CARBON MARKETS INFRASTRUCTURE

OPTIONS FOR TRACKING ARRANGEMENTS

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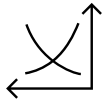
What is Carbon Market Infrastructure?

Carbon market infrastructure refers to the systems and platforms that facilitate the operation and functioning of carbon markets through the support of underlying frameworks and institutions. It encompasses various elements necessary for the monitoring, reporting, and verification of greenhouse gas emissions (GHG) reductions or removals, as well as the issuance, trading and tracking of carbon credits or allowances.



GHG Inventories	Monitoring and Reporting Systems	Registry Systems	Trading Platforms
Record greenhouse gas emissions and removals, typically organized by source, sector, or activity.	Monitor, measure, and report GHG emissions data from regulated entities or carbon offset projects.	Record and track, issuance, transfer, retirement, and cancellation of carbon credits or allowances.	Trade carbon credits, allowances, or offsets

Legal and Regulatory Frameworks

This lay down the international and national requirements of accounting and reporting of emission reductions.

Verification and Certification Bodies

Independent third-party entities that verify and certify the quality and validity of carbon offset project emissions reductions or removals.

Accounting, Reporting, Verifying, Issuing and Trading of Carbon Credits

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Tracking under Article 6.2

Each participating party must **"have"**, or **"have access to", a registry** for the purpose of tracking under Article 6.2 of the Paris Agreement. The registry records authorization, first transfer, use and other relevant actions relating to ITMOs.

Article 6 Rulebook on tracking

Article 6.2 Guidance (Decision 2/CMA.3, annex, chapter VI)

- Sets out the general requirements on tracking
- Tasks the UNFCCC Secretariat to implement an international registry

Guidance on registries (Decision 6/CMA.4, annex I, I)

Specifies:

- Registry form, functions and processes
- Interoperability
- Guidance relating to international registry

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Source: Article 6 Implementation Partnership (A6IP)

Article 6.2 registry functions

The Article 6.2 guidance specifies key requirements for the registry (Decision 2/CMA.3, annex, para. 29), which is further elaborated by the guidance for registries (Decision 6/CMA.4, annex I, chapter I).

Key requirements	Summary
Accounts and access	The registry must have **accounts** for ITMOs, as necessary. It must also provide access to the country and other entities with authorized access.
Recorded actions	The registry must be able to record the following **actions**: authorization, first transfer, transfer, acquisition, use towards NDCs, authorization for use towards OIMPs, and voluntary cancellation (including for OMGE, if applicable)
ITMO IDs	Each ITMO must have **a unique identifier (ID)**. The Article 6.2 guidance on registries sets out the minimum composition of the ITMO IDs.
Reporting	The registry must be implemented in a way that **enables reporting** of annual information consistent with the agreed electronic format (AEF).
Form	The registry's electronic, technical, and administrative arrangements must be based on **"software"** that enables tracking and recording of ITMOs.

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Source: Article 6 Implementation Partnership (A6IP)

Considering possible options for registry

	Registry options		
	Participating party registry		International registry (Operated by UNFCCC secretariat)
	Develop own registry	Use other available registry	
Countries suitable for this option	• Countries having in place domestic registry which serves similar functions • Countries intending to implement domestic CPIs which require a national registry • Countries having technical capacity and resources for operating its own system	• Countries receiving support from development partners who provide such service • Countries wishing to use registry for multiple functions in addition to Article 6 without developing own registry (subject to the functions provide by each registry) • Countries wishing to reduce cost in operating the system by themselves	• Countries intending to use the registry for the sole purpose of Article 6 • Countries with limited capacity and resources • Countries intending to use international registry in addition to their own registries to facilitate Article 6 implementation

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Source: Article 6 Implementation Partnership (A6IP)

