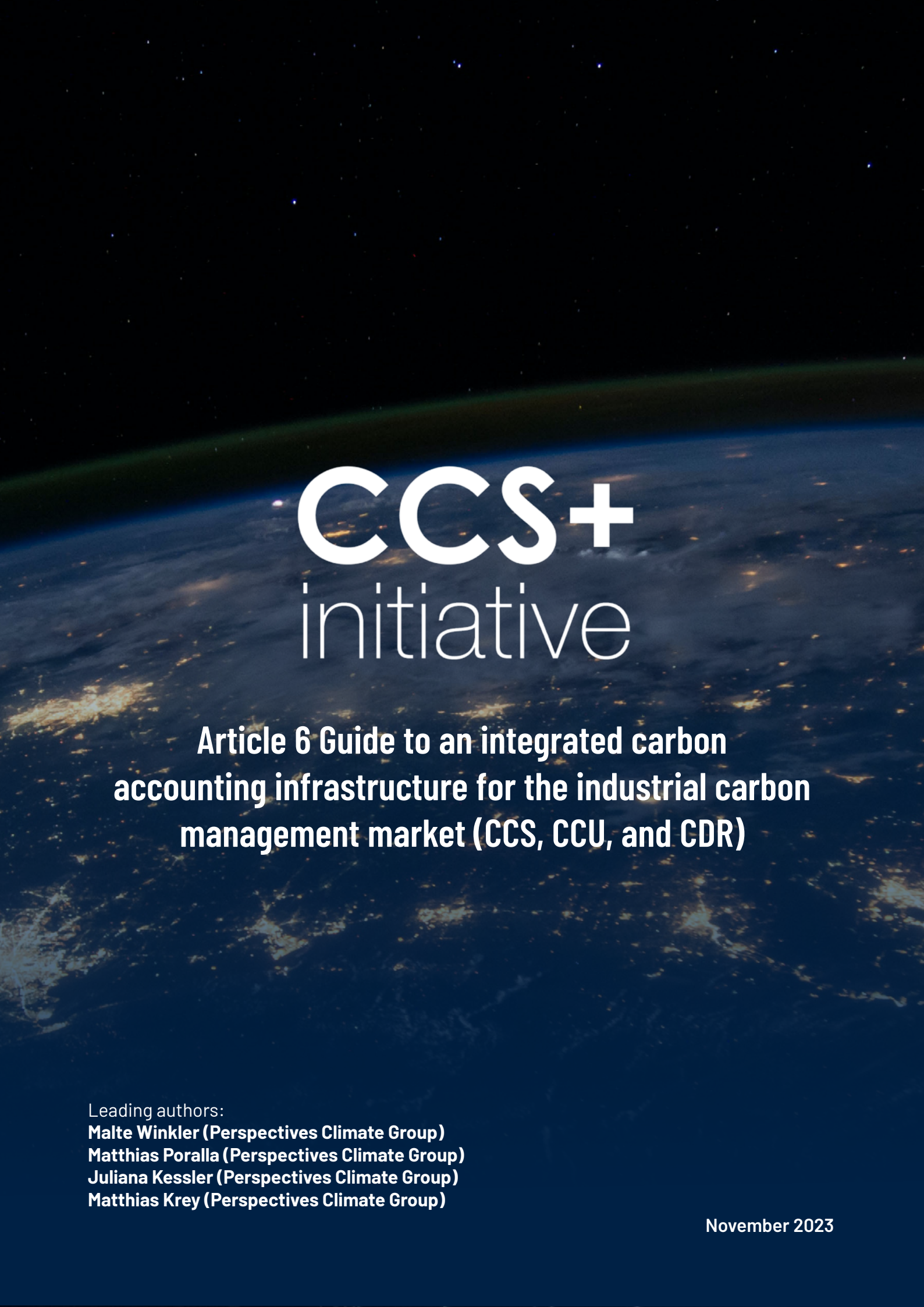

CCS+ initiative

Article 6 Guide to an integrated carbon accounting infrastructure for the industrial carbon management market (CCS, CCU, and CDR)

Leading authors:
Malte Winkler (Perspectives Climate Group)
Matthias Poralla (Perspectives Climate Group)
Juliana Kessler (Perspectives Climate Group)
Matthias Krey (Perspectives Climate Group)

November 2023

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List of abbreviations

A6.2TER	Article 6.2 Technical Expert Review
A6.4ER	Article 6.4 Emission Reduction
A6.4M	Article 6.4 Mechanism
A6.4SB	Article 6.4 Supervisory Body
BAU	Business as Usual
BTR	Biennial Transparency Report
CCfD	Carbon Contract for Difference
CCS	Carbon Capture and Storage
CCU	Carbon Capture and Utilization
CCUS	Carbon Capture Utilization and Storage
CDM	Clean Development Mechanism
CDR	Carbon Dioxide Removal
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DAC	Direct Air Capture
DOE	Designated Operational Entity
GHG	Greenhouse Gas
ITMO	Internationally Transferred Mitigation Outcome
JI	Joint Implementation
LT-LEDS	Long-Term Low Emissions Development Strategy
MRV	Monitoring, Reporting and Verification
NDC	Nationally Determined Contribution
OMGE	Overall Mitigation of Global Emissions
PA	Paris Agreement
RMPs	Rules, Modalities and Procedures
SoP	Share of Proceeds
tCO2e	Metric Tonne of Carbon Dioxide Equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
VVB	Validation/Verification Body

Summary

Article 6 formulates a set of requirements which activities and/or methodologies need to fulfil to be eligible for UNFCCC based cooperation. The level of detail and international oversight varies between Article 6.2 (no international oversight, participating parties decide how to proof their compliance to the respective rules; high level rules rather than detailed requirements) and Article 6.4 (international oversight via the Article 6.4 Supervisory body (A6.4SB); detailed rules, modalities and procedures (RMPs)). Some of these requirements can be addressed by methodologies, others like Parties´ reporting and accounting obligations go beyond the methodological scope but are often informed by data derived from methodologies. This compliance guidance focusses on requirements directly related to methodologies. These requirements mainly address issues related to environmental integrity especially additionality, baseline setting, and monitoring, reporting and verification (MRV).

The CCS+ Initiative is a global, multi-stakeholder platform developing an integrated carbon accounting methodology infrastructure to accelerate emission reductions and removals through industrial carbon management projects. The CCS+ Initiative integrates the collaborations of energy industry leaders with technology, solution and professional service providers. It leverages state-of-the-art expertise in technologies. The methodologies, tools, and modules are rooted in Verra´s Verified Carbon Standard (VCS) and fulfill its strict quality [1] standards. To make them fit also for use under Article 6 (either via individual Parties under Article 6.2, or as Article 6.4 methodologies approved by the A6.4SB), this compliance guidance analyses which Article 6 requirements are met by the CCS+ Initiative´s methodological documents, which requirements are not met but could be met by using further sources (e.g. other methodological tools, approaches, or procedures) and which requirements call for further conceptual work.

The analysis shows that the additionality test formulated in the CCS+ Initiative is well aligned with Article 6 requirements. Both regulatory and financial additionality are well covered in the respective CCS+ tool.

Similarly, MRV procedures outlined in the CCS+ modules are fit for Article 6 by quantifying both activity emissions and reductions/removals, including life-cycle emissions and measurement accuracy. Storage permanence and the risk of leakages are addressed using Verra´s Non-Permanence Risk Tool, which applies a buffer pool approach. While Article 6 guidance on how reversals should be addressed is yet to be defined, Modalities and Procedures developed under the UNFCCC´s Clean Development Mechanism (CDM) for CCS activities already in 2011 point into a similar direction. A key difference is that these Modalities and Procedures enable refunding of the buffer pool, which alters project economics substantially.

Baseline setting under the CCS+ Initiative in its current form requires some adjustments to comply with Article 6. Under CCS+, the crediting baseline is set at business-as-usual (BAU), while Article 6 requires a baseline to be set below BAU. A parameter to adjust this could easily be applied to industrial carbon management activities realizing emission reductions; for removals, a concept to define which removals should be considered in the baseline needs to be defined before a similar approach can be established. Similarly, a "Paris Goal Coefficient" can be applied to reductions (and, potentially, removals) to align with the Article 6 requirements to encourage ambition over time and to align with Parties´ long-term low emissions and development strategies (LT-LEDS) and the Paris Agreement´s 2100 temperature goals.

Other issues, namely (1) the risk to lock-in fossil fuel related activities and emissions by implementing CCS technologies and (2) the risk of non-permanent storage are closely related to industrial carbon management activities, and cannot easily be solved with methodological work.

(1) While emission reductions based on CCS activities are considered an important contribution to short- and

[1] For the purpose of this guide, industrial carbon management is frequently used to cover projects involving CCS, CCU with durable storage (CCUS) and engineered forms of CDR, such as DACCS and BECCS. Accurately differentiating projects according to their mitigation outcomes, emission reductions or carbon removals, remains vitally important.

mid-term climate targets, they are inherently linked to fossil-fuel related industries and therefore to locking-in respective practices. They should therefore be considered against the time horizon envisaged for their application, and its relation to the Paris Agreement´s temperature targets and countries´ Nationally Determined Contributions (NDCs) and LT-LEDS. How to distinguish between industrial carbon management activities contributing to fossil-fuel lock-in on the one hand, and to urgently required emission reductions on the other hand needs to be defined, both under the CCS+ Initiative and in the ongoing development of Article 6 requirements. A clear differentiation between emission reductions and carbon dioxide removals (CDR) exempts CDR methods from locking in fossil fuels.

(2) The CCS+ Initiative covers different modalities of long-term storage, such as geological storage in saline aquifers and depleted oil and gas fields, mineralisation in igneous rock formations and CO2 storage in durable products (e.g. concrete, aggregates). Both underground storage and utilization in some products (e.g. in concrete) can keep CO_2 out of the atmosphere for a climate-relevant time horizon. To address potential reversals, Verra´s Non-Permanence Risk Tool is applied, which uses a buffer pool approach. Similarly,a refundable buffer pool approach is applied in the CDM´s 2011 modalities and procedures for CCS. The refundability has a large impact on a project´s economics.

While more detailed requirements for Article 6.4 are still under development, it can be expected that the overall approach of the CCS+ Initiative can be aligned with Article 6. However, general questions on long-term liability and responsibility for monitoring and addressing potential leakages remain open and can't be judged before finalization of the A6 rules. National regulations will require individual Parties´ solutions.

How to use this guidance

This guidance provides a state-of-the-art assessment of the current Article 6 requirements[2]. The requirements for Article 6.2 are relatively high level, demanding participating Parties to ensure environmental integrity and transparency, promote sustainable development and apply robust accounting, including to avoid double counting. Participating Parties set national criteria and procedures, inter alia for methodologies for authorizing ITMOs.

The requirements for Article 6.4 are more detailed than the rules for Article 6.2. Methodologies used under the A6.4M need to be approved by the A6.4SB[3]. Once operational, the A6.4M can promote consistency across methodologies applied under Article 6, including under Article 6.2, by providing an international platform for the development of common, detailed approaches. Consistency can, but does not automatically, promote the high integrity of carbon credits.

This guidance distinguishes between Article 6.2 and 6.4 requirements. Where Article 6.4 requirements are more detailed than 6.2 requirements, this guidance applies the former. The guidance identifies opportunities and challenges for applying Article 6 requirements to the methodological framework of the CCS+ Initiative and related activities. It targets regulators and other public actors, managers of private carbon market programs, as well as the wider climate community spanning academia, civil society, industry, and project developers interested in facilitating the uptake of the modular methodologies developed under CCS+ while promoting consistently high integrity and robust accounting across all carbon market segments.

This guidance elaborates the potentials and challenges related to the methodological harmonization of the respective rules and tools with CCS+. The status of Article 6 requirements is described in chapter 2. In chapter 3, we present the methodological approach of the CCS+ Initiative, which targets mitigation that is based on CO_2 capture. We further analyze where CCS+ methodologies are compatible with Article 6, and where they are not. Chapter 4 proposes an approach as to how CCS+ can feed into Article 6 cooperations. Chapter 5 concludes.

[2] See chapter 2 for a detailed discussion.

[3] As of October 2023, the criteria and procedures for methodology development and approval were still under development and the A6.4M was not yet operational.

