

Interlinkages of registries and implications for functions and structures in the context of Article 6

08/2023

Discussion Paper

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IMPRINT

Publisher:

Perspectives Climate Research gGmbH

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Date:

08/2023

ACKNOWLEDGEMENTS

This paper was developed by Perspectives Climate Research gGmbH (PCR), with inputs from the Carbon Market Mechanisms Working Group (CMM-WG). We thank all the working group members and technical experts as well as the workshop speakers for their input to this paper.

The CMM-WG is chaired by PCR and is funded and coordinated in close collaboration with the German Federal Ministry for Economic Affairs and Climate Action. The CMM-WG focuses on technical aspects of programmatic and upscaled crediting mechanisms in Article 6 of the Paris Agreement as well as results-based climate finance. The working group aims to facilitate a continuous dialogue on technical issues among key carbon market stakeholders. For more information go to:

<https://www.carbon-mechanisms.de/en/news-details/cmm-wg>

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The analysis, results, and recommendations in this paper, funded by the German Federal Ministry for Economic Affairs and Climate Action, represent the opinions of the authors and are not necessarily representative of the position of the funder.

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Abbreviations

AAU	Assigned Amount Unit
AEF	Agreed Electronic Format
API	Application Programming Interface
A6.4ER	Article 6.4 Emission Reduction
CA	Corresponding Adjustment
CAD	Climate Action Data
CARP	Centralized Accounting and Reporting Platform
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CMA	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
ERU	Emission Reduction Unit
ETS	Emission Trading System
GCR	Ghana Carbon Registry
GHG	Greenhouse Gas
GS4GG	Gold Standard for Global Goals
ICAO	International Civil Aviation Organization
ICVCM	Integrity Council for the Voluntary Carbon Market
ITL	International Transaction Log
ITMO	Internationally Transferred Mitigation Outcome
JI	Joint Implementation
NDC	Nationally Determined Contribution
OIMP	Other International Mitigation Purpose
OMGE	Overall Mitigation in Global Emissions
RSA	Article 6 Registry System Administrators and Technical Experts
SB	Subsidiary Bodies
SOP	Share of Proceeds
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
VCS	Verified Carbon Standard

1. Background

A carbon credit represents a real, additional, and verified mitigation outcome (emission reduction or removal) of one metric tonne of carbon dioxide equivalent. Carbon credits are **issued** by carbon crediting programmes for mitigation outcomes (emission reductions or removals) that meet the programme's criteria. These programmes may be governed by international entities¹, national authorities² or private or not-profit organisations³ (hereafter referred to as international, domestic (national and subnational), and private crediting programmes, respectively).

Carbon credits can be **purchased and used** on a voluntary basis or for international or domestic compliance purposes. All carbon credits can be used voluntarily, and some may also be eligible for certain compliance uses⁴.

Articles 6.2 and 6.4 of the Paris Agreement enable market-based cooperation involving the authorisation, transfer, and use of internationally transferred mitigation outcomes (ITMOs), and the generation of Article 6.4 Emission Reductions (A6.4ERs), respectively. Under Article 6.2, host countries may authorise mitigation outcomes, including but not limited to A6.4ERs and carbon credits issued under other carbon crediting programmes, as ITMOs. By authorising ITMOs, the host country commits to ensuring that ITMOs meet all relevant Article 6 criteria and applying corresponding adjustments (CAs) to its emissions balance for authorised and first-transferred ITMOs, so as to not account the associated mitigation outcomes towards its Nationally Determined Contribution (NDC). ITMOs can be authorised for use by other countries towards their national mitigation targets (NDCs), for international mitigation purposes (e.g., by airlines under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) obligations under the International Civil Aviation Organization (ICAO)), and other purposes (e.g., by non-state actors for voluntary offsetting). International mitigation purposes and other purposes are jointly referred to as “other international mitigation purposes” (OIMP). A6.4ERs that are not authorised as ITMOs are referred to as “mitigation contribution A6.4ERs. They may be used, “... inter alia, for results-based climate finance, domestic mitigation pricing schemes, or domestic price-based measures, for the purpose of contributing to the reduction of emission levels in the host Party” (UNFCCC 2023b, annex I, para 29 (b)).

To understand how and how much these carbon credits contribute to global mitigation efforts, it is crucial to **keep track** of their issuance, transfer, and use. This is done by **carbon**

¹ E.g. The Kyoto Protocol's Clean Development Mechanism (CDM) was governed by the international CDM Executive Board and the Paris Agreement's Article 6.4 Mechanism (A6.4M) is governed by the international Supervisory Body (A6.4SB).

² E.g. China's Ministry of Ecology and Environment administers the China Greenhouse Gas (GHG) Voluntary Emission Reduction Program.

³ E.g. Non-profit organisations Verra and The Gold Standard Foundation administer the Verified Carbon Standard (VCS) and Gold Standard Foundation's Gold Standard for Global Goals (GS4GG), respectively.

⁴ Eligibility criteria for any carbon credit use would be determined by the compliance scheme in question.

credit registries. They aim to ensure data integrity and enable consistent reporting of co-operation involving carbon credits. Carbon credit registries are databases that list registered mitigation activities, record issued carbon credits and their ownership, and undertake and track different actions with respect to issued carbon credits, such as transfer, use, retirement, and cancellation⁵. These actions are referred to as **carbon credit transactions**.

Also, carbon credit registries may be operated by **international, national, or private** entities. Often, carbon crediting programmes have their own registries. For example, the UNFCCC Secretariat administers the **CDM registry** and the forthcoming international registries under Article 6 (see below). There are **nationally operated registries** for example in China for the China GHG Voluntary Emission Reduction Program, and in Ghana for Article 6 and voluntary carbon market activities. Governments may use private service providers like IHS Markit to establish and operate the registry infrastructure. In the voluntary carbon market (VCM) space, private or non-profit entities (such as Verra and the Gold Standard Foundation) manage **registries** for carbon credits issued under their carbon crediting programmes, Verified Carbon Standard (VCS) and Gold Standard for Global Goals (GS4GG), respectively. We call these “**private registries**” to distinguish them from the registries of public, compliance programmes like the CDM.

The Article 6 rulebook adopted by the 3rd Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA3) in Glasgow prescribes the use of three registries under market-based Article 6 cooperation (hereafter jointly referred to as ‘**Article 6 registries**’). To participate in cooperation involving ITMOs under Article 6.2, participating Parties must ensure that they have the necessary arrangements in place for tracking ITMOs. This can be done through a **national Party registry**, or the **international registry** being developed by the UNFCCC Secretariat as a part of the centralized accounting and reporting platform (CARP) (Decision 2/CMA.3, annex, paras 30-31). The A6.4M prescribes the use of a **mechanism registry** connected to the international registry to track A6.4ERs issued to Article 6.4 activities. A6.4ERs authorised for use towards NDC and/or OIMP will be distinguished as such in the mechanism registry (Decision 3/CMA.3, annex, paras 54-55, 63). To enable Parties and authorised entities to add to their holdings of Article 6 credits or transfer credits from one country or entity to another, Article 6 registries need to be in the form of robust and interoperable registry systems to track the location, ownership, and use status of carbon credits at all times. Article 6 registries need to contain publicly available information to uniquely identify mitigation activities as well as the credits issued to such activities, and transparently track ownership and status of each credit.