Country's selection of registry for ITMOs tracking

Order: Alphabetical

Name of country	Registry for tracking ITMOs	Type of registry			Link
		Participating party registry		International registry	
		Develop own registry	Use other available registry		
Bhutan[2]	National Carbon Registry	✓			
Ghana[1]	Ghana Carbon Registry (GCR)	✓			Click here
Guyana[1]	Under development (Currently use ART TREES Registry)	Under development	✓		
Japan[2]	JCM Registry	✓			Click here
Suriname[1]	National Registry / International Registry for REDD+ Results	✓			Click here
Switzerland[1]	Swiss Emissions Trading Registry	✓			Click here
Thailand[1]	Thailand Carbon Credit Registry	✓			Click here
Vanuatu[1]	National Carbon Registry	✓			Click here

References:
1 confirmed in the submitted initial report
2 from official documents

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Source: Article 6 Implementation Partnership (A6IP)

Update as of March 28, 2024.

Note: The above list in an initial list. A6IP Center will collect and regularly update the list to include additional cases.

Example list of other available registries (1):
Registries provided by development partners and countries

Registry name	Provider	Brief description	Link for further information
National Core Carbon Registry and National Enhanced Carbon Registry	World Bank	Build on open-source software, provides national-level registry infrastructure enabling member countries to issue digital carbon assets.	Click here
National Carbon Credit Registry	UNDP	A digital public good (DPG), enables carbon credit tracking transactions from mitigation activities. Any country can customize and deploy a local version of the registry.	Click here
JCM Registry	Ministry of Environment, Japan	Partner countries may request the use of the JCM Registry for Article 6.2 cooperation.	Click here

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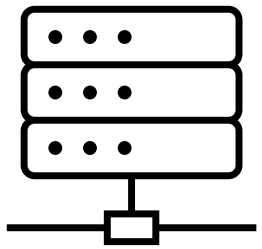
Source: Article 6 Implementation Partnership (A6IP)

Example of off-the-shelf registry

For capacity-building and training



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Testing the World Bank's Opensource "Core Registry"

Climate Warehouse

An open-source registry system with core functionalities for Article 6 tracking requirements and automatic sync-in to the Climate Action Data Trust (CAD Trust).

Tracking and accounting for article 6 requirements

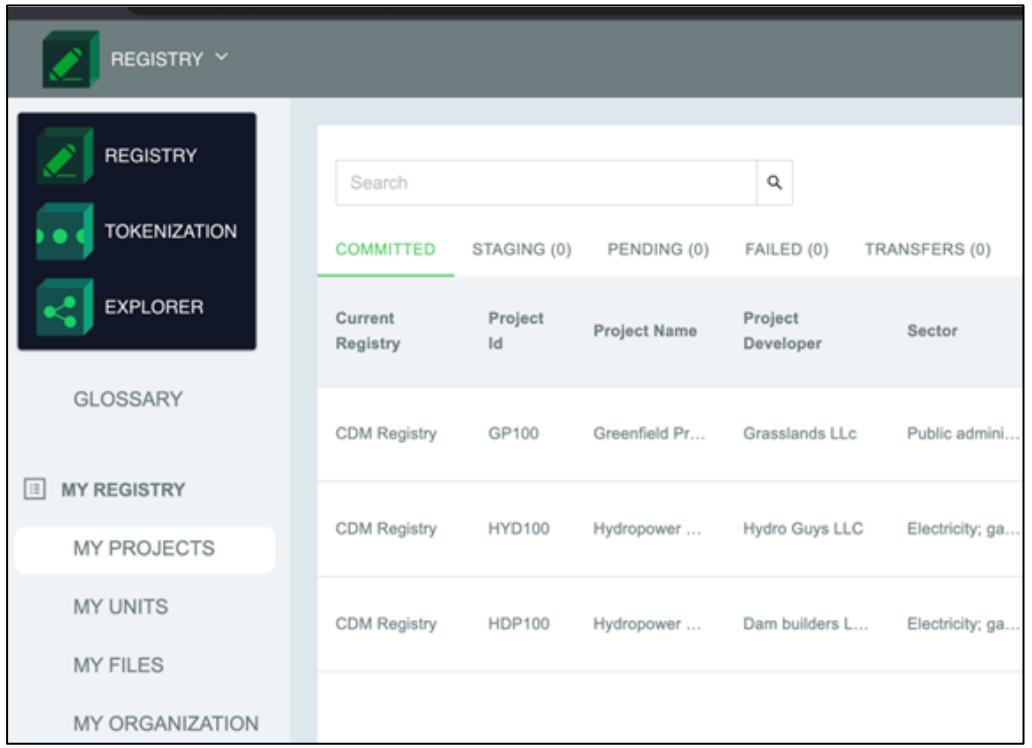
Leveraging common data model and automatic sync to the Climate Action Data Trust, which aggregates and harmonizes data from connected country registries.

