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**Operations of the registry for the mechanism established by
Article 6, paragraph 4 of the Paris Agreement**

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I. Introduction

A. Mandate

1. The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its fifty-sixth session, requested the secretariat to prepare, with a view to facilitating the understanding of the relevant issues but without prejudging possible outcomes, and considering the views expressed by Parties at that session and taking into account paragraph 29 of the rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, where applicable, technical papers without formal status on, inter alia, the operation of the mechanism registry referred to in chapter VI of the annex to decision 3/CMA.3 (Mechanism registry), including in relation to the infrastructure for cooperative approaches and possible connection to other relevant systems under the UNFCCC.¹

2. This technical paper has been prepared for consideration at SBSTA 57, to be held in November 2022, as well as in the intersessional period. The technical paper serves an input to the work of the SBSTA, parallel to Parties' submissions. The SBSTA may consider the usefulness of this paper as a basis for making relevant recommendations to the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA) at its fourth session.

B. Scope and approach

3. This technical paper discusses how the mechanism registry may be implemented and operated in accordance with chapter VI (Mechanism registry) of the annex to decision 3/CMA.3, including through identifying key issues and possible solutions to those issues.

4. The discussions of the key issues are based on analysis of the agreed Glasgow outcome on Article 6.4 (decision 3/CMA.3) and Article 6.2 (decision 2/CMA.3), where links between the two outcomes have an impact on the operations of the mechanism registry. **The possible solutions to the key issues are aligned with the work undertaken in relation to options for operationalization of the guidance on cooperative approaches referred in Article 6.2 and decision 2/CMA.3 and elaborated in the technical paper on the same topic.**

5. The detailed requirements for the development and operationalization of the mechanism registry will be developed by the Supervisory Body (SB) of the mechanism established by Article 6, paragraph 4, of the Paris Agreement (the mechanism).² To provide a full picture of the operations of the mechanism registry, the paper also identifies possible solutions understood to be in the purview of the SB.

6. In identifying and discussing possible solutions to the issues, the secretariat has drawn on its experience with the relevant systems and processes under the Kyoto Protocol, and in particular in operating the clean development mechanism (CDM) registry, as well as its broader expertise in, and knowledge of, practices associated with registry systems.

II. Key issues

A. Mechanism registry

1. Scope of operations

7. According to paragraph 1(b) of the annex to decision 3/CMA.3, Article 6, paragraph 4, emission reductions (A6.4ERs) are issued for mitigation achieved pursuant to Article 6, paragraphs 4–6, the rules modalities and procedures (RMPs) for the mechanism, and any further relevant decisions of the CMA.

¹ See FCCC/SBSTA/2022/L.10.

² See decision 3/CMA.3, annex, paragraphs 24(a)(v) and 64.

8. The mechanism registry tracks A6.4ERs in accordance with the operations described in chapter V (Article 6, paragraph 4, activity cycle) of the annex to decision 3/CMA.3 – more specifically, chapters V.H (Issuance), V.J (First transfer from the mechanism registry) and V.K (Voluntary cancellation).

9. The mechanism registry tracks A6.4ERs through accounts, including the holding accounts of participating Parties and their authorized entities,³ and according to set processes⁴ or instructions for forwarding or first transfer by activity participants.⁵

10. Furthermore, according to paragraph 75 of the annex to decision 3/CMA.3, certified emission reductions (CERs) issued under the CDM may be used towards first or first updated nationally determined contributions (NDCs) under the conditions specified in the same paragraph. The CERs shall be transferred to and held in the mechanism registry and identified as pre-2021 emission reductions.

11. According to paragraph 1(g) of the annex to decision 2/CMA.3, A6.4ERs issued under the mechanism are internationally transferred mitigation outcomes (ITMOs) when they are authorized for use towards achievement of NDCs and/or authorized for use for other international mitigation purposes (OIMP). Therefore, the mechanism registry tracks authorized A6.4ERs according to the reporting requirements of chapter IV (Reporting) of the annex to decision 2/CMA.3.