Given the proliferation of different carbon market registries in different market segments, there is a need for registries to communicate to each other and/or transfer credits to each other, while guaranteeing data consistency. This implies that a certain degree of **interoperability** between the different registries would be necessary. Interoperability refers to the ability of different systems or products to connect and communicate with one another in a

⁵ Retirement implies a transfer of units of an entity/Party to a retirement account of a registry, for compliance with their emissions targets. Cancellation implies a transfer of units of an entity/Party to a cancellation account that prevents that unit from being used for compliance with an emissions target. Cancellation can take several forms: voluntary cancellation, mandatory cancellation, cancellation for administrative purposes etc.

coordinated manner, that reduces efforts from the user. Interoperability between Article 6 Party and/or private registries can help to secure efficient and well-coordinated data exchange, thereby improving the flow and tracking of information across registries.

In general, interoperability between registries can take two different forms: **Exchange of information across registries** (e.g., communication of data) or **transactions of carbon credits**, including ITMOs, between registries.

The objective of this discussion paper is to identify the different types of carbon credit registries in the international carbon market infrastructure under Article 6 and the VCM and explore the possible ways in which these registries can connect and interact with each other. Inputs shared by participants of a Carbon Market Mechanisms Working Group (CMM-WG) registry workshop in May 2023 as well as Party submissions and discussions prior to and at the 58th session of the Subsidiary Bodies are considered in this paper.

2. Registries in the Kyoto era

Under the **Kyoto Protocol**, binding quantified emission reduction and limitation targets were set for Annex B Parties, which were expressed as allowed emissions or 'assigned amounts' over multi-year periods (2008–2012 and 2013–2020). Units representing the initial assigned amounts of Annex B Parties were issued as Assigned Amount Units (AAUs) into **national Kyoto registries**⁶. These registries contained accounts where Parties themselves or authorised entities could hold and trade Kyoto units (Decision 3/CMP.1, annex, para 31). The Kyoto Protocol included two carbon crediting programmes: Joint Implementation (JI) and CDM for projects that reduced emissions in countries with and without targets, respectively. For JI projects, carbon credits were issued in national Kyoto registries by converting them from AAUs while for CDM projects, carbon credits were issued, and their holdings, transfers and acquisitions were tracked in the international **CDM registry** (Decision 3/CMP.1, annex, appendix D).

The International Transaction Log (ITL) tracked international transfers of Kyoto units between the CDM registry and national Kyoto registries. The ITL ensured accurate accounting and verification of unit transactions proposed by registries (Michaelowa et al. 2021). The ITL assessed transaction proposals sent by registries based on which the transaction was either completed or terminated. Such a communication between the CDM registry and a national Kyoto registry was, for example, required for the retirement of certified emission reductions (CERs). If used for retirement (compliance use towards Annex B targets), the CERs were transferred from the CDM registry holding accounts to the retirement account in a national registry (of an Annex I country). In case of CER use by non-Annex I country entities towards

⁶ Under the Kyoto Protocol, Annex I parties had to establish and maintain national registries, in the form of a standardised electronic database, to ensure accurate accounting of issuance, holding, transfer, acquisition, cancellations and retirements of Kyoto units (UNFCCC 2005). Data structures and formats of national registries had to ensure the accurate, transparent and efficient exchange of data between national registries, the CDM registry and the ITL. Each Kyoto unit had to be assigned a unique serial number that contained information on the commitment period, Party of origin, type of unit, activity type, and unit number.

national carbon pricing instruments (e.g., carbon tax) or by non-state entities for voluntary purposes, the CERs were placed in the CDM registry's voluntary cancellation account.

There were no direct interlinkages between the CDM registry and private registries in the Kyoto context. CDM projects could register under the Gold Standard and be both listed in the CDM and Gold Standard registry. CERs from Gold Standard projects would be labelled as Gold Standard CERs but the label would not be formally applied in the CDM registry. In case a project registered under the CDM transitioned to a private registry, such as the Verra registry, this needed to follow certain procedures depending on the standard and required in some cases (e.g., forestry projects) deregistration from the CDM.

3. Article 6 registries

To participate in cooperation involving ITMOs, the rules adopted at CMA3 in Glasgow require a Party to **have** or **have access to a registry** that **tracks and records** authorisation, first transfer, transfer, acquisition, use towards NDCs, authorisation for use towards OIMP, and voluntary cancellation of mitigation outcomes or use the **international registry** being developed by the UNFCCC secretariat (Decision 2/CMA.3, annex, para. 29-30). Building on the relatively high-level decisions adopted in Glasgow on registries, the discussions at CMA4 in Sharm el-Sheikh focused on providing the technical specifications of the different Article 6 registries. Registries proved to be a challenging topic to discuss as not all Parties had the same level of experience when it came to implementing registries in the past. Furthermore, unlike the Kyoto targets, NDCs under the Paris Agreement are not based on fungible units. As Parties were still in the process of developing their positions at Sharm el-Sheikh, negotiators took an open exploration approach for the discussions, with the aim to understand all the possible registry implementation options.

In this spirit, the Article 6.2 decision adopted in Sharm el-Sheikh further added to the Glasgow decisions on registries by specifying that (Decision 6/CMA.4, Annex I, para. 1-8):

- Party registries must **track, maintain records and account** for ITMOs, including through unique identifiers (allowing to trace back to represented mitigation outcomes), and **present and compile data in a consistent manner with the annual information in the agreed electronic format** (AEF).
- Each participating Party must **track and record** ITMOs (or ITMO blocks) from a cooperative approach **consistently during the NDC implementation period**.
- Parties' national registries **can be interoperable** and must implement procedures to ensure data consistency if ITMOs in a cooperative approach are transferred.

In case a Party does not want to establish and use an own registry, it can make use of the **international registry** which has Party-specific sections and the same functions as the Party registries (Decision 6/CMA.4, Annex I, para. 11-20). Even if a Party decides to use the international registry, the Party is still responsible for tracking the underlying mitigation activities and outcomes and for avoiding double counting. The international registry will be developed in a way that allows automatic pre-filling of AEF and other quantitative information required under Article 6 reporting requirements. As the administrator of the international registry, the UNFCCC Secretariat is responsible for developing and maintaining registry management procedures as well as procedures for interoperability with other registries.

