[DRAFT]

GMA+RMI Book and Claim Framework

Note: A public comment period for the draft framework is open from August 27th - September 19th, 2025. Please submit any feedback to the form linked here: Feedback Form

Introduction

Cement and concrete are responsible for approximately 8% of global greenhouse gas emissions, yet many of the technologies needed to decarbonize the sector remain in the early stages of deployment. Accelerating their adoption will require strong demand signals and new mechanisms to channel investment beyond traditional procurement. A book and claim system addresses these needs by enabling a broader set of stakeholders to support the production of low-carbon materials, while ensuring through rigorous tracking and verification that investments correspond to reported emissions reductions. By mobilizing demand, book and claim can serve as a critical catalyst for sector-wide decarbonization.

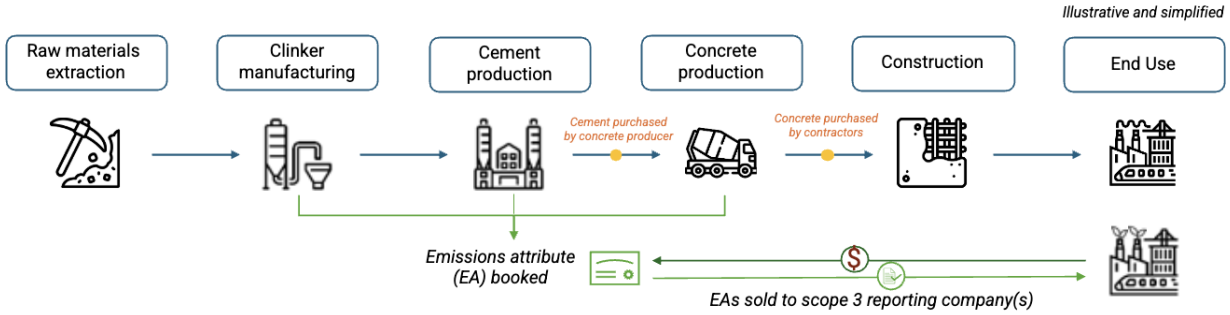
To advance this opportunity, in December 2024, the Center for Green Market Activation ("GMA") and RMI (founded as Rocky Mountain Institute) gathered a group of stakeholders across the cement and concrete value chain to inform the development of the nascent book and claim market for the industry. GMA and RMI, the "Organizers," worked with the participants of the Working Group to outline the core principles and design components for how book and claim should operate. The intent of this framework is to inform book and claim transactions, environmental attribute certificate (EAC) issuance, and digital registry tracking rules.

What is "book and claim"?

Book and claim is a chain of custody model that allows environmental attributes (such as carbon intensity) to be decoupled from a physical product (i.e. good or service) that carries those attributes. Through this model, a certificate representing the product's environmental attributes is issued and then sold and transferred to a buyer without direct access to the lower-carbon product, enabling them to financially support decarbonization efforts and claim the associated environmental benefits. For book and claim to function effectively at scale, strong credibility and sustainability guardrails are essential. Inaccurate

measurement as well as lack of transparency or standardization can limit scalability or put the whole market at risk.

Figure 1: Illustrative book and claim model in cement and concrete



Source: GMA & RMI

For producers, book and claim offers a way to expand market reach without the need to physically ship products, which is particularly valuable in sectors like cement and concrete, where market activity is mostly regional due to high transport costs. By decoupling environmental attributes from the physical product, producers can monetize low-carbon production even in markets where customers are not yet willing or able to pay a premium. This creates new revenue streams, and enables long-term offtake agreements, that can help de-risk investments in low-carbon technologies such as alternative binders and carbon capture and storage (CCS).

Buyers, on the other hand, engage in book and claim to meet Scope 3 emissions reduction targets when low-carbon products are not locally available. It enables buyers to overcome supply chain limitations, aggregate procurement across projects or regions, and catalyze the market for future growth.

Book and claim is well established in other sectors, allowing work in the concrete value chain to build upon existing best practices. The most notable examples of book and claim are in the renewable energy and sustainable aviation fuel (SAF) markets. In renewable energy, renewable energy certificates (RECs) or guarantees of origins (GOs) are issued and sold to corporate buyers seeking to reduce their Scope 2 emissions who may not have access to renewable sources on the grid. In the aviation market, corporate travelers and air

freight shippers use book and claim to fund sustainable aviation fuel (SAF) and claim the benefits toward their climate targets. Since these buyers typically are unable to directly procure from fuel producers, book and claim is among the few mechanisms for corporate customers to invest in and reduce their aviation emissions, short of reducing flying.