Issuance and transaction of carbon credits

Through blockchain and tokenization technology, this transaction layer enables the creation of digital carbon assets – a digital record or representation of a traditional carbon credit

Fostering capacity-building and experiential learning

Learning between all actors involved on the needs, technical and functional requirements, and governance and business models



PMIF
PARTNERSHIP FOR MARKET IMPLEMENTATION FACILITY

Core Registry – Key Functionalities

Term	Definition	Usage
Digital Carbon Assets	A digital record of a traditional carbon credit that holds the same values and metadata as the traditional offset captured on a distributed ledger technology (DLT).	Carbon credits are created by the registry as the tradeable instrument for the carbon offset. These are sent to project developers, or custodied by the registry.
Climate Tokenization Engine	Functionality used in module 2 of Core Registry which allows the registry administrator to create and view existing carbon credits.	Registry administrator will view existing units in the register and decide which units to issue. This is the first step in the carbon credit lifecycle.
Climate Wallet	Functionality Core Registry which enables the transaction of carbon credits.	Project developers and buyers of carbon credits will use the Climate Wallet to view, send, and retire their held carbon credits.
Climate Explorer	Functionality of Core Registry which allows the registry administrator to track all carbon credits activity that occurs on the blockchain.	Registry administrators leverage this functionality to confidently track their issued carbon credits.
Carbon Credit retirement	Describes the final stage of the carbon credit, where it is provably removed on chain, creating a permanent record of the offset being used as a claim.	Buyers of carbon credits will use the Climate Wallet to retire a carbon credit, providing an anonymized - yet provable - record of the claim.

Training and Capacity-Building To Deploy the Registry

Training and testing the opensource registry system

Deployment of national carbon registry

Phase 1
Training

During this phase, participants will use a test environment, provided by the World Bank, to be able to test the Core Registry.

Participants will be provided with test scripts which will guide the testing process.

Feedback will be collected based on testing results.

2-4 Weeks

Phase 2
Feedback Assessment

After testing, the World Bank will guide a needs assessment session which is aimed at uncovering the specific needs of the country registry.

A questionnaire will guide the discussion to understand what gaps exist (if any) between the current Core Registry and what is needed by the country.

1-2 Weeks

If the government opts to adopt this registry system as their national carbon registry, they can proceed to phase 3.

Phase 3
Deployment

After the feedback assessment phase, countries can decide to deploy the Core Registry.

Once the decision to deploy has been made, the existing software can be deployed and used by the participant.