1 Introduction

At the 26th Conference of the Parties (COP 26) held in Glasgow in 2021, the Parties to the United Nation's Framework Convention on Climate Change (UNFCCC) adopted rules for international carbon markets under Article 6 of the Paris Agreement (PA). Article 6.2 provides for cooperative approaches of two or more countries without international oversight to generate Internationally Transferred Mitigation Outcomes (ITMOs), while the Article 6.4 mechanism (A6.4M) is overseen by a Supervisory Body (A6.4SB) under the UNFCCC[4]. These markets are expected to mobilize mitigation activities, including Carbon Capture and Storage (CCS), Carbon Capture and Utilization (CCU), and Carbon Dioxide Removal (CDR).

This document gives an overview of the current Article 6 rules and provides guidance on how methodologies, tools, and modules developed under the CCS+ Initiative can be applied to this evolving carbon market. It hopes to enable activity developers, governments, and private actors involved in Article 6 to make use of the high-integrity, high-quality methodological approaches developed under the CCS+ Initiative.

Industrial carbon management solutions, which include carbon capture, storage, utilization and removal approaches are important mitigation solutions to achieve decarbonization, and CDR will play a vital role by (over) compensating residual emissions in order to meet global climate targets. The CCS+ Initiative aims to deliver an integrated methodological framework for generating carbon credits from the full suite of industrial carbon manageme solutions[5]. These credits need to meet strict criteria to ensure their environmental integrity ("high-integrity credits"). The CCS+ methodologies will ensure separate accounting approaches for activities that lead to emission reductions and activities that remove CO_2 from the athmosphere. This framework pursues approval under the carbon crediting program run by Verra, which focuses on the voluntary carbon markets (VCM). However, the initiative aims at broadening the use of methodologies and their alignment, including by compliance markets under Article 6 of the PA.

The use of carbon markets under Article 6 is attractive both for private and public entities. Using ITMOs for voluntary offsetting aims to increase credibility and to avoid reputation risks commonly linked to VCM credits. Many stakeholders consider only mitigation outcomes that are exclusively claimed for offsetting to truly counterbalance the negative impact associated with specific emissions. ITMOs can only be generated if host countries undertake corresponding adjustments and thus ensure that associated mitigation outcomes are not claimed by the host country, thereby eliminating the risk of double claiming by a government and a non-governmental entity. Furthermore, host countries are increasingly interested in keeping track of voluntary mitigation action within their borders and may introduce national requirements for voluntary carbon market activity developers. Article 6 compliance ensures both the former and the latter.

Article 6 requirements could support alignment of various carbon market programs and segments. They can provide an international benchmark for implementing criteria related to environmental integrity, sustainable development, and robust accounting. Activities and/or methodologies approved by private carbon crediting programs (such as the Verified Carbon Standard, VCS) can seek approval under Article 6.2 and/or A6.4M. By aligning methodological work with Article 6 requirements, private programs and initiatives (e.g., the CCS+ Initiative) can consistently promote high integrity across various carbon market segments. In turn, this can promote the trust in and the value of carbon market activities. Private programs can also actively contribute to the ongoing development and piloting of Article 6 requirements. To align its methodological framework with Article 6, the CCS+ Initiative aims to inform, and be informed by, the ongoing development of Article 6 requirements and methodologies.

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[4] Strictly speaking, "Article 6.2 cooperation" is covered in Articles 6.2-6.3, and the A6.4M is covered in Articles 6.4-6.7. For the sake of readability, we follow the common practice of referring only to Articles 6.2 and 6.4, respectively. We also note Article 6.8 defining a non-market approach, which will not be covered further in this document.

[5] For an overview on covered methods see modules on capture, transport, storage, and utilization in Table A 1.

2 Summary of current Article 6 rules

2.1 Key elements of Article 6

Article 6 of the PA enables Parties to cooperate to increase the ambition of their mitigation and adaptation actions while ensuring environmental integrity, transparency, robust accounting, and sustainable development. This guidance focuses on market-based cooperation under Article 6, namely Article 6.2 cooperation, involving the use of ITMOs, and the A6.4M, involving the generation of Article 6.4 Emission Reductions (A6.4ERs)[6]. Non-market-based forms of cooperation, regulated under Article 6.8, are not discussed in this guidance.

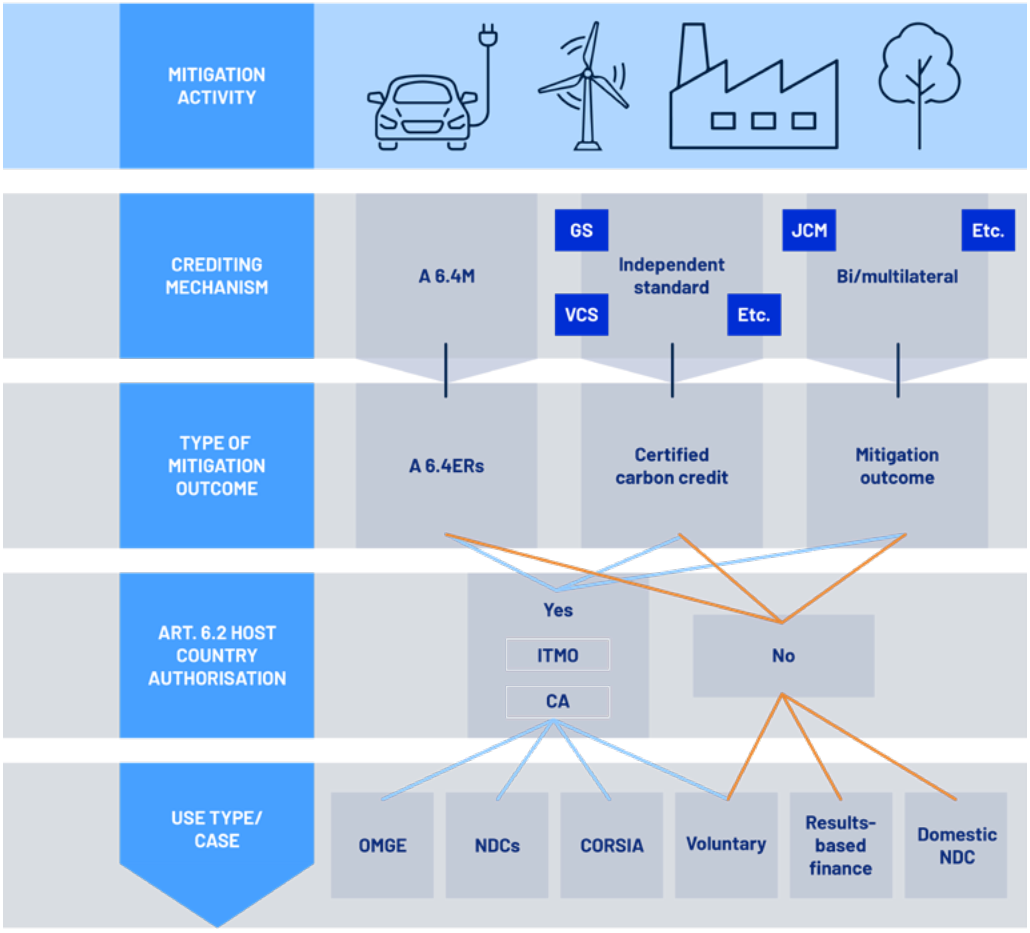

Figure 1: Possible paths from mitigation activity to use case under Article 6.2, 6.4, and independent carbon crediting programmes.

Mitigation outcomes that are authorized as ITMOs under Article 6.2 and/or certified as A6.4ERs under A6.4M must meet certain criteria.

Under Article 6.2, participating countries must ensure, through national arrangements, that these criteria are met, and keep track of and report about their cooperation to the PA. They may choose to utilize the A6.4M or private crediting programs (e.g. VCS) in their Article 6.2 cooperation. To set up robust national arrangements which ensure that Article 6.2 cooperation complements – and does not undermine – NDC achievement, countries

[6] Despite their name, A6.4ERs could also be based on removals.

need to develop national strategies, provide legal mandates, allocate resources, and build capacity (Espelage et al. 2022).

ITMOs, Article 6.2´s "currency", are defined as real, verified and additional emission reductions or removals, generated from 2021 onwards and authorized by a host Party for use towards NDCs (i.e. PA compliance), for international mitigation purposes (e.g, CORSIA compliance) or for other purposes (e.g. voluntary offsetting) (see Figure 1). Host countries are required to apply corresponding adjustments to all authorized, first-transferred ITMOs, which avoids claiming them towards the host Party's NDC. When used for international mitigation purposes or other purposes, first-transfer could also be defined as the point of authorization, issuance or use or cancellation. Despite their name, ITMOs do not necessarily involve an international transfer (UNFCCC 2022a, annex, para 1), for example if used for voluntary offsetting by an entity in the host country, or if voluntarily cancelled by the host country.

Under the A6.4M, compliance with relevant criteria is ensured and methodologies are approved by the A6.4SB, which oversees the activity cycle (UNFCCC 2022b, annex, para 24). The A6.4M can be utilized by countries that do not have the capacity and/or interest to ensure environmental integrity of mitigation outcomes solely through national arrangements, as well as by private entities that seek an international quality stamp for their carbon credits.

A6.4ERs are issued for mitigation outcomes that meet relevant criteria adopted by the A6.4SB, as well as potential national criteria defined by the host country (UNFCCC 2022b, annex, para 53, 26). If and when A6.4ERs are authorized, they become ITMOs and the Article 6.2 requirements apply (UNFCCC 2022a, annex) (see Figure 1).

Article 6.4 rules include detailed requirements regarding, inter alia, additionality testing, baseline setting, monitoring and other methodological aspects, that are subject to the approval and oversight of the A6.4SB. Countries can authorize public and private entities to generate and use ITMOs and participate in the A6.4M.

2.2 Article 6.2 rules relating to methodologies

Participating Parties must ensure that activities meet the requirements stipulated in the latest Article 6.2 rules and discussed below. Methodologies can be utilized to show that requirements and respective criteria are met.

- **Ensuring environmental integrity:** Participating Parties shall ensure environmental integrity, inter alia, by showing that there is no net increase in global emissions within and between NDC implementation periods, that conservative reference levels are applied, and baselines set in a conservative manner and below BAU emission projections (UNFCCC 2022a, annex, para 18, 22). Baselines must further consider all existing policies and address uncertainties in quantification and potential leakage (UNFCCC 2022a, annex, para 18, 22). Mitigation outcomes must be verified and additional (no further specification). Furthermore, the risk of non-permanence of mitigation across several NDC periods needs to be minimized. If reversals occur, these need to be addressed in full. The link to the NDC implementation period is also important for ensuring environmental integrity.

- **Promoting ambition:** The Article 6.2 rules state that Parties need to ensure that their participation in Article 6 contributes to the long-term goals of the PA (UNFCCC 2021a, annex, para 4).

- **Promoting and safeguarding sustainable development:** The Article 6.2 rules specify reporting requirements to promote sustainable development: In the initial report and regular information, a participating Party needs to outline how the activity will be consistent with the host country's sustainable development objectives (UNFCCC 2022a, annex, para 18 and 21). Furthermore, the Article 6.2 rules require minimizing and, where possible, avoiding

negative environmental, economic and social impacts.

- **Methodology related approaches in accounting:** In addition to the Article 6.2 rules, the host country may have national criteria for authorizing ITMOs.

- **Methodology related reporting:** Parties that engage in ITMO transactions must report an emissions balance that reflects the annual emissions and removals, or non-GHG metrics, covered by the NDC, and correspondingly adjusted based on the ITMOs transferred, acquired and/or used in that year. Methodology-related provisions regarding the initial report to the UNFCCC require a description how reference levels and baselines have been set in a conservative way and below BAU emission projections (including by taking into account all existing policies and addressing uncertainties in quantification and potential leakage)(UNFCCC 2022a, annex, para 18).

2.3 Article 6.4 rules on methodologies

Detailed rules, modalities and procedures (RMPs) exist for the A6.4M, including detailed requirements for activities, the activity cycle, and a process for methodology development and approval.

A6.4M governance

The A6.4M is governed by the A6.4SB, under the guidance of the PA. The A6.4SB functions like the CDM Executive Body, and host countries can introduce more stringent rules. The A6.4SB approves methodologies.

In 2022, the A6.4SB failed on its mandate to agree on recommendations on the application of methodological requirements, which would have been important to advance the methodological work of the body (UNFCCC 2022d). The development of recommendations for Article 6.4 activities involving removals was heavily contested among A6.4SB members. Members agreed on a document to be forwarded to the Parties, which was rejected at COP27 though, asking the A6.4SB to continue its work. Consequently, the A6.4SB has not yet agreed on recommendations for methodologies and removals.