How is book and claim different from mass balance?

Mass balance and book and claim are both chain of custody models used to allocate environmental benefits. However, they manage the relationship between physical products and environmental attributes differently. While book and claim enables the separation of environmental attributes from the physical product, mass balance maintains a physical linkage but defines how environmental attributes can be assigned across multiple outputs. More information about mass balance is available in Appendix C.

How does this document interact with the broader ecosystem?

This document aims to generate a representative, sector-specific perspective on how book and claim should be applied in the cement and concrete industry. It lays out core principles and foundational guidance that reflect input from a diverse set of stakeholders. With shared rules and expectations, market actors can engage in this emerging space with greater confidence in the credibility of certificates, the bankability of certificate offtake agreements, and, ultimately, in the contribution these instruments make to decarbonization goals.

This work does not exist in a vacuum. It was developed with an explicit goal of aligning with and contributing to broader ecosystem efforts. During the writing of this document, the Science Based Target Initiative (SBTi) and Greenhouse Gas Protocol (GHGP) are both undergoing revisions to their scope 3 and corporate reporting guidance, including new approaches to the treatment of market-based mechanisms. While those discussions are ongoing and final guidance is not expected until 2027–2028, this process attempts to reflect the latest developments and anticipated direction of guidance from those bodies.

Concurrently, GMA is a co-organizer of the Advanced and Indirect Mitigation Platform (“AIM Platform”) alongside Gold Standard and C2ES. At the time of drafting, The AIM Platform was also preparing to publish the AIM Platform Standard and Guidance to bring cross-sectoral consistency and alignment to Scope 3 value chain interventions, including those using book and claim. The cement and concrete framework in this document will be complementary to the AIM standard, providing more detailed, sector-specific guardrails and components.

This framework is an important starting place from which the Organizers and industry stakeholders will build from to design subsequent components of a robust book and claim ecosystem. This includes the development of a digital registry that can transparently track the issuance, transfer, and retirement of certificates. Lastly, individual companies and buyers' alliances will surely go beyond this framework to define their specific attribute purchasing criteria in a way that aligns with their sustainability and business objectives. This framework sets the foundation for future transactions but should not constrain buyers from layering in their own purchasing criteria, so long as those do not contradict the foundational guidance and requirements contained in the document.

What are the guiding design principles?

At the beginning of the design process, the Working Group agreed that an effective book and claim system should be:

- Credible from an environmental standpoint, driving high-integrity atmospheric benefits
- Straightforward and usable to facilitate scalable market transactions for low-carbon cement and/or concrete attributes
- Compatible with existing regulatory, non-regulatory frameworks, and best practices
- Comprehensive across a range of decarbonization solutions to ensure the book and claim system can support multiple viable pathways to low-carbon cement and concrete
- Designed to serve diverse geographic regions and markets, minimizing fragmentation and promoting geographic equity in access to decarbonization opportunities
- Designed for longevity and adaptability for future low-carbon technologies

Who contributed to this document?

The Working Group comprised of the Organizers, GMA and RMI, alongside approximately 30 organizations including asset owners, developers, construction companies, cement and concrete producers, non-governmental organizations, and others. The Organizers and Working Group participants held monthly meetings with additional sub-topic discussions to inform the development of this framework.

The goal of the Working Group is to achieve consensus on all key system design criteria contained in this framework.

DRAFT Framework Contents

How to use this document

The terms "shall" or "must" are used throughout this framework to indicate a requirement for book and claim certificate issuance, transactions, and/or tracking. The term "should" indicates a recommendation, but not a requirement, and "may" indicates an option that is permitted or allowed. This document in its current form should not be used as a normative standard, nor should it be used as the basis for an audit. Rather, this document should be considered a broad set of principles and best practices for establishing a book and claim system in the cement and concrete sector.

This document is organized as a series of elements that together constitute the book and claim framework for the concrete value chain. Each element is accompanied by a rationale, intended to provide helpful context, including justification and considerations.

Disclaimer

Please note that this draft document assumes an advanced understanding of greenhouse gas accounting and familiarity with standards such as Greenhouse Gas Protocol (GHGP), Science-based Targets initiative (SBTi), and Advanced and Indirect Mitigation (AIM) Platform, and product category rules (PCRs) for cement and concrete, among others. Appendix D includes additional resources related to these topics.