12. Other information related to the Article 6, paragraph 4, activity cycle is not tracked by the mechanism registry.⁶

2. Users of the mechanism registry

13. The following stakeholders have an interest in information tracked in the mechanism registry:

- (a) The SB, the SBSTA and the CMA;
- (b) Host Parties⁷ to which A6.4ERs will be issued from activities they approve for uses they may authorize, or A6.4ERs held in accounts of entities they may authorize;
- (c) Activity participants,⁸ authorized by participating Parties to implement Article 6, paragraph 4, activities (mechanism activities);
- (d) Account holders, which are either participating Parties or public or private entities authorized by participating Parties, that request an account in the mechanism registry and meet identification requirements to be defined by the SB;⁹
- (e) Parties that will use eligible CERs transferred to the mechanism registry for their first or first updated NDC;¹⁰
- (f) The Trustee of the Adaptation Fund, as the holder of the account for the Adaptation Fund where A6.4ERs will be transferred upon each issuance;¹¹
- (g) Other stakeholders¹² that may request the voluntary cancellation of A6.4ERs for overall mitigation in global emissions (OMGE) in the mechanism registry;¹³

³ See paragraph 63, annex, decision 3.CMA.3.

⁴ For example, first transfer for OMGE as per paragraph 69(a), annex, decision 3.CMA.3.

⁵ See paragraph 60, annex, decision 3.CMA.3.

⁶ It is anticipated that such other information related to the Article 6, paragraph 4, activity cycle will be tracked through an information system to be established by the SB in the context of its governing functions.

⁷ See paragraph 26, annex, decision 3.CMA.3.

⁸ See paragraphs 41 and 45, annex, decision 3.CMA.3.

⁹ See paragraph 63, annex, decision 3.CMA.3.

¹⁰ See paragraph 75, annex, decision 3.CMA.3.

¹¹ See paragraph 58, annex, decision 3.CMA.3.

¹² See paragraph 70, annex, decision 3.CMA.3.

¹³ See also technical paper on processes necessary for the delivery of OMGE.

- (h) UNFCCC secretariat as the administrator of the mechanism registry;¹⁴
- (i) The public.

14. The above-listed stakeholders will use information from the mechanism registry directly as users of the mechanism registry (through access rights) or indirectly (through the public information of the mechanism registry).

15. **Possible solution:** The SB to elaborate the scope of the mechanism registry operations and the users of the mechanism registry as part of the mechanism registry procedure (see section C below).

B. Functions

16. The functions and features of the mechanism registry are derived from the RMPs, including in relation to supporting reporting requirements as per chapter VI (Reporting) of the annex to decision 2/CMA.3.

1. Method for tracking

(a) Unit serialization

17. A6.4ERs meet the characteristics of serialized units,¹⁵ including:

- (a) Equal one metric tonne of CO2 equivalent;¹⁶
- (b) Are issued¹⁷ for emissions reductions or removals achieved by mechanism activities;
- (c) Are uniquely identifiable.

18. CERs are tracked as units and will be transferred to the mechanism registry if they meet the eligibility requirements.¹⁸

(b) Unit attributes

(i) Tracking of units according to attributes

19. Units have characteristics (attributes) which are assigned and tracked according to reporting requirements.¹⁹ Values for attributes are specified according to nomenclatures.²⁰ Attributes enable the specification and automation of business rules.

20. Authorized A6.4ERs are ITMOs and therefore carry attributes according to the reporting requirements for ITMOs. Unauthorized A6.4ERs may become authorized later.

21. Attributes include²¹ host Party, vintage, sector(s), activity type(s), originating mechanism activity, unit type and serial number.²²

22. The data model of the mechanism registry should be designed in a flexible way to enable evolution of the data schema with the development of the mechanism. Should changes

¹⁴ See paragraph 65, annex, decision 3.CMA.3.

¹⁵ A serialized unit or just a unit is a record held in a registry database, representing minimal, indivisible unit of accounting of mitigation outcomes. Units have unique identifiers that include certain metadata pertaining to the mitigation outcome. See also chapter III on infrastructure from the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

¹⁶ See paragraph 1(b), annex, decision 3.CMA.3.

¹⁷ See paragraph 1(b), annex, decision 3.CMA.3.

¹⁸ See paragraph 75, annex, decision 3.CMA.3.

¹⁹ Mandated as per the RMPs or according to the reporting requirements of section IV (Reporting) of the annex to decision 2/CMA.3 and any future relevant decisions by the CMA.