The Article 6.2 decision text from Sharm el-Sheikh also calls for the establishment of a voluntary forum of Article 6 registry system administrators and technical experts (RSA Forum) by the secretariat for enhancing cooperation and knowledge sharing on the implementation of registry infrastructure (Decision 6/CMA.4, para. 34). The forum is to provide input into the further development and implementation of the infrastructure. This also accounts for the communication standards for interoperability and practices to be developed by the secretariat (para. 32). In July 2023, the secretariat published a concept note for the administrator forum (see UNFCCC 2023f). The concept note establishes that the capacities of participants are to be enhanced through structured discussions, working groups and other outputs. Knowledge sharing and collaboration would be facilitated to develop common methodologies, tools and guidelines for the accounting, tracking and reporting of ITMOs. In addition, innovative technologies for improved reliability and efficiency of tracking registries could be promoted. Regarding the input on infrastructure, communication standards and recommended practices to be provided by the RSA Forum, it is specified that collaboration with international standards organisations, technical bodies and relevant stakeholders can be sought. It is made clear that neither technical assistance nor training programmes are within the forum's mandate. The mandate also specifically excludes the definition or re-definition of features and functions of the Article 6 registries, the Article 6 database and CARP. The first session of the RSA Forum is to take place in October 2023.

The Article 6.4 decision adopted at Sharm el-Sheikh states that the **mechanism registry** (Decision 7/CMA.4, Annex I, para 27-49):

- will be **consistent with the requirements for registries enshrined in the Article 6.2 decisions** and shall **track** A6.4ERs and CERs using **unique identifiers**.
- shall **track A6.4ERs** authorised for use towards NDCs and/or OIMP, **with first transfers being identified as such in the mechanism registry**, as well as mitigation contributions, which means non-authorised A6.4ERs.
- shall have at least a pending account, holding account, share of proceeds (SOP) for adaptation account, account for mandatory cancellation for overall mitigation in global emissions (OMGE), account for voluntary cancellation for OMGE, retirement account, account for cancellation for OIMP, account for voluntary cancellation for other purposes and account for administrative cancellations.
- shall **allow account holders to see the authorisation status and the first transfer status of A6.4ERs** held in their holding accounts.
- shall allow **automatic pre-filling of the AEF** and other quantitative information required under Article 6 reporting requirements.

The Article 6 work programme for registries until CMA.5 (also see Figure 1) includes the development of recommendations on (Decision 6/CMA.4, para. 17g-i; Decision 7/CMA.4, para. 9c):

- the need for additional functionalities and procedures for the international registry to allow for the transfer of A6.4ERs to the international registry and to provider voluntary services for cooperative approaches
- the accounts of the international registry and the role of the international registry administrator
- the submission of information by Parties using the international registry
- the connection of the mechanism registry to the international registry as well as to other registries.

At the 58th session of the Subsidiary Bodies (SB58) of the UNFCCC in June 2023, Parties intensely debated the registry types and interoperability of the international registry with other registries, including the link from the mechanism registry to the international registry and other registries. Technical workshops and papers prepared on the matters in the run-up to SB58 helped inform Party positions. The following options on the type of Article 6 registries emerged:

- **Transactional registries**, i.e., registries that enable the transfer of ITMOs between different registries
- **Non-transactional registries**, i.e., registries that enable the pulling and viewing of information from underlying cooperative approach registries

Furthermore, discussion on the question of **interoperability** between the mechanism registry and the international registry, as well as with other registries revealed that Parties had diverging views on the nature and purpose of such connection, which are summarised below:

- **Pulling and viewing** of data and information
- **Transfer of units**

Advocates of the 'pulling and viewing' only connection argue that a linkage that allows for 'transfer of units' would be cost-intensive and complex. The proponents of the second interoperability option dismissed this argument as unsubstantiated and stressed that having a central location to track ITMOs, A6.4ERs and related information is necessary for transparency and reporting of information, and thereby upholding the principles of the Paris Agreement.

It was evident from the polarised positions presented by Parties at SB58 on this matter that there is significant work yet to be done. The topics of Article 6 registries, their purpose and the nature of interoperability between the different registries will be discussed during the intersessional hybrid workshop in the run-up to, as well as in Dubai (CMA.5). In the Article 6.2 draft conclusions at SB58, Parties requested the UNFCCC Secretariat to prepare a technical paper on the functionalities and procedures for the international registry including its accounts, the submission of information and the use of common nomenclatures (UNFCCC 2023d, para. 6c). The technical paper is to consider any Party submissions on the estimated costs for the international registry. In addition, the Secretariat is also to provide updated specifications and estimates that consider Party submissions (UNFCCC 2023d, para. 12). The Article 6.4 draft conclusions specify that an informal document is to be prepared by the SBSTA chair that captures the views expressed at SB58 and at the inter-sessional technical expert dialogue including on the connection of the mechanism registry to the international registry (UNFCCC 2022d, para. 9). Figure 1 outlines the upcoming work programme on registries.

At the international level, an initiative has emerged that aims at facilitating the implementation of registry infrastructure. The United Nations Development Programme (UNDP) launched a "National Carbon Registry" open-source software to enable countries to manage national data and processes for trading carbon credits (UNDP 2023). The software can be tailored to a user country's specific context and be integrated with national MRV or platforms such as the Climate Action Data (CAD) Trust (see Box 1). Other initiatives are looking

into enhancing the transparency of carbon market transactions by establishing links across different registries (see Box 1 on meta-registries).

Box 1: Meta-registries

Meta-registries: Not a registry, but compiler of information from many registries

The existence of many registries in the international carbon market infrastructure has created a need for an accessible central repository of data on carbon credit issuances, transfer and use in compliance and voluntary carbon markets. **Meta-registries or data platforms** aim to serve this purpose of connecting and aggregating carbon registry data by hosting metadata registries. One example of a metadata platform is the CAD Trust. The CAD Trust is an open source, decentralised metadata platform that links, aggregates and harmonises all major carbon registry data from countries and private crediting programmes to enhance market transparency and facilitate reporting and accounting in line with Article 6 of the Paris Agreement (CAD Trust n.d.). In doing so, it aims to help avoid double counting and generally restore trust in carbon market transactions. CAD Trust was jointly launched by the International Emissions Trading Association, the World Bank, and the government of Singapore.

This metadata platform builds on a global blockchain system using the “Chia” blockchain which is seen as a simple way to connect all registries (Bart 2023). Blockchains carry a “backpack” of all changes that have ever happened to a specific unit as an immutable record, and information is not stored in one central data base but can be held in many different systems. Additionally, a blockchain does not require trust in the database operator as information can be checked in the blockchain tool by any user. Therefore, blockchains are seen as an ideal approach for compiling carbon credits data, considering that all the rights would not need to be given to a single organisation.

At present, the CAD Trust is focusing its efforts on connecting private registries, however, the linking is expected to work for any registry including international and national registries (Bart 2023). The data dashboard is expected to be operational in Q4 2023, connecting to almost all private registries (CAD Trust 2023).