Ensuring environmental integrity

(a) in activity design, with relevance for methodologies

The Article 6.4 requirements provide guidance on the activity design such that activities (UNFCCC 2022c, annex, para. 31):

- deliver **additional** mitigation without increasing global emissions and achieve emission reductions in the host Party
- deliver real, measurable and **long-term** benefits related to climate change
- ensure environmental integrity via **additionality, baselines** and MRV
- foster **sustainable development**
- address non-**permanence**, avoid **leakage** and **negative environmental** and **social impacts**
- undergo local and subnational stakeholder consultation, facilitating participation by local communities and indigenous peoples
- apply a **crediting period** for the issuance of A6.4ERs of a maximum of 5 years, renewable twice or a maximum of 10 years with no option of renewal[7]. For **removals**, a crediting period of 15 years, renewable twice, is applicable.

[7] Note that CCS+ and CCUS+ activities frequently involve large capital investments, which potentially makes crediting periods between 5 (min) and 15 (max) unattractive for t heir developers. However, restricting crediting periods is important to avoid lock-in.

(b) in mechanism methodologies, especially baselines.

The Article 6.4 requirements specify principles ensuring that mechanism **methodologies** (UNFCCC 2022c, annex, para. 33):

- encourage **ambition over time** and broad participation
- are real, transparent, conservative, credible and below BAU
- take into account uncertainty, leakage, suppressed demand, **reversals, policies and measures**
- are **aligned with the long-term temperature goal** of the PA and the host country's NDC and long-term strategy, contributing to the equitable sharing of mitigation benefits between the participating Parties.

Baselines are further required to (UNFCCC 2022c, annex, para. 34-36):

- take into account **uncertainty, leakage, policies and measures**, and relevant circumstances including national, regional or local, social, economic, environmental and technological circumstances
- be **conservative,** credible and **below BAU**
- **avoid leakage** and **address reversals**, where applicable
- recognize suppressed demand
- be aligned with the **long-term temperature goal** of the PA and the host country's NDC and long-term strategy
- apply a **performance-based approach** to baseline setting that takes into account:
  - best available technologies that represent an economically feasible and environmentally sound course of action, where appropriate
  - an ambitious benchmark approach where the baseline is set at least at the average emission level of the best performing comparable activities providing similar outputs and services in a defined scope in similar social, economic, environmental and technological circumstances
  - or an approach based on existing actual or historical emissions, adjusted downwards to ensure alignment with the principles to be adhered by a mechanism methodology discussed above.

The justification for the appropriateness of the choices must be provided, including information on how the proposed baseline approach is consistent with the principles discussed above. The host Party may determine a more ambitious level at its discretion.

Furthermore, a mechanism methodology must specify the approach to demonstrate the additionality of the activity. A robust assessment must be undertaken to show that the activity would not have occurred in the absence of the incentives from the A6.4M, taking into account all relevant national policies, including legislation, and representing mitigation that exceeds any mitigation that is required by law or regulation, and taking a conservative approach that avoids locking in levels of emissions, technologies or carbon-intensive practices (UNFCCC 2022c, annex, para. 38).

Finally, mechanism methodologies must appropriately calculate emission reductions achieved by an activity and ensure accurate monitoring of emission reductions (UNFCCC 2022c, annex, para. 32). The activity participants shall monitor emission reductions achieved by the activity during each monitoring period, in accordance with the relevant requirements adopted by the A6.4SB. The activity participants shall also monitor potential reversals over a period to be decided by the A6.4SB.

Promoting ambition

Regarding ambition, the Article 6.4 requirements state that Parties need to ensure that their participation contributes to the long-term goals of the PA (UNFCCC 2022c, annex, para. 26). To promote higher ambition, Parties have the option to specify their own baseline approaches, other methodological requirements, limit crediting periods and set criteria for crediting period renewal, provided they adhere to the Article 6.4 requirements (UNFCCC 2022c, annex, para. 27).

A mandatory levy of 5% of the A6.4ERs at issuance and a monetary contribution related to the scale of the Article 6.4 activity is applied as Share of Proceeds (SoP) to assist developing country Parties to meet the costs of adaptation (UNFCCC 2022c, annex, para. 67). Furthermore, Overall Mitigation of Global Emissions (OMGE) must be delivered through mandatory cancellation of 2% of the issued A6.4ERs (UNFCCC 2022c, annex, para. 69).

Promoting and safeguarding sustainable development

One of the primary participation requirements of the A6.4M is for the host Party to indicate to the A6.4SB how its participation in the mechanism contributes to sustainable development, recognizing that sustainable development is a national prerogative (UNFCCC 2022c, annex, para. 26). Furthermore, when approving an activity for registration, the host Party must provide information to the A6.4SB regarding how the activity fosters sustainable development. The Article 6.4 rules also require minimizing and, where possible, avoiding negative environmental, economic and social impacts.

3 Developing industrial carbon management methodologies in line with Article 6 requirements

3.1 Development and approval for methodologies to be used under Article 6

CCS+ methodologies can find their way into Article 6 cooperation either under Article 6.2, or they could be approved by the A6.4SB for use under Article 6.4. While Article 6 requirements have not been integrated into the methodology development under CCS+, so far, this guidance outlines ways to make the high-quality methodologies of CCS+ fit for use under Article 6 to realize this potential.

As outlined in chapter 2, under Article 6.2, participating Parties can decide on the methodological approach without international oversight. Parties can either make use of already existing methodologies (not only CDM, but also from private carbon market programs), develop a new methodological approach, or make use of an approved A6.4M methodology, once available. As an example, Parties could choose to apply CCS+ methodologies, tools or modules for their cooperation under Article 6.2.

A6.4M methodologies can either be developed by activity participants, host Parties, stakeholders or the A6.4SB (UNFCCC 2022c, annex, para. 35). They must meet all relevant Article 6.4 requirements and must be approved by the A6.4SB. Throughout 2023, the A6.4SB planned to review CDM methodologies for their application under the A6.4M but this will be delayed to 2024 given that the methodological approaches can at the earliest be approved by COP28 in December 2023. If CDM methodologies are deemed to comply with the new Article 6 requirements, they can be applied (with revisions, if appropriate) to activities under the A6.4M. In this context, the A6.4SB will also consider methodologies from other market-based mechanisms for their use under A6.4M (UNFCCC 2022e).

The A6.4SB also plans to develop new top-down methodologies (UNFCCC 2022e). In principle, thus, there are three options for developing a mechanism methodology:

- Revision of existing CDM methodologies and subsequent transition to the A6.4M
- Consideration of the use of methodologies from other market-based mechanisms (e.g. CCS+ methodologies, tools or modules)

- Developing new methodologies from scratch

The development of new methodologies can build on past experience. In general, the development of entirely new methodologies can be a costly and time-consuming endeavor. In the context of the CDM, development of new methodologies took up to two years, and the development costs per methodology amounted to USD 0.1-0.2 million (Michaelowa et. al 2020). To not disregard the methodological knowledge generated under the CDM and waste resources, some experts argue that an emphasis should lie on the revision of existing CDM methodologies to ensure that they comply with Article 6 requirements, to the extent possible. The International Initiative for Development of Article 6 Methodology Tools (II-AMT)[8] addresses this issue by developing Article 6-proof tools on additionality, baseline setting, and MRV. These tools can simply be added to existing CDM methodologies, replacing parts of the document that are not aligned with Article 6 requirements (II-AMT 2022a). Further, a guidance document informs about how NDC related Article 6 requirements can be met. The II-AMT tools and NDC guidance document, designed to ensure Article 6 compliance, can serve as an example in cases where CCS+ approaches do not meet Article 6 requirements. See Textbox 1 as well as Figures A1 and A2 (in the Appendix) for further information on the II-AMT.

For methodologies, tools and modules developed under CCS+, there are two pathways to be deployed under Article 6: First, they can be used by Parties engaging in Article 6.2. Given the lower level of detail and the less formalized approval process, this path might be easier to follow compared to seeking approval by the A6.4SB. However, the decision whether or not to use CCS+ methodologies, tools or modules would be made on a case-by-case basis and depends entirely on the Parties´ decision. Second, CCS+ could seek approval by the A6.4SB. This would entail meeting the more detailed Article 6.4 requirements. Once approved, chances for broad application of the methodologies, tools and modules are high, as the Article 6.4 market will gather momentum. Bottom-up submissions for A6.4SB-approval of methodologies covering industrial carbon management activities are expected to be rare due to the high cost of methodology development, further increasing the potential for CCS+ methodologies to be applied broadly once approved.

[8] See here and Annex III for more information on II-AMT.

Textbox 1: The International Initiative on Article 6 Methodology Tools (II-AMT)

II-AMT aims at bridging the gap between existing CDM or voluntary carbon market methodologies and Article 6. It provides tools for Article 6-proof additionality assessment (II-AMT 2022b), baseline setting (II-AMT 2022c) and MRV (II-AMT 2022d), which can replace respective parts of CDM methodologies. In addition to the three tools, the international expert team is developing an NDC guidance (II-AMT 2022e). The II-AMT applies the detailed Article 6.4 requirements, thereby assuring both Article 6.2 and 6.4 compliance. If the efforts of the expert team are (partly) taken up by the A6.4SB or Article 6.2 stakeholders, this could considerably accelerate the overall operationalization of Article 6 cooperations.

Regarding **additionality determination**, the II-AMT proposes six steps:

1. An **eligibility pre-check** to make sure that the activity is in line with the PA's long-term goals.

2. A **public notification** of activity participants on their intention to earn carbon revenues.

3. A **regulatory additionality determination** showing that a) the proposed activity is neither directly mandated by law nor triggered by legal requirements or agreements, and b) there are no agreed legal requirements that would trigger the activity once they go into effect during the activity's forthcoming crediting period.

4. A **risk analysis**, comprising (a) an activity type-specific **inherent financial additionality risk analysis**, and (b) an **implementation risk analysis** targeting prevalent non-monetary barriers to the activity type implementation. Conclusions from this step determine whether the following investment analysis is mandatory.

5. If an **investment analysis** is mandatory, the following sub-steps apply:

    a. identification of a financially viable and realistic alternative(s) to the mitigation activity in similar social, economic, and regional contexts;

    b. inclusion of all revenues and savings generated for the activity, including any incentives related to policy instruments;

    c. inclusion of any identified medium and high risks to implementation.

There are three possible outcomes from step 4: the activity is considered (a) not additional, if it is likely to be attractive without carbon revenues; (b) financially additional, but crediting period is restricted, if it is only marginally unattractive; (c) financially additional, if medium to high degree of confidence that it would not be attractive without the carbon revenues.

6. Finally, the activity's eligibility (eligibility pre-check) and regulatory additionality must be re-assessed at the point of crediting period renewal.

Regarding **baseline setting**, the II-AMT proposes four steps:

1. An **assessment of the appropriateness of performance benchmarking** is carried out to determine which baseline setting approach is applicable:

    a. If the sector is characterized by homogeneous production, the 'best available technology' (BAT) baseline setting approach must be chosen (if a BAT has been specified).

    b. If a BAT is not specified, then the 'ambitious benchmark' approach must be chosen.

    c. If neither is possible (due to lack of data or overly complex sector specifics), the approach based on existing actual or historical emissions adjusted downwards must be chosen.

2. Depending on the outcome, the baseline is set following one of the three approaches. Note that in each approach, the baseline emissions intensity is adjusted downwards over the crediting period using an ambition coefficient to ensure it is in line with the long-term goal of the Paris Agreement.

   a. When **setting the baseline in relation to BAT**, the activity must define potential baseline technologies which produce an output equivalent to the activity and are deemed commercially and financially viable and environmentally sound in the host country or region. Out of these, the performance parameters and values of the BAT are used as a benchmark for the activity.

   b. When **setting the baseline through an ambitious benchmark**, the activity must determine an up to date (maximum three years old) performance distribution curve of all technologies providing similar outputs or services in similar circumstances as the proposed activity in the host country. Next, an ambitious benchmark is determined, at minimum at the 20th percentile of the performance distribution curve.

   c. **Setting the baseline based on existing actual or historical emissions adjusted downwards** can only be chosen for activities in host countries that have communicated a net-zero pathway/target and/or an LT-LEDS. The activity developer must determine an actual or historical emissions baseline based on existing methodologies used under the Kyoto mechanisms and then adjust the baseline downwards through a discount actor that declines over time.

3. Once the crediting baseline is set, it is **assessed for alignment with the NDC unconditional target scenario and sector-specific strategies.** In this step, the activity developer must compare the stringency level of the NDC/sectoral reference scenario to the activity level crediting baseline. If the downscaled reference emissions level is lower than the activity level baseline, it must be downward adjusted.