1. *Book and claim functional units*

This section outlines the proposed functional units for generating book and claim EACs across the cement and concrete value chain – clinker, cement, and concrete – and explains why multiple entry points will help enable supplier participation and flexibility amid market and policy uncertainty.

1.1 EACs may be generated at three stages of the value chain:

- Clinker, defined as: the intermediate product and primary ingredient to make a binder for traditional hydraulic cement, typically produced by heating limestone to ~1450º C
- Cement, defined as: Hydraulic cement - cement that sets and hardens by chemical reaction with water (hydration) and is capable of doing so under water. Cements conforming to ASTM C150, ASTM C595, ASTM C1157, AC529, or EN 197-1
- Concrete, defined as: a composite material that consists of a mixture of hydraulic cement, aggregates, and water, with or without admixtures, fibers, or other cementitious materials to be used as the final construction product

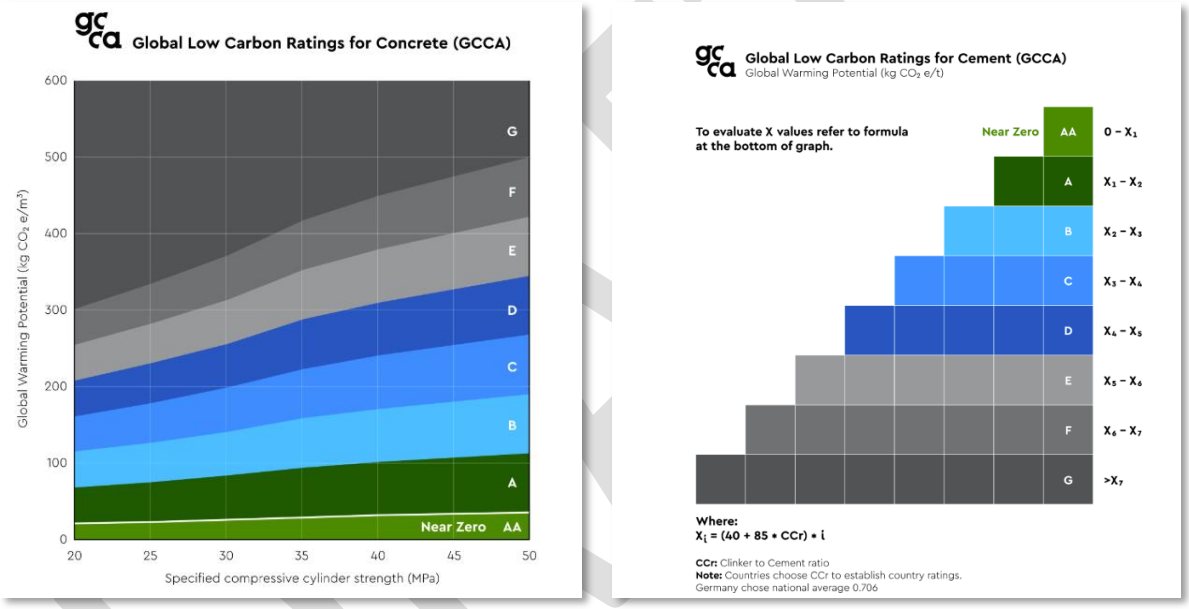
Rationale (1.1):

- *Decarbonizing the cement and concrete industry includes interventions that occur at various steps in the value chain – each with their own primary stakeholder. Multiple functional units are included to enable these different pathways for supplier involvement and scaling of innovative solution.*
- *Revised standards from bodies such as, but not limited to, GHGP and SBTi, are still in development and may impact the future viability and feasibility of certain functional units. As such, designing for multiple units provides flexibility and dynamism amid potential uncertainty.*
- *Availability of decarbonized products in a local market may vary at different levels of the value chain.*
- *Supplementary cementitious materials (SCMs) are not included as their own category but, instead, may be reflected in a cement or concrete EAC. SCMs traditionally must be mixed into a cement or concrete blend and cannot function as the complete cementitious material alone. As a result, SCMs should be considered within a cement or concrete functional unit as to not overstate the impact potential of the products.*

2. Eligibility of EAC creation

This section establishes the criteria for determining which products are eligible to generate EACs, with a focus on ensuring environmental integrity, credibility, and real-world impact. It emphasizes the importance of transparency and alignment with broader decarbonization goals across the value chain.