²⁰ Attribute values are updated through transactions.

²¹ As derived from the annexes to decisions 2/CMA.3 and 3/CMA.3 or best practice.

²² CERs are not tracked according to sector(s) and activity type(s). Further analysis will be required to establish the approach to tracking attributes for CERs transferred from the CDM registry.

in the data model affect already issued A6.4ERs or transferred CERs, a solution that requires the minimum mutation of existing data will need to be elaborated on a case-by-case basis and with due consideration to the mechanism units that may be tracked in other registries.

23. Values for attributes are assigned upon issuance of a unit. Examples of unit-specific information include host Party, activity type, vintage and others. Information that is relevant to the business rules regulating the life cycle of A6.4ERs that may not be available at issuance, such as the information about authorizations, first transfers, potential information on expiry dates, and other information, should be stored in separate data structures and propagated to registry systems, including the mechanism registry.²³

(ii) *Nomenclatures*

24. The values of certain attributes are maintained according to nomenclatures. The nomenclatures of the mechanism registry need to follow any guidance by the CMA in relation to reporting. For example, the mechanism registry will need to align with any guidance on nomenclatures for sectors(s), activity type(s) and type of OIMP as per paragraph 20 of the annex to decision 2/CMA.3 applicable to the tracking of ITMOs.²⁴

25. The services of the centralized accounting and reporting platform (CARP) could be used for the maintenance of nomenclatures,²⁵ including those required for the functioning of the mechanism registry.

(iii) *Tracking of CERs*

26. A CER can be recorded in the mechanism registry upon transfer from the CDM registry with a unique identifier and attributes according to the data model of the mechanism registry.²⁶ The transferred CER should be uniquely mapped to the original CER by recording the serial number of the original CER as one of its attributes.

2. Accounts

(a) Attributes of accounts

27. Accounts, through which units are tracked, are characterised by attributes such as unique identifier, account name, account type (defined in paragraph 63, annex, decision 3/CMA.3), account status (active or inactive according to time stamps), account holder and account representatives.

28. Each account type is described below according to its purpose and rules.

(b) Pending account

29. The way this account will be used is not specifically addressed in the RMPs. In CDM, the pending account is the sole account where business rules allow CERs to be issued. Units on the pending account are not associated with any specific owner or holder. The SB should design the mechanism registry procedures such that units are moved promptly to holding accounts (internally and externally, as may be possible) to avoid the accumulation of large balances on the pending account.

²³ See proposed approach in section III.E.2(d) of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

²⁴ Nomenclatures for ITMOs are discussed in section II.B.5 of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

²⁵ See proposed approach to the maintenance of nomenclatures in the CARP in the section III.G.4(h) of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement.

²⁶ See the technical paper on transfers of eligible CERs from the CDM registry to the Article 6, paragraph 4, mechanism registry in accordance with paragraph 75(b) of the annex to decision 3/CMA.3.

(c) Holding account

30. As per paragraph 63, annex, decision 3/CMA.3, the mechanism registry should contain “at least (...) a holding account for each Party and each public or private entity authorized per Article 6, paragraph 4(b), by a Party that requests an account where the entity meets the requisite identification requirements developed by the Supervisory Body”.

31. Holding accounts are accounts that can hold units, originate outgoing transfers and accept incoming transfers in accordance with the instructions of the activity participants and with any further modalities adopted by the CMA and relevant requirements adopted by the SB.²⁷ The CMA has not set limits on the A6.4ERs that a holding account may acquire, implying that A6.4ERs may be transferred freely between holding accounts.

32. Different holding account types may be established to enable the implementation of distinct processes, as necessary.

(d) Share of proceeds for adaptation account

33. This account collects the mandatory levy for adaptation at issuance of A6.4ERs²⁸ and CERs that may be transferred from the CDM registry.²⁹ The Trustee of the Adaptation fund will develop and execute the monetization programme for units. The possible transfers from this account (for both A6.4ERs and CERs) should follow the general transaction procedure of the mechanism registry. Any limitations to possible transfers from the Adaptation Fund account would have an impact on the monetization of A6.4ERs.

