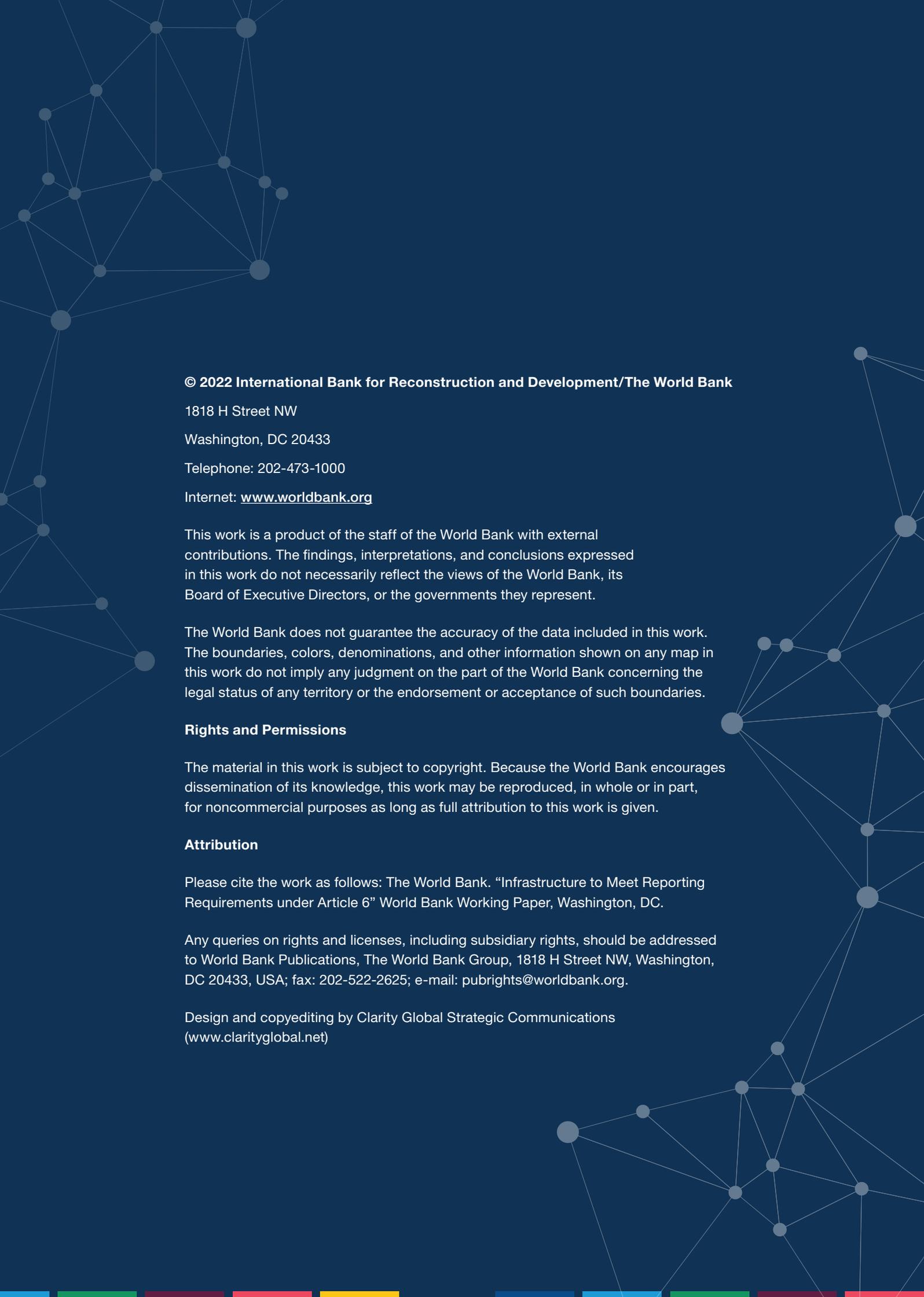


Infrastructure to Meet Reporting Requirements under Article 6



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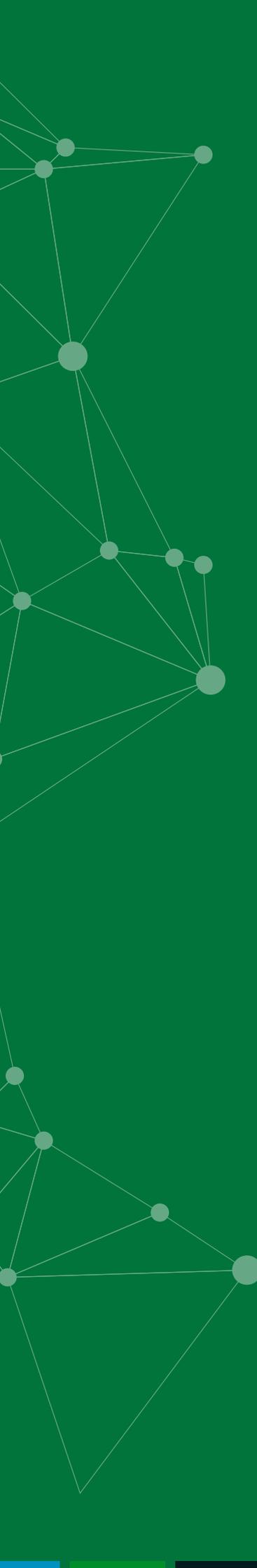
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Infrastructure to Meet Reporting Requirements under Article 6

1. Background

International carbon markets under the Paris Agreement are expected to be significantly different from those under the Kyoto Protocol. Under the Kyoto Protocol, developed countries had greenhouse gas (GHG) emission targets, and the Kyoto Protocol defined how carbon units could be traded across countries under international market mechanisms, such as the Clean Development Mechanism (CDM). In contrast, both developed and developing countries are required to submit their Nationally Determined Contributions (NDCs) every five years with a subsequent increase in ambition under the Paris Agreement. Furthermore, Article 6.2 of the Paris Agreement allows countries to partake in voluntary bilateral or plurilateral cooperative approaches to achieve their NDC targets through the transfer of mitigation outcomes (MOs). NDCs are diverse in nature, with some countries using business-as-usual emissions projects as the reference point, while others using the emissions targets from a baseline year or emission intensity per unit of economic outputs as the point of reference. Furthermore, the bottom-up nature of the Paris Agreement could generate a variety of MOs, which makes it difficult to compare and trade units across different mechanisms.

While the Paris Agreement does not define how MOs should be transferred internationally, it does establish that as a condition of their use, Parties must apply robust accounting to ensure the avoidance of double counting. The decision that accompanies the Paris Agreement also notes that this should be done based on corresponding adjustment (CA), although it is not known how CA would be carried

to account for the diversity of NDCs because multiple options are under consideration.

The Kyoto Protocol has provided a common framework for GHG accounting through its internationally governed market-based approaches. On the other hand, the Paris Agreement is not calling for the establishment of one centrally coordinated or interlinked emissions trading architecture. The discussions at COP25 on Article 6.2 only suggest that each participating Party shall have, or have access to,¹ a registry for tracking purposes.

As negotiations continue, further analysis is needed to understand the infrastructure needs at the domestic and international level to ensure that the MOs generated and potentially transferred internationally are environmentally robust, real, and measurable.

While this market infrastructure will need to reflect the diversity of instruments and market transactions, as well as differences in country capacities, a certain degree of standardization is likely to be required if the countries intend to use international market mechanisms or cooperate by connecting their national registries to those of other jurisdictions. Striking the right balance between these two purposes—that is, creating a registry that is both nationally appropriate and internationally compatible—will be one of the biggest challenges. That said, future developments regarding infrastructure design in the Paris framework will benefit greatly from already existing infrastructure, as well as knowledge and experience that have been gained over the years.²

¹ The UNFCCC Secretariat is expected to implement an international registry for participating Parties that do not have a registry or have access to a registry

² PMR (2016), “Emissions Trading Registries: Guidance on Regulation, Development, and Administration”

2. Objectives

This approach paper aims to reach a common understanding on what market infrastructure may be needed at the national and international level to meet transparency and integrity requirements of Article 6, as well as to store, track, and transact units at different stages of a carbon asset's life cycle. Different options will be explored to assess how the market infrastructure at the national and international level could be developed under different scenarios. As this space is evolving rapidly with different market players adopting innovative technologies and approaches to serve different needs, and also with the infrastructure requirements at the national level and the role of UNFCCC becoming clearer, the assessment and analysis presented in this paper might warrant revision on a regular basis.