2.1 The EAC-generating product must have a minimum rating of C as defined by the GCCA low-carbon ratings for cement and concrete. The C rating is a floor for participation. Buyers or other stakeholders may also provide additional eligibility criteria or emissions reduction requirements for specific transactions.



Source: GCCA

Rationale (2.1):

- *A rating of at least 'C' under the GCCA low-carbon product scale ensures that only products below typical market emissions intensities are eligible to generate EACs. Selection of 'C' provides additional buffer from traditional products as compared to 'D', serving as a more conservative floor to enable meaningful impact.*
- *This threshold is designed to exclude marginal or business-as-usual improvements, ensuring that claimed emissions reductions represent additional decarbonization beyond current market norms, while maintaining flexibility for a variety of interventions critical to the transition.*

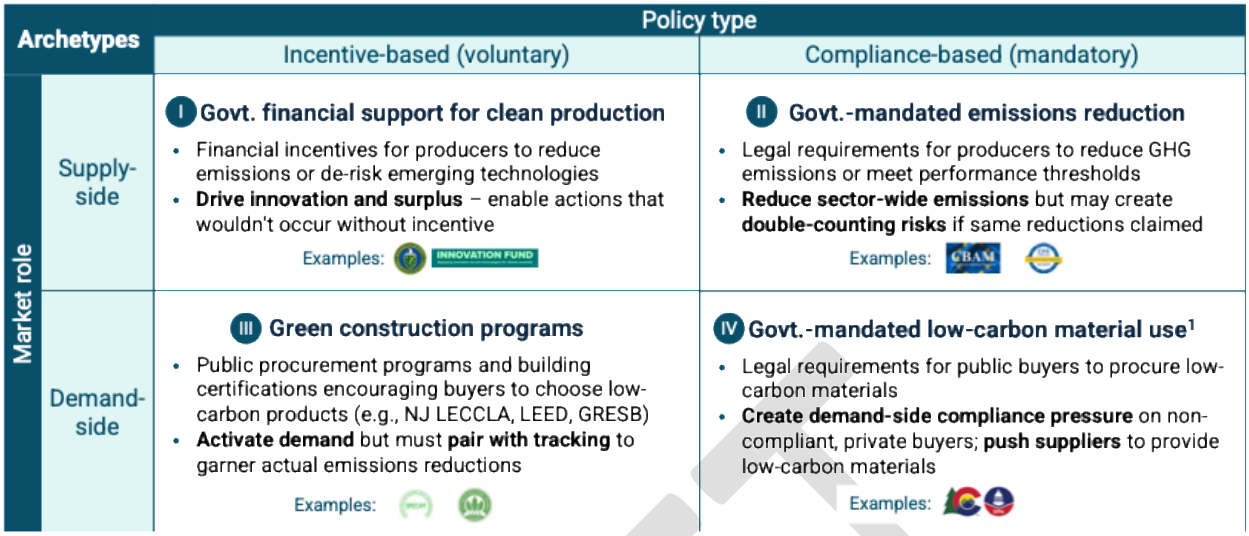
2.2 EAC-generating products and the associated environmental attributes must represent regulatory surplus; they must not be mandated by emissions regulations or be used to meet regulatory compliance for any related market stakeholders, i.e., they must create an additional atmospheric benefit beyond regulation.

- If a law requires achievement of a specific level of emission reductions or emissions intensity, then EACs generated must go beyond those levels.
- The presence of demand-side regulations, policies and codes regulating the downstream buyers, users, or owners of buildings and infrastructure does not preclude eligibility for EAC issuance, but seller must ensure no double-counting of emissions reductions and impacts between the physical reporting company and EAC purchaser (see section 8 for more details).