1-2 Weeks

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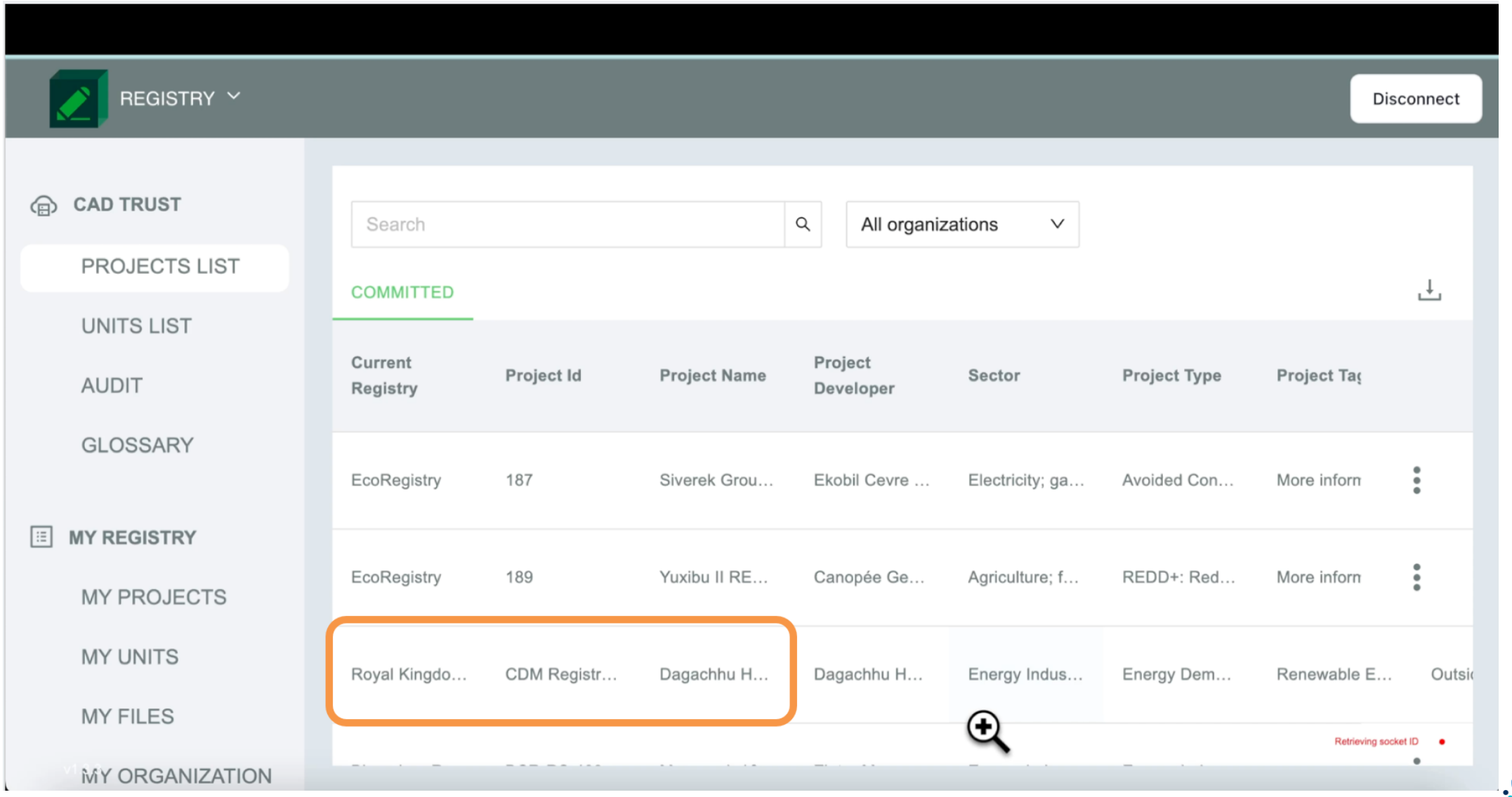
REGISTRY
Disconnect
CAD TRUST
PROJECTS LIST
UNITS LIST
AUDIT
GLOSSARY
MY REGISTRY
MY PROJECTS
MY UNITS
MY FILES
MY ORGANIZATION
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All organizations
COMMITTED
Current Registry
Project Id
Project Name
Project Developer
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Project Tag
EcoRegistry 187 Siverek Grou... Ekobil Cevre ... Electricity; ga... Avoided Con... More inform
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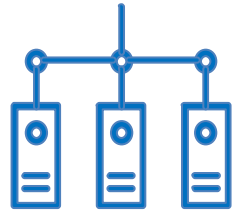
Retrieving socket ID