3. Key Terminologies

The Glasgow text on Article 6 discusses the use of different infrastructure components for each participating Party. The characteristics and functionalities of these components can be supported by key terminologies defined below in the context of supporting transactions under Article 6.

National Level:

- **Data Management System (DMS)** is a database that records and archives national-, sectoral-, or project-level information, which does not need to be stored or listed in the register/transaction registry but is necessary for transparency and accountability. The DMS can include documents related to GHG emissions, emission reductions/removals, methodologies and tools, permissions

required for project operation and safeguard, host country issued documents, stakeholder engagement documentation, monitoring reports, validation, and verification reports, among others.

- **Registry:** A registry can be simply described as a system that has two functionalities – a register and a transaction registry. A register is a database that records unit-level information as required by the market mechanism. This includes the vintage of the carbon unit, the serial number and location of the project for which the carbon unit was issued, the project owner, or verification details. Depending on the host country's choice, ability and the need, a separate DMS may not be needed. A transaction registry³ is a database that has all the features of a register, plus the capability to transact carbon units between multiple account holders on the transaction registry (internal transfer), and/or the capability to transfer carbon units to another transaction registry (external transfer). The more complex the market mechanism, the more features the transaction registry will be required to have. Registry is used in this note as a more general term for register and transaction registry. While the DMS can be implemented offline, it is mandatory to display information related to projects and units online in a registry.

International Level:

- **Centralized Accounting and Reporting Platform:** The text stipulates that the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat will implement a centralized accounting and reporting platform to publish information submitted by the participating parties on cooperative approaches. This platform will include public information on internationally transferred mitigation outcomes (ITMOs), link to publicly available data submitted by participating parties on cooperative approaches, and provide annual reports to the CMA.
- **Article 6 Database:** The Article 6 database is part of the centralized accounting and reporting platform. The database will record CAs, emissions balances, information on ITMOs submitted by participating Parties in their reporting.

³ The Glasgow text also identifies the functionalities of the registry as its ability to record MOs with unique identifiers and record actions such as authorization, first transfer, transfer, acquisition, cancellation, use towards NDCs, authorizations for use towards other international mitigation purposes, voluntary cancellation, and to maintain relevant accounts, as necessary.

- **Trading Platform (e.g., Exchanges):** Registries may have the ability to integrate with trading platforms, such as exchanges, which enable account holders to buy and sell carbon assets in open markets. Key benefits of an exchange include providing a centralized pool of liquidity, electronic clearing and settlement; same-day settlement of products and funds; real-time price transparency; anonymous trading; and a transparent web-based marketplace.
- **Connecting Registries and other Information Systems:** The Glasgow text and guidance related to the Paris Agreement do not elaborate on how registry systems will be connected so that carbon assets may be tracked across different decentralized market mechanisms. Going forward, international climate markets, such as under CORSIA or Article 6, will likely require different registry systems to communicate with one another for compliance purposes, including robust tracking and the avoidance of double counting. Linking these systems to reduce fragmentation and systems integration – through initiatives like the World Bank Climate Warehouse’s Climate Action Data Trust (CADT) – can facilitate an inclusive platform to track carbon assets and avoid double counting.

4. Reporting Requirements under Article 6

As per the Glasgow text, participating parties are required to regularly submit information on projects and programs related to their Article 6 activities. The reporting requirements are intended to ensure environmental integrity and transparency of the Article 6.2. Some submission types reference the key terminologies, defined above. The different reports, submission intervals, and required data, is summarized in this section.

Initial Report (one-time submission)

An Article 6, paragraph 2 *initial report*, referred to as initial report, must be submitted no later than authorization of ITMOs from a cooperative approach under Article 6, or together with the next biennial transparency report for the NDC implementation period.

Information in the initial report should (as per paragraph 18 of the Glasgow text guidance):

- Demonstrate that the Party meets the responsibilities for participation;
- Submission of biennial transparency report (if not already submitted);
- Describe the applied metric for ITMOs and how CA will be undertaken for period of NDC implementation;
- Quantify the NDC mitigation information in tCO₂ equivalent, including sectors, emission sources, types of GHGs, time period covered by the NDC, reference level of emissions and removals for the time period, the target level for the NDC, and, if available, the methodology for quantifying the NDC (in tCO₂ equivalent);
- Quantify the NDC, or portion of NDC, that is in a non-GHG metric;
- Quantify emissions resulting from policies and measures for a first, or first updated NDC that are relevant to cooperative approaches identified by the host Party;
- For each cooperative approach provide the following:
 - o a copy of authorization by the participating Party,
 - o description and duration of the approach,
 - o expected mitigation for each year of duration, and
 - o participating parties involved and authorized entities;

- Describe how each cooperative approach will achieve environmental integrity, by
 - o showing there is no net increase in global emissions within and between NDC implementation period,
 - o having strong, transparent governance and high-quality MOs with conservative baselines
 - o minimizing the risk of mitigation non-permanence across NDC period; and
- Further describe the way cooperative approaches will:
 - o minimize negative environmental, social, and economic impacts,
 - o adhere to the eleventh preambular paragraph of the Paris Agreement,
 - o follow the sustainable development objectives of the Party,
 - o apply safeguards and limits to the transfer and use of ITMOs,
 - o add to the resources for adaptation, if relevant, and
 - o overall mitigate global emissions.

The information submitted for each planned cooperative approach will be included in the centralized accounting and reporting platform, maintained by the secretariat.

Annual Information (Recurring submission, yearly)

Participating Parties need to electronically submit information on ITMOs on an annual basis, no later than April 15 of the following year. The submission will be through an agreed upon electronic format to the Article 6 database and cover the following:

- Annual information on ITMO authorization for NDC achievement, use for other international mitigation purposes, first transfers, transfers, transfer acquisition holdings, cancellation, voluntary cancellation, voluntary cancellation of MOs or ITMOs for global mitigation, and use towards NDC;

- For each instance, the cooperative approach, the international mitigation purpose authorized, first transferring participating Party, the using participating party, authorized entity(ies), should provide the year in which the mitigation occurred, sector and activity type, and the unique identifiers.

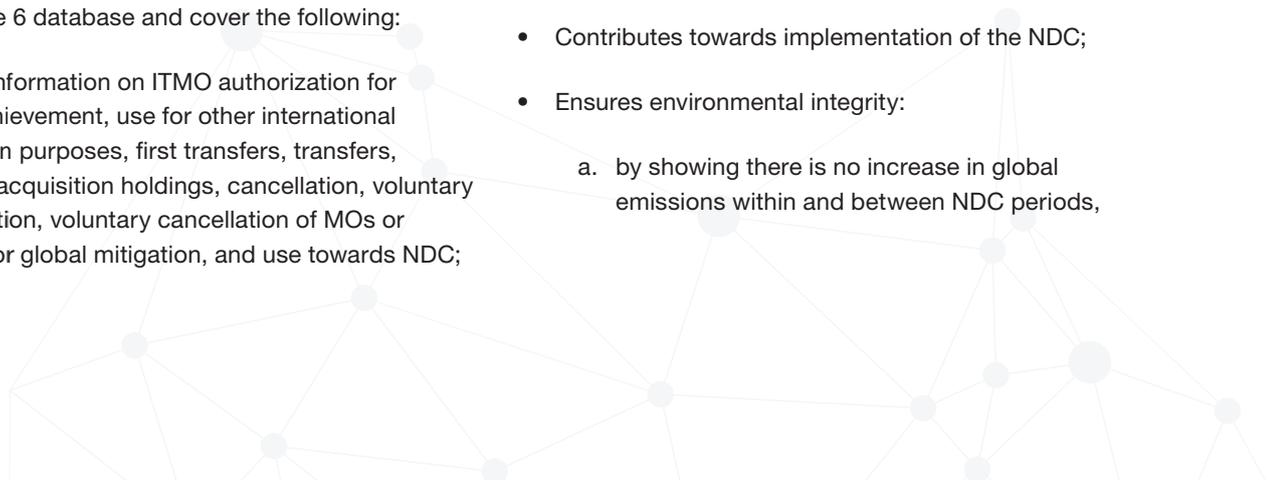
Regular Information (Recurring submission, every 2 years)

Each participating Party should submit, as part of its biennial transparency report, information on each cooperative approach the Party participates in, annual information on CAs, including any updates to information submitted for previous years covered by the NDC implementation period. This information should be submitted no later than December 31st of the relevant year. This covers for the participating Party:

- How the Party is meeting its participation responsibilities;
- Any updates to the initial report, annual reports, or past biennial transparency report(s);
- Authorizations and information on ITMO authorizations for use towards NDCs, or other international mitigation purposes, and any changes to previous authorizations;
- How CAs have been undertaken in the latest reporting period; and
- How ITMOs used for NDC achievement or other international mitigation purposes are ensured not be further transferred, further cancelled, or otherwise used.