4. Finally, the **crediting baseline must be regularly updated** with the start of each new NDC period.

Regarding **MRV**, the II-AMT outlines four additional elements which were needed to be introduced in the MRV framework to comply with Article 6 requirements next to the nine elements that are still relevant from the CDM. The new elements comprise:

1. Ensuring conservativeness in case accuracy is low due to excessive costs of accurate monitoring approaches

2. Ensuring monitoring of all relevant policies, including potential new policies influencing emissions levels of the mitigation activity

3. Ensuring full identification and monitoring of reversals

4. Ensuring identification and monitoring of all relevant sustainable development parameters through use of robust methodological guidance and tools.

The elements sufficiently covered in CDM methodologies include accuracy, completeness, consistency, comparability, leakage, materiality, confidential information, use of recent IPCC global warming potentials, and quality assurance and control.

Regarding the **NDC Guidance**, the II-AMT discusses the concept of target surplus, which ensures that activities authorized for Article 6 cooperation go beyond the mitigation required by the host country to fulfill its NDC, thereby avoiding overselling of mitigation. Further, the guidance shows how activities can contribute to and at the same time go beyond the host country NDC. See also chapter 4.2 in this Article 6 Compliance Guidance.

3.2.1 Overview on the CCS+ Initiative´s methodological approach and its relation to the Article 6 approaches

Considering the different characteristics of geological carbon storage and utilization in long-lived products, two separate frameworks, namely CCS+ and CCUS+, are currently being developed[9]. Given the size and complexity of the CCS+ and CCUS+ methodologies, the methodological approach under the CCS+ Initiative differs from that of regular VCS methodologies. Regular VCS methodologies are applicable to one particular project type, i.e. one project activity is eligible and the methodology is written in one document including all relevant requirements, procedures and calculations for that project activity. In contrast, the methodological approach under CCS+ is set up in a more flexible manner, with an overarching methodology framework and individual methodological modules that can be used in a plug-and-play fashion with the framework. This is comparable to the approach under the CDM with methodologies referring to overarching tools, which is likely to be applied also under Article 6.4.

This modular setup allows having one central **methodology** available that includes the basic calculations, procedures and requirements for a number of eligible project types, including the determination of project boundary and setting the baseline. Additional **tools** for differentiating between emission reductions and removals and for quantifying and allocating project emissions in carbon capture project activities provide further guidance. **Modules** are used to address different types of project activities regarding capture, transport, storage and utilization. By combining the overarching methodological framework and tools with specific modules, project proponents can apply a methodological approach which fits their project best (for an overview see Figure 2).[10]

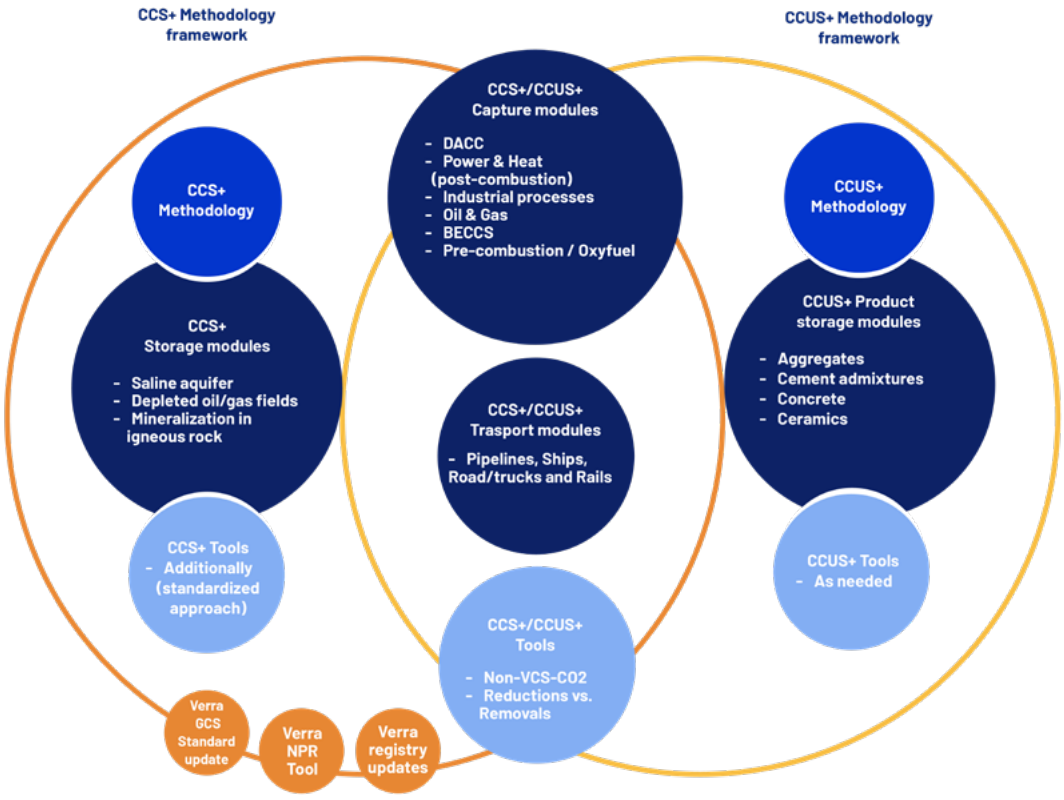

Figure 2: Overview of the modular framework of the CCS+ Initiative

[9] Further methodology design innovation efforts are considered under the CCS+ Initiative to acknowledge the distinct features and needs of CDR.

[10] For instance, for a direct-air carbon capture and storage in saline aquifers project, a project proponent selects the CCS+ methodology framework and tools, and adds the dedicated DAC capture module, the consolidated transport module as well as the storage in saline aquifers module. After adding the project-specific parameters into the methodologies and modules, a project proponent can prepare its project design document and submit it to Verra

3.2.2 Project boundary

In principle, the project boundary of the CCS+ methodology framework excludes source facilities and includes the capture facility, transport facility (if applicable) and storage site. In case elements of the source facility that are directly affected, modified or added for the capture of CO_2 (e.g. equipment for flue gas capture), these elements should also be included in the boundary. The project boundary encompasses all module boundaries defined in the respective capture, transport, and storage modules of the methodology framework that are relevant to the project activity.

In addition, the boundary for GHG accounting shall also include effects on GHG emissions sources and sinks outside the project boundary associated with:

- CO_2 capture, transport, and injection and the related facilities
- Upstream fuel emissions including such effects in electricity generation
- Upstream emissions related to electricity inputs (both grid and onsite generation)
- Material inputs (e.g. chemicals) for construction and operation

A threshold of 2% is used to determine exclusion of such secondary effects.[11]

This approach is highly conservative and in line with Article 6 approaches.

3.2.3 Additionality

The CCS+ framework methodology is currently still under development. In the latest version, the project method is used to demonstrate additionality as per the following steps:

Step 1: Regulatory surplus: it must be demonstrated that the project is not mandated by any law(s), regulation(s) or other regulatory framework.

Step 2: Implementation barrier: the project activities must demonstrate that they face an investment barrier by conducting an investment analysis

Step 3: Common practice: the project shall not be common practice

For investment analysis in particular, additional specific guidance is provided on the following aspects:

- Investment analysis reflecting multiple participants involved in the project activities
- Investment analysis reflecting third-party involvement in industrial carbon management project activities
- Investment analysis reflecting CO_2 not covered by VCS methodologies ("non-VCS CO_2") but included in industrial carbon management project activities
- Investment analysis guidance reflecting risk and uncertainty of industrial carbon management technologies
- Operating and maintenance costs

The CCS+ Initiative has the intention to include standardized methods for the demonstration of additionality based on a positive list for certain projects that remove CO_2 emissions. The intended approach foresees that the VCS shall develop positive lists of technologies and their applications, based on the technical work performed by members of the CCS+ Initiative and/or other parties. Technologies and their applications in such positive lists

[11] A prospective VCS Program update regarding the allocation of one-time emissions may lead to a revision of the materiality threshold to 1%

shall be deemed automatically additional without the need for any further assessment. Such lists shall be developed per country and per sector (where appropriate) for projects that permanently store CO_2 that is captured directly from the atmosphere or from biogenic sources. In the development process, it will be important to consider all relevant components of the value chain, e.g. the installation of liquefaction plants at the capturing unit as well as the storage technologies in the case of storage in products.

3.2.4 Baselines

The CCS+ methodology applies a business-as-usual (BAU) baseline for project activities. This is not in line with Article 6 which requires the baseline to be below BAU. The following baseline scenarios are considered:

- Greenfield capture facilities: the absence of CO_2 capture from the source facilities, or the absence of CO_2 capture from the atmosphere
- Brownfield expansion/capacity capture activities: same as for greenfield capture facilities. Capture capacity that exists before the project activity must be accounted for in the baseline and treated as non-VCS CO_2
- For existing capture facilities: discontinuation or reduction of an existing capture activity due to end-of-life, or a significant evolution in regulatory or financial barriers that were not previously present.

Where relevant, the installation of pipes and liquefaction plants is also considered in determining the baseline. If CO_2 is stored in products, the storing technologies need to be considered to establish the additional operational steps and associated emissions correctly and determine the baseline scenario for the end use of the CO_2 in concerned industries.

Even though the BAU is set as the baseline, the actual baseline emissions for crediting are determined based on the amount of CO_2 injected at storage sites in the methodology instead of being based on the monitored emissions from the source facility. Furthermore, all leakage emissions occurring outside the project boundary are directly attributable to the project and are quantified and deducted from the mitigation outcomes (e.g., land-use changes or energy emissions), as are embodied emissions.In the case of point source capture, safeguards for capacity increases in the source facility will be developed.

Moreover, in some cases, the project emissions will be co-captured, transported and stored with baseline emissions. Eventually, the measured baseline emissions are higher than the BAU baseline emissions from the source facilities/atmosphere. Nevertheless, this co-captured part of emissions will be a part of both project and baseline emissions. Hence, it will be cancelled out in the calculation of emission reductions and removals. Another advantage of quantifying baseline emissions based on the amount of CO_2 injected at storage site is the following: If the baseline for DAC and BECCS would be set at "0", the mitigation outcome calculation would result in negative (-) numbers.

3.2.5 Monitoring, reporting and verification

Regarding MRV, industrial carbon management activities shall comply with the MRV requirements set in Verra's latest Geological Carbon Storage (GCS) Requirements for CCS monitoring program. The modules developed under the CCS+ Initiative either apply these requirements or go beyond them and provide more details on capture and transport. The project proponent must establish, maintain, and apply a monitoring plan and GHG information system that includes criteria and procedures for obtaining, recording, compiling, and analyzing data, parameters, and other information for quantifying and reporting GHG emissions relevant for the project and baseline scenarios.

Monitoring procedures must address the following:

- Types of data and information to be reported

- Monitoring times and frequencies
- Units of measurement
- QA/QC procedures
- Origin of the data
- Monitoring roles and responsibilities
- Monitoring methodologies
- GHG information management systems
- Type of equipment used

In the storage modules, it is stated that monitoring plans must support permanent storage of CO_2 injected by ensuring containment of the CO_2 flow (e.g. in plumes, where applicable) over time. This includes surface, near-surface, and subsurface equipment for continuous monitoring, and defined monitoring campaigns. To ensure the implementation of the rules, additional requirements for monitoring plans at storage sites are provided to address the issues of loss of CO_2 containment and conformance. This includes i.a. requiring project proponents to describe techniques, define a detection threshold, and determine expected mean time to detect a loss of containment. The actions that must be taken upon detection of loss of containment and conformance are also specified. Moreover, if a loss of containment occurs, the procedures of the VCS Program Documents Registration and Issuance Process and the Non-Permanence Risk Tool for Geologic Carbon Storage shall apply, which were developed by Verra and applied by the CCS+ Initiative.[12]

In addition to the procedures and requirements defined by Verra in its VCS Program and Non-Permanence Risk Tool, further guidance on modalities and procedures for CCS with storage in geological formations can be drawn from the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol's decision 10/CMP.7 that was taken in 2011 (UNFCCC, 2011). Although no dedicated CCS methodologies were approved under the CDM, the modalities and procedures can serve as guiding principles and criteria to be met by CCS projects under UNFCCC governance. They follow a similar approach, where in case of reversals the respective amount of credits is deleted from a dedicated reserve account.

