

# Connecting carbon markets through open data

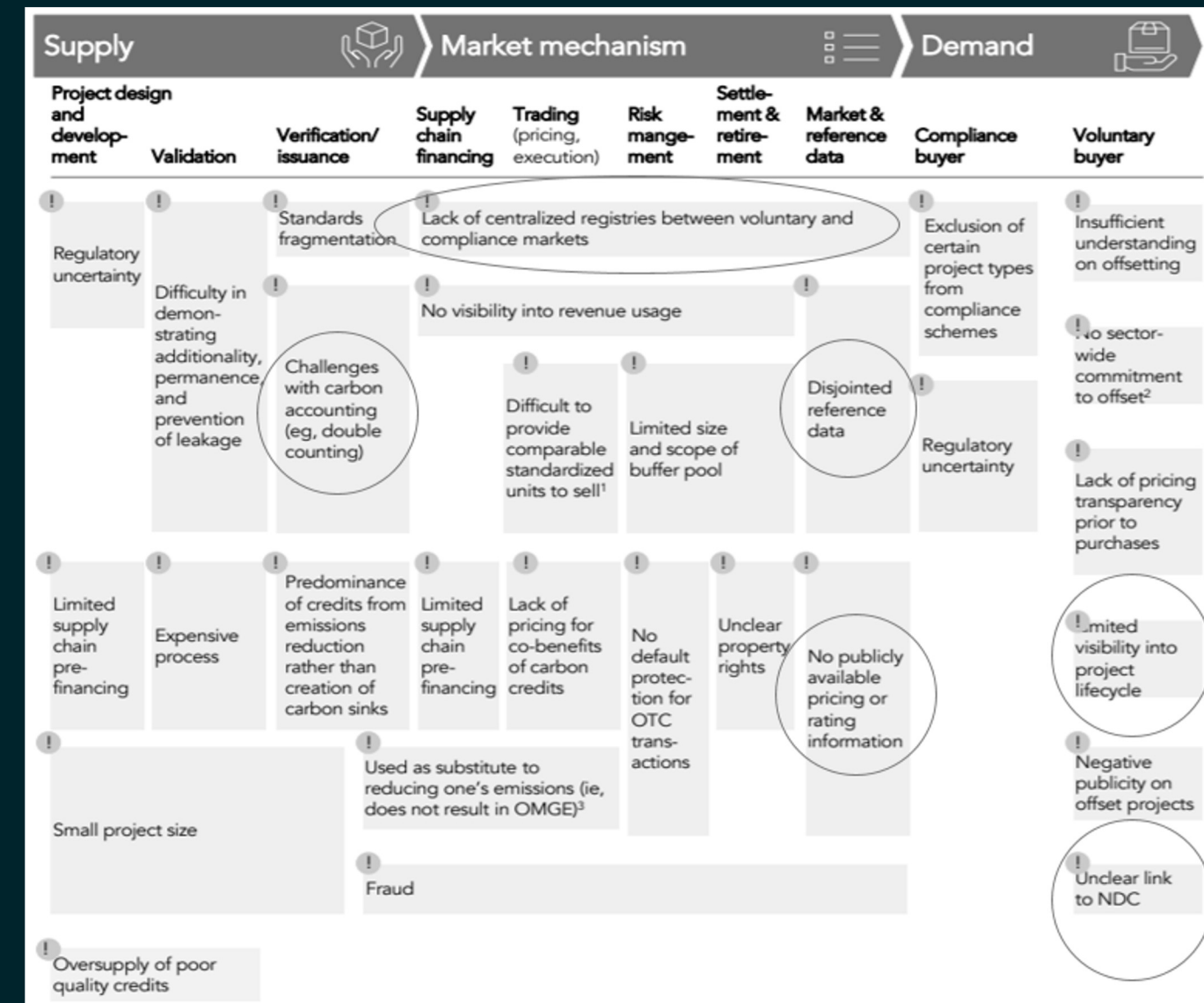


# CONTEXT



- Individual commitments through nationally determined contributions (NDCs). The Paris Agreement introduced a bottom-up approach for addressing climate change.
- Decentralised cooperative approaches to achieve their NDCs. This is expected to lead to heterogeneous climate markets, which may have differences in governance rules and operate under different technological systems.
- Challenges across stakeholders' ecosystem: a decentralised information technology approach is a need to connect climate markets systems.

Report by Taskforce on Scaling Voluntary Carbon Markets (TSVCM)



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





The **Paris Agreement** underscores the importance of robust systems and processes for tracking and reporting GHG emissions, fostering transparency, and ensuring the credibility and security of data. These points highlight some of the key technical and procedural considerations that arise when implementing the agreement's provisions.

### GHG Emissions & Assets

Monitor, verify, and report emissions.  
Maintain & enhance mitigation efforts

### Transparent Processes

Ensure clarity & transparency with third-party interactions for accountability

### Connectivity

Link diverse GHG registries for international consistency and mechanisms like carbon trading

### Dashboards

Display key data for progress assessment and informed decision-making

### Data Management

Data Management:  
Prioritise confidentiality, integrity, and data availability to foster trust

# PURPOSE OF A NATIONAL CARBON REGISTRY



A national carbon registry is an essential tool in the implementation of Article 6 of the Paris Agreement as it ensures the integrity, transparency, and effectiveness of the international efforts in carbon reduction and facilitates the operationalisation of market and non-market mechanisms for climate action cooperation.

## National Carbon Registry in Article 6 Implementation:

- ✓ Tracks and records GHG emissions and reductions
- ✓ Prevents double counting of emission reductions
- ✓ Ensures transparency and builds international trust
- ✓ Facilitates carbon trading and market mechanisms
- ✓ Centralises data for compliance and reporting
- ✓ Supports linkages between carbon mitigation and sustainable development





# REGISTRY AS A MANAGEMENT SYSTEM



## Information Management

- Maintain data for carbon unit issuance process
- Ensure confidentiality, availability, & integrity
- Allow public access for project understanding & review

## Accounting System

- Oversee issuance, transfers, & retirements of carbon units
- Manage unit eligibility & usage purpose
- Prevent double issuance



# World Bank's Climate Warehouse Program - Two-Tiered Approach

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 Measurement, Reporting and Verification (dMRV) systems.** Piloting the connection between dMRV systems with national carbon registries.
- **National Carbon Registries.** Development of opensource off- and on-chain national registries.
- **Tokenization instruments.** Development of tokenization instruments with the aim enable efficient transactions.
- **Climate Action Data Trust (CADT).** Aggregation and harmonization of carbon credits data.