In addition, the participating Party should submit, along with the biennial transparency report, how each cooperative approach:

- Mitigates GHG emissions;
- Contributes towards implementation of the NDC;
- Ensures environmental integrity:
 - a. by showing there is no increase in global emissions within and between NDC periods,

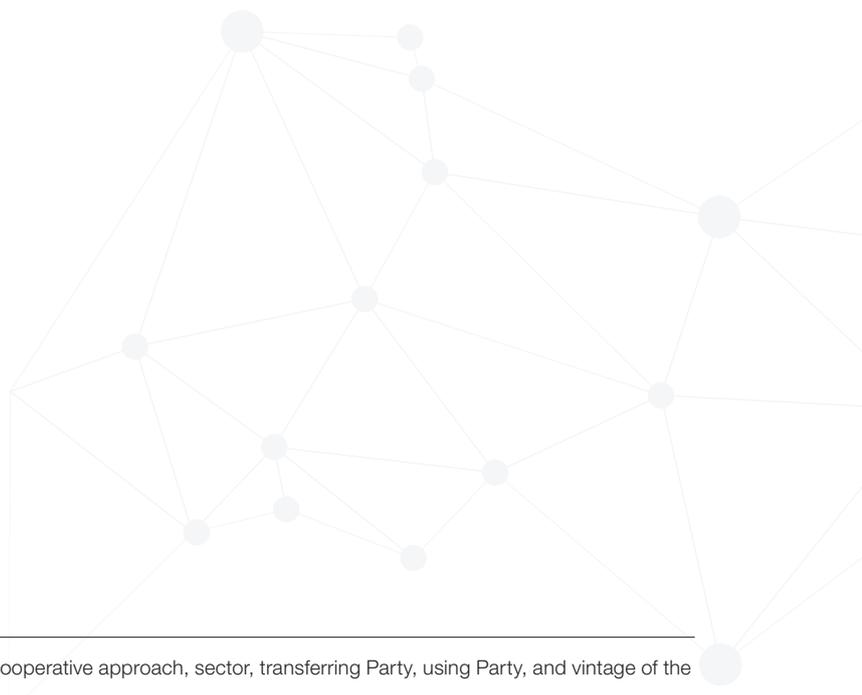


- b. through good governance and quality MOs, e.g., conservative baselines, and
 - c. through minimizing risks of non-permanence;
- Calculates MOs measured in tCO₂ equivalent, with methodologies and metrics/default values;
- Calculates MOs measured in non-GHG metrics, while ensuring that the conversion method to tCO₂ equivalent:
 - a. represents emission reductions or removals within the same geographic and time boundary of the non-GHG MOs,
 - b. is appropriate for conversion of the specific non-GHG metric by demonstrating how the conversion method and factors take the specific scenario into account,
 - c. is transparent by showing the source of data, how the data was used, how the applied method is conservative and addresses uncertainty and required environmental integrity;
- Measures any mitigation co-benefits;
- Minimizes negative social, environmental, and economic impacts;
- Reflects the eleventh preambular paragraph of the Paris Agreement;
- Is consistent with the sustainable development objectives of the Party;
- Follows safeguards and limits to the transfer and use of ITMOs;
- Contributes resources for adaptation; and
- Delivers overall mitigation of global emissions.

Supporting the information above on cooperative approaches by the participating Party, the Party should also submit, as part of the biennial transparency report, annual information on the following:

- Changes in emissions and removals from sectors and GHG covered by the NDC (annual and cumulative);
- Quantity of ITMOs first transferred (annual and cumulative);
- Quantity of MOs authorized for other international mitigation purposes (annual and cumulative) and entities authorized to use such MOs;
- Quantity of ITMOs used for NDC (annual and cumulative);
- Total quantitative CAs used to calculate the emissions balance;
- Annual level of non-GHG indicators used to track progress towards NDC achievement.⁴

Finally, if the biennial transparency report covers the last year of an NDC implementation period, an assessment of whether the target(s) of the NDC has been achieved should be included. A summary of the different types of information to be reported along with definitions and units is shown in Annex I of this approach paper.



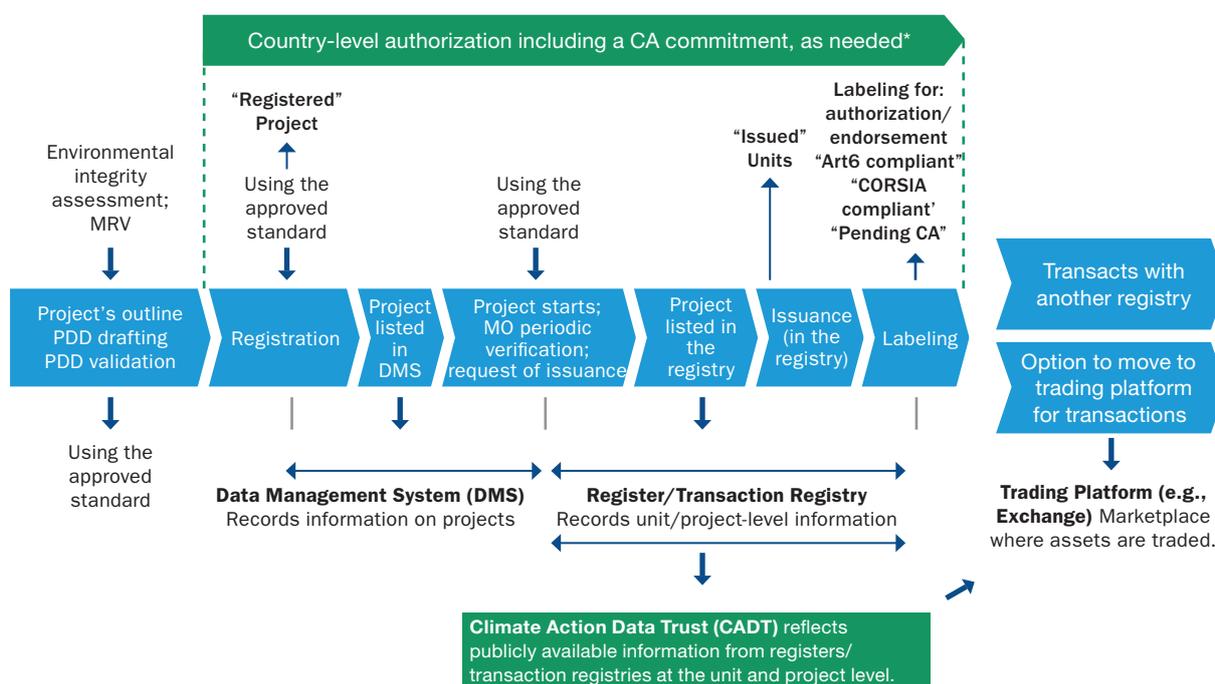
⁴ The annual information submitted should list the respective cooperative approach, sector, transferring Party, using Party, and vintage of the ITMO

5. Carbon Asset Development Cycle and Article 6

In order to better understand the sources of data and the process under which relevant data/information is generated, it is important to understand the expected asset development cycle under Article 6. A previous approach paper was developed for the development cycle of carbon assets under Article 6. The contents of the paper are summarized below, and more detail can be found in the approach paper on the [Carbon Asset Development Process](#).⁵

The steps shown in Figure 1, above, cover the complete carbon asset development cycle from drafting the project documentation through labeling of any issued MOs. The components of carbon asset development are mostly identical to the processes under the Kyoto Protocol apart from ‘Labeling’. Labeling is the authorization/endorsement of MOs or ITMOs by the host country of the mitigation action to designate how the issued units can be used. Each step of the process is further detailed below along with how information recorded at different steps is relevant to the reporting requirements under Article 6.