3.2.6 Ensuring Article 6 readiness of methodologies, tools and modules developed under the CCS+ Initiative

On the basis of the preceding discussion, Table 1 provides a checklist for CCS+ Article 6 compliance, assessing which Article 6 requirements are met by the CCS+ Initiative, where potential methodological gaps and challenges lie, and how they could be met.

[12] Note that this section is still under revision and thus changes may be made to specific monitoring plans with respect to conversion between standard and operating conditions, frequency, etc. In addition, discussion is still ongoing as to if the storage module of saline aquifer and depleted oil and gas should be combined or not. Whether different MRV plans are required will be a part of the discussion.

Applies to Art. 6.2/6.4	Reference	Requirement	Addressed by CCS+	CCS+ methodology approach	Suggestions for CCS+ methodology enhancement to make it fit for Article 6
General requirements					
Article 6.2 Article 6.4	para 4 para 33	**encourage ambition** over time	No	Currently not addressed in methodologies	Include discount factor/Paris Goal Coefficient, applicability to removals to be tested
Article 6.2	para 1	ITMOs from a cooperative approach are **real, verified and additional**	Yes	Addressed (see further remarks on additionality and MRV in chapter 4 below)	N/a
Article 6.4	para 33	A6.4M methodologies shall…			
		encourage **broad participation**	Yes	CCS+ methodologies are developed by a broad set of stakeholders, and are "simple, clear and applicable to a broad set of sectoral and technology coverage", as required in A6.4SB (2023a), p. 14	N/a
		be real, transparent, conservative, credible, below **'business as usual'**	No	Baseline is currently set at BAU, but not below BAU	Include parameter to shift crediting baseline below BAU. Applicability to removals to be tested (see above)
		avoid leakage, where applicable	Yes	CCS+ methodologies quantify embodied emissions, upstream emissions, and transport emissions which" …occur[…] outside the project boundary, and which [are] measurable and attributable to the Article 6.4 activity" (A6.4SB, 2023, p. 15)	N/a
		recognize **suppressed demand**	N/a	Most CCS+ activities do not provide additional goods (unlike e.g. renewable energy projects)	N/a
		align to the **long-term goals of the Paris Agreement** (including temperature goals)	No	Currently not addressed in methodologies. Criteria on avoiding emission lock-in are outlined in the Guidance and Principles Document (see also section 4.1.1).	Include eligibility criteria (e.g. following pre-check in II-AMT tool on additionality setting) and baseline becoming net negative over time in order to be aligned with PA long term goals, with specific dates depending on host country net negative goal timing and funding.
		contribute to **equitable sharing of mitigation benefits between Parties** and to **reducing emission levels in the host Party**	No	Currently not addressed in methodologies	Requirement expected to be addressed by designated national authority (DNA) (A6.4SB, p. 18). Alternatively, stricter crediting baseline (further below BAU) could be applied, leaving extra mitigation outcomes for use of host Party.

Applies to Art. 6.2/6.4	Reference	Requirement	Addressed by CCS+	CCS+ methodology approach	Suggestions for CCS+ methodology enhancement to make it fit for Article 6
		align with **host Party NDC and long-term low GHG emission development strategy** (if applicable)	Yes	Currently not explicitly addressed in methodologies, but included in additionality determination (regulatory additionality), baseline setting ("ambition increasing over time"), and lock-in discussion	Follow II-AMT guidance on NDC and LT-LEDS alignment. Further guidance by A6.4SB expected (A6.4SB, 2023a, p. 18)
	para 34	Included **assumptions, parameters, data sources and key factors**	Yes	Assumptions etc. are provided, e.g. in calculating project emissions in individual modules	N/a
		take into account **uncertainty, leakage, policies and measures, and relevant circumstances** including national regional or local, social, economic, environmental and technological ones	Yes	Guidance on Implementation Barrier (Step 2) in methodology includes uncertainty regarding activity economics (e.g. risks associated with implementing business cases on which there is limited experience)	N/a
Additionality		The activity…			
Article 6.4	para 31	shal **not lead to an increase in global emissions**	Yes	CCS+ represents technologies for realizing emission reductions and removals; meeting other requirements (being real, transparent and additional, and avoiding leakage and reversals) guarantee not leading to increase in global emissions	N/a
	page38	shal **not have occurred** without A6.4M (consider all relevant national policies)	Yes	Regulatory Surplus test (Step 1), Implementation Barrier test (Step 2), and Common Practice test (Step 3) in methodology ensure that the requirement is met	N/a
		represents mitigation that **exceeds what is required** by law or regulation	Yes	Regulatory Surplus test (Step 1) in methodology ensures that the requirement is met	N/a
		avoid locking in levels of emissions, technologies or carbon-intensive practices	Yes	See dedicated discussion in section 4.1.1. In addition, recommendations on avoiding emission lock-in are outlined in the Guidance and Principles Document	N/a
Baseline setting		The activity baseline…			
Article 6.2	para 18,22	Shall **apply conservative reference levels**	Yes	The baseline considers only CO2 (no other GHG), which is a conservative assumption. Project proponents must show that baseline assumptions are realistic. Non-VCS CO_2 injected at the same side is deducted from baseline emissions.	N/a

Applies to Art. 6.2/6.4	Reference	Requirement	Addressed by CCS+	CCS+ methodology approach	Suggestions for CCS+ methodology enhancement to make it fit for Article 6
		must be set in a **conservative way and below 'business as usual'** emission projections	No	Baseline is currently set at BAU, but not below BAU	Include parameter to shift crediting baseline below BAU, applicability to removals to be tested
		must address uncertainties in quantification and **potential leakage**	Yes	Uncertainties are addressed by defining measurement accuracy; leakages are addressed in terms of embodied emissions, upstream emissions, and transport emissions	N/a
Article 6.4	para 36	must be set by applying one of the following approaches: · **performance-based approach**, based on best available technologies · **ambitious benchmark approach** where the baseline is set at least at the average emission level of the best performing comparable activities · approach based on **existing actual or historical emissions**, adjusted downwards	No	Baseline is no capture of the CO2 therefore the approach "existing actual or historical emissions" is used, but not adjusted downwards. For DAC, the baseline is "no capture from the atmosphere"	Include parameter to shift crediting baseline below BAU, applicability to removals to be tested
MRV					
Article 6.2	para 1	ITMOs are measured in **metric tons of carbon dioxide equivalent** (t CO2 eq)	Yes	Emissions and removals calculated in t CO2 eq	N/a
Article 6.2	para 18	Describe how cooperative approach will **minimize and/or avoid negative environmental, economic and social impacts**	Yes	Addressed by referring to latest VCS Standard v4.4 in the Guidance and Principles Document	Apply SD tool to be developed under Article 6.4
Article 6.2 Article 6.4	para 22 para 24	quality of mitigation outcomes, including addressing **uncertainties in quantification**	Yes	Uncertainties are addressed by defining measurement accuracy	Apply uncertainty definitions in line with best practice under Article 6
		address reversals of emission removals in full	Yes	Reversals quantified in storage modules	Expand MRV duration and liability for storage in line with Art. 6 requirements for removals
		activity fosters sustainable development	Yes	Latest VCS Standard mandates that a project activity needs to contribute to at least three SDGs	Apply SD tool to be developed under Article 6.4
Article 6.4	para 32	**accurate monitoring of emission reductions**	Yes	Measurement accuracy defined in tools and modules	Apply accuracy definitions in line with best practice under Article 6
Article 6.4	para 50	**monitor emission reductions/ reversals over a period** (to be decided by A6.4SB)	Yes	Monitoring beyond last injection into a storage site is mandatory	A6.4SB has not yet decided on required period, but likely to be met.
Article 6.4	para 51	**Verification/certification** by a designated operational entity (DOE)	Yes	Under VCS, a VVB verifies emission reductions and removals; if VVB is approved as DOE by the A6.4SB, the requirement is met	N/a

4 Proposed CCS+ approach to Article 6 cooperation

4.1 Ensuring environmental integrity

4.1.1 Additionality and lock-in of emissions, technologies or carbon-intensive practices

The current additionality test enshrined in the CCS+ framework methodology is in line with Article 6 requirements (see Table 1). However, the proposed inclusion of positive lists allows listed industrial carbon management solutions to circumvent this robust additionality test and should therefore be flanked with strict rules as to which activity types can be included on such lists.

Some activity types (e.g. DAC) have no revenue streams apart from carbon markets and are therefore financially additional by definition unless they receive government subsidies higher than the cost of the CCS+ approach. Their regulatory additionality would be given in the absence of subsidies unless NDCs include substantial negative emission targets[13] and corresponding policies safeguarding actual deployment are in place. For other activity types, which are more likely to be mandated and/or enshrined in current NDCs, or which are applied in industries generating revenues, their appearance on a whitelist could lead to environmental integrity issues of related credits.

The II-AMT additionality tool (II-AMT 2022b) provides suggestions on developing whitelists (or "positive lists", as they are referred to in II-AMT) regarding financial additionality. This can inform the development of an assessment under the CCS+ Initiative. These suggestions build on the cost-revenue ratio and/or marginal abatement costs of activity types and include a regular revision of positive lists to avoid locking in of emissions, technologies or carbon-intensive activity types.

The latter aspect is crucial for evaluating industrial carbon management solutions fulfilling the Article 6.4 requirement to avoid carbon lock-in (Decision 3/CMA.3, paragraph 38 (see Table 1)). Enhanced Oil Recovery (EOR) is by many considered to have a high risk of carbon lock-in and is therefore not considered in the CCS+ Initiative. The discussion on carbon lock-in[14] relates to activity types combining fossil fuels and carbon capture, as well as to removals, as the latter can lead to continued and/or increased emissions if used to offset emissions. A strict differentiation between emission reductions and removals and separate targets to avoid offsetting are required to avoid removals-induced emission lock-in. The CCS+ Initiative has developed a tool dedicated for the distinction between reductions and removals (see Table A1).

On the one hand, CCS and CCU reductions building on the capture of CO_2 from fossil fuel combustion generally carry the risk to prolong the acceptance and deployment of fossil fuel-based technologies despite better alternatives, which is not in line with Article 6.4. Especially the energy sector could further reduce emissions by applying renewable energy rather than CCS technologies. CCS therefore typically targets applications in other industrial sectors, in which emissions are harder to abate. However, CCS applications can only yield capture rates below 100%, leaving residual emissions to be offset with removals, if net-zero targets are to be met. On the other hand, the same activity types are acknowledged to be indispensable for reaching emission reduction targets (Pathak et al., 2022; IEA, 2019; OECD & IEA, 2016) especially in sectors with otherwise low (or slowly achievable) emission reduction potential. The current development of policy instruments fostering not only carbon removals, but also fossil-fuel CCS and CCU activities (e.g. the US Inflation Reduction Act, or plans for dedicated Carbon Contracts for Difference (CCfDs) in the EU) are further evidence for policy makers relying on such capture-based emission reduction activity types. Some policies have a limited time horizon to ensure CCS is used to reduce emissions in the short term and at the same time avoid fossil fuel lock-in.

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[13] Note that in the current situation, in which some CDR methods like DAC are not reflected in national GHG inventories, these methods cannot be part of NDCs.

[14] E.g. EOR is explicitly not eligible for approval under the IC-VCM's Core Carbon Principles (CCP; see IC-VCM, 2023).

Clearly, a line must be drawn between CCS and CCU which unnecessarily prolong the lifetime of emission-intensive technologies and processes on the one hand, and activity types which enable rapid emission reductions in sectors inevitably reliant on fossil fuels on the other hand. Finding the right spot for drawing this line is the critical part to evaluating CCS and CCU activities leading to versus avoiding lock-in of emission levels and technologies. While future guidance can be expected both from carbon credit quality initiatives like the IC-VCM and Article 6 developments, the CCS+ Initiative shall endeavor to take a proactive and forward-looking role in this discussion.

Cost efficiency is one criterion to evaluate whether a CCS+ application is necessary or whether it leads to avoidable lock-in. As an example, equipping a coal-based power plant with carbon capture technology might be less cost efficient than installing wind power plants. In such a case, the CCS application would lead to unnecessary lock-in of coal-based electricity production and would therefore not be compliant with Article 6 requirements.

Energy efficiency is another criterion to consider. In some cases, a fossil fuel-based technology equipped with capture technology demands less energy than a non-fossil alternative, potentially leading to a near-term preference for the CCS-based solution. Such constellations may arise especially in situations where policies demand not only emission reductions but also energy efficiency improvements (Janipur et al., 2020). If the delta in energy demand between the fossil fuel based and the alternative technologies is sufficiently large, the former can be interpreted as a bridging technology enabling emission reductions while the alternative´s energy demand is being brought down and overall renewable energy capacity increased, rather than as leading to fossil fuel lock-in. Again, the definition of what is a sufficiently large delta is challenging and not (yet) reflected in the Article 6 requirements.