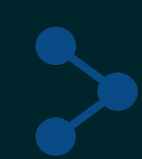


## Pillar 2: Global Knowledge and Capacity-Building

Support countries and jurisdictions to in implementation of digital infrastructure for carbon markets needed for GHG mitigation and NDC implementation.

### 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's opensource national registry automatically synced to Climate Action Data Trust

## Objectives

- Tracking and reporting of carbon projects and emission reductions units for Article 6 requirement.
- Issuance and transaction of carbon credits
- Building capacity-building and experiential learning

## Phases

- Phase 1 - **Testing**: Test Module 1 (Register) and Module 2 (Transaction Layer) of the Core Registry.
- Phase 2 - **Feedback Assessment**: Collect feedback to cover specific needs of the country registry.
- Phase 3 - **Customization**: Define and assess customization based on needs
- Phase 4 - **Deployment**: Once deployment is decided, the existing software can be deployed and used.

- **Lessons Learned**: Testing sessions help define further technical and functional needs of the registry to ensure its adoption. Moreover, expertise both on carbon markets and IT is a prerequisite to ensure an effective training phase. In parallel, it is crucial to define the policy and institutional arrangements to determine the process flows and the management roles of the registry.
- **Next steps**: Discussions related to the custodial approach of the registry based on country specific needs and priorities. Additionally, feedback is systematically collected to prepare the of Customization and Deployment.

**Region:**  
Global

**Project Scope:**  
PMI

**Objective:**  
Develop National Carbon Registry

**Software:**  
Opensource

**Current phase:**  
Testing

# Climate Action Data Trust Testing Phase Outcomes

Participation in CAD Trust Simulation III (2022)

## Platform & Governance

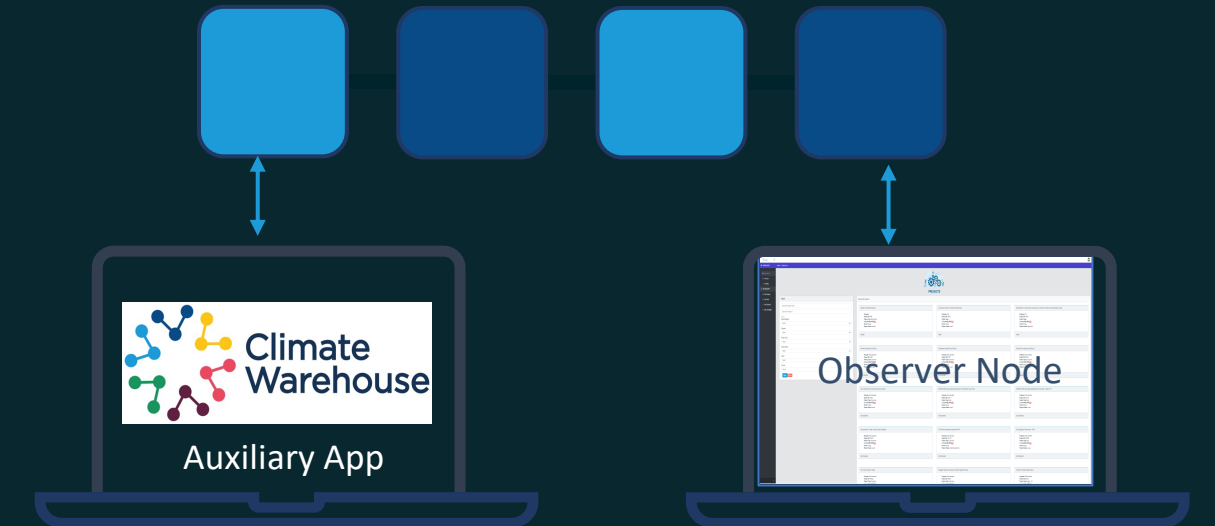
- Developed operational prototype as a global public good that aims to empower a new global carbon market infrastructure through a decentralized information technology platform built on blockchain technology
- Implemented the recommendations from the governance consultations on the operational platform 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
- 40 weekly office sessions
- 11 governments
- 30 participating organisations
- 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)



22 full participants

Chile  
Japan  
Peru  
Rwanda  
Senegal  
Singapore  
Sweden  
Switzerland  
UK  
Uganda

ACR  
CAR  
GCC  
Gold Standard  
Verra  
IFC  
WB CATS  
WB CMI  
EcoRegistry  
Colombia  
IHS Markit  
SK Certification  
Center  
GenZero

8 observers:

Spain  
EBRD  
UNDP  
UNFCCC  
Climate Ledger Initiative  
ClimateCheck  
IETA  
Open Earth Foundation

Climate Action Data Trust (CAD Trust) is a decentralised metadata platform that links, aggregates and harmonises all major carbon registry data to enhance transparent accounting in line with Article 6 of the Paris Agreement.