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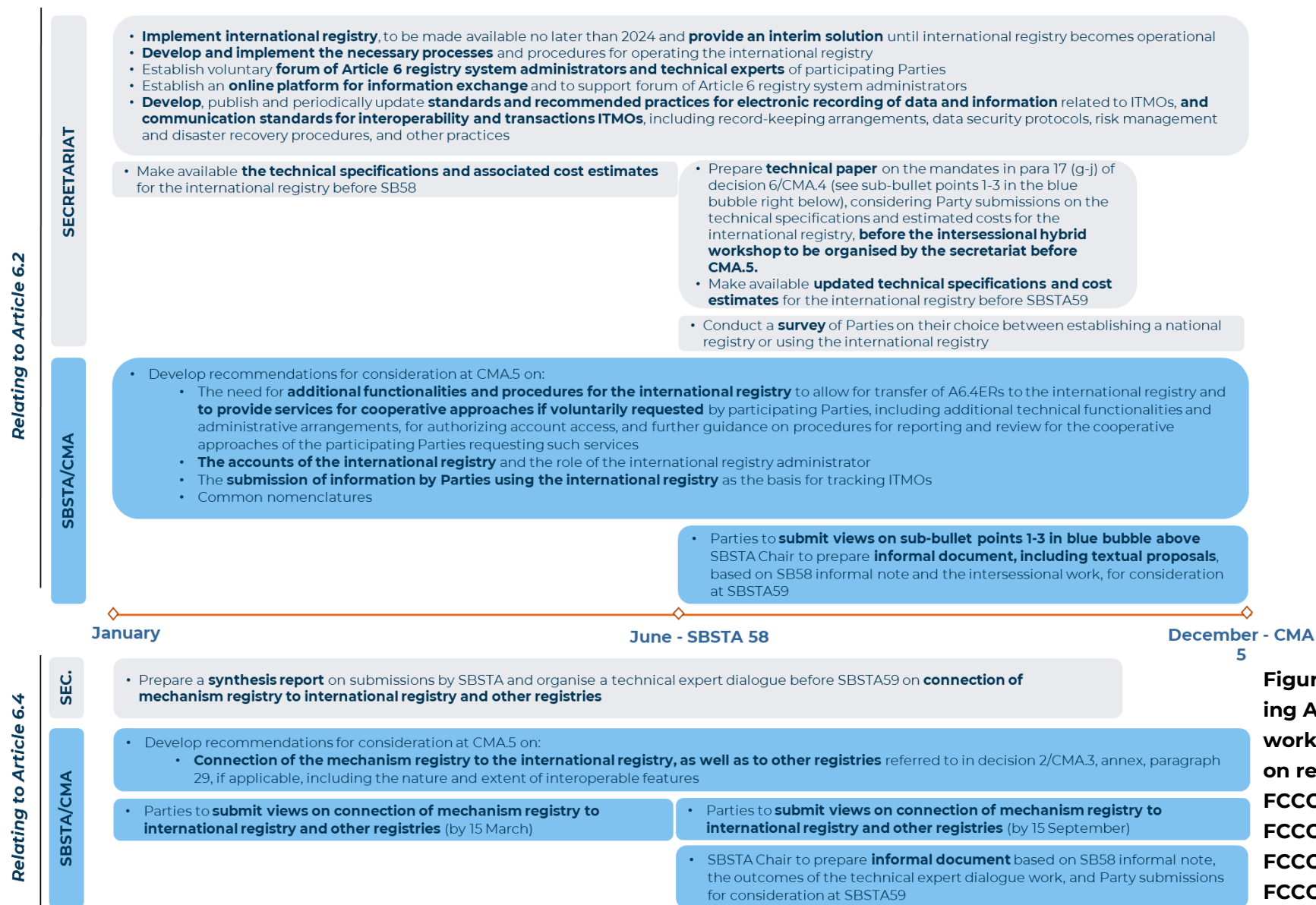


Figure 1: Upcoming Art. 6.2 and 6.4 work programme on registries (UN-FCCC 2023a; UN-FCCC 2023b; UN-FCCC 2023d; UN-FCCC 2023e)

4. The role of private registries

A key issue that has garnered interest and has been discussed by negotiators and carbon market experts in the run-up to and at SB58 is the potential role of private registries - currently operating under the voluntary carbon market, as discussed in the preceding section - under Article 6. Private registry operators are engaging with governments to offer their services also for Article 6.2 cooperation. Some experts have flagged that private carbon crediting programmes operate outside of the Paris Agreement in highly differing governance contexts depending on the legal form in which they are constituted and the jurisdiction where they are registered. They have their own baseline and monitoring methodologies and processes for issuing and retiring carbon credits and are not regulated by international or national governing bodies. Host countries are ultimately responsible for ensuring that all ITMOs that they authorise comply with the relevant Article 6 criteria. Thus, the carbon credit issuance process under private carbon crediting programmes should only ever complement, never substitute, host country scrutiny of mitigation outcomes to be authorised as ITMOs, including the assessment of environmental integrity and implications to NDC achievement and sustainable development objectives.

Private **registries** include, for example, the Verra Registry, Gold Standard Impact Registry, American Carbon Registry, Global Carbon Council as large players on the voluntary carbon market. Recently, small registries have been proliferating for specific market niches such as removals. Lack of central oversight can undermine trust in the procedures in such registries.

With the goal to align the quality of carbon credits in the VCM, the Integrity Council for the Voluntary Carbon Market (ICVCM) Assessment Framework specifies threshold quality criteria for carbon credit types and carbon crediting programmes, including for their registries that track carbon credit transactions. ICVCM criteria for registries combine CORSIA's requirements for registries with additional ICVCM requirements (ICVCM 2023). CORSIA requires programmes to have in place procedures to ensure that units are tracked and individually identified through serial numbers, the registry is secure, and units have clearly identified owners or holders. In addition, CORSIA requires programmes to have measures to avoid double issuance, double use and double claiming. Registries can help to address some, but not all, of these challenges. For example, double counting based on overlapping boundaries between two projects that are registered under different (or even the same) programme cannot really be addressed by registries, but rather in project design. According to additional ICVCM criteria, registries shall require the identification of the retirement entity as well as the purpose of retirement and establish procedures for dealing with erroneous issuance of carbon credits. So far, it is unclear which registries adhere to these criteria.

According to Gold Standard, the need for **interlinkages** between private, national and UN-FCCC registries is driven by the following (Salway 2023):

- **Continued interest in using private registries** to support Article 6 implementation, as shown by governments like Singapore and by CORSIA.
- **Desire for sovereignty and integrity of information** by recording ITMO information in national (i.e., not private) registries, as indicated by several national governments.

- **Private registries are increasingly holding themselves up to a certain standard** as laid down under CORSIA (i.e., registry requirements to track information on CAs) and ICVCM.

