th>
<th>Date</th>
<th>Unit Count</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detokenize</td>
<td>Pending</td>
<td>October 5, 2022</td>
<td>-21 tCO2e</td>
<td>0.0000000001</td>
</tr>
<tr>
<td>Receive</td>
<td>Pending</td>
<td>October 5, 2022</td>
<td>+9,978.28 tCO2e</td>
<td>0 TXCH</td>
</tr>
</tbody>
</table>
2. National Enhanced Carbon Registry
What is the value proposition?
Infrastructure to support domestic and international crediting market transactions

1. **Integrated MRV (Monitoring, Reporting, and Verification)** and automated entry mechanism to share projects and units’ data, reducing time required to generate and trade an emission reduction. This should also reduce transaction costs, directing a greater percentage of carbon revenues towards mitigation projects. In short, this is an out-of-the-box solution.

2. **Provide visibility into corresponding adjustment procedures and the lifecycle of carbon offsets** from issuances to retirement, which will safeguard against double counting and ease audit requirements through the registry's transaction, reporting and reconciliation functionality.

3. **Active participation in international carbon markets**, providing the capacity to introduce additional market-based-mechanisms (MBMs). The Enhanced Registry also supports interoperability between domestic mechanisms.

4. **Enhance transparency and trust among market participants, with the aim to reduce the risk of double counting and double claiming**. The Enhanced Registry does not hold credits or directly facilitate.

An open-source carbon registry
The Enhanced Registry Ecosystem

Outcomes

- Tools to support NDC reporting
- Ability to support transactions and interoperability between domestic mechanisms
- Participation in international carbon market
- Address risk of double counting and double claiming
Technical Value Proposition of Enhanced Registry

**Benefits**

- **Reduced development costs** through access to opensource registry code and resulting productization
- **Ease of deployment** – akin to downloading new software
- Application structure will allow for customization
- Allows countries to **address inconsistency** with datasets, parameters, indicators and technological interfaces
- Will define minimum standard of market ready national registry system that would allow robust tracking of units and the avoidance of double counting

**Requirements**

- Countries will **bear responsibility to secure the application** and the IT environment and performing software upgrades, requiring additional dedicated resources
- Countries will **need to customize the registry** to align with their requirements, which may be resource-intensive
- Regulation to **enforce the usage of the system** by all relevant stakeholders in the country
- Buyer and seller countries are responsible for ensuring unit quality

All transactions through direct registry-registry communication

Parties choose with registries they wish to link to

Parties set up their own registries

Information on holding of units in registries reported internationally in biennial transparency reports
Technical Capabilities & Functionalities of Enhanced Registry

Technical Capabilities
The Enhanced Registry aims to provide the country users with the following capabilities:

Technical Admin (TA)
• The TA would be able to configure the registry to increase the robustness of transactions.

Registry Admin (RA)
• The RA would be able to carry out all required transactions required over the lifetime of a project, guaranteeing the traceability the transactions and units.
• The RA would be able to view the balance of several account holders and a statement of the transactions carried out via the accounts to manage assets efficiently.
• The RA would be able to check the accounts to certify the compliance of the registry and its reports.

Registry Functionalities
The Enhanced Registry expands on the functionalities of the Core Registry. ER- specific functionality is highlighted.

1. Add, edit, and remove Emissions Reductions (ER) projects
2. Issue ERs to the projects
3. Add labels and approvals, with supporting documentation, to issued ERs
4. Retire, cancel, transfer issued ERs
5. Multiple accounts to allow for ER buyers to have an account in the country registry
6. Dedicated accounts for holding ERs as overall mitigation in global emissions (OMGE) or share of proceeds (SOP)
7. Track and manage unit verification process (MRV)
8. Create new project types with underlying methodologies
9. Link registry to GHG inventory systems and key parameters (Grid Emission Factor, Non-Renewable Biomass fraction)
10. Automatically generate reports on ER projects
For further information:

**Climate Warehouse**
- Website: [https://www.theclimatewarehouse.org/work/climate-warehouse](https://www.theclimatewarehouse.org/work/climate-warehouse)
- Testing Activities Video: [https://www.youtube.com/watch?v=cXwTV2bA_nv](https://www.youtube.com/watch?v=cXwTV2bA_nv)
- Online Library: [https://olc.worldbank.org/content/climate-warehouse-learning-series](https://olc.worldbank.org/content/climate-warehouse-learning-series)

**Climate Action Data Trust**
- Website: [https://climateactiondata.org/](https://climateactiondata.org/)

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