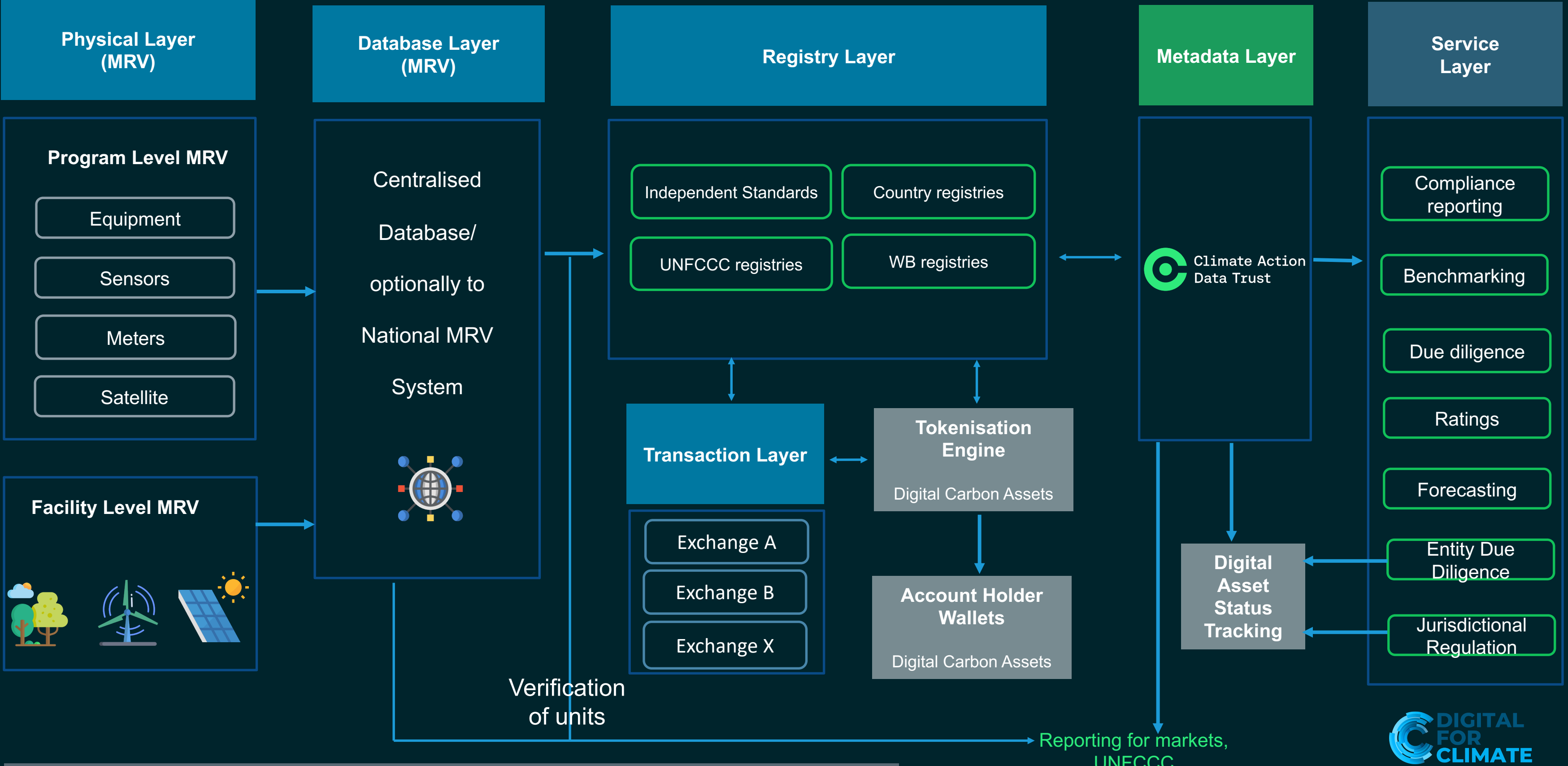
The CAD Trust open-source metadata system uses blockchain technology to create a decentralised record of carbon market activity with the aim to avoid double counting, increase trust in carbon credit data and build confidence in carbon markets.





# Climate Warehouse End-to-End Digital Ecosystem for Carbon Markets

**Digital Methodology**  
 Digitalisation of Methodologies: smart contract toward the digitisation of the mitigation activity cycle



**Digital work-flow**  
 Project preparation from document development, approval, validation to registration in applicable standards





# Current Challenges



- Fragmentation across standards
- Lack of centralised registries between voluntary and compliance markets
- No joint reference data
- Lack of pricing transparency
- Limited visibility of project lifecycle
- Unclear link of credits to the NDCs



# Key Value Propositions

## COMMON DATA MODEL

Enable reconciliation of data from registries and facilitate peer-to-peer connection among registries through blockchain technology.

## TRANSPARENCY

Enhance transparency and trust among market participants and enable tracking of carbon credits and reduce the risk of double-counting.

## CORRESPONDING ADJUSTMENTS

Provide visibility into corresponding adjustment procedures and the lifecycle of carbon credits from issuance to retirement, safeguarding against double counting and simplifying reporting requirements.

## INFORMATION & STATUS

Surface publicly available information on carbon credits and record status changes to provide information on how the credits are used.

## ARTICLE 6

Help to operationalise processes under Article 6 of the Paris Agreement such as compliance reporting and registry data model development.

# Enabling Features



Open-Source

Standard/Registry  
Managed

Distributed  
Ledger

- Seamless synchronisation of registry data
- Advanced blockchain encryption for protection
- Tamper-proof, read-only access for other participants
- Ensures data accuracy and privacy
- Does not interfere with existing Registry's systems or processes



# Global Carbon Market - Positioning



## SUPPLY SIDE

A DEFINITIVE GLOBAL THRESHOLD STANDARD FOR  
HIGH-QUALITY CARBON CREDITS



## MARKET

A MARKET BASED ON RIGOROUS STANDARDS  
AND MARKET INFRASTRUCTURE



## DEMAND-SIDE

ACCEPTED STANDARDS FOR USING CREDITS AS  
PART OF A CREDIBLE NET-ZERO PATHWAY



# Benefits for Key Stakeholders

## Buyers & Traders

Aggregated trustworthy data to search through.  
Easier access to project developer information.

Tracking the Article 6 status of credits (once authorised by the host country) to enable enhanced price discovery.

## Exchanges

Decreases market fragmentation and eases integration.

Promotes standardisation and asset integrity.

Adds information security to the data needed from registries for transactions.

Increases volume of standard asset types.

## Rating Agencies

Harmonised data to carry out risk assessment and assign ratings.

Access to comprehensive projects and units information for sectoral assessment and establishing benchmarks.

Ability to carry out ratings on a dynamic basis.

## Project Developers

Display projects & units portfolio across standards through a trusted source.

Building trust in the accounting of MOs will enable transparency and trade, benefiting project developers.

# Benefits for Key Stakeholders

## Governments

Increases visibility and credibility of a country's climate activities.

View MOs to potentially purchase.

Promotes new project activity and increases market participation of private sector.

Aggregate view of projects within their jurisdiction, ability to identify duplicative projects.