Figure 1. Overview of the asset development process flow



NOTES

- * Authorization would ideally take place at an earlier stage to provide greater certainty to the project developer. This could take place before validation, but our view is to consider country-level authorization after the validation stage to provide more project information to the host country.
- * Countries may choose to endorse voluntary market claims (optional)

⁵ Figure from the Climate Market Club’s approach paper on the Carbon Asset Development Process

1. Project design

During the project design stage, the project owner prepares the project documentation as required by the standard or as required by the relevant host country's Article 6.2 Policy Framework. The Policy Framework may allow the use of defined independent standards, their documentation, processes, and procedures.

2. Validation/broader independent assessment and registration

Independent assessment is a standard feature of carbon crediting standards. Certain standards require project owners to contract an independent entity to validate the project design and the application of the relevant methodology and MRV, while other schemes combine this step with the verification step described below.

3. Verification

Verification is the periodic independent review and ex-post determination of the monitored emission reductions or removals by a qualified, accredited entity. The project owner must follow a monitoring plan that details how to track and report on carbon assets and other data relevant to the project as specified in the applied methodology and independent standard, as applicable.

4. Issuance

Carbon assets can be issued into the project participant's account in the standard's registry or a registry specified by the host country. Issuance is the responsibility of the host country or standard, and the associated processes and institutions and can also be specified by the host country. Issued carbon assets can then be "authorized" as MOs for NDC use, ITMOs, or for other uses. As indicated, "authorization" can be for mitigation activities or units and can be provided by the host country at any time before the transfer of the MOs. This is described in more detail below.

5. Labelling and Use Cases

Carbon assets could have different 'use cases'. Use cases that are subject to the regulatory requirements of the Paris Agreement or CORSIA for instance, require authorization and CA. Other use cases may not require such authorization or CA, for example, when the use of the credit is to compensate for an emission within the same national boundary or when alternative claims are made about the purchase and retirement of voluntary carbon credits to finance climate action beyond an organization's own boundaries.

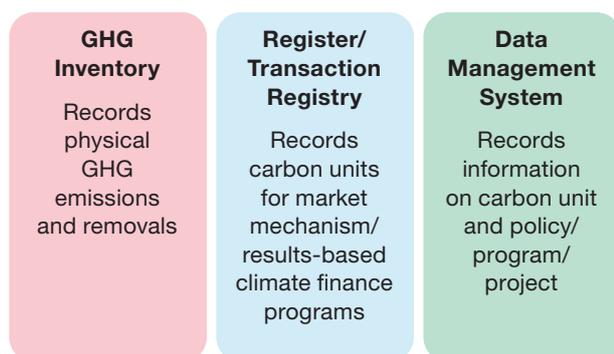


¹⁰ This discussion assumes that ITMOs are directly linked to underlying mitigation activities and not just transfers of "surplus" emission reductions beyond the country's NDC goal.

6. Infrastructure Needs under Article 6

To meet the reporting requirements summarized in section 4 and 5, above, the development of a DMS and registry is necessary, while the registry can be developed at the national or international level. The registry and DMS required under Article 6 are in addition to the GHG Inventory used to track and report a country's emissions for the NDC target under the Paris Agreement. An overview of the general functions of the three different systems are shown in Figure 2, below.

Figure 2. Different Types of Accounting Systems⁶



The Data Management System

The DMS stores and tracks information related to emission reductions/removals, methodologies and tools, permissions required for project operation, host country issued documents, stakeholder engagement documentation, monitoring reports, validation, and verification reports, among others. This information is reported in the initial report and in the biennial transparency report covered in section 4, above, covers information from steps 1–4 of the carbon asset development cycle.

The DMS serves to satisfy transparency, environmental integrity, and overall quality concerns regarding MOs and ITMOs generated by mitigation actions. For each action the DMS will store information on the project description and performance, methodology, and third party reports (validation/ verification/other independent assessments⁷). Each country will need to manage DMS covering its mitigation actions to participate under Article 6.

The Registry

The registry, on the other hand, tracks information related to the use and transfer of MOs and ITMOs. Once generated through the steps highlighted in the carbon asset cycle above and documented in the DMS, MOs and ITMOs are issued to the registry to allow for tracking of the information to be reported by each Party. Whether at the national or international level, all required reporting information on cooperative approaches, CAs, and MOs will need to be recorded and updated in the registry.

As listed in the reporting requirements above, the registry will require to contain information related to:

- a. Authorizations;
- b. First transfers;
- c. Transfers;
- d. Acquisitions;

⁶ World Bank Group. *Emissions Trading Registries: Guidance on Regulation, Development, and Administration*. 2016

⁷ There may be independent assessments of broader project risks and performance through frameworks such as the [Mitigation Action Assessment Protocol \(MAAP\)](#) that seek to provide a more nuanced assessment to increase the comparability of projects/programs and drive demand toward high-quality carbon assets.

- e. Cancellations;
- f. Use towards the NDC;
- g. Authorizations for use towards other mitigation purposes; and
- h. Voluntary cancellations.

There is a need for connected registries, if participating Parties develop a national registry and then enter into cooperative approaches with another Party, either with their own registry or the international registry provided by the secretariat or by an eligible third-party. The international registry implemented by the secretariat will be under the centralized accounting and reporting platform (described in section 3).