High-Level Data Model of the Registry

Country Data	The organization ID (a public key) is the unique identifier across the Core Registry. Countries will use their private key to access their node and update data. Data within the Core Registry is tied to an organization ID.
Project Data	Project data sits below the organization layer. Organizations will post project data they host, such as project names, types, owners, status, etc. Each project gets assigned a unique project ID.
Carbon Credits (Unit) Data	Units' data is connected to specific projects through the project ID. This is where organizations will input information denoting the issuances, amount, status, etc. for carbon credit units. All IDs created by the Core Registry are globally unique, meaning no single ID created will be created again. Organizations will not have two IDs that are the same, for any Core Registry ID field.



Governance

To enhance consistency in carbon projects and their related data, CAD Trust will oversee and manage the values in specific data fields.

This approach is designed to streamline reporting rather than impose restrictions.

Registry Data Model - Table and Field data

Project Location

Warehouse project ID*
Project location ID
Country*
In-country region
Geographic Identifier*

Project Rating

Warehouse project ID*
Project Rating ID
Rating Type*
Rating Range Lowest*
Rating Range Highest*
Rating*
Rating Link*

Co- Benefits

Warehouse Project ID*
Co- Benefit ID
Co- Benefit

Estimations

Warehouse Project ID*
Estimations ID
Crediting Period Start*
Crediting Period End*
Unit Count*

Projects

Warehouse Project ID*
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*
Related Project ID
Relationship Type
Registry

Issuances

Warehouse Project ID*
Issuance ID
Verification Period Start*
Verification Period End*
Verification Approach*
Verification Report Date*
Verification Body*

Labels

Warehouse Project ID*
Label ID
Label Type*
Label*
Crediting Period Start Date*
Crediting Period End Date*
Validity Start Date*
Validity End Date*
Unit Quantity*
Label Link*

Units

Issuance ID*
Warehouse Unit ID*
Unit Issuance Location*
Label ID*
Unit Owner
Country Jurisdiction of Owner
In-Country Jurisdiction of Owner
Unit Block Start*
Unit Block end*
Unit Count*
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

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
Co-Benefit values

Each ID is globally unique, meaning no two organizations will generate the same ID for any table

Process Flow: Transaction of Carbon Credits

1

ISSUE

Countries using the Core Registry can issue digital assets directly to project developer wallets.

2

SEARCH

Buyers will use the CAD Trust interface to search for available carbon credits they wish to purchase

3

TRANSACT

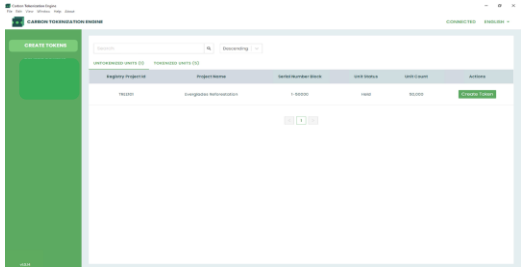
Buyers can work with the existing registry and project developer to determine a price per ton of carbon credits .

4

RETIRE

Buyers can then choose to retire the carbon credit on the Chia blockchain, creating a permanent record of the retirement.

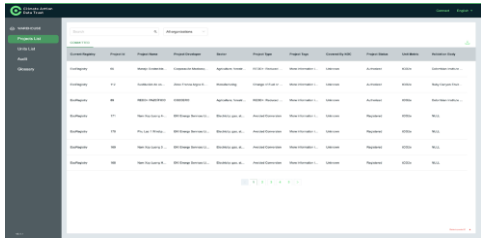
Core Registry



Countries will leverage the Core Registry to create digital carbon assets. These carbon credits will be issued on the blockchain.