## UNFCCC

- Aggregates reporting
- Provides unified and comprehensive access to both independent and national registries
- Help to operationalise processes under Article 6 of the Paris Agreement such as compliance reporting and registry data model development.
- Facilitates trust and transparency between systems

## Independent Standards

- Reduces burden on monitoring external systems for due diligence processes by making it easier to aggregate information
- Facilitates trust and transparency between systems

## Verification Bodies

- Access to aggregated information, ability to audit transactions and changes to data



# Ensuring Environmental Integrity under Article 6 Mechanisms



Art. 6 acknowledges countries can pursue voluntary cooperation towards NDC implementation *for higher mitigation ambition and to foster sustainable development*

Article 6.2 outlines cooperative approaches and transfer of Internationally Transferable Mitigation Outcomes (ITMOs)

*between different actors, countries and private sector companies, through bilateral agreements.*

Paris Agreement thus has created new markets for countries to cooperate to reduce GHG emissions *employ a market-based approach, capture massive economies of scale through global action*

**CAD Trust acts as a common data system that serves all stakeholders and aims to provide the foundation to build a transparent, verifiable, inclusive and cost-effective carbon market that promotes genuine high environmental integrity.**



# CAD Trust : Benefits for Governments



**A common data taxonomy that enables reconciliation of data from registries.** Through blockchain technology, it facilitates a peer-to-peer connection among decentralized registries with the aim to link, aggregate and harmonize the underlying data

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**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.

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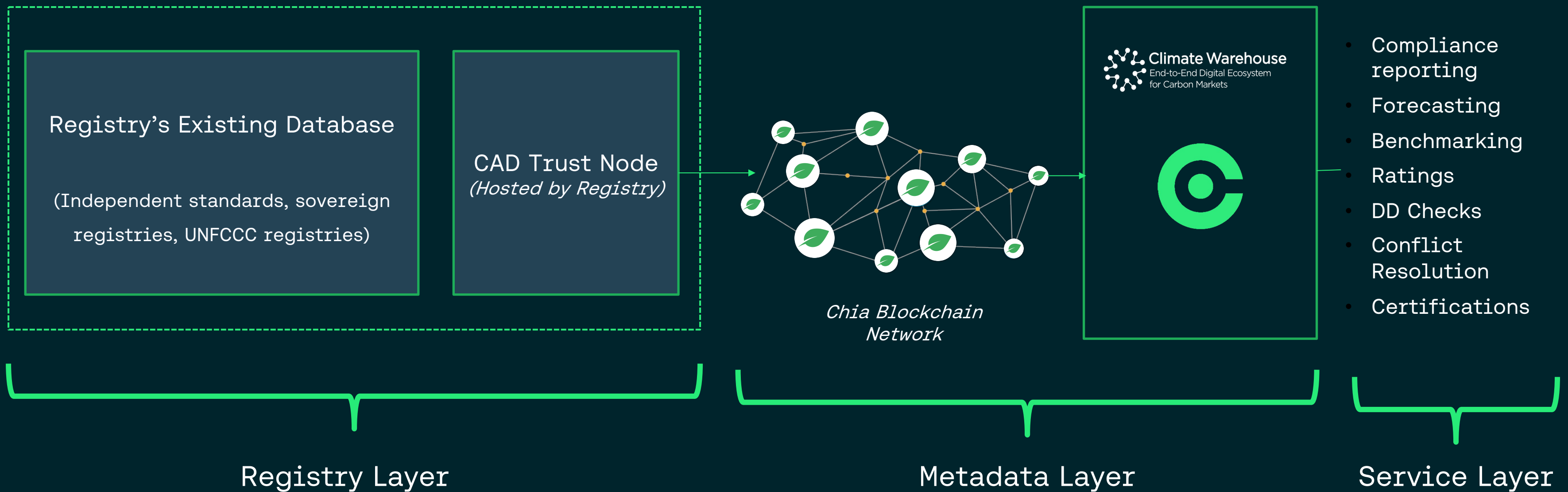
**Surface publicly-available information on MOs** and record status changes to provide information on how MOs are used.

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**Enhance transparency and trust among market participants and enable tracking of MOs and reduce double counting risk.** The CAD Trust would not hold assets or directly facilitate.

# Data Flow



# Modes of Integration (For Registries)



## 1. Manual Upload

Easily submit your carbon credit data by uploading files directly onto the CAD Trust Application, ensuring data accuracy and transparency for all stakeholders.

## 2. API Integration (Batch)

Seamlessly connect and synchronise your registry data in batch mode, enabling efficient data transfer and streamlined updates.

## 3. API Integration (Real Time)

Integrate your systems to enable real-time data exchange, providing instant carbon credit updates and fostering trust in market activity.

RECOMMENDED

# Data Model



## PROJECT LOCATION

- CAD Trust Project ID\* (FK)
- Project Location ID (PK)
- Country\*
- In Country Region
- Geographic Identifier\*

## PROJECT RATING

- CAD Trust Project ID\* (FK)
- Project Rating ID (PK)
- Rating Type\*
- Rating Range Lowest\*
- Rating Range Highest\*
- Rating\*
- Rating Link\*

## CO-BENEFITS

- CAD Trust Project ID\* (FK)
- Co-Benefit ID (PK)
- Co-Benefit

## ESTIMATIONS

- CAD Trust Project ID\* (FK)
- Estimations ID (PK)
- Crediting Period Start\*
- Crediting Period End\*
- Unit Count\*

## PROJECTS

- CAD Trust Project ID\* (PK)
- 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

Each ID is global unique, meaning no organisations will generate the same ID for any table.