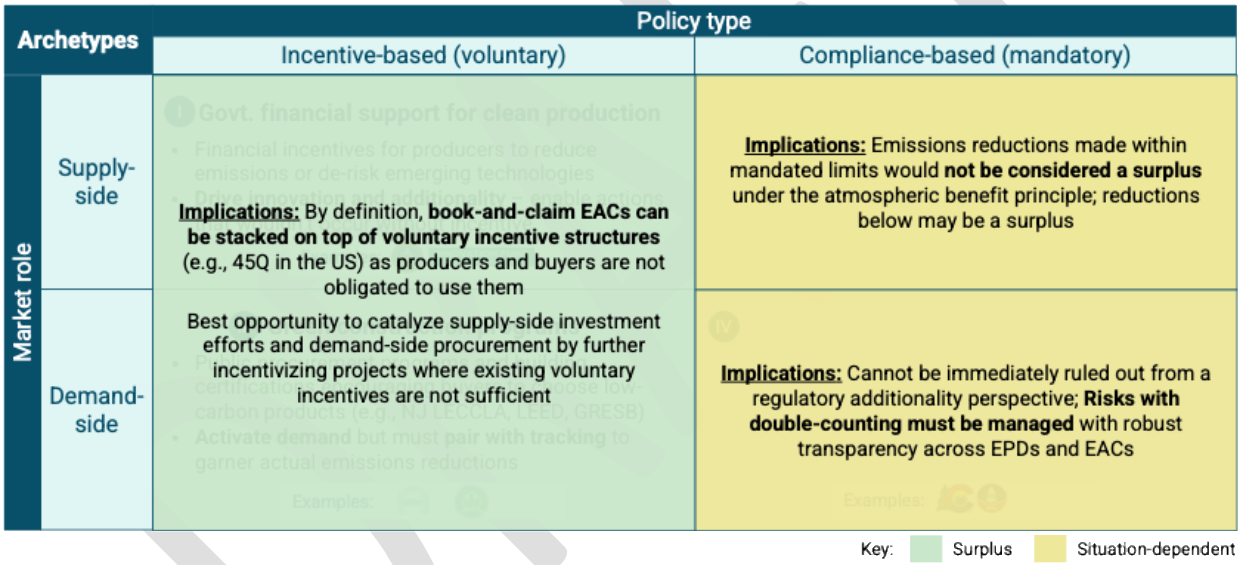
Rationale (2.2):

- *Ensuring regulatory surplus is considered best practice across the voluntary carbon market and beyond, regardless of whether the intervention is within or outside of value chain, and is applied to other book and claim systems.*
- *Though not definitive, ongoing discussions indicate that regulatory surplus will likely be a requirement of the forthcoming GHGP and SBTi revisions for scope 3 market instruments such as book and claim.*
- *Demand-side regulations are often designed differently than those for production and include a number of pathways for determining compliance; further guidance will be needed to define details of regulatory surplus for given regulation and policies.*

2.3 Utilizing incentives, including but not limited to grants and tax subsidies, for products or the production facilities they come from does not conflict with regulatory surplus.



Source: GMA and RMI



Source: GMA and RMI

Rationale (2.3):

- *Suppliers are not obligated to take action in the presence of incentives.*
- *Approaches to determining "financial additionality" are heavily disputed, requiring alignment of pivotal assumptions that make consistency across products and projects infeasible. Furthermore, proving "financial additionality" is not a requirement under any other comparable system (e.g., SAF).*

2.4 The book and claim certificate must transparently disclose all regulatory programs, requirements and incentives associated with the manufacturing of the EAC-

generating products. If demand-side policies are known to the producer, they should be listed.

Rationale (2.4):

- *Visibility provides buyers and the market at-large assurance in the credibility of the system and reduces risk of greenwashing.*
- *Enables market stakeholders to adapt to changing book and claim landscape and buyer preferences.*

3. Measurement methodology

This section defines the methodologies to calculate the emissions intensity associated with EACs at each functional unit level, leveraging alignment with established PCRs as the foundation for consistent measurement.

3.1 Clinker: The emissions intensity of the clinker EAC must be calculated consistent with the applicable cement PCR guidance, conforming to ISO 14025 and/or BS EN 15804:2012+A2:2019, using a 100% clinker ratio.[1] If a specific clinker PCR exists, this may be used.[2]

Rationale (3.1):

- *Aligning with existing PCR requirements reduces verification and validation requirements on supplier and creates consistency in physical, direct offtake practices within a region.*
- *While clinker-specific PCRs are currently unavailable, it's important to maximize alignment with existing frameworks like cement PCRs to ensure consistency and comparability across the cement value chain.*
- *Leveraging established methodologies supports credible and transparent GHG accounting for clinker within the broader scope of cement-related emissions.*

[1] Applicable cement PCRs include: ISO 14025, ISO 21930:2017, EN 16908, EN 16757:2017, EN 15804+A2, Smart EPD® Part B PCR for Cements for Construction 1000-010, v4.0, PCR for Slag Cement v2.0, or Part B PCR for Supplementary Cementitious Materials Standard 1000-002

[2] Mass balance approaches are not currently valid under Smart EPD® Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.2. If a chain of custody model is used in the measurement approach, the system boundary and attribution approach must be disclosed.