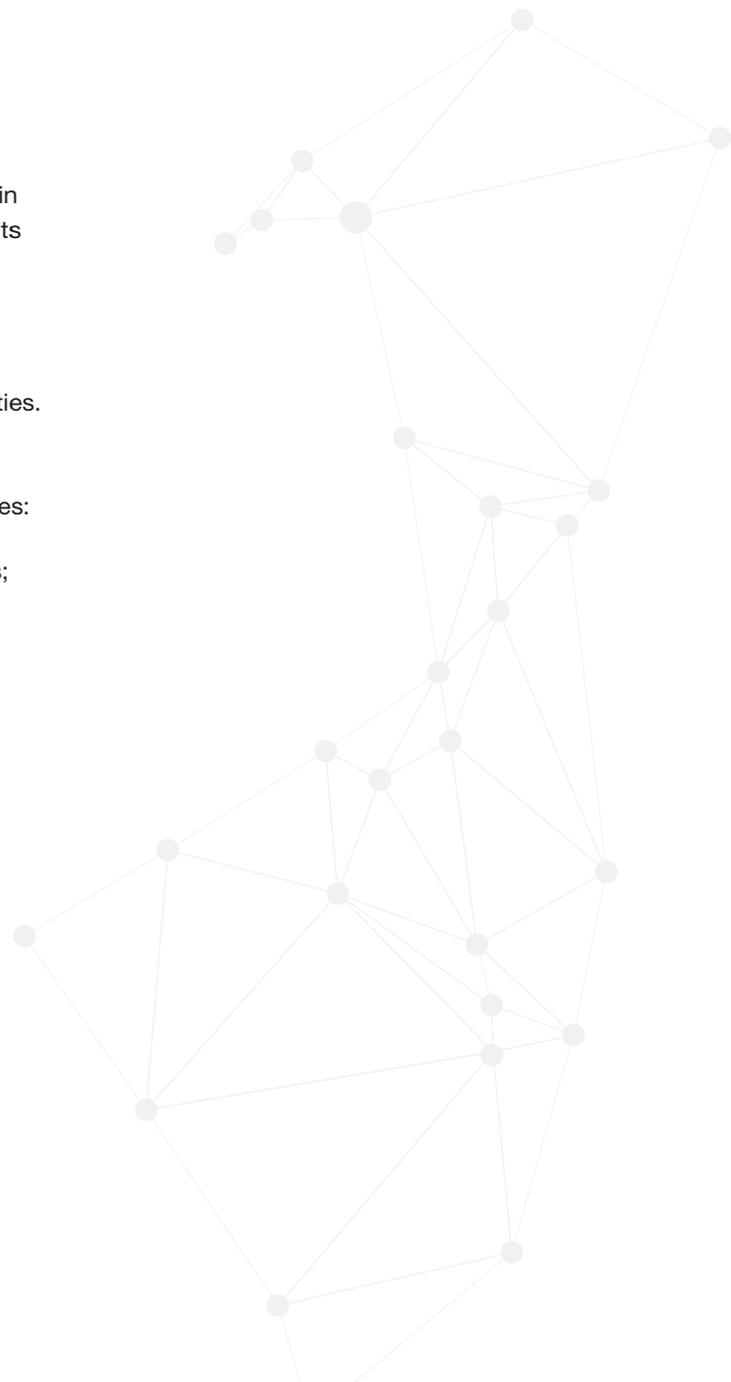
International Infrastructure

As discussed above, as per the Glasgow text, the secretariat will develop and maintain an international registry which participants can use in place of developing their own registry. Participants are not obligated to use the UNFCCC Registry or formally link their own registry to it. Under the same platform, the secretariat will also manage an Article 6 database to ensure transparency of cooperative approaches by the participating Parties. The database will track information required for reporting under section 4 not only covered in the registry but also by a country's DMS. This includes:

- a. Recording CAs and emissions balances;
- b. Status of ITMOs, specifically:
 - i. First transfers
 - ii. Transfers
 - iii. Acquisitions
 - iv. Holdings
 - v. Cancellations, or
 - vi. Use by participating Parties;

- c. Unique IDs of ITMOS, including
 - i. Originating Party
 - ii. Vintage of mitigation
 - iii. Activity type, and
 - iv. Sector.

The Article 6 database will be used by the secretariat to review information reported by participating Parties, as described in section 4 above. It is likely that participating Parties opting for a national registry, will also implement their own Article 6 database to streamline reporting requirements.



Summary of Reporting Requirements and Infrastructure for Participating Countries

The type of information to be reported, frequency of reporting, and which system tracks this information can seem complex. The table below gives an overview of the reporting requirements for a participant under Article 6 and how the information is stored and reported.

Table 1. Reporting Requirements and Infrastructure

Title	Required Information	Supporting Infrastructure	Reporting and Frequency
Initial Report	NDC quantification (in tCO ₂ and non-CO ₂ metric), measurement metric for ITMOs, CA process, and proposed cooperative approaches for NDC implementation period	GHG inventory (for NDC quantification) No infrastructure needed for other information	One-time initial report to the secretariat before first transfer under any cooperative approach.
Yearly Information on ITMOs	Authorization(s), transfers, cancellation, use towards NDC, or other international purposes	Registry (National, Regional, or International)	Annual electronic submission
Biennial Transparency Report (Cooperative Approaches)	For each cooperative approach, annual information on CAs, any updates to information submitted for previous years, authorizations of first transfers and use of ITMOs towards the NDC, and how acquired ITMOs are ensured to be used towards achievement of the NDC and will not be transferred or cancelled And How each cooperative approach mitigates GHG emissions, contributes towards implementation of the NDC, ensures environmental integrity, calculates MOs, measures co-benefits, and contributes towards sustainable development goals.	Registry (National, Regional, or International) And DMS	Every two years (as part of Biennial Transparency Report)
Biennial Transparency Report (GHG, MO, and ITMO balances)	Annual information on changes in emissions and removals from sectors and GHG covered by the NDC (annual and cumulative), And Quantity of ITMOs first transferred (annual and cumulative), quantity of MOs authorized for other international mitigation purposes (annual and cumulative, and quantity of ITMOs used for NDC	GHG Inventory (change in GHG emissions) And Registry (Quantities of ITMOs)	Every two years (as part of Biennial Transparency Report)

As shown in the table above, participant parties under Article 6 need to regularly report extensive information on their NDC, changes in GHG emissions, cooperative approaches, CAs, mitigation actions, and MO/ITMO uses. While the DMS and GHG inventory will likely be maintained by each country, as there is a need for countries to track NDC progress and maintain a full repository of their mitigation activities, there are multiple options for participating parties for how to setup the registry component. Each country can develop and manage a domestic registry, a group of countries can operate a regional registry, or parties can link their information to the international registry provided by the UNFCCC or third party registry operators. The preferred option depends on the number of cooperative approaches a country plans to participate in, domestic information technology capacity, and in some cases, the complexity of its national GHG regulatory system (cap & trade system, sectoral crediting, or other). The different setups are discussed in section 7.

7. Options for Developing or Accessing Registries under Article 6

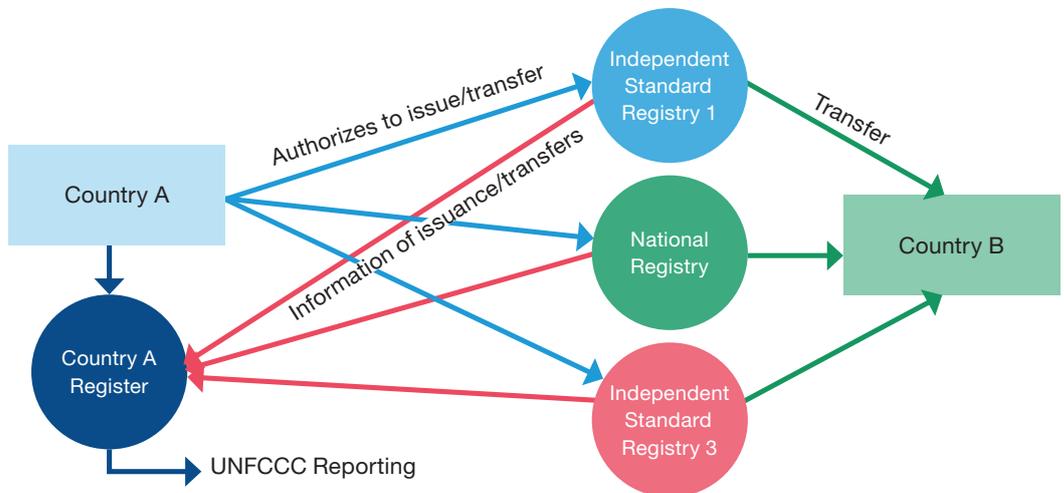
A registry (or a designated registry account) is desirable at the national level to accommodate the reporting and tracking requirements of the Paris Agreement. Suitable registries for reporting and tracking do not need transaction functionality as any transactions can be extracted from the information maintained in the registry system and reported to the UNFCCC or other registry operators. The design of national registries is likely to be influenced by existing registries managed by the UNFCCC or independent standards. Participating parties will have the option to develop a registry at the domestic level, participate in a regional registry, or make use of registries managed by independent standards, if allowed and permitted, or the UNFCCC's international registry. Even if a country develops a national registry, the registry can link to other national or regional registries and registries managed by a third party.

Using Independent Standard or Third Party Registry Systems

Independent standards either have implemented or may develop registries in the future. For example, most of the independent standards that operate today (Verra, Gold Standard etc.) have their own registry. Participating parties may likely have the option to utilize a third party registry system that links to the registries of other countries as well as the UNFCCC's international registry system. An example of information flows from a country to the different registries is shown in Figure 3.



Figure 3. Connecting to an Independent Standard’s Registry



As shown above, the example Country A authorizes issuances, transfers, and other functions through registries owned by independent standards. The registry(ies) then communicates with Country B engaging in a cooperative approach with Country A. The third party registries update Country A’s register for reporting to the UNFCCC.