The above lock-in discussion relates to the Article 6 requirement for activities to contribute to LT-LEDS. In the long term, fossil fuel-based production is expected to play only a marginal role, and any combination of fossil fuel combustion and carbon capture will have to be evaluated with regard to its contribution to LT-LEDS, especially when considering that capture rates in CCS technologies are below 100%. This means that only activity types which are described in the respective country´s LT-LEDS either as a bridging technology (potentially with a limited activity crediting period) or as indispensable would be in line with Article 6. The CCS+ Initiative's forthcoming Guidance and Principles document shall formulate its discursive guidance on carbon lock-in against this background. Clear definitions and methodological steps to evaluate lock-in risks are not yet available, neither from CCS+ nor from Article 6 regulatory documents.

4.1.2 Baseline setting

The baseline setting approach currently used in the CCS+ initiative is not consistent with Article 6 requirements: Under the CCS+ Initiative, the crediting baseline is set at BAU level (defined as no capture), while both Article 6.2 and 6.4 rules require the baseline to be set below BAU. To comply with Article 6.2, the CCS+ frameworks could establish an approach to decrease crediting baseline, such that it is set below BAU. This can be achieved by defining a minimum coefficient (e.g. 10 %) for baselines for emissions reductions by which BAU emissions are discounted. There is no guidance on how much below BAU the baseline would need to be set.

For removals, setting the baseline below BAU implies that it is below zero emissions, i.e. that some removal activities are already included in the baseline. One option to address this could be to pre-define a certain percentage of removals in a removal baseline, in analogy with the approach for an emissions reduction baseline. Given that technology-based removal activities are only beginning to materialize at a larger scale, and are not included in NDCs, the percentage should be rather small in the short term, a few percentage points, and increase over time as NDCs start to include removal targets. However, there are other options, and the approach to set a baseline below zero in case of removals still needs to be further explored, and further guidance from the A6.4SB is required.

As outlined above, Article 6.4 rules require mechanism methodologies to encourage ambition over time and align with the PA´s long-term goals.

II-AMT TOOL02 (II-AMT, 2022c; see Textbox 1) is specifically designed to ensure an activity baseline is set in accordance with these requirements. It uses a discount factor or "Paris Goal Coefficient" to ensure the baseline is below BAU and falls linearly over time. Note that for removal activities further research on the application of such an ambition raising coefficient is required, because in current approaches these methods typically have no intensity baseline, or that the baseline is zero (see Michaelowa et al., 2022). In any case, regular updates to the baseline are required to ensure that developments in the political and technological spheres are mirrored. Therefore, the MRV approach must include monitoring of policies, benchmark developments etc. to comply with Article 6.

To align with Article 6.4 requirements, the crediting baseline would need to be set based on best available technologies, ambitious benchmarks or existing actual or historical emissions adjusted downwards. In the current situation, where industrial carbon management activities are not applied on a broad basis, the approach based on existing actual or historical emissions seems the most practicable way to go. However, also approaches based on best available technologies and ambitious benchmarks can be applied in cases where industrial carbon management activities are available for comparison on a national and/or regional scale. As an example, setting the baseline for an activity in a host country A can be informed by the performance of industrial carbon management activities in a neighboring country B, which has similar economic and environmental characteristics.

4.1.3 Monitoring, reporting and verification

The monitoring of industrial carbon management activities must cover carbon capture, transport, and storage/ utilization. Reversals can occur during all steps of the industrial carbon management value chain (depending on the capture method). The modules of the CCS+ Initiative therefore cover all steps of the value-chain, and enable different combinations of capture, transport, storage and utilization modules. Monitoring equipment and methods to quantify both captured and re-released CO_2 are described in detail in the CCS+ methodologies, tools, and modules.

4.1.4 Permanence

Permanence is a central issue when crediting industrial carbon management activities. Storing captured CO_2 underground (CCS+) or utilizing and storing it in products (CCUS+) does not (necessarily) keep it out of the atmosphere for geological time periods, and if the CO_2 is re-released, it will contribute to climate change. Therefore, the time between storage and reversal (if it occurs) is crucial when considering the actual objective of the industrial carbon management activity (does the activity aim at short-, medium-, or long-term emission reduction or removal?) and quality of credits issued for a respective activity. There are several definitions for what is considered `permanent´, e.g. 1000 years (Carbon Plan, 2021) or 100 years, derived from the 100 year warming potential of CO_2, which (amongst others) is primarily used in a different context in IPCC reports allowing the comparison of the impact of different greenhouse gases and their respective climate impacts and also included in some provisions for the PA.

The permanence of stored CO_2 highly depends on the storage method. As an example, storage in saline aquifers is considered potentially permanent (IPCC, 2021), whereas CO_2 stored in biomass (after photosynthesis-based capture) can be expected to be re-emitted in the short- to mid-term. The current scope of the CCS+ Initiative covers storage in aquifers, depleted oil and gas fields, igneous rock formations (through mineralization processes) as well as in durable building materials like cement, but not biomass-based storage[15]. Therefore, this discussion focusses on aspects related to long-term storage methods.

Article 6 requires reversals to be monitored and addressed in full. This implies that monitoring continues also

[15] Note that the scope might be extended to also cover short-term CCU applications (e.g. e-fuels) in the future.

after the injection site has been closed and the crediting period of the activities is over. There are two prominent approaches as to how long stored CO_2 should be monitored: First, by defining a fixed time period, as applied in the US. Second, the required monitoring period is based on the performance of the storage regarding reversals, as applied e.g. by the EU.

In the US CFR Part 146 ("Underground Injection Control Program: Criteria and Standards"), the post-injection monitoring period is set at a minimum of 50 years. However, this time horizon can be "shortened with an approved alternative time frame" (Legal Information Institute, n.d.). The EU regulates the post-closure monitoring in Articles 17 and 18, as well as in the Annex of Directive 2009/31/EC (EU, 2009). The monitoring period is based "on information collected and modelled during the implementation of the monitoring plan" (Annex II), thus depends on the performance of the respective site. Further, a minimum period of 20 years is defined in Article 18, which can be undercut by the respective authority. This performance-based approach seems somewhat more reasonable, given that liability for continued monitoring over long time periods (e.g. 1000 years) can hardly be guaranteed and priced in at the point of authorizing a industrial carbon management activity for Article 6.

Overall, CCS+ complies with the currently formulated Article 6 requirements for monitoring reversals.

There are two[16] popular approaches for addressing reversals: First, by applying a buffer and second, by temporary credits. In a buffer approach, a certain share of credits is stored in a reserve. If reversals occur, these credits are deleted to account for the re-released CO_2. CCS+ refers to Verra´s existing Geological Carbon Storage Non-Permanence Risks Tool (Verra, 2023) for addressing reversals. In this tool, a buffer pool approach[17] is described, in which the risk for reversals is estimated. This risk determines the share of credits to contribute to the buffer Depending on the estimated risk score, a share between one and seven % of issued credits are deposited into the buffer pool.[18] This share is also generally aligned with the CDM decision from 2011, according to which 5% of the CERs issued should be forwarded to a reserve account for accounting for any reversals. A key difference is that under the CDM decision this buffer is refundable, which implies lower financial risks to project developers (UNFCCC, 2011).

Temporary credits try to account for the temporary nature of the respective storage method. Tonne-year approaches are controversially discussed to be used for biomass-based storage. In such an approach, a time horizon is defined, and the amount of CO_2 stored and/or re-emitted until that time horizon estimated. A similar approach could also be considered for application with more durable storage methods, such as the ones covered under the CCS+ Initiative. However, estimating the respective reversals and defining a relevant time horizon, as well as setting respective credits into relation with emission reduction units retains challenges associated with the task of designing a robust tonne-year approach.[19]

Currently, Article 6 requires that reversals must be addressed in full, but do not define how this should happen. Therefore, both described approaches seem to comply with Article 6. Recent developments point towards a buffer pool rather than a tonne-year approach to be favored by the A6.4SB(see A6.4SB, 2023b,c). Also the CCS specific modalities and procedures for the CDM (UNFCCC, 2011) apply a refundable buffer pool approach by installing a dedicated reserve account. Note that Parties may agree to use alternative approaches under Article 6.2.

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[16] The EU ETS Directive required storage operators to compensate for reversals by surrendering an equivalent amount of allowances, which can be interpreted as an approach to addressing reversals.

[17] Note that a buffer pool approach offers more flexibility and safety compared to project specific buffers, and are implemented e.g. in the IC-VCM´s Assessment Framework (IC-VCM, 2023).

[18] Activities with a higher risk are not eligible for the VCS.

[19] See Unpacking ton-year accounting – CarbonPlan for a detailed discussion of current ton-year approaches and the related challenges.

4.1.5 Environmental and social safeguards and contribution to sustainable development

Most crediting programs apply the "do no significant harm" principle, but their requirements and approach regarding environmental and social safeguarding differ.

As more and more mitigation projects enter the carbon markets, it is paramount that they not only deliver on climate action but also substantially contribute to the SDGs. Standard-setting organizations define how mitigation projects need to contribute to sustainable development with a few standards available to date, e.g. the SD VISta Standard, that explicitly address sustainable development.

The CCS+ Initiative does not explicitly formulate a procedure to assess a project´s SDG[20] contribution. In its latest VCS Standard version, Verra mandates that a project activity needs to contribute to at least three SDGs (including SDG 13-climate action) to ensure a more holistic contribution of a project to transformational change. Hence, project proponents need to demonstrate non-mitigation co-benefits (on the social, economic, and/or environmental dimension). More exhaustive approaches could be applied to ensure Article 6 compatibility. As an example, activity proponents could refer to other existing tools like the II-AMT TOOL03 on MRV (II-AMT, 2022d), which includes elements dedicated to the monitoring of policies and sustainable development impacts, respectively, and which partly refers to existing procedures of World Bank and other standards for SDG contributions.

This is especially relevant in industrial carbon management projects as such activities are often perceived by the public as climate-protection-only where SDG co-benefits are largely absent. Industrial carbon management projects can contribute to several SDGs, e.g. to SDG 7 (via using captured CO_2 for syn-fuel production); SDG 8 (via demanding high skill and precision employees); and SDG 12 (via waste reduction and reuse and recycling of captured CO_2 as a feedstock). This list is not exhaustive.

4.2 NDCs in Article 6 and their impact on methodologies

Host countries intending to participate in the A6.4M may specify to the A6.4SB their methodological approaches and how these are compatible with their NDCs and any LT-LEDS. As an example, a test of regulatory additionality, which includes policies implemented to reach the NDC, addresses the requirement of Article 6 cooperation contributing to the reduction of the emission level of the host country. Activity-level monitoring of mitigation outcomes can be aligned with NDC periods to ensure that NDC updates and relevant policies are reflected in the monitoring plan, as under II-AMT (II-AMT, 2022d, Element 2). The obligation to contribute to LT-LEDS (where such have been submitted) can be interpreted as avoiding lock-in of emissions, which is addressed in chapter 4.1.1.

The host country could adjust the activity's baseline downwards, whereby a certain share of additional mitigation outcomes is authorized as ITMOs and the rest are counted towards its NDC (see II-AMT, 2022e).

[20] The Guidance and Principles document suggests including an assessment of SDG impact, but does not require it, and it is not included in the CCS+ initiative´s methodologies, tools or modules. For Article 6 compliance, such an assessment is mandatory.

5 Outlook and recommendations: aligning the CCS+ methodologies with Article 6 requirements

Decades of methodological work both under the CDM and for private carbon market programs like the VCS have produced a large pool of approaches and solutions. This has included specific approaches to CCS, as under the CDM, which have informed more recent endeavors like the CCS+ Initiative. Despite not being developed with Article 6 requirements in mind explicitly, the methodologies, tools and modules developed under the VCS in the CCS+ Initiative meet most Article 6.2 and 6.4 requirements, especially in terms of additionality testing and MRV.

5.1 Generic approaches for revising CCS+ methodologies to become "fit for Article 6"

The specific characteristics of activities based on carbon capture and storage (be it in reservoirs or in products) jointly pose several challenges for industrial carbon management project developers regarding methodological approaches. However, where full alignment with Article 6 requirements is not yet given, existing approaches can often be applied to close the gaps, enabling CCS+ activities to comply with Article 6. Figure 3 shows how CCS+ can be combined with approaches developed under the II-AMT (a set of tools and a guidance aiming at Article 6 proof additionality testing, baseline setting, MRV, and NDC/LT-LEDS alignment for existing CDM methodologies), and other sources to become fit for Article 6.