(e) Cancellation account, including for voluntary cancellation

34. At least one cancellation account will be opened in the mechanism registry as per paragraph 63, annex, decision 3/CMA.3. Cancellation accounts will be used to accept incoming transfers and hold units that can no longer be further transferred.

35. Cancellation accounts would be allocated to a specific purpose (e.g. cancellation towards OMGE as specified in paragraph 63)³⁰ as necessary,³¹ and may be organized according to subtypes. Voluntary cancellation accounts would be a type of cancellation account and may also be allocated to specific purposes such as voluntary cancellation for use towards OIMP (including subpurposes) and voluntary cancellation for OMGE. Voluntary cancellation accounts may be opened for individual users as a method of tracking information on the purpose of voluntary cancellation.³²

(f) Retirement account

36. This account type is also required by paragraph 63, annex, decision 3/CMA.3. Under the Kyoto Protocol, retirement accounts were used for accounting towards compliance with commitments inscribed in the Annex B to the Kyoto Protocol for Annex I Parties.³³ Once units are transferred into a retirement account, they cannot be further transferred.³⁴

37. In light of the above, a retirement account required by decision 3/CMA.3 is understood to track use towards NDC. Retirement accounts could be allocated per Party and for each NDC implementation period of the Party. Retirement accounts could accept only

²⁷ See paragraph 60, annex, decision 3/CMA.3.

²⁸ As per paragraph 63, annex, decision 3/CMA.3.

²⁹ As per paragraph 75, annex, decision 3/CMA.3.

³⁰ See the technical paper on processes necessary for the delivery of overall mitigation in global emissions.

³¹ For example, in relation to compensation for reversal of removals.

³² An example of cancellation for a specific purpose is cancellation for compliance towards international mitigation purpose, such as the Carbon Offsetting and Reduction Scheme for International Aviation.

³³ Retirement is defined in decision 13/CMP.1. Retirement is the internal transfer of a unit to a retirement account within a registry, in order that it can be used by the Annex I Party to demonstrate compliance with its emissions commitment under Article 3, paragraph 1, of the Kyoto Protocol (source: Kyoto Protocol reference manual, UNFCCC https://unfccc.int/resource/docs/publications/08_unfccc_kp_ref_manual.pdf).

³⁴ Retirement accounts are end-use accounts like cancellation accounts.

authorized A6.4ERs of the appropriate vintage.³⁵ Retirement accounts for the first NDC implementation period could also accept CERs transferred from the mechanism registry.

38. No other accounts are mentioned in the RMPs. However, other accounts may be envisaged to be defined – for example, in relation to compensation for reversal of storage – as such processes may be elaborated over time.

3. Transactions

39. Transactions track actions performed with units by updating their location through recording the move of units between accounts. Transactions are recorded and tracked according to attributes, including transaction unique identifier, transaction type, transaction date/time; transaction status (pending, completed, or rejected).

40. Transactions can be categorized according to the accounts involved and would include issuance and transfer. Transfers, depending on the destination account type, could also constitute cancellation, voluntary cancellation and retirement.

41. Business rules are used to automate the processing of transactions. Business rules are sensitive to various parameters of the transaction context, such as authorized use(s) for units, account types and other business rules and conditions (e.g., rules for first transfer).

(a) Issuance

42. Issuance is defined in paragraphs 54 and 55, annex, decision 3/CMA.3. Issuance would generate the block of units by assigning them serial numbers and other attributes.

(b) Authorization of use(s)

43. An authorization is a transaction involving a change in the status of a subset of ITMOs that defines and limits the allowed use of such ITMOs. Authorization may be performed in conjunction with issuance or any time after issuance.³⁶

(c) Transfer to share of proceeds for adaptation account

44. Transfer to the share of proceeds for adaptation account is defined in paragraph 58, annex, decision 3/CMA.3. All transfers to this account that occur immediately after issuance are first transfers.

(d) Forwarding

45. Paragraph 60, annex, decision 3/CMA.3 specifies that, after issuance and transfer of the share of proceeds for adaptation, the administrator of the mechanism registry shall forward or effect a first transfer, as applicable, in accordance with the instructions of the activity participants and with any further modalities adopted by the CMA and relevant requirements adopted by the SB. Forwarding³⁷ is distinguished from “first transfer”.