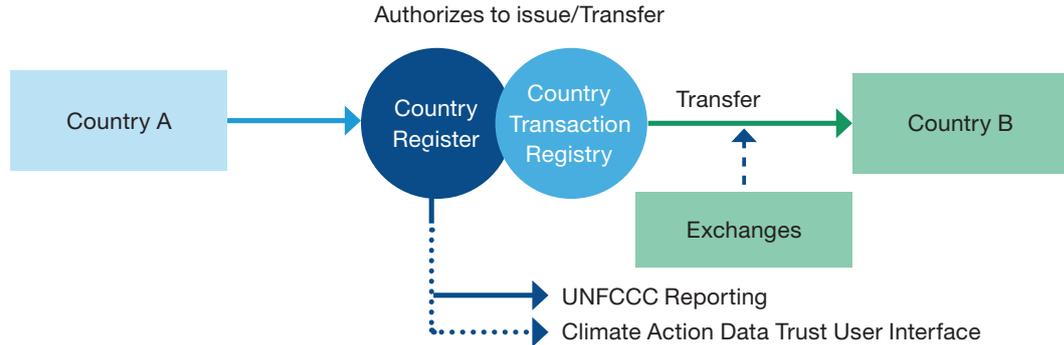
The advantages of using a third party registry system are that the reporting functions will mostly be compliant with Article 6 requirements and the third party is responsible for ensuring linkage with other registry systems. Country A needs to authorize and label ITMOs through its account at the third party registry and report the required information from Table 1 above directly to the UNFCCC. Reporting requirements around transfer, use, CA, and cancellation of ITMOs is tracked by the third party registry. If a country does not intend to participate in many cooperative approaches, outsourcing the registry infrastructure could be the best option.

The disadvantage to using a third party registry from an independent standard is the inability to customize the registry to the unique needs of the participating Party. It is also likely that there will be a fee to the registry owner or operator for having a country account and migrating a country’s information to a different registry, or domestic registry. This needs to be considered against the cost required for development of its own registry and its operation and maintenance.

Developing a Domestic Registry

To maintain control of its reporting infrastructure, and track domestic emission reduction programs, Country A could develop a domestic registry. If, for example Country A anticipates participating in multiple cooperative approaches or intends to implement a domestic cap and trade system or sector-wide crediting, a domestic registry can support these activities in addition to meeting reporting requirements under Article 6. A graphic of this infrastructure setup is shown in Figure 4.

Figure 4. Developing National Registry Infrastructure

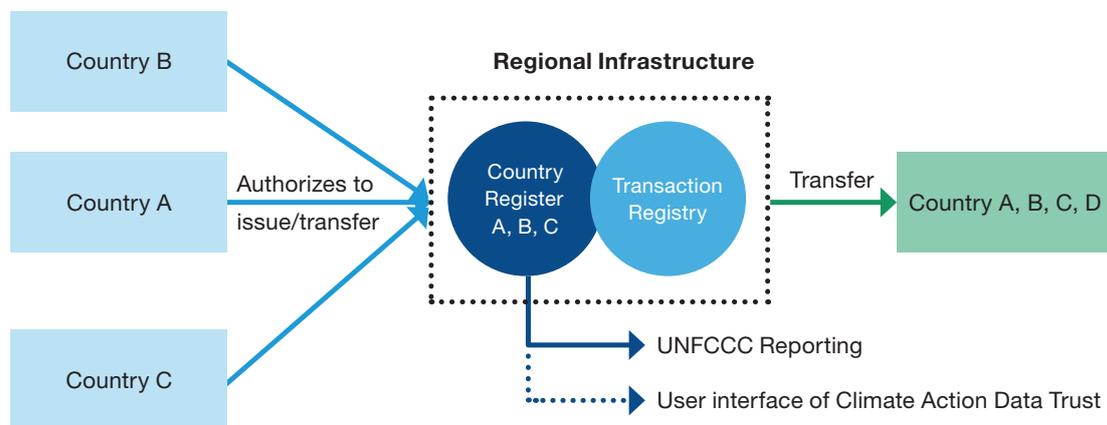


Through a domestic registry (register and transaction registry) a participating Party can communicate with and transfer directly to other national or regional registries. This requires Country A to have, or develop, sufficient capacity to implement and operate a registry.

Developing/Participating in a Regional Registry

A group of countries participating in regional markets or planning to connect emission trading programs or other commonalities can choose to develop a regional registry. This infrastructure setup is identical to the domestic registry, except that the specifications of the registry are decided at the regional level.

Figure 5. Developing Regional Registry Infrastructure



Whether participating in a regional registry, developing a domestic one, or outsourcing the service to an independent standard or third party, the trade-off for participating parties is between control over the reporting infrastructure, governance around it and the effort required to meet those requirements.

Communication between Registries

One key question for ensuring avoidance of double counting and thereby maintaining reliability of the entire system will be communication between various registries that participating Parties will be using. Under the Kyoto systems, there was a central UN architecture called the International Transaction Log (ITL) for the linking of national/regional/independent registries. Such a central system could be designed for the new Paris regime to provide a central hub to link both UN-led and domestic carbon pricing mechanisms, though this would require domestic systems to be designed to the UN specification. The central hub could also collect the relevant information on unit transfers needed to account for NDCs. Alternatively, registries of linked systems could link bilaterally in a peer-to-peer arrangement; in this case, the individual registries would need to submit the information needed for (UNFCCC) accounting. This could include information on issuances, retirements, international transfers, banking, and holdings (including vintages).

Although a peer-to-peer system may be simpler, there may be concerns about varying compatibility, security standards and a lack of transparency: it would be difficult for outside observers to know that units and transactions are unique. This could potentially give rise to a separate UNFCCC process of reporting and review of the carbon pricing systems themselves, to demonstrate that they are maintaining high environmental integrity. Under the Paris Agreement, the use of international transfers toward NDCs is voluntary and must be “authorized by participating Parties.” This does not preclude subnational systems from linking without approval from national authorities but means that any unapproved carbon units could not be counted toward NDCs.

The table below summarizes the differences in communication protocols between a centralized registry communicating directly with all other registries, and direct registry-to-registry communication.

Table 2. Centralized Communication Protocols compared to Peer-to-Peer

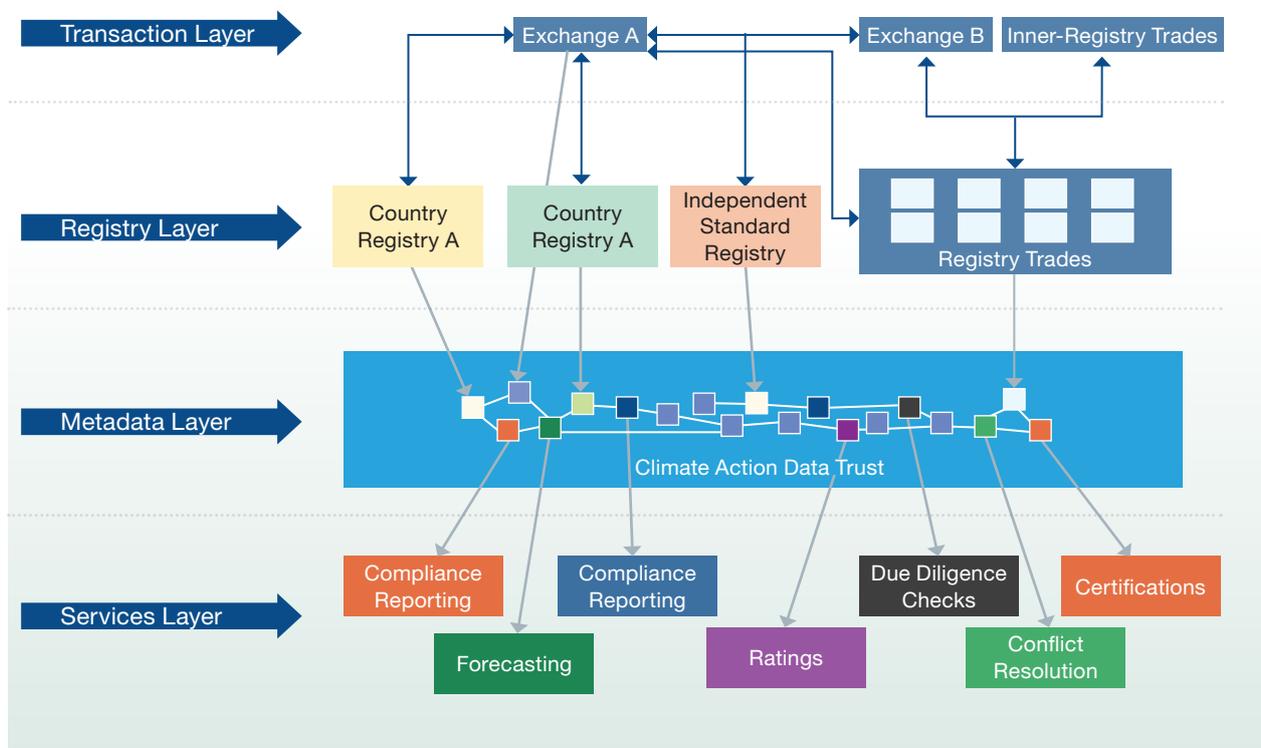
Centralized communication protocol	Registry-to-registry communication
Central checks and reliability – especially non-double counting – and also applies to single-registry operations. For example, issuance, conversion, replacement, retirement or cancellation.	Single-registry operations are accounted under the sole and entire responsibility of the registry involved.
Provides globally unique IDs for a range of reference data. For example, unit serial numbers, unit types, account types, project IDs, transaction IDs.	Each country may create IDs.
Provides common accounting rules, as well as common rules for international transfers completion including the case being, transaction's roll-back in a manner that avoids double counting (serial numbers are guaranteed as held in only one registry account at a time).	Accounting rules are determined at registry level and may differ from one registry to another. International transfers workflows, leading to transaction completion or transaction roll-back, are ruled by procedures to be agreed bilaterally and may differ from one registry to another.
The level of requirement regarding IT security and service delivery, is set centrally and must be reached by each registry connected. Registries must pass testing requirements prior to participating in international transfers.	The level of requirement regarding IT security and service delivery, may differ from one registry to another. The possibility to transfer units from one registry to another depends on the two registries agreement on a common set of rules and procedures.
A shared reconciliation process applies, that ensures non-double counting in each registry and globally, with public announcement of eventual breaches and de-connection of registries in breach.	Reconciliation involves a relation between two registries, seen from one registry.
Real-time processing offered to each connected registry	Real-time processing may occur but, on a case-by-case basis. Required to agree on a common time zone to ensure accounting period closure.