## RELATED PROJECTS

- CAD Trust Project ID\* (FK)
- Related Project ID (PK)
- Relationship Type
- Registry

## ISSUANCES

- CAD Trust Project ID\* (FK)
- Issuance ID (PK)
- Issuance Start Date\*
- Issuance End Date\*
- Verification Approach\*
- Verification Report Date\*
- Verification Body\*

## LABELS

- CAD Trust Project ID\* (FK)
- Label ID (PK)
- Label Type\*
- Label\*
- Crediting Period Start Date\*
- Crediting Period End Date\*
- Validity Start Date\*
- Validity End Date\*
- Unit Quantity\*
- Label Link\*

## UNITS

- Issuance ID\* (FK)
- CAD Trust Unit ID\* (PK)
- Unit Issuance Location\* (FK to project loc ID)
- Label ID\* (FK)
- 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\*

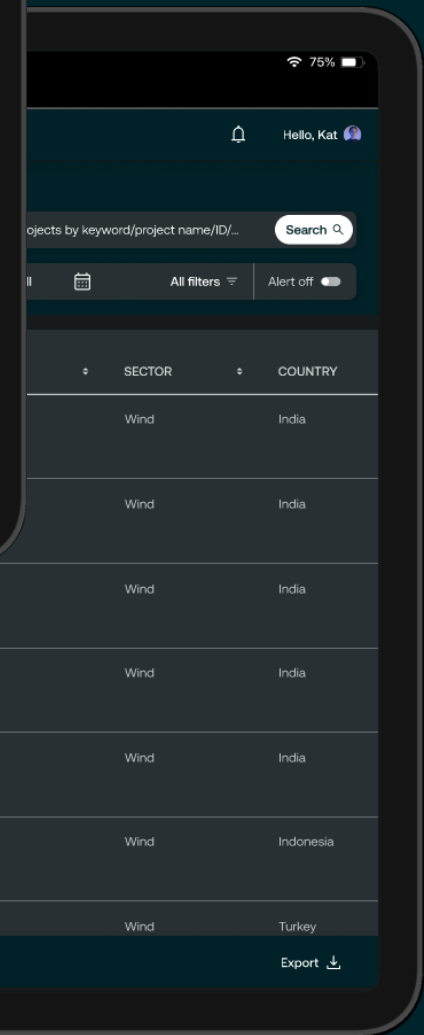
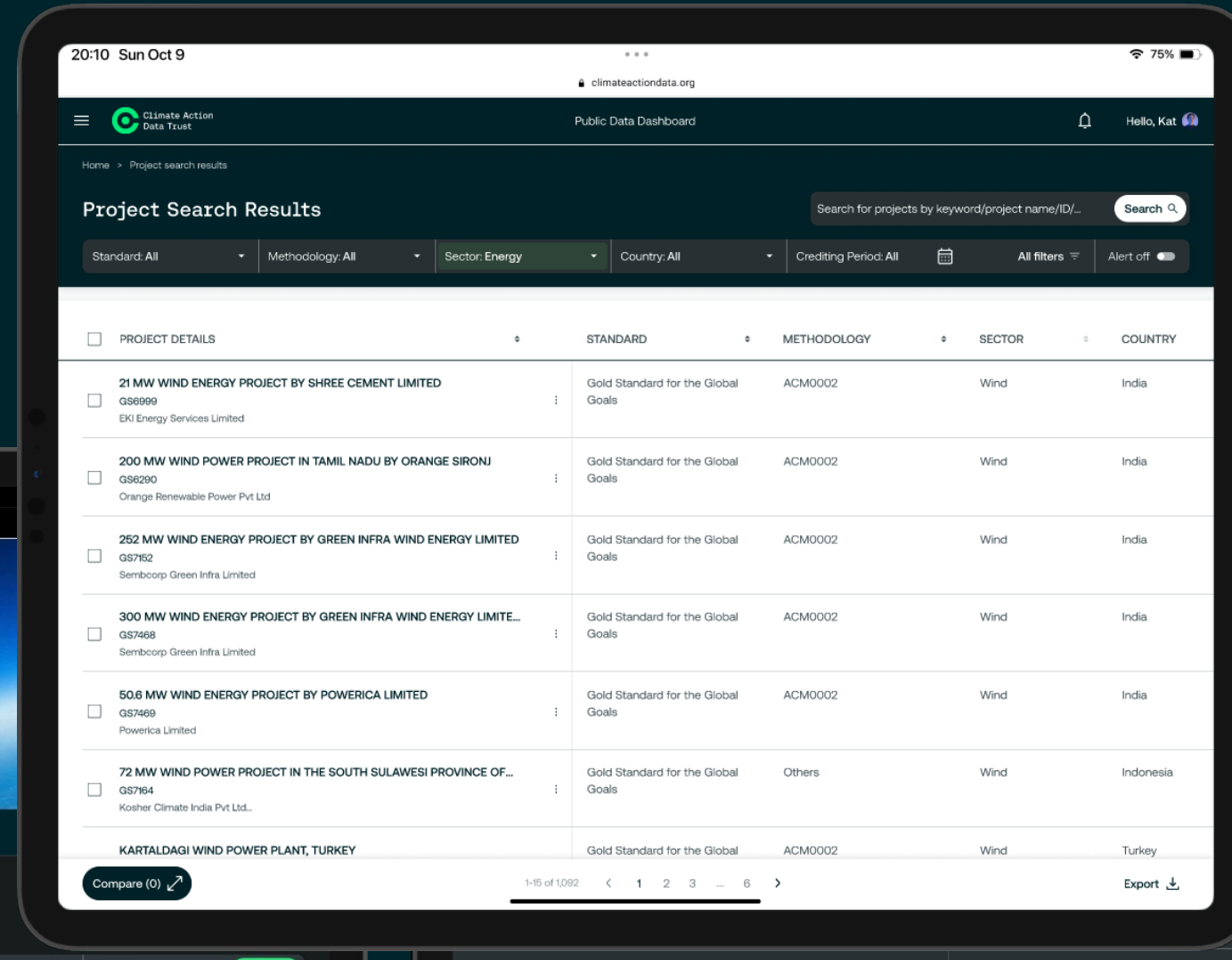
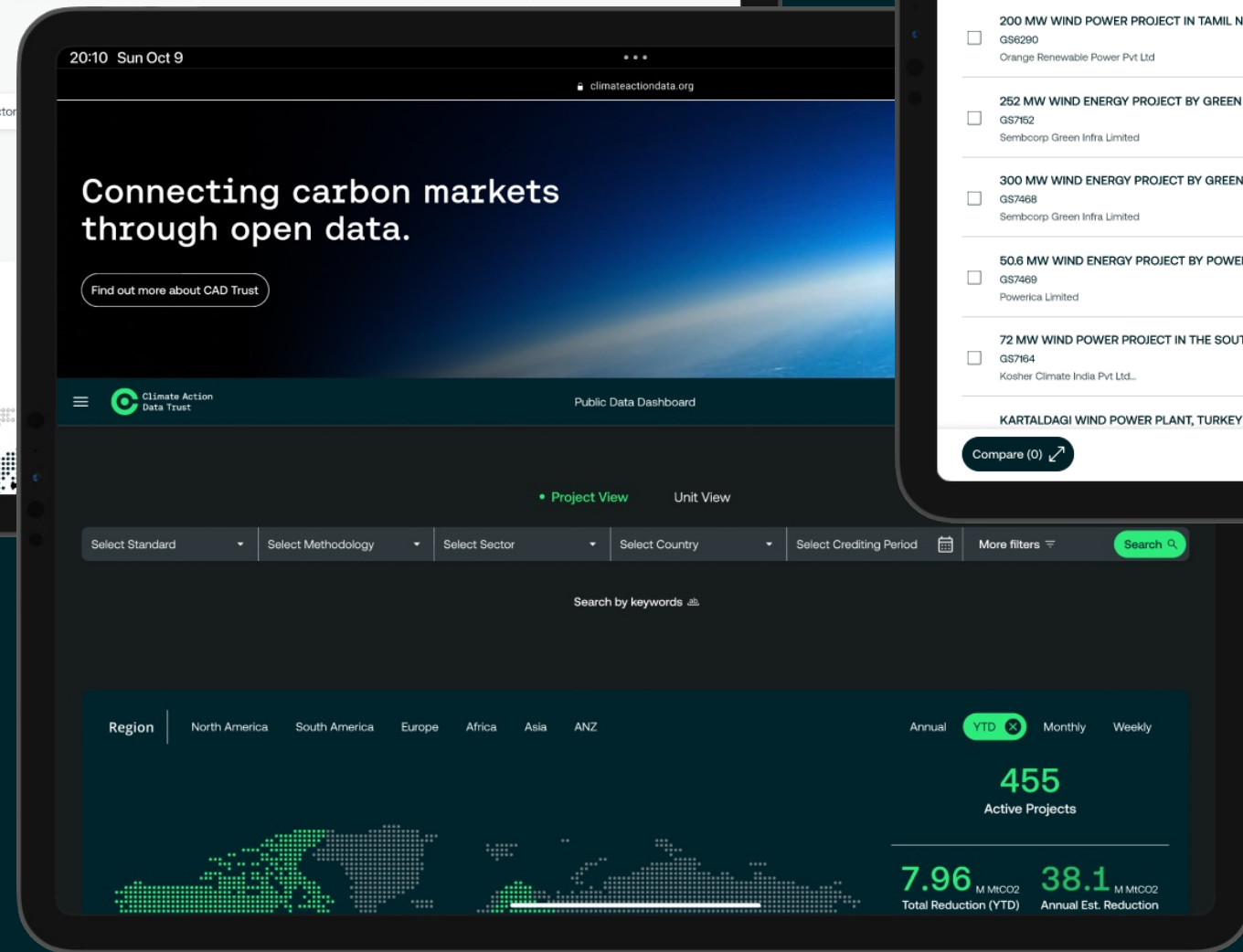
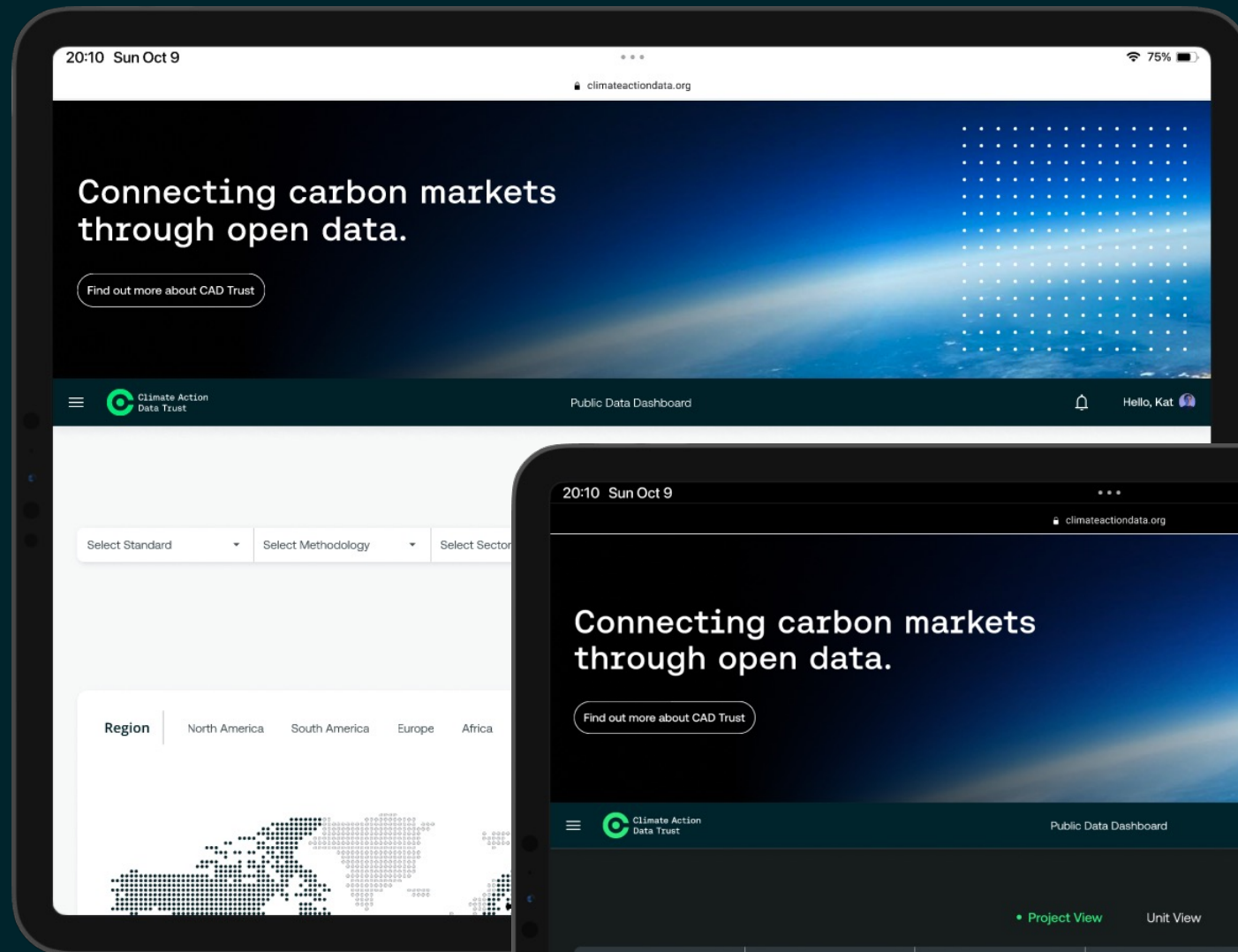
Fields with an \* are required form fields  
 PK donates primary key for a specific table  
 FK denotes foreign key which links tables together