Bearing in mind that the authorising Party is always responsible for ensuring that ITMOs meet all relevant Article 6 criteria, we identify **three illustrative scenarios for the role for private carbon crediting programmes and private registries** in implementing Article 6.2:

- **Scenario A:** Participating Parties rely solely on their **own quality control and registries** and there is **no role** for private carbon crediting programmes and registries. Participating Parties carry out their own quality control of mitigation outcomes and their authorisation as ITMOs through national and/or bilateral frameworks and record and track ITMO authorisations, transfer and use in their own Party registries or the international registry. In this scenario, ITMOs would be issued, recorded, and tracked **as units**.
- **Scenario B:** Participating Parties **make complementary use** of private carbon crediting programmes and private registries, **in addition to their own quality control and registries**. In this scenario, Parties allow carbon credits issued under private programmes into private registries to request authorisation as ITMOs. Participating Parties carry out their own quality control on all mitigation outcomes that request authorisation, including carbon credits (to be) issued under private programmes, in line with the national (or bilateral) framework. For carbon credits (to be) issued under private programmes, the national quality control process may take into consideration the methodologies and documentation developed under the private carbon crediting programme, such as validation and verification reports and sustainable development impact assessments, as evidence for meeting national authorisation criteria. Compared to the private programme, however, the national criteria and quality control may differ in terms of scope (e.g., assessment on NDC and SDG alignment) and stringency (e.g., more stringent criteria for additionality or baselines). Carbon credits issued under private programmes and authorised as ITMOs that reside in the private registry are **tagged** by the registry administrator as ITMOs, with their transfers and use tracked. In addition, participating Parties would record and track ITMO authorisations, transfers and use in their own Party registry. This would require timely and accurate exchange of information on issuance, authorisation, transfer and use between the private registry and the Party registry. For ITMOs that are not based on carbon credits issued under private programmes, the Party registries would record and track ITMOs **as units**. Note that this scenario **could resemble scenario C** (see below) if participating Parties do not have capacity and/or incentives to perform own quality control as part of authorisation but instead authorise all carbon credits issued by private crediting programmes as ITMOs.
- **Scenario C:** Participating Parties rely **solely on private carbon crediting programmes and registries** for quality control and/or registry functions, with **no own quality control or registries**. In this scenario, participating Parties authorise all carbon credits issued by (potentially pre-approved) private crediting programmes without conducting own quality control, rendering national authorisation effectively a rubber stamp for private programmes. They may also utilise one or several private registries as their registry. It is, however, unclear if the latter serve as “the registry” referred to in Article 6.2 rules. Even in this scenario, the authorising Party remains responsible to the Paris Agreement for ensuring that all ITMOs meet relevant Article 6 criteria and for applying robust accounting in line with the relevant Paris Agreement rules. Given that private carbon crediting programmes and registries are not designed nor mandated to comply with Article 6 criteria, full reliance on them would increase the risk that Article 6 criteria are not met.

Box 2: Examples from practice – moving towards registry implementation

Key elements of Singapore's Article 6.2 Implementation Agreement

Singapore's government (2023) outlines the key elements of an agreement for a bilateral framework for the authorisation and transfer of ITMOs from host Parties to Singapore as the acquiring Party. The cooperation will be structured around a Joint Committee that sets the working modalities. Environmental integrity criteria use the CORSIA standards as a minimum basis, complemented with additional Article 6 criteria and potential further host Party criteria, such as national reference levels. A pre-approved list of carbon crediting programmes, methodologies and activity types will be developed, based on national frameworks. Following no-objection by Singapore and the host Party, respectively, activities are assessed and registered under pre-approved private crediting programmes. Singapore checks applications from registered activities against no-objection requirements and the host Party assesses them against no-objection conditions and its national framework. Subject to a positive assessment, the host Party issues a Letter of Authorisation. After issuance, carbon credits must pass a positive examination by the host Party against conditions included in the Letter of Authorisation to be first-transferred as ITMOs to Singapore for NDC use, or to Singapore-based companies for OIMP. Singapore and host Parties will have their own registries, with arrangements with private registries aligned with Article 6. Carbon credits will be issued in the private registry and also listed in the national registries. Upon transfer to the Singaporean registry, carbon credits are retired in the private registry. This approach corresponds to scenario B.

Ghana's Article 6.2 framework on international carbon markets and non-market approaches

Ghana's Article 6 framework aims to provide the necessary guidance for operationalising Article 6.2 cooperative approach as well as for establishing the key administrative arrangements for implementing Article 6.4 in Ghana (Environmental Protection Agency 2022). As per the framework, Ghana has established the Ghana Carbon Registry (GCR) to track and record information on the issuance, transfer and use of uniquely identified ITMOs. Activity developers can open an account in the GCR containing information on the mitigation activity and records of ITMO transactions in the holding account (e.g., issuance of mitigation outcomes, ITMOs, and reconciliation records). The framework also allows activity developers to request issuance of carbon credits in a registry of a recognised carbon crediting programme, provided they meet the necessary registry requirements specified in Ghana's Article 6.2 framework. The private registry operator must notify Ghana's Carbon Market Office promptly via e-mail or other electronic means on the issuance of mitigation outcomes, so that the Office can maintain this information in the GCR for record keeping and consistency check before effecting any transfer. This scenario is comparable to Scenario B discussed above as regulatory responsibilities such as authorisation rests with Ghana's Carbon Market Office. The framework also suggests that where GCR can be connected to other registries, exchanges and tracking of transfers of authorised and recognised mitigation outcomes will take place electronically using the debit and credit method to reconcile the quantities of transferred mitigation outcomes.

The development of Panama's national carbon market

In April 2023, Verra announced that it entered into a memorandum of understanding with Panama to support the development of a national carbon market. Verra will explore information sharing options between Panama's National Registry of Mitigation Actions and the Verra registry (Verra 2023). This collaboration also aims to align carbon crediting of local activities with Verra procedures while ensuring compliance with national regulations (Verra 2023). Depending on the extent to which Panama's decision-making process would rely on Verra's approach to quality control, it may resemble either Scenario B or C.

Private carbon crediting programmes are currently exploring the role they could play under Article 6.2 including in its registry infrastructure. With Scenario B in mind, Gold Standard has, for example, developed Article 6 functionalities for its registry to tag and track the authorisation status of units as well as the status of application of CAs (Salway 2023). Tagging a carbon credit housed in the Gold Standard registry as ‘authorised’ or ‘correspondingly adjusted’ would be purely informational and would not imply that the Gold Standard registry houses ITMOs (Salway 2023).

Some mitigation outcomes are not issued under any carbon crediting programme but directly by the government. Whether issued under a carbon crediting programme or not, authorisation should always be decided by, and thus be the prerogative of the host country (also see Figure 2). Even in cases where the host country recognises certain private crediting programmes and/or methodologies to demonstrate compliance with (some) national criteria, this should not be equated with delegating the decision-making on authorisation to private crediting programmes. Private crediting programmes can have a role in assessing carbon credits against the programme’s criteria and recording them in their registries alongside activity- and credit-specific metadata (e.g. on vintages). Their issuance should not, however, pre-judge the outcome of the authorisation, as the host country is always ultimately responsible for ensuring the environmental integrity of the ITMOs, as well as alignment with the NDC and sustainable development objectives. Furthermore, given that host Parties have primary information about authorisations and are also responsible for tracking, recording and reporting to Paris Agreement about ITMO authorisations and transactions, private registries should not serve as the Party registry for ITMO accounting. ITMO authorisations, transfers and use should always be recorded by the host Party in a Party registry or the Party account in the international registry.