46. The use of forwarding in the context of paragraph 60 suggests that it relates to the transfer of unauthorized A6.4ERs, as forwarding is not mentioned in relation to decision 2/CMA.3, or any other transfer that is not “first transfer”. Forwarding may be clarified in the context of the mechanism registry procedure, unless the analysis in the preparation of the procedure indicates that the CMA clarification may be necessary.

(e) Cancellation and voluntary cancellation

47. Cancellation transaction takes units out of circulation by sending them to a cancellation account, indicating end use of the units after which no further transfers or

³⁵ See paragraphs 8(b) and 10(b), annex, decision 2/CMA.3.

³⁶ Proposed approach is discussed in section III.E.2(d) of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

³⁷ Forwarding in the Kyoto Protocol is mentioned in decision 3/CMP.1 in relation to the operations of the CDM registry. Forwarding lacks clear definition and is used interchangeably with transfer.

cancellations may be performed. The following cancellation transaction types are referred to in the annex to decision 3/CMA.3:

- (a) Cancellation for OMGE;³⁸
- (b) Voluntary cancellation for OMGE;³⁹
- (c) Voluntary cancellation.⁴⁰

48. While cancellation accounts (without a purpose) are mentioned in paragraph 63, annex decision 3/CMA.3, there are no specifics with regard to the relevant transactions. No other cancellation transactions are explicitly mentioned in the RMPs. However, other cancellation transactions may be envisaged to be defined – for example, in relation to compensation for reversal of storage – as such processes may be elaborated over time.

49. It appears that voluntary cancellation corresponds to “use towards OIMP” and for other purposes that maybe specified by host Parties, including for unauthorized A6.4ERs. Paragraph 61, annex, decision 3/CMA.3 appears to limit voluntary cancellation in the mechanism registry only to requests by activity participants in relation to their Article 6, paragraph 4 activities. This is a significant constraint, with potential implications for the use of A6.4ERs, as it would require those who may use A6.4ERs for voluntary cancellation to first become activity participants or accept voluntary cancellation on their behalf but not effected by them.

(f) Retirement

50. Retirement⁴¹ as per the meaning in paragraph 63, annex, decision 3/CMA.3 and in line with the discussion in section B.2(f) above, appears to be the transaction type to record “use towards NDC” as defined in the annex to decision 2/CMA.3.

4. Transactions with CERs

51. The possible transactions with CERs transferred from the CDM registry may need to be elaborated. Paragraph 75, annex, decision 3/CMA.3 defines the use of CERs towards first or first updated NDCs only. It may be beneficial to clarify if CERs transferred from the CDM registry may be used for OIMP and for what duration of time.

52. **Possible solution:** The following are possible solutions in relation to the functions of the mechanism registry:

- (a) Both A6.4ERs and CERs transferred to the mechanism registry are tracked as uniquely identifiable serialized units;
- (b) Units tracked in the mechnism registry should be tracked according to attributes (data structures) that enable the reporting of units according to the requirements of the guidance on the cooperative approaches referred to in Article 6.2 as contained in the annex to decision 2/CMA.3 and the reporting requirements of the reporting practice for the mechanism to be established by the SB as part of the mechanism registry procedure;
- (c) The nomenclatures for the operations of the mechanism registry to align with nomenclatures relevant to reporting of information on ITMOs as per decision 2/CMA.3 and any further relevant decision of the CMA, including as may be maintained on the CARP;
- (d) The attributes structure of units, and the data model of the mechanism registry, should be implemented in a flexible manner to ensure that tracking can accommodate changes from future decisions by the CMA;
- (e) Enabling the creation of accounts and relevant transaction rules by the mechanism registry administrator, as necessary;

³⁸ See paragraph 59, annex, decision 3/CMA.3.

³⁹ See paragraph 70, annex, decision 3/CMA.3.

⁴⁰ See paragraph 61, annex, decision 3/CMA.3.

⁴¹ See paragraph 63, annex, decision 3/CMA.3.

(f) Clarifying if CERs transferred from the CDM registry may be used for OIMP and for what duration of time.