## 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
- Co-benefit values



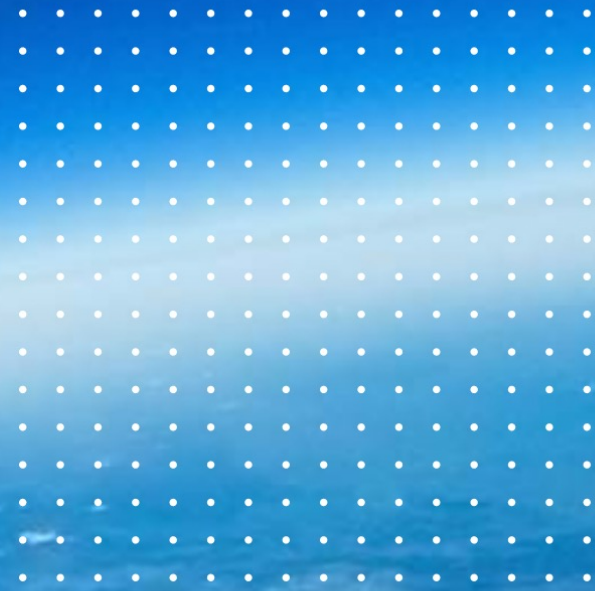
# Data Dashboard





# Connecting Carbon markets through open data.

Find out more about CAD Trust



• Project View Unit View

Registry | Methodology | Sector | Country | Crediting Period | Search

Search projects by keywords ab

Region

Select region

Max 12m 6m 1m

258

Active Projects

360

1'731



# Connecting with National Registries

## Three Possible Paths

COUNTRIES WITHOUT A FULLY  
OPERATIONAL NATIONAL CARBON  
REGISTRY

World  
Bank  
support

UNDP  
support

COUNTRIES WITH AN EXISTING NATIONAL  
CARBON REGISTRY

CAD Trust  
support

# Registry connections

## INDEPENDENT STANDARDS (1/2)



2022

2023

Q4

H1

H2

Onboarding  
Commenced

EcoRegistry  
BioCarbon  
GCC\*

*onboarded*

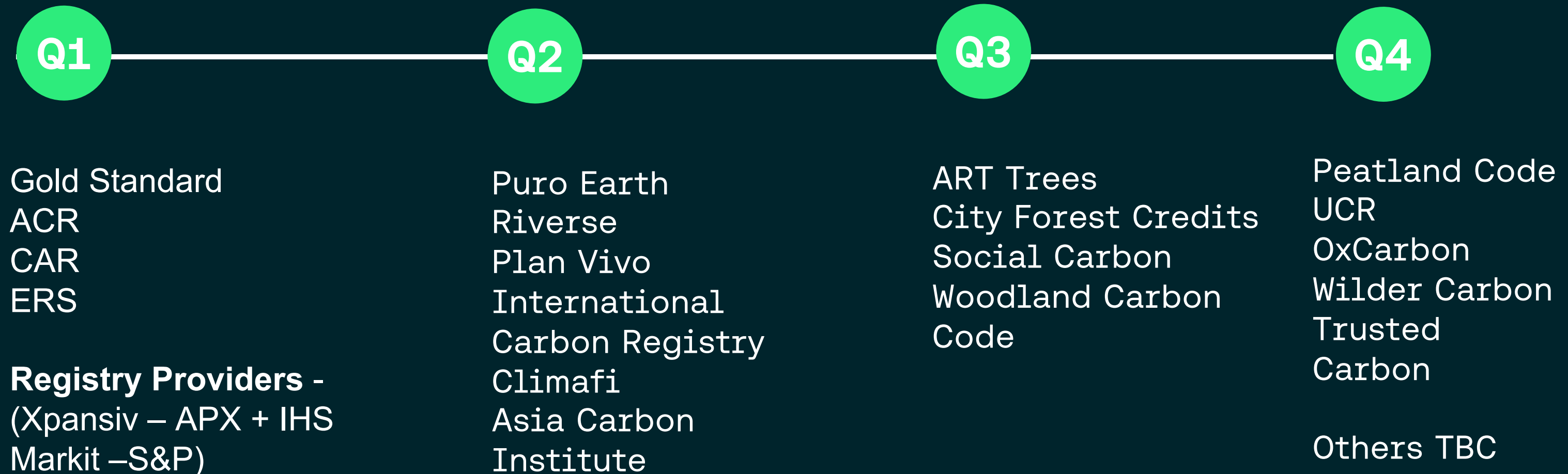
CDM Registry  
Verra  
WB CATS

# Registry connections

## INDEPENDENT STANDARDS (2/2)



2024



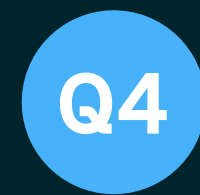
# Registry Connections

## NATIONAL REGISTRIES (1/2)



2022

2023



Onboarding  
Commenced