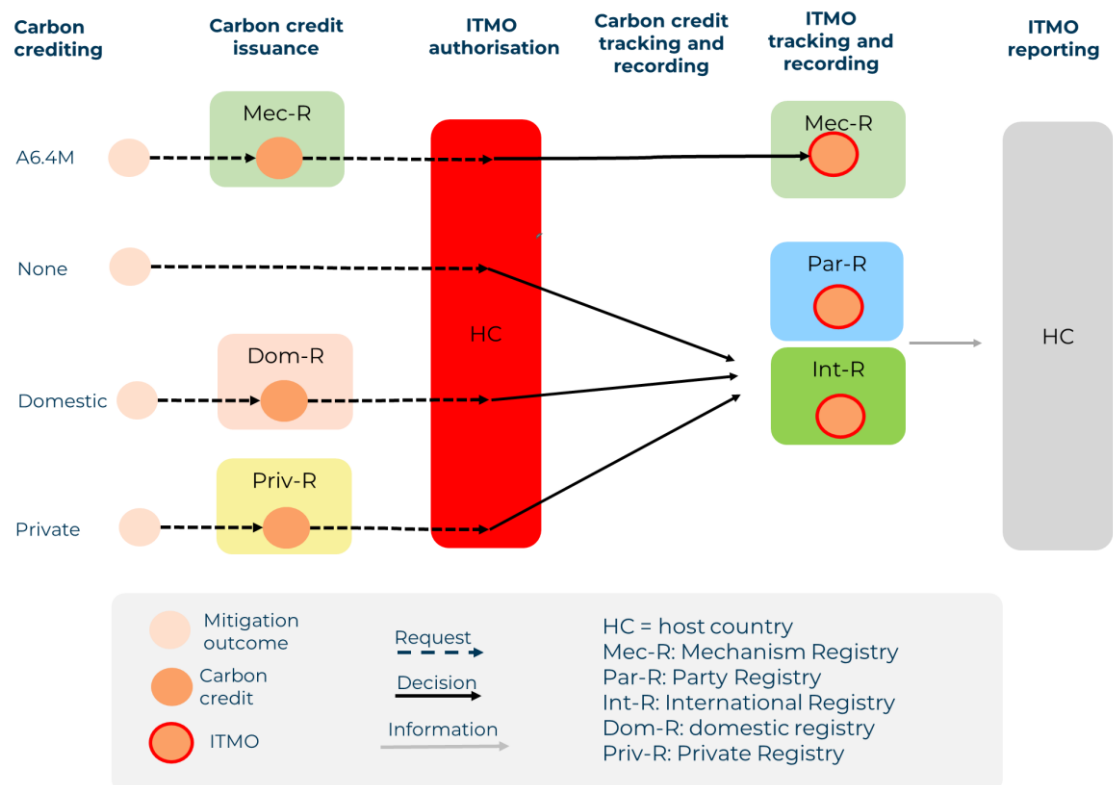


Figure 2: The role of host country authorisation in the Article 6 registry infrastructure

5. Registry types

The possibility of interoperability between Article 6 registries is mentioned in several places in the Sharm El-Sheikh Article 6 decisions. Interoperability between registries can mean one or both of the following:

- allowing exchange of information across registries, i.e., communication of data
- allowing transactions of units, including ITMOs, between registries

As per the Article 6.2 decision, participating Parties may choose to connect their Party registries to other Party registries or to the international registry (Decision 6/CMA.4, Annex I, para. 9, 24) but this is not mandatory. To enable interoperability, Party registries must fulfil the following minimum requirements:

- Have standards and procedures in place to mitigate risks to the consistency of data including through communication of data about the transfer and reconciliation procedures within and between registries (Decision 6/CMA.4, Annex I, para. 9)
- Do not allow for any repudiation of existence, type, time or content of the transfer by a Party to an inter-registry transfer (Decision 6/CMA.4, Annex I, para. 10)

The Article 6.2 decision also stipulates that the mechanism registry under Article 6.4 is connected to the international registry for Article 6.2 (Decision 6/CMA.4, Annex I, para. 23). Decision 7/CMA.4 (Annex I, para. 49) further specifies that the connection between both registries shall allow for automated pulling and viewing of data and information on holdings and the action history of A6.4ERs authorised for use by participating Parties that have an account in the international registry. The Subsidiary Body for Scientific and Technological Advice (SBSTA) has been mandated to develop recommendations on the need for additional functionalities that allow the transfer of A6.4ERs from the mechanism registry to the international registry (Decision 6/CMA.4, para. 17g). At SB58 in June 2023, the link between the mechanism registry and Party registries was under discussion and will require further negotiation.

Notwithstanding these decisions, the nature of interoperability between Article 6 registries remains under negotiation, especially regarding the scope. This is linked to the question of the role of private registries. The most radical position says that the Article 6 Party registry should just mirror transactions in the private registries, which would mean that the regulatory function is fully deferred to the private registry operators (comparable to Scenario C above). This might jeopardise the environmental integrity of Article 6. The other extreme would be that all transactions go through the Article 6 registries and private registries do not play any role under Article 6. Intermediate positions are possible, where a government could engage in transactions through its governmentally operated Article 6 Party registry for some activity types, but where the private registry would also be authorised to do transactions which are then mirrored through accounting in the Party registry.

Gold Standard has also been exploring how interoperability can be operationalised between national registries and between the [programme][private] registry and different national registries, as well as the mechanism registry. Gold Standard foresees four approaches to implement interoperability (Salway 2023):

- **Manual approach:** If private crediting programmes have carbon credits in their private registries that are authorised for use by host country, these registries provide downloads of data and send the information to the host country, so that it can record and track that information within its own Party registry, and report it to the Paris Agreement. Experiences have already been made with this approach, e.g., for carbon credits that are used towards the South African carbon tax, but it is an arguably imperfect method for the future.
- **Bilateral approach:** Direct, singular connections between registries through application programming interfaces (APIs). This option could become complex and difficult to manage when Article 6 scales up due to myriad connections between all registries.
- **UNFCCC-centred approach:** Focus only on the interoperability between the Article 6 registries, without linking them with private registries.
- **Global approach:** Global system (e.g., Climate Action Data (CAD) Trust, see Box 1 for further information) that connects the full set of different registries and enables information to flow between all of them.