C. Procedure

53. The registry operational procedure is the document that will describe the general, operational and maintenance requirements of the registry, including:

- (a) Definitions needed for understanding the procedure;
- (b) Roles of administrators, including for Party-level administrators that may be delegated roles in the account administration process for national authorities and entities they authorize;⁴²
- (c) Units, including unique identification;
- (d) Account types, account maintenance processes, account representatives and authentication processes, and terms for accounts;
- (e) User administration to manage user access, permissions and account provisioning, segregation of duties, and other controls;
- (f) Transactions procedures that describe possible transactions and associated rules;
- (g) Records management, public reports and confidentiality of information;
- (h) Fees structure;
- (i) Interoperability with other registries and systems for data exchange, including establishment, maintenance and troubleshooting of communication links;
- (j) Technical provisions and requirements, including in relation to security, authentication, automated checks, recording and completing of processes, specifications and change management processes.

54. *Possible solutions*: The SB to develop the mechanism registry procedure.

D. Reporting and publicly accessible information

55. The tracking function of the mechanism registry ensures accurate accounting and reporting of information on units. As outlined above, the reporting practice should be an element of the mechanism registry procedure. The reporting would include internal and public reports and should be enabled through appropriate communication channels. The public information should be made available on the public website for the mechanism registry. The reporting practice would also establish processes for the classification and treatment of confidential information.

56. Broadly, the mechanism registry reporting would include:

- (a) Reports for each participating Party necessary to fulfil:
 - (i) Quantitative reporting obligations under Article 6.2, including the use of CERs towards NDCs;
 - (ii) Information needs in relation to unauthorized A6.4ERs;⁴³
- (b) Reports on unauthorized A6.4ERs allocated to the Adaptation Fund account and cancelled for OMGE;
- (c) Reports for the Trustee of the Adaptation Fund;

⁴² This approach may be beneficial for the due diligence process and know-your-customer requirements.

⁴³ Other reporting requirements under Article 6.2, such as elements of the initial report and of the regular information, would be extracted from other parts of the mechanism information system – for example, in relation to mechanism activities in which the Party participates.

(d) Reports for account holders, including on transaction history and holdings;

(e) Publicly accessible information, including disaggregated information on voluntary cancellation. Disaggregated information should include details in relation to the purpose of voluntary cancellation.

57. The CDM registry reporting could inform the development of the reporting practice of the mechanism registry, taking into account the reporting needs of participating Parties in the mechanism and other stakeholders, including the general public. The generation of reports should be automated to the extent practical.

58. The use of the mechanism registry data in the context of the consistency check as per paragraph 33(a), annex, decision 2/CMA.3 is discussed in the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.⁴⁴

59. **Possible solution:** The SB to develop processes for reporting of information as part of the mechanism registry procedure.

E. High-level design

Chapter VI (Mechanism registry) of the annex to decision 3/CMA.3 establishes that the SB shall adopt requirements for the development and operationalization of the mechanism registry, following best practice and standards for registries. In addition, any guidance in relation to the high-level design of registries for tracking in accordance with guidance on cooperative approaches should apply to the mechanism registry.⁴⁵

60. To provide an understanding of the role of the SB, the following is a brief outline of key consideration for the design of the registry.

1. System operation and maintenance

61. System administration is the process of defining, managing and executing the day-to-day operations of the mechanism registry system to ensure that the service is available to its end users. It includes activities that guarantee that the system is running securely, efficiently, effectively and reliably. To maintain high levels of availability and resilience to failures and security breaches, the mechanism registry service should be designed, operated, monitored and maintained in line with industry best practices and demonstrate compliance with established security standards.

62. As a mission-critical system, the mechanism registry should be well protected against cyber threats to ensure the availability, confidentiality and integrity of the information it manages. Business continuity planning arrangements should be established to minimize the potential impact of threats on business operations of the mechanism registry service.

63. The service delivery and overall life cycle of the mechanism registry service should be managed following a proven Information Technology Service Management framework such as an Information Technology Infrastructure Library.

2. Design approach

64. The mechanism registry is a multi-user system that will potentially track large volumes of units over a long period of time, receiving and providing input to systems it is connected to. According to best-practice standards and the agreed method for accounting, the mechanism registry should be in the form of a standardized electronic database that ensures the accurate accounting of units, according to agreed rules.