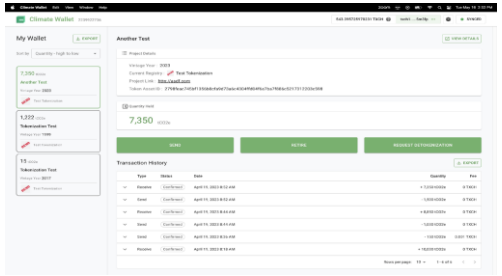
Additionally, the tokenization will be recorded in CAD Trust so that potential buyers may find the carbon credit.

CADT Observer Node



Buyers will search for existing carbon credits on the CADT observer node.

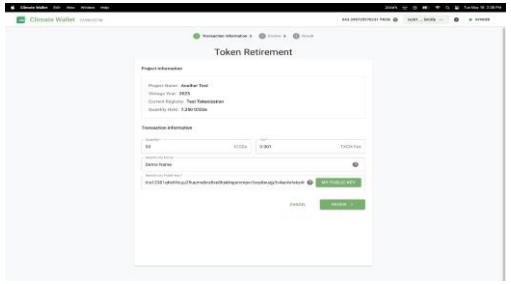
Climate Wallet



Once a price has been agreed upon, the project developer will send the carbon credits to the buyer.

This transaction will be a permanent record on the Chia blockchain.

Climate Wallet



The buyer can then choose to retire the carbon credits using the Climate Wallet.

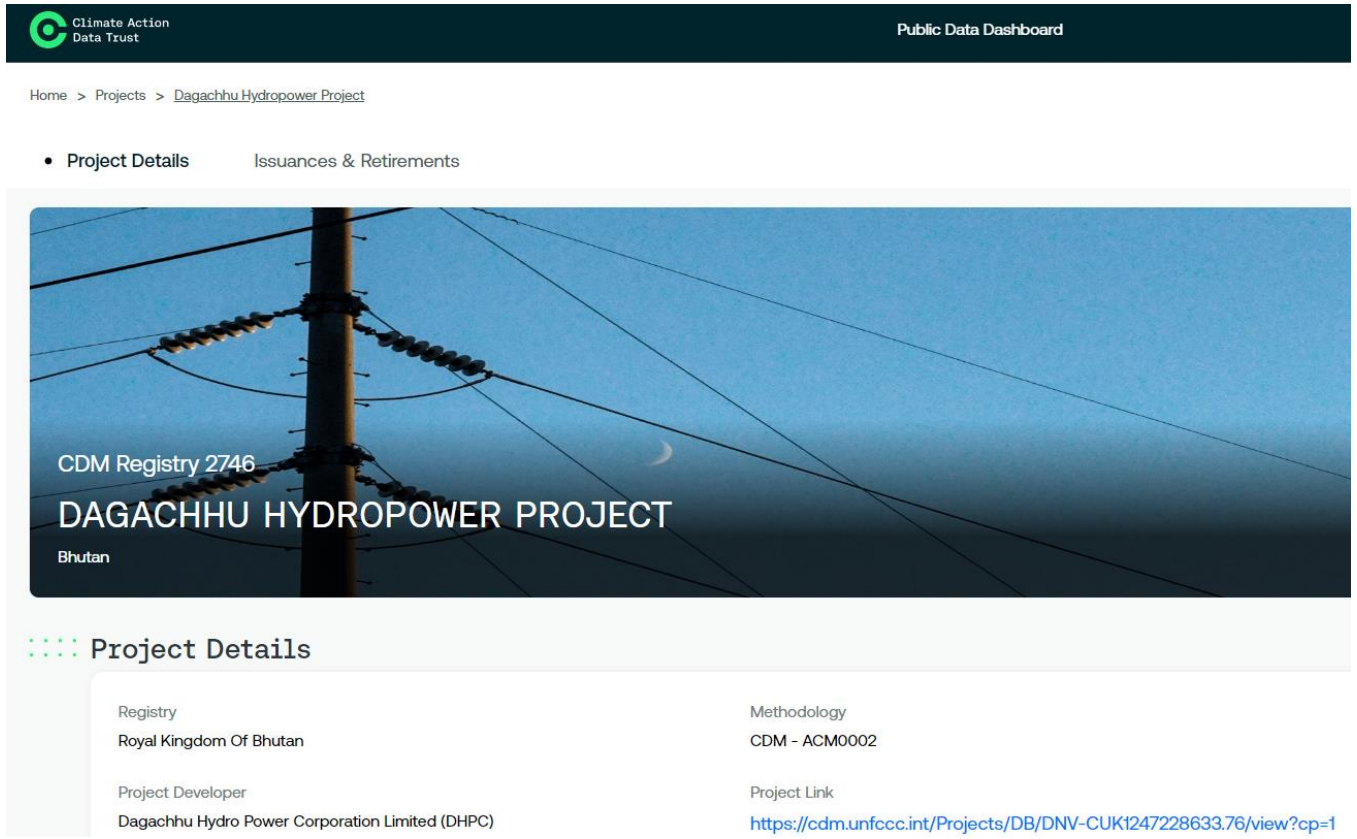
This will destroy the existing carbon credit and create a permanent record of the retirement, so that the buyer is ALWAYS able to prove the retirement.