As per the discussions in Sharm el-Sheikh and at SB58, registries – including the Party registries, the international registry and the mechanism registry – can take different forms. They could be implemented as **recording registry type** that mirror data on mitigation outcomes tracked in underlying domestic carbon markets or private registries or, in the case of Article 6.4, in the different accounts within the mechanism registry, or as **transaction registry type** that track the transfer, use, retirement and cancellation of ITMOs. Hybrid systems that cover both types are also possible. The registry type determines the nature of the interoperability provisions with other registries. A recording registry type implies a two-layer registry system, wherein there is a transfer layer involving the domestic and/or private registries or the different accounts in the mechanism registry where the commercial activities (i.e., all carbon credit transactions) take place and a pure recording layer involving Article 6 Party registries and the international registry, where the information on the underlying commercial activity transactions (authorisations, transfers and use) and associated corresponding adjustments (CAs) in the case of authorised units is recorded. In other words, a recording registry system type records **accounting amounts** related to mitigation outcomes held in underlying registries. A **transaction registry** system type implies that there is only one layer where both tracking (i.e., transfer of ITMOs) and recording of ITMOs takes place in the Article 6 Party registry or international registry. In this case, Article 6 registries hold mitigation outcomes as actual **assets** (units). The national Kyoto registries and the CDM registry are examples of transaction type registries. While Parties and Party Groupings like the African Group of Negotiators, the Environmental Integrity Group (EIG), the EU, Norway and the UK argued at SB58 that the Article 6.4 mechanism should follow the CDM example and thus be of transactional nature, other Parties and Party Groupings including Argentina, Brazil and Uruguay (ABU), the Like Minded-Group of Developing Countries (LMDC), New Zealand and the US do not see any actual units but rather information flowing from

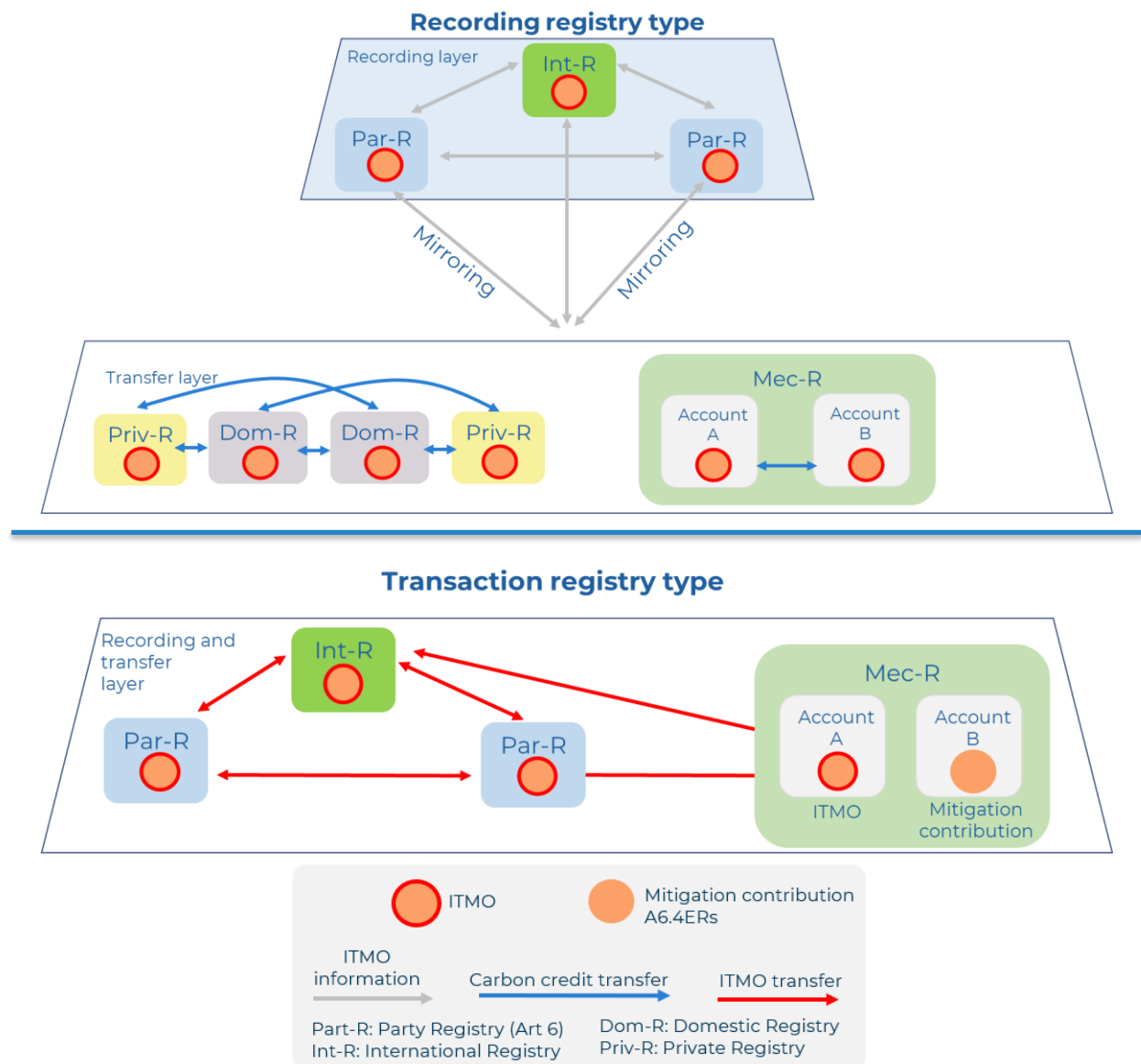


Figure 3: Different registry types under Article 6 (Source: Authors, adapted and further developed from UNFCCC 2023c)

the mechanism registry to the international registry or Party registries. It was also raised that the costs for a transactional registry type should be covered by the respective Party which triggered a discussion on the costs of different registry types. Figure 3 depicts these two main registry types under Article 6.

In practice, registry systems could cover the functions of both recording and transaction registry types, as often pointed out as a compromise in the ongoing Article 6 negotiations. In this case, Article 6 registries hold some mitigation outcomes as assets as well as record accounting amounts based on those mitigation outcomes that are held as assets (e.g., carbon credits) in private or domestic registries. The hybrid system would always include also an Article 6 Party registry or a Party account in the international registry as a recording registry for carbon credits held in domestic/private registries and as a transaction registry for ITMOs transferred directly into the Party/international registry. The key to implementing a hybrid registry system is to have a single recording platform (either Article 6 Party registry

or the international registry) to enable accurate reporting. Such an approach is being considered by Ghana (Benefoh 2023). Ghana's registry system is being developed in a way that can track all asset types, undertake both transactional and recording functions as well as accommodate multiple formats of serial numbers. Ghana's Party registry (i.e., the GCR) will serve as the primary recording platform to record transaction activity in all transaction registries for the purpose of generating information required by Ghana to meet its Article 6 reporting obligations.

Regarding interoperability between these systems, interoperability in the **two-layer recording registry type** will require data exchange as the recording layer must mirror data from the underlying transaction layer. This would require establishing standard communication protocols (communication of data) to reflect the status of underlying transactions. Delays in provision of this real-time data about the status of underlying transfers can potentially have implications on the application of CAs and reporting this information via the AEF for recording in the Article 6 database.

For the **single-layer transaction registry type**, a more integrated approach to interoperability is required that not just allows the exchange of information between Parties but also allows the transfer of ITMOs between them. The technical paper developed by the Secretariat prior to SB58 (UNFCCC 2023g) outlines that transaction registries need to ensure consistency by making sure that no ITMO is created other than via a reportable issuance transaction and that a specific ITMO exists in exactly one account.

6. Interlinkages between registries

The different registry types influence the discussion of the interlinkages.