65. A possible design approach for the mechanism registry as an accounting system is to consider a multi-tiered architecture that would include a communication interface and a

⁴⁴ See section II.D.8 of this technical paper.

⁴⁵ See discussion on high-level design for registries and the international registry in sections III.C, III.E and III.F of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

messaging system to facilitate the handling of inbound and outbound messages with external connected systems via application programming interfaces; a backend system, including a database and a system to process and enforce business rules; a user-friendly web interface; and a flexible reporting system.

3. Data model and database

66. The data model of the mechanism registry should support the secure and consistent handling of all records and data entities necessary to accommodate its operation as an accounting system and the processing of transactions involving ITMOs across connected registry systems. Achieving these objectives will involve the definition of, inter alia, users, accounts, account representatives, units, unit blocks, accounting amounts, transactions, instructions (from connected systems), reconciliations, holdings snapshots, audit logs, and project information, the latter to the extent needed for the processing of transactions with units.

67. To ensure the readiness of the mechanism registry service to interoperate and provide flexibility to support heterogeneous data standards, the mechanism registry system should be equipped with an extendable and adjustable data model supported by an equally flexible software design that supports loosely defined data structures and can accommodate regular data model modifications as required by the business needs. The potential benefits of the use of a non-tabular database system (non-relational) as opposed to a traditional relational database system should be evaluated in this context, bearing in mind the need to support the strong consistency guarantees⁴⁶ required for the mechanism registry by the chosen database system solution.

4. Administration of lists of values

68. Recognizing the absence of a top-down specification for data exchange standards across the registry systems and cooperative approaches, the mechanism registry may need to support and interpret attributes and related data sets which may not be known in advance, as these would be resulting from independently driven change management processes within cooperative approaches.

69. To the extent possible, the mechanism registry service should be equipped with end-user functionalities allowing for data model maintenance – for example, an administrator to manage data dictionaries and lists of possible values for a given attribute, as well as to create and manage a registry of high-level business rules to support business changes independently from software release management. Alternatively, the lists of possible values may be maintained as centralised nomenclatures within the CARP (see section B.1(b)(ii) above).

5. Interoperability

70. According to paragraph 63 of the annex to decision 3/CMA.3, the mechanism registry will be connected to the international registry referred to in decision 2/CMA.3. Connection to other registries is not mandated by the CMA but has been highlighted as an option desired by Parties that will implement or have access to registries, including during the technical workshops from May 2022,⁴⁷ at SBSTA 56⁴⁸ and in the survey on the registry choices by Parties requested by SBSTA 56.⁴⁹

⁴⁶ See discussion on consistency guarantees in section III.C of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

⁴⁷ Information on the technical workshop on options for implementing infrastructure requirements is available here: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/cooperative-implementation/technical-workshops-related-to-the-article-62-of-the-paris-agreement#eq-2>.

⁴⁸ See IN.SBSTA56.i13.2.

⁴⁹ For the results of the survey, see annex V of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

71. The mechanism registry is expected to be connected to other system, as outlined below, to enable a secure and reliable exchange of information related to tracking.

(a) Connection to international registry

72. The connection of the mechanism registry to the international registry referred to in paragraph 63, annex, decision 3/CMA.3 would depend on the methods for tracking of ITMOs⁵⁰ discussed in the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

73. Suggestions for approaches and options for the modalities to connect both registries (describing network communication protocols, authentication mechanisms, data exchange and reconciliation standards) are described in chapters III.I and IV of the above-mentioned technical paper. The scope of data exchange between the two systems will depend on the direction for transfers of A6.2ERs (unidirectional from the mechanism registry to the international registry or bidirectional) and the operational procedures for each registry.

74. The mechanism registry service will be connected to the international registry via a bidirectional communication interface to facilitate the exchange of information and the execution of transactions, and, in the absence of an overarching transaction log, to implement specific bilateral reconciliation functions to guarantee the consistency of the system.

(b) Possible connection to other registries

75. The connection between the mechanism registry and the international registry will be developed with a goal to further offer the resulting generic communication approaches and protocols for implementation of connection between the registries maintained by the secretariat and other registries.