The tools and guidance of the II-AMT can inform and complement the CCS+ Initiative in several ways:

- by informing the procedure to formulate positive lists for activities to avoid activity-specific additionality testing;

- by formulating a pre-check to ensure activities meet the Article 6.4 requirement to contribute to the PA´s long term goals;

- by formulating an approach for a Paris Goal Coefficient which ensures compliance with the requirement to increase ambition over time, and to set the crediting baseline below BAU;

- by providing guidance on how an activity can contribute to the host country NDC and LT-LEDS.

The Non-Permanence Risk Tool developed by Verra guides the buffer pool approach applied to address potential reversals under CCS+ Initiative´s methodologies. When the A6.4SB further specifies its work on reversals, the approach might need to be revisited. It is likely that the SB will draw on modalities and procedures formulated for (but never applied to) CCS in 2011, which might lead to the current approach not being aligned with then established Article 6.4 requirements.

For now, Article 6 compliance could be achieved through the inclusion of respective elements from II-AMT and VCS into the CCS+ methodologies, tools and modules.

The most critical outcome thus is that an approach to ensure that baselines are set below BAU, rather than at BAU both for emission reductions and removals, as well as a discount factor to ensure increasing ambition over time could make CCS+ "fit for Article 6" relatively easily. For removals, BAU is typically (also under the CCS+ Initiative) considered to be zero. So, a below-BAU approach requires some removal covered by the baseline. The challenge is to define this baseline removal rate.

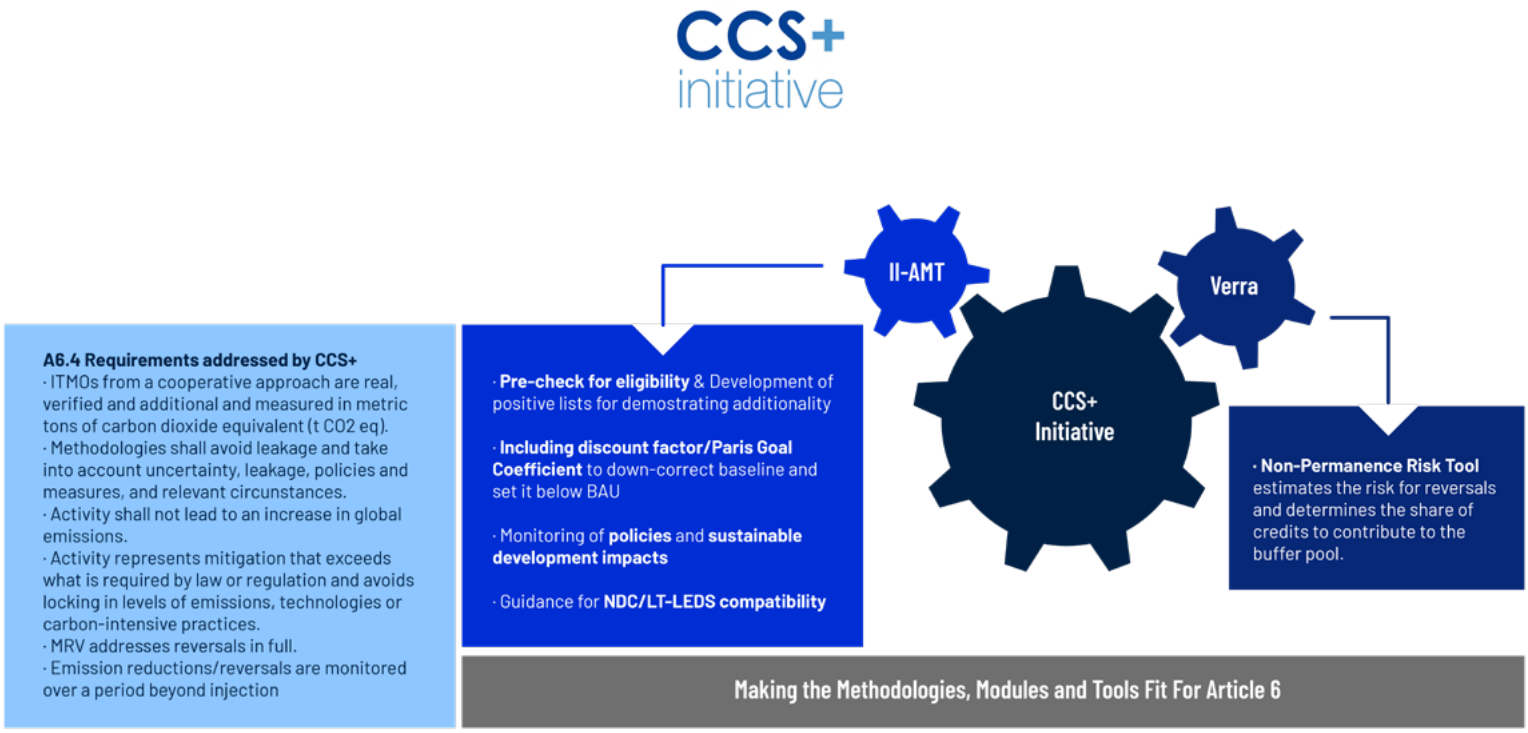

Figure 3: Proposed combination of CCS+ methodologies, tools and modules with other existing approaches to become fit for Article 6. Where Article 6.4 requirements are more detailed than Article 6.2, they are used as the basis for Article 6 compliance. Source: Authors

How this requirement can be implemented for removals remains to be explored in the future, when country specific goals and funding measures will begin to take shape. The requirement to increase ambition over time would mean the removal rate in the baseline would increase. Ideally, the baseline removal rates would be driven by national net removal targets after the net zero targets have been reached.

5.2 Key open issues

There are two characteristics of activities based on carbon capture and storage and/or utilization which are difficult to operationalize in the context of Article 6 methodologies, namely the risk of carbon lock-in and the risk of non-permanent storage.

Article 6.4 requires activities to avoid lock-in of emissions, technologies, or carbon-intensive practices. On the one hand, CCS at point sources poses a risk to prolong reliance on fossil fuels, including residual emissions, since respective technologies are not expected to capture 100% of emissions. On the other hand, it can serve as an important bridging technology and is acknowledged as a method required to reach the PA´s long-term temperature target. There is no clear approach yet how to distinguish between an activity leading to lock-in or to meaningfully contribute to mitigation targets (see detailed discussion in section 4.1.1). Energy efficiency, cost efficiency, and activities contribution to LT-LEDS can inform this important debate.

Permanence of storage, be it in reservoirs or in products, is vital for industrial carbon management activities to achieve real and credible mitigation outcomes across NDC periods as required by Article 6. CCS+ methodologies, tools and modules effectively quantify potential re-emissions, and both the VCS Non-Permanence Risk Tool and the CDM modalities and procedures for CCS provide approaches to deal with related uncertainties. However, criteria for long-term liability and MRV obligations as well as eligible approaches to deal with storage uncertainty remain to be defined by the A6.4SB. These criteria will guide implementing Parties in formulating solutions in line with local regulations. The CCS+ Initiative shall further engage with the A6.4SB to ensure high-integrity approaches are pushed, thereby increasing its credibility and helping to achieve a high standard for industrial carbon management+ activities in international carbon markets.

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Annex I: CCS+ Workplan

Scope of modules (covered issues: overarching, capture, transport, storage and utilisation) developed under the CCS+ Initiative

Overarching Modules

Module 1.1: 'Guidance and Principles' document

Module 1.2: CCS+ methodology

Module 1.3: CCUS+ methodology

Tool for differentiation between emission reductions and removals in carbon capture project activities

Tool for baseline quantification and allocation of project emissions in carbon capture project activities

Capture Modules

Module 2.1: Carbon capture from air

Module 2.2: Carbon capture from power and heat

Module 2.3: Carbon capture from industrial processes

Module 2.4: Carbon capture from oil and gas production and processing

Module 2.5: Carbon capture from bioenergy

Transport Modules (consolidated)

Module 3.1: Transport via pipeline, ships/barges, road/trucks, rail

Storage and Utilisation Modules

Module 4.1: Geologic carbon storage (storage in aquifers and depleted oil and gas fields)

Module 4.2: Conversion of CO_2 => $CaCO_3$ for "construction" additives

Module 4.3: Mineralisation of CO_2 injected into the concrete production for ready mix and precast

Module 4.4: Injection of CO_2 into the baking process to produce ceramics

Module 4.5: Admixture to cement, reducing clinker usage

Module 4.6: CO_2 storage via geological mineralisation in igneous rock formations

Module 4.7: CO_2 utilisation and storage in medium-lifetime products, e.g. plastics

Module 4.8: CO_2 utilisation and storage in short-lifetime products, e.g. e-fuels

Compliance Guidances

Compliance Guidance 5.1: EU guide

Compliance Guidance 5.2: Article 6 guide

Compliance Guidance 5.3: US guide

Compliance Guidance 5.4: Guide to domestic regulations (including accounting) for three selected countries

Compliance Guidance 5.5: VCM guide

Compliance Guidance 5.6: Gulf region guide

Compliance Guidance 5.6: Guide to three cross-border use cases

Annex II: Article 6 requirements as formulated in Annexes to Decisions 2 and 3/CMA.3

Table A 2 Article 6 requirements for additionality, baseline setting and MRV as formulated in Annexes to Decisions 2 and 3/CMA.3

Additionality		
Article 6.2	Decision 2/CMA.3, annex, paragraph 1	ITMOs from a cooperative approach are (a) real, verified and additional
Article 6.4	Decision 3/CMA.3, annex, paragraphs 31 and 38	31. The activity shall be designed to achieve mitigation of GHG emissions that is additional, including reducing emissions, increasing removals and mitigation co-benefits of adaptation actions and/or economic diversification plans (hereinafter collectively referred to as emission reductions), and not lead to an increase in global emissions; [...]
		38. Each mechanism methodology shall specify the approach to demonstrating the additionality of the activity. Additionality shall be demonstrated using a robust assessment that shows the activity would not have occurred in the absence of the incentives from the mechanism, taking into account all relevant national policies, including legislation, and representing mitigation that exceeds any mitigation that is required by law or regulation, and taking a conservative approach that avoids locking in levels of emissions, technologies or carbon-intensive practices incompatible with paragraph 33 above.
Baseline setting		
Article 6.2	Decision 2/CMA.3, Annex, paragraphs 18, 22	18. [...] The initial report shall contain comprehensive information to:[...](h) Describe how each cooperative approach ensures environmental integrity, including: [...] (ii) Through robust, transparent governance and the quality of mitigation outcomes, including through conservative reference levels, baselines set in a conservative way and below 'business as usual' emission projections (including by taking into account all existing policies and addressing uncertainties in quantification and potential leakage);" (the same wording is taken up again in paragraph 22)
Article 6.4	Decision 3/CMA.3, Annex, paragraph 33	"Mechanism methodologies shall encourage ambition over time; encourage broad participation; be real, transparent, conservative, credible, below 'business as usual'; avoid leakage, where applicable; recognize suppressed demand; align to the long-term temperature goals of the Paris Agreement, contribute to the equitable sharing of mitigation benefits between Parties; and, in respect of each participating Party, contribute to reducing emission levels in the host Party; and align with its NDC, if applicable, its long-term low GHG emission development strategy if it has submitted one and the long-term goals of the Paris Agreement."

Decision 3/CMA.3, Annex, paragraph 34	"Mechanism methodologies shall include assumptions, parameters, data sources and key factors and take into account uncertainty, leakage, policies and measures, and relevant circumstances including national regional or local, social, economic, environmental and technological circumstances and address reversals where applicable."
Decision 3/CMA.3, Annex, paragraph 35	"35. Mechanism methodologies may be developed by activity participants, host Parties, stakeholders or the Supervisory Body. Mechanism shall be approved by the Supervisory Body where they meet the requirements of these rules, modalities and procedures and the requirements established by the Supervisory Body."
Decision 3/CMA.3, Annex, paragraph 36	"36. Each mechanism methodology shall require the application of one of the approach(es) below to setting the baseline, while taking into account any guidance by the Supervisory Body, and with justification for the appropriateness of the choices, including information on how the proposed baseline approach is consistent with paragraphs 33 and 35 above and recognizing that a host Party may determine a more ambitious level at its discretion: A performance-based approach, taking into account: Best available technologies that represent an economically feasible and environmentally sound course of action, where appropriate; An ambitious benchmark approach where the baseline is set at least at the average emission level of the best performing comparable activities providing similar outputs and services in a defined scope in similar social, economic, environmental and technological circumstances; An approach based on existing actual or historical emissions, adjusted downwards to ensure alignment with paragraph 33 above."
Decision 3/CMA.3, Annex, paragraph 38	"38. Each mechanism methodology shall specify the approach to demonstrating the additionality of the activity. Additionality shall be demonstrated using a robust assessment that shows the activity would not have occurred in the absence of the incentives from the mechanism, taking into account all relevant national policies, including legislation, and representing mitigation that exceeds any mitigation that is required by law or regulation, and taking a conservative approach that avoids locking in levels of emissions, technologies or carbon-intensive practices incompatible with paragraph 33 above."