Namibia

Pakistan

Bhutan

Bangladesh



# Registry Connections

## NATIONAL REGISTRIES (2/2)

2024

Q1

Chile  
Argentina

Ghana  
Vanuatu

Q2

Indonesia  
UAE  
Thailand

India  
Jordan  
Sri Lanka

Q3

Japan  
Switzerland

Georgia

Q4

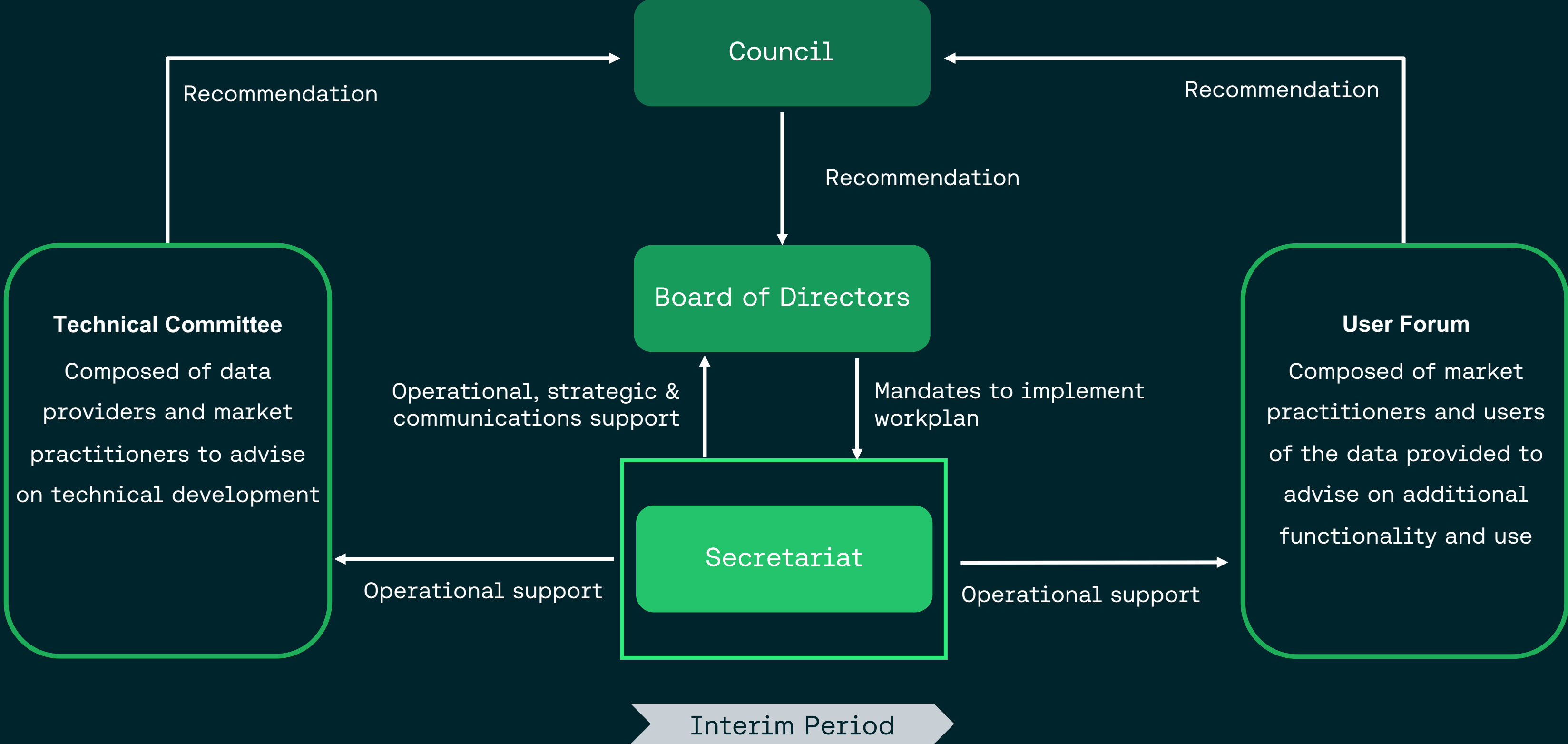
Singapore  
UK

### Parallel Efforts:

Sweden  
Spain  
Vietnam  
Colombia  
Mexico  
Senegal  
Uganda  
Rwanda  
Uruguay  
Ukraine  
Seychelles  
Russia  
Peru  
Morocco  
Malawi  
Zimbabwe  
Solomon Islands



# Governance update



# The CAD Trust Council



Rui Yun Gan (Singapore)



Jessica Bede



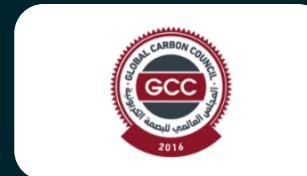
Chris Shipley (UK)



Andrew Howard



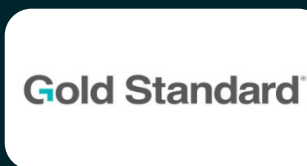
Mbaye Diagne (Senegal)



Kishor Rajhansa



Sonam Tashi (Bhutan)



Hugh Salway



Juan Pedro Searle (Chile)

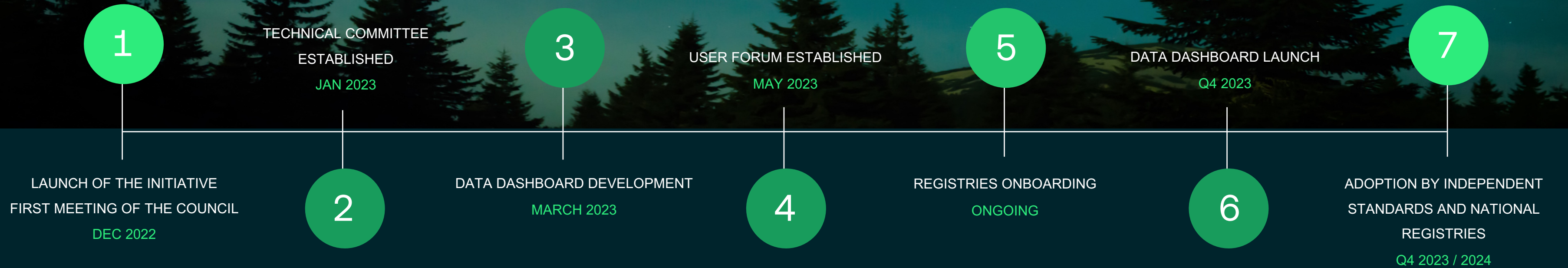
*User Forum appointee*



Kazuhisa Kaokutsu (Japan)

*User Forum appointee*

# CAD Trust Timeline





W [www.climateactiondata.org](http://www.climateactiondata.org)

E [contact@climateactiondata.org](mailto:contact@climateactiondata.org)