(c) Connection to other UNFCCC systems

76. It is foreseen that the mechanism registry service will be connected to other information systems managed by the secretariat via customized (bespoke) communication interfaces, to acquire, for example, information related to mechanism activities, or to transfer eligible CERs from the CDM registry.⁵¹ The mechanism registry service will aim to degrade gracefully⁵² in case of disruptions of any of the connected systems.

77. To ensure the safety of operations and maintain high availability of its primary function as an accounting database system, the mechanism registry should be implemented as a standalone service independent of other mechanism information systems (for example, the mechanism information system for tracking information on mechanism activities). Other connected information systems may include the submission portal of the CARP referred in decision 2/CMA.3. This segregation will ensure clear demarcation of the registry service and its group of users, provide enhanced isolation options to restrict access to the service to its intended target users only, and help keep the attack surface⁵³ of the mechanism registry service to its minimum.

78. **Possible solutions:** The following are possible solutions in relation to the implementation of the mechanism registry:

(a) The SB to implement the mechanism registry as a transactional electronic database, aligned with any further guidance on the high-level-requirements for registries referred to in decision 2/CMA.3 and according to best industry standards;

⁵⁰ See section III.D.1 of the technical paper on options for operationalizing the guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3.

⁵¹ See technical paper on transfers of eligible CERs from the CDM registry to the Article 6, paragraph 4, mechanism registry in accordance with paragraph 75(b) of the annex to decision 3/CMA.3.

⁵² Graceful degradation is the ability of a system to maintain limited functionality when business or operational conditions do not allow the use of full functionality, but remain functional overall.

⁵³ An attack surface is the complete set of points of interaction with the system that may potentially be exploited to extract or tamper with data accessed and/or managed by the system.

(b) Clarifying the connection (interoperability) of the mechanism registry with the international registry referred to in decision 2/CMA.3, considering methods for tracking;

(c) Clarifying the possible connection (interoperability) of the mechanism registry with other registries for cooperative approaches as referred to in decision 2/CMA.3, including with respect to unidirectional or bidirectional transfers of A6.4ERs and CERs.

III. Summary of possible solutions

79. Table 1 below contains a summary of the possible solutions according to topics.

Table 1. Summary of possible solutions

Paragraph	Topic	Possible solutions
15	Scope of operations	The SB to elaborate the scope of the mechanism registry operations and the users of the mechanism registry as part of the mechanism registry procedure.
52	Functions	The following are possible solutions in relation to the functions of the mechanism registry: (a) Both A6.4ERs and CERs transferred to the mechanism registry are tracked as uniquely identifiable serialized units; (b) Units tracked in the mechanism registry should be tracked according to attributes (data structures) that enable the reporting of units according to the requirements of the guidance on the cooperative approaches referred to in Article 6.2 as contained in the annex to decision 2/CMA.3 and the reporting requirements of the reporting practice for the mechanism to be established by the SB as part of the mechanism registry procedure; (c) The nomenclatures for the operations of the mechanism registry to align with nomenclatures relevant to reporting of information on ITMOs as per decision 2/CMA.3 and any further relevant decision of the CMA, including as may be maintained on the CARP; (d) The attributes structure of units, and the data model of the mechanism registry, should be implemented in a flexible manner to ensure that tracking can accommodate changes from future decisions by the CMA; (e) Enabling the creation of accounts and relevant transaction rules by the mechanism registry administrator, as necessary; (f) Clarifying if CERs transferred from the CDM registry may be used for OIMP and for what duration of time.
54	Mechanism registry procedure	The SB to develop the mechanism registry procedure.
59	Reporting and publicly accessible information	The SB to develop processes for reporting of information as part of the mechanism registry procedure.

Paragraph	Topic	Possible solutions
78	High-level design	<p>The following are possible solutions in relation to the implementation of the mechanism registry:</p> <ul style="list-style-type: none">(a) The SB to implement the mechanism registry as a transactional electronic database, aligned with any further guidance on the high-level-requirements for registries referred to in decision 2/CMA.3 and according to best industry standards;(b) Clarifying the connection (interoperability) of the mechanism registry with the international registry referred to in decision 2/CMA.3, considering methods for tracking;(c) Clarifying the possible connection (interoperability) of the mechanism registry with other registries for cooperative approaches as referred to in decision 2/CMA.3, including with respect to unidirectional or bidirectional transfers of A6.4ERs and CERs.