MVR

Article 6.2	Decision 2/CMA.3, annex, paragraph 1	"1. Internationally transferred mitigation outcomes (ITMOs) from a cooperative approach are: (a) Real, verified and additional; [...]" (c) Measured in metric tonnes of carbon dioxide equivalent (t CO2 eq) in accordance with the methodologies and metrics assessed by the Intergovernmental Panel on Climate Change and adopted by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA)7[...]
	Decision 2/CMA.3, annex, paragraph 18	18 f). For a first or first updated NDC consisting of policies and measures that is not quantified, quantify the emission level resulting from the policies and measures that are relevant to the implementation of the cooperative approach. (i) Describe how each cooperative approach will: (i) Minimize and, where possible, avoid negative environmental, economic and social impacts;
	Decision 2/CMA.3, annex, paragraph 22	22. Each participating Party shall also include, as an annex to its biennial transparency reports [...], the following information on how each cooperative approach in which it participates: (b) Ensures environmental integrity, including: [...] (ii) Through robust, transparent governance and the quality of mitigation outcomes, including [...] addressing uncertainties in quantification (iii) [...] when reversals of emission removals occur, ensuring that these are addressed in full; [...] (f) Minimizes and if possible avoid negative environmental, economic and social impacts."
Article 6.4	Decision 3/CMA.3, Annex, paragraph 24	The Supervisory Body shall, in accordance with relevant decisions of the CMA: (a) Establish the requirements and processes necessary to operate the mechanism, relating to, inter alia: [...](xi) The development of tools and approaches to assess and report information about how each activity is fostering sustainable development, [...]
	Decision 3/CMA.3, Annex, paragraph 32	The activity shall apply a mechanism methodology that has been developed in accordance with chapter V.B below (Methodologies) and approved by the Supervisory Body following its technical assessment, in order to: [...] (c) Ensure accurate monitoring of emission reductions.

	Decision 3/CMA.3, Annex, paragraph 50	The activity participants shall monitor emission reductions achieved by the activity during each monitoring period, in accordance with the relevant requirements adopted by the Supervisory Body. The activity participants shall also monitor potential reversals over a period to be decided by the Supervisory Body.
	Decision 3/CMA.3, Annex, paragraph 51	A designated operational entity shall independently review and determine the implementation of, and the emission reductions achieved by, the Article 6, paragraph 4, activity during the monitoring period (hereinafter referred to as verification) against the requirements set out in these rules, modalities and procedures, further relevant decisions of the CMA and relevant requirements adopted by the Supervisory Body, and provide written assurance of the verified emission reductions (hereinafter referred to as certification).
Enhanced transparency framework	Paragraph 3	The guiding principles of these modalities, procedures, and guidelines (MPGs) are: [...] (d) Promoting transparency, accuracy, completeness, consistency and comparability; [...]
	Paragraph 31	Each Party shall use notation keys where numerical data are not available when completing common reporting tables, indicating the reasons why emissions from sources and removals by sinks and associated data for specific sectors, categories and subcategories or gases are not reported. These notation keys include: [...] (e) "C" (confidential) for emissions by sources and removals by sinks of GHGs where the reporting would involve the disclosure of confidential information [...]
	Paragraph 37	Each Party shall use the 100-year time-horizon global warming potential (GWP) values from the IPCC Fifth Assessment Report, or 100-year time-horizon GWP values from a subsequent IPCC assessment report as agreed upon by the CMA.

Annex III: Additional information on the II-AMT

Figure A1: Methodological steps of II-AMT TOOL01 on additionality testing. Source: II-AMT (2022c)

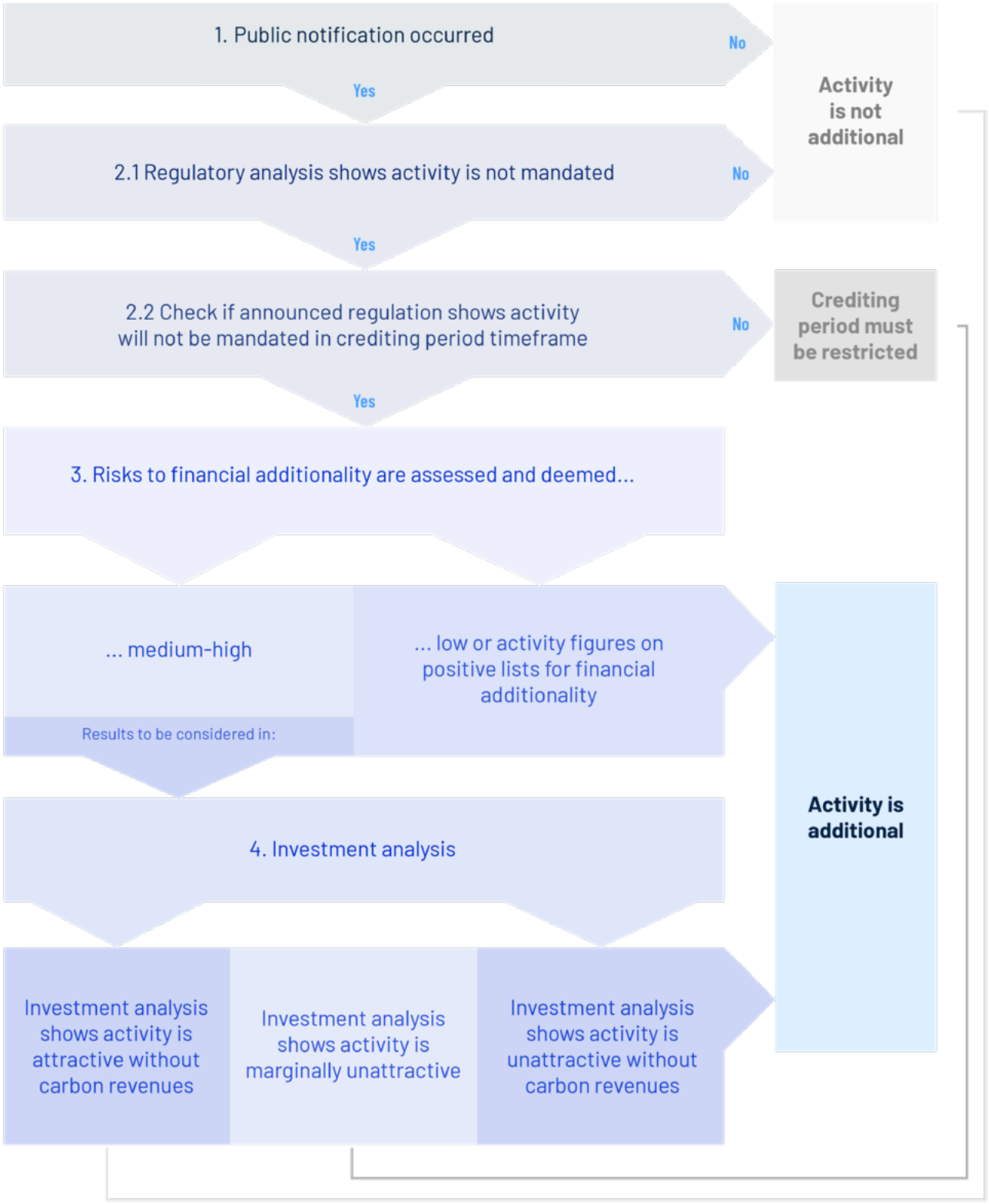

Figure A2: Methodological steps of II-AMT TOOL02 on baseline setting. Source: II-AMT (2022b)(2022c)

Figure A2: Methodological steps of II-AMT TOOL02 on baseline setting. Source: II-AMT (2022b)(2022c)

Annex IV: Key terms and concepts

This section introduces key terms and concepts of the CCS+ methodology frameworks.

Mitigation of climate change

Mitigation of climate change is defined as "a human intervention to reduce emissions or enhance the sinks of greenhouse gases" (Intergovernmental Panel on Climate Change [IPCC]. 2018). Mitigation thus comprises human activities that either result in a reduction of GHG emissions (relative to the baseline scenario)[20] or a removal of GHG from the atmosphere into permanent storage.[21]

Carbon capture and storage (CCS)

Carbon(dioxide)capture and storage is defined as "a process in which a relatively pure stream of carbon dioxide(CO_2) from industrial and energy-related sources is separated (captured), conditioned, compressed and transported to a storage location for long-term isolation from the atmosphere" (IPCC, 2018). For the CCS+ Initiative, CCS includes carbon capture directly from the atmosphere and its storage for long-term isolation from the atmosphere.

Carbon capture and utilisation (CCU)

CCU is defined as "process in which CO_2 is captured and then used to produce a new product. If the CO_2 is stored in a product for a climate-relevant time horizon, this is referred to as carbon dioxide capture, utilisation and storage (CCUS)." (IPCC, 2018).

CCU in short-lived products relates to when CO_2 is captured, irrespective of the source, and utilised in short-lived products before going back into the atmosphere. This replaces fossil-based CO_2, and such activities could potentially achieve GHG emission reductions. A rigorous LCA must be applied to ensure that the CCU application is comprehensively assessed.

Carbon capture utilization and storage (CCUS)

Carbon capture utilization and storage (CCUS) includes carbon captured from the atmosphere and its storage in long-lived products and materials, potentially leading to either emissions reduction or carbon removal. Durable product storage refers to processes in which captured CO_2, based on CO_2 from a fossil or geogenic (e.g. cement) carbon source, is injected into a product or material (e.g. CO_2 in concrete or cement) and the resulting product is long-lived, thereby representing durable storage and achieving a reduction in GHG emissions. When CCUS utilises CO_2 captured from the atmosphere or biogenic emissions and is stored in long-lived products, this can result in CDR.

Net greenhouse gas (GHG) reductions and net GHG removals

CCS can result in either a net reduction in GHG emissions, when the CO_2 originated from a fossil fuel or cement (i.e. geogenic) source is captured and durably stored, or in net GHG removals, when CO_2 is captured from a biogenic source or from the air and durably stored (e.g. BECCS and DACS).

In order to determine the overall mitigation outcome of a project (i.e. its net emission reduction or net removal result), all GHG flows (i.e. emissions and removals) caused by the operation of the project activity have to be taken into consideration in the life cycle analysis (LCA) (i.e. determination of project emissions).

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[20] Such emission reductions can arise from preventing emissions by capturing CO_2 at the source (e.g. a cement or powerplant) and storing it underground.

[21] For a detailed explanation of the terminology of 'mitigation' in relation to emission reductions and CDR (or negative emissions) in international environmental law, refer to Honegger et al. (2021).

Durable storage

Based on relevant IPCC definitions, durable storage can be synonymous with permanent storage and storage over a climate-relevant time horizon. The terms 'durable'/'durability' are used interchangeably with permanent/ permanence.[22]

For both CCS+ and CCUS+ projects, the Initiative considers that durable storage is a concept which is still evolving as there are yet no universally agreed-upon time-periods that would determine a particular percentage-probability of permanence over a specific time-window to be permanent or not.

The closure of the geological storage site should be such that it promotes best practices and prevents any reversal post project period. The Geologic Carbon Storage Non-Permanence Risk Tool, currently being developed by Verra, refers to the already existing standards for closure, such as the International Organization for Standardization. It also establishes requirements for post-injection monitoring.

[22] The terms 'permanent'/'permanence' is used consistently on the VCM. Organisations such as the International Carbon Reduction and Offset Alliance (ICROA) require GHG benefits to be permanent, and where there are risks associated with GHG benefits, they shall be evaluated and addressed appropriately. See the ICROA 'Standards Endorsement Review Criteria' for endorsement under the ICROA 'Code of Best Practice'.

CCS+ initiative

Support the CCS+ Initiative and contribute to advancing key climate technologies

info@ccsplus.org ccsplus.org ccsplus-initiative

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