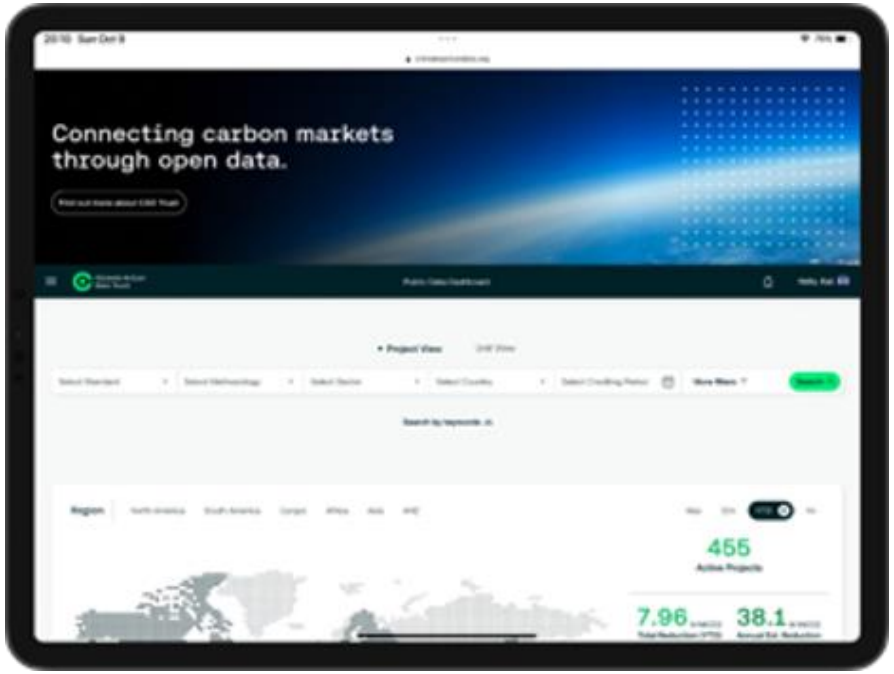
Chia Blockchain

Example

Bhutan's Registry Data Broadcasted in the CAD Trust

- Users can now access, compare and use carbon markets data on a free, open-source platform from connected country and standard registries.
- CAD Trust Dashboard: https://data.climateactiondata.org/search/projects





Resources

- State and Trends of Carbon Pricing
- Partnership for Market Implementation (PMI)
- Climate Warehouse
- Climate Market Club

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