If using centralized communication protocols, there are advantages to standardization of labeling, authorizations, and accounting. Centralized communication also allows for more robust reconciliation between registries, to reduce instances of double counting, and real-time processing of transactions. Peer-to-peer communication on the other hand allows for more customization of registry functions which can be of benefit to participating Parties to optimize registry functions for domestic program requirements.

As peer-to-peer registry connection is more complex and the costs and expertise required of parties choosing this option are higher, it is recommended to evolve towards a peer-to-peer registry network gradually and once supporting infrastructure can be established in place. For example, potential drawbacks of the peer-to-peer communication can be addressed by connecting decentralized registries through a common data layer to support comparability of projects and issuances. Common taxonomy of data facilitates communication between entities and acts as a connector between different registry systems. Figure 6 depicts how building a public-good data layer (i.e., metadata layer) or an information system based on a set of common data fields pertaining to issued units can support visibility to climate activities, allow tracking and accounting, and enhance transparency of overall market activity. In the figure, the Climate Action Data Trust is listed as an example of a metadata layer to connect decentralized registries.

In the information system, all essential information on issued units in the connected registries is surfaced and stored. This includes their status changes, transactions happening at the transaction and registry layers in the diagram, uses, etc. Data collected through such an information system can be used for various purposes as seen in the services layer. For instance, countries can collate the information relevant for UNFCCC reporting; trading platforms can utilize the information for due diligence checks and auditing; companies providing specialized market analysis services, including data checks to ensure against double reporting or double counting of projects and their carbon units, auditing services of the life-cycle of the carbon offsets, title verification, title insurance, etc.

Figure 6. Building a Public-good Data Layer to Facilitate a Peer-to-Peer Connection



8. Concluding Remarks and Next Steps

A recurring theme in the comparison between developing a domestic registry compared to using a registry from an independent standard or third party is a trade-off between simplicity and customization. The same concept applies when deciding between a centralized communication protocol and peer-to-peer communication structures discussed in section 7. The decision between centralized and peer-to-peer communication will probably be made for all participating parties at a Conference of the Parties and given the bottom-up nature of the Paris Agreement in general, peer-to-peer communication will be an option for countries engaging in cooperative approaches, if there is assurance that the registry systems are robust and will not allow for double counting.

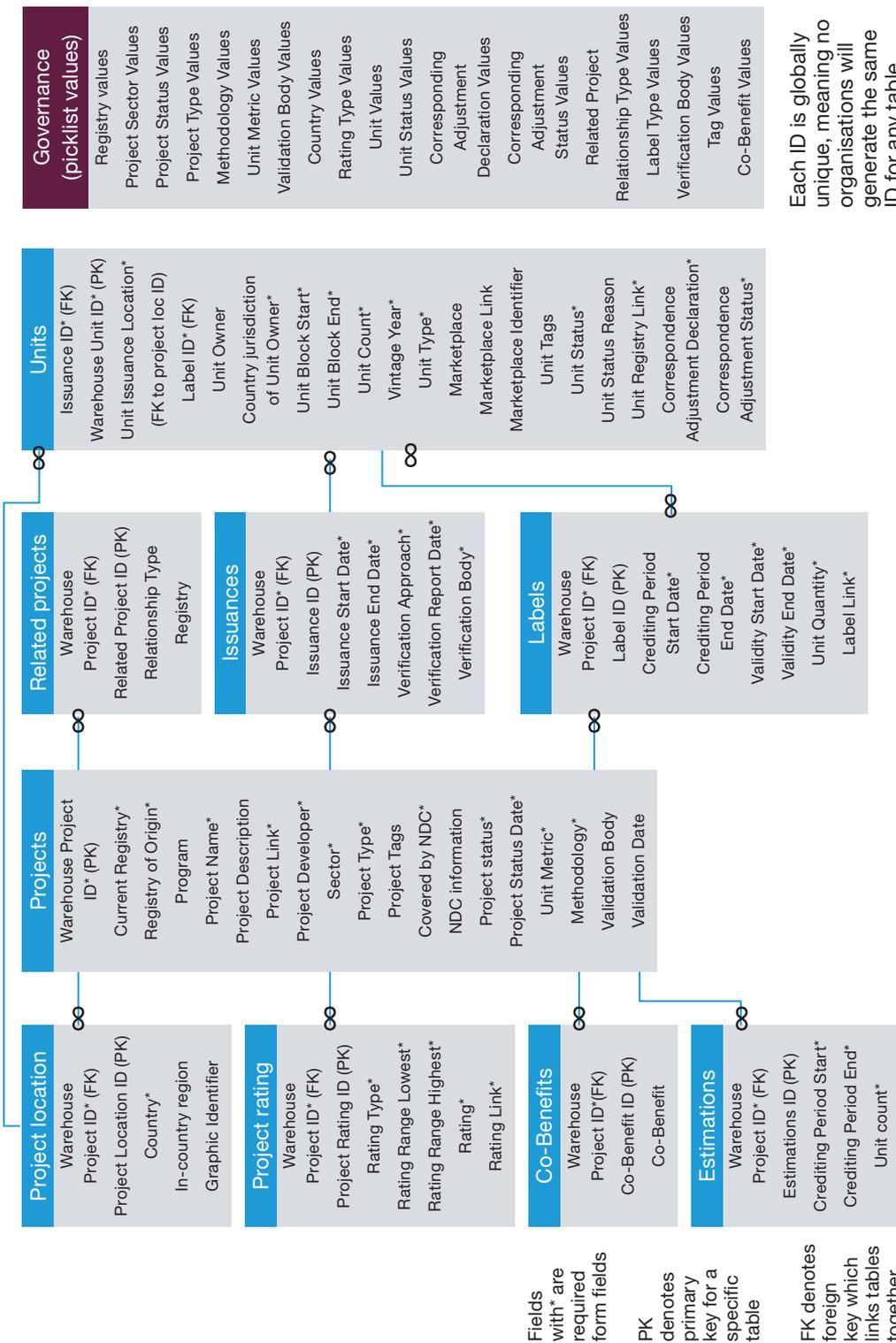
The decision to develop a national registry, participate in a regional registry, or establish a country account at a registry managed by an independent standard, will depend on the specific circumstances of the country. Countries participating in few cooperative approaches can make do with tracking their GHG inventory, managing a DMS, and maintaining an up-to-date register with support from a third party registry (or the UNFCCC international registry). Countries anticipating many cooperative approaches, frequent ITMO transactions, or using a registry to support domestic programs in addition to meeting Article 6 reporting requirements, could opt to invest in the development of a domestic registry.