Under Article 6.2, host Party authorisation may be granted for mitigation outcomes that may be, but are not necessarily, issued as carbon credits under a private or domestic crediting programme. ITMOs that are not based on carbon credits can be recorded as assets or accounting amounts directly into the Article 6 Party registry (Par-R) or the international registry (Int-R) while ITMOs based on carbon credits would be issued as carbon credits in the underlying private registry (Priv-R) or domestic registry (Dom-R) and recorded as ITMO-related information in the Par-R or Int-R. As mentioned above, Article 6.2 registries record ITMO authorisations. This also includes authorisation for use towards other international mitigation purposes. The Secretariat's technical paper highlights that interoperability arrangements are essential for passing on information on (an) issued authorisation(s) (UNFCCC 2023g). The registry into which the authorisation is first issued would be responsible for the spreading of this information.

Under Article 6.4, mitigation outcomes are issued as A6.4ERs into the Article 6.4 mechanism registry (Mec-R). A6.4ERs may be authorised as ITMOs. A6.4ERs without authorisation are referred to as mitigation contribution A6.4ERs. The Glasgow decision requires the mechanism registry to be linked to the international registry, which seems to imply that A6.4ERs authorised as ITMOs could be transferred as assets and/or related information recorded in the international registry. Parties using Party registries (rather than the international registry) would need to track and record at least information relating to ITMO authorisation, transfers and use in their Party registry. As discussed in chapter 3, Parties are still debating

the link between the Party and the mechanism registry. Some Parties call for tagging A6.4ERs in the mechanism registry with information whether it has been authorised as an ITMO. In this regard, the Sharm el-Sheikh decision stipulates that the mechanism registry shall allow account holders⁷ to see the status of A6.4ERs held in their holding accounts with regards to authorisation and first transfer (Decision 7/CMA.4, Annex, para. 34).

Depending on which registry type a Party chooses under Article 6.2 and where the Article 6.4 negotiations are heading, some of the interlinkages will either materialise as transactions of units in the form of assets or in an information flow based on accounting amounts. The European Commission is one of the biggest advocates for all Article 6 registries taking the form of transaction type registries (Sweden and European Commission 2023). In their submission in March 2023, the Commission outlines concerns regarding a “decentralised approach” – meaning fully promoting recording type registries – as host countries would be dependent on private programme registries passing on information on transactions (Sweden & European Commission 2023). Thereby, reference is specifically made to transactions that trigger the application of CAs such as cancellation.

One implication of Parties making use of different registry types will be the different information flows required to ensure data integrity across registries. For example, Parties making use of recording registry types will need to pay attention that communication standards for interoperability to be developed by the secretariat are also followed through by the underlying private registries. Only in this way, participating Parties – who are ultimately responsible for the environmental integrity of the cooperative approach – can make sure that the ITMOs are tracked in a transparent manner throughout various transactions. Regarding the trigger for the application of CAs, the first transfer of ITMOs will require special attention by the host Party. Ideally, the communication standards outline clear rules for the timing of this communication and the host country should keep oversight of the process.

Under Article 6.2, it will become even more complex if two Parties that participate in the same cooperative approach have different registry types in place. Parties are currently still negotiating whether this is a possibility or participating Parties have to agree on one approach. In case of two different registry types, the Party that has a recording Party registry in place would need to ensure that the buyer Party receives the purchased ITMOs from the underlying private programme registry. The buyer Party that has a transaction Party registry in place would need to pass the information on applied CAs (once used) to the host Party (and/or the underlying private registry).

In its technical paper, the UNFCCC Secretariat notes that the international registry will need to implement both transactional and recording (referred to as higher-tier in the paper) functionalities and that it will support ITMOs represented as uniquely identified units and uniquely identified accounting amounts (UNFCCC 2023g). The Secretariat outlines how it will ensure consistency for both approaches (UNFCCC 2023g, p. 16):

- Transactional registry type: Consistency to be ensured through the IT system's internal consistency.

- Recording registry type: Consistency to be ensured through the implementation APIs that may be used by underlying cooperative approach registries for necessary data exchange.

7. Outlook

Accommodating various communication standards and protocols for the different registry types will increase the complexity of the international carbon market registry infrastructure. To ensure consistency of data and transparency, the following safeguards are important:

- All registries must use the same unique identifiers that include all information required for Article 6.2 and 6.4 tracking, recording and reporting.
- Any underlying registries should connect with the Int-R or Part-R to ensure timely information on e.g. authorisation, issuance and first-transfers, to enable the Participating Parties to apply CAs and track, record and report ITMO-related information in an accurate and timely manner
- While the UNFCCC Secretariat establishes a 'may' requirement for the use of APIs by the underlying private or domestic registries in its technical paper on the international registry, we would argue that this should be changed into a 'shall' requirement and that the respective country using such a registry approach ensures the underlying registry's compliance with this communication standard.
- The CDM registry is a transactional registry, built on the ITR to ensure data consistency. A similar reconciliation mechanism should also be introduced for the linkages with transactional type registries between Article 6 registries.
- One CAD Trust is fully operational and has proved its functionality, all Article 6 registries should connect to the metadata platform. Parties should be encouraged to link their Party and domestic registries with the CAD Trust metadata platform. CAD Trust can add additional scrutiny to data communicated to the Article 6 database by Parties. The governance of CAD Trust needs to be fully transparent and reflect international best practice.

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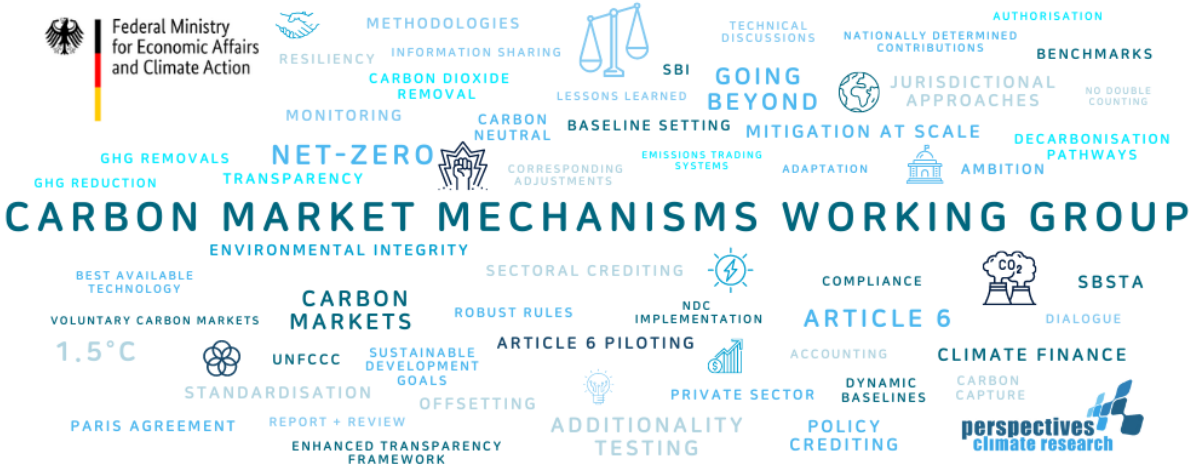
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