While this approach paper has focused on the reporting requirements under Article 6 and resulting infrastructure requirements, the decision to develop a domestic or regional registry to tracking cooperative approaches under Article 6 comes with important governance considerations for the country hosting the registry. The larger the scale of the registry and the more functions it can perform, the more complex the institutional arrangements underpinning it will be. A national registry will probably involve a range of national authorities, including Ministries of Environment, Finance, and Justice, and require regular reporting from non-governmental organizations. The legal and governance structures for interactions between the entities involved and how they interact with the registry will be explored in another approach paper as these structures will need to be in place to ensure proper functioning of a national or regional registry system.

August 2022

Data Model Sim III

Annex 1: Information to be collected by Parties for participating in Article 6



Note: High-level overview of the Climate Action Data Trust data model as of August 2022. This version integrates the feedback received during the Climate Warehouse Simulation III.

Category	Name	Use
Projects		
Projects	Warehouse Project ID	Primary key for the project as a logical entity; can be exposed to user but as a read-only label
Projects	Current Registry	The name of the registry that currently hosts the project
Projects	Project ID	Project ID assigned to the project by the hosting registry
Projects	Registry of Origin	Name of registry where the project was previously listed, if different from current registry
Projects	Origin Project ID	Project ID assigned to the project by the registry of origin
Projects	Program	If defined by registry due to use of programmatic structure by the registry
Projects	Project Name	Name of the project in the hosting registry
Projects	Project Link	External link to project on the registry's website
Projects	Project Developer	Ordered collection of names of developers involved in the project; Users will enter developer names during initial project data entry
Projects	Sector	The industry sector that the project is targeting
Projects	Project Type	Registry-specified descriptor(s) of the type of a project
Projects	Project Tags	Collection of registry-defined, searchable metadata tags
Projects	Covered by NDC	Flag indicating whether this project is covered under the country's NDCs
Projects	NDC Information	Registry-specified description of how the project falls under the country's NDC. Only valid if "Inside NDC" is selected.
Projects	Project Status	Current status of the project (e.g., validated, registered, expired, etc.)
Projects	Project Status Date	Calendar date when the status of the project was last updated
Projects	Created At	Date and time this project record was created; autocreated by API when the record is first created
Projects	Updated At	Date and time this project record was updated; autocreated by API when projects table and any related table is manipulated
Projects	Unit Metric	The metric used to assess the outcomes produced by the project (e.g., kWh, MW, tCO ₂ , etc.)
Projects	Methodology	The monitoring methodology used for calculating outcomes
Projects	Validation Body	The name of the validating organization
Projects	Validation Date	The calendar date the project was validated by the validating organization
Projects	Project Description	This field is meant to give external viewers a sense of what is being done with the project – it should excite the reader into wanting to get more information about the project.

Category	Name	Use
Estimations	Warehouse Project ID	Foreign key to projects table
Estimations	Estimations ID	Generated by the Climate Action Data Trust, identifies the estimation record
Estimations	Period Start	Start date for the estimated crediting period
Estimations	Period End	End date for the estimated crediting period
Estimations	Unit Count	Estimated number of outcomes produced in the specified crediting period
Locations	Warehouse Project ID	Foreign key to projects table
Project locations		
Locations	Warehouse Location ID	Primary key for the location table
Locations	Country	Country in which project is located
Locations	In-Country Region	Region(s) or subnational division in which project is located, if applicable
Locations	Geographic Identifier	This gives additional specificity to where the project is being conducted. Some projects may list GPS coordinates, some may not want to disclose exact location.
Ratings	Capture independent assessment of additional attributes of mitigation activities (e.g., sustainable development co-benefits, project risk assessments, etc.)	
Ratings	Warehouse Project ID	Foreign key to projects table
Ratings	Project Rating ID	Foreign key to projects table
Ratings	Rating Type	The name of rating or rating module
Ratings	Rating Value	The score received by the project on this rating module
Ratings	Rating Range Lowest	Worst score possible on this rating module
Ratings	Rating Range Highest	Best score possible on this rating module
Ratings	Rating Report Link	Link to the rating report generated for this project by the rating module
Co-Benefits	Key objective of Article 6 is to foster increase in collective ambition, while supporting sustainable development and environmental integrity. SDG benefits could be listed, and when available, provide information on its verification.	
Co-benefits	Warehouse Project ID	Unique identifier for projects within the Climate Action Data Trust.
Co-benefits	Co-benefits	Identifier for a specific co-benefit associated with a project
Co-benefits	Co-benefits	Enter the co-benefit achieved with the project.

Category	Name	Use
Units		
Units	Warehouse Unit ID	Primary Key for a block of units as a logical entity
Units	Issuance ID	Foreign key to issuances table from registry
Units	Label ID	Foreign key to Projects table
Units	Units Issuance Location	Foreign key to project locations table
Units	Unit Owner	Name of the legal organization/country that is the current owner of the units
Units	Country Jurisdiction of Owner	The name of the country jurisdiction that applies to the unit owner organization
Units	In-Country Jurisdiction of Owner	Regional or sub-national jurisdiction that applies to the unit owner organization
Units	Unit Block Start	First serial number in a sequential collection of unit serial numbers
Units	Unit Block End	Last serial number in a sequential collection of unit serial numbers
Units	Unit Count	Count of units in the issued block
Units	Vintage Year	The year (or vintage) when the units were awarded
Units	Unit Type	Select the type of outcome achieved - reduction, removal, etc.
Units	Marketplace	Exchange, token or other location where this block of units can be purchased
Units	Marketplace Link	Hyperlink to the marketplace that is hosting that unit (only for units listed on a marketplace)
Units	Marketplace Identifier	If issued in a marketplace, the identifier of the units in that marketplace
Units	Unit Tags	A field used to denote an additional attribute that is not captured in other fields
Units	Unit Status	The unit status within its lifecycle
Units	Unit Status Reason	Used for describing why a particular status is being used (ex. Retired status; this field would be used to describe the purpose the retired units are being used)
Units	Unit Link Registry	Hyperlink to information about the units
Units	Corresponding Adjustment Declaration	Determination on whether a corresponding adjustment is needed or not (or it is unknown)
Units	Corresponding Adjustment Status	Information whether the unit adjustment has actually taken place or not

Category	Name	Use
Issuances		
Issuances	Warehouse Project ID	Foreign key to projects table
Issuances	Issuance ID	Primary key for the issuances table
Issuances	Issuance Start Date	Date which a unit was issued
Issuances	Issuance End Date	Date which a unit was ended
Issuances	Verification Approach	Approach used for the units in the issuance period
Issuances	Verification Report Date	Calendar date when the verification was completed for a particular issuance
Issuances	Verification Body	Validating body that performed the verification for an issuance
Related Projects		
Related Projects	Warehouse Project ID	Foreign key to projects table
Related Projects	Related Project ID	This is the project ID that was created by the registry
Related Projects	Registry	The registry that houses the project
Related Projects	Related Project Relationship Type	Information about the relationship between the projects, e.g., subset
Labels	The label denotes the eligibility of units for particular use of what the unit may be used for. The label will include voluntary and compliance type labels, including authorizations from sovereigns from the letter of authorization.	
Labels	Warehouse Project ID	Foreign key to labels table
Labels	Label ID	Primary key for the labels table
Labels	Label	Enter the name of the label that is being applied
Labels	Label Type	Describes what type of qualification is being applied: endorsement, letter of qualification, letter of authorization, or letter of approval
Labels	Crediting Period Start Date	This is the date that defines the period when units are being credited.
Labels	Crediting Period End Date	This is the date that defines the period of time which units are being credited.
Labels	Validity Start Date	This is the date that indicates when the label is valid
Labels	Validity End Date	This is the date that indicates till when the label is valid
Labels	Unit Quantity	Count of the units that this label applies to; this is important because an issuance might have some units that fall into a qualification and other units that do not.
Labels	Label Link	Link to the label in question