3.2 Cement and Concrete: the emissions intensity of the cement EAC must be calculated consistent with the applicable PCR of the production jurisdiction, conforming to ISO 14025 and/or BS EN 15804:2012+A2:2019, and demonstrated with a third-party verified product-specific Type III EPD.[2]

- If cement product category rules are not defined in the production jurisdiction, an LCA aligning with the system boundaries and methodologies of EN 16908:2022+A1 or Smart EPD® Part B PCR for Cements for Construction 1000-010, v4.0.
- If concrete product category rules are not defined in the production jurisdiction an LCA aligning with the system boundaries and methodologies of EN 16757:2022 or NSF 1112-19 PCR for Concrete v2.3.

Rationale (3.2):

- *Aligning with existing PCRs creates consistency with physical, direct offtake practices within a region which mitigates discrepancies between what is claimed via the EAC and the physical product, supporting reliable accounting and fostering trust among buyers and supply chain participants.*

4. Product certification

Product certification provides assurance to the buyers and broader market that the EAC represents an accurate impact on the environment. Given the adoption and increasing integration of PCRs in the cement and concrete value chain, this framework primarily relies on existing third-party verified EPDs to provide product certification.

4.1 A product-specific, third-party verified Type III EPD developed in accordance with the appropriate regional standard must be generated and recorded for the associated physical product to issue an EAC.

Rationale (4.1):

- *Product definitions, third-party verified EPDs, and strict registry requirements collectively ensure system credibility.*
- *The EPD contains much of the relevant information for determining issuance eligibility.*
- *Third-party verification provides assurance that the emissions intensity associated with an EAC is accurate, consistent, and based on credible, independently reviewed data which may minimize risk of errors, inconsistencies, or intentional misreporting, all of which may undermine trust in the system and reduce the environmental integrity of EACs.*

5. EAC issuance and data tracking

EAC issuance refers to the timing, conditions, and way an EAC may be generated before it is transferred to a buyer. The guardrails outlined in this section aim to increase confidence in the realized impact of the low carbon product. Accurate data tracking also serves to demonstrate certificate ownership and prevent erroneous double counting, including through double issuance.

5.1 An EAC must only be issued after the physical product has either been deployed for its final intended use or shipped to the next step in the supply chain, which indicates imminent use.

Some examples of documentation that may be used to prove imminent use include, but are not limited to bill of lading, delivery ticket, invoice, or declaration of performance. Please see Appendix A for further details.

Production alone does not constitute eligibility for EAC issuance.

Rationale (5.1):

- *Allowing issuance only when the product is deployed or is to be imminently utilized ensures that EACs correspond to real-world consumption and decarbonization activity.*
- *In many cases, proving utilization of a clinker, cement, or concrete product may be difficult and out of control of the upstream supplier, therefore shipment of a product to the next step in the supply chain displays a sufficiently high likelihood of imminent use.*
- *Production alone does not provide sufficient proof that the material is likely to be used and could create inconsistency in the date of impact and vintage.*

5.2 EACs must be tracked on a digital registry and must not be issued simultaneously on multiple registries.

Rationale (5.2):

- *A digital registry provides a transparent, auditable record of EAC issuance, transfer and retirement, which ensures attributes are accurately documented and consistently tracked.*
- *Registries also minimize the risk of double counting and provide transparency to system participants and stakeholders.*

5.3 Digital registries should be managed and operated without a conflict of interest and should include a public facing retirement statement.

Rationale (5.3):

- *Third-party managed registries with public-facing retirement statements provide visibility into how, when, and by whom EACs are issued, transferred, and retired, building transparency and trust among stakeholders that the claims reflect actual decarbonization.*
- *Independently managed registries reduce the risk that organizations with financial or reputational stakes in certificate issuance or use could unduly influence system operations.*
    - *Separating registry oversight from producers, buyers, or system administrators enhances the impartiality of the process and strengthens market credibility.*
- *Public retirement statements and third-party oversight work together to ensure that environmental attributes are accurately tracked, appropriately retired, and not double counted, which reinforces the overall environmental integrity of the system.*

5.4 The EAC and digital registry must include the following data, at minimum:

- Date of issuance
- Producer information
- Production location
- Purchaser(s) information
- Distribution location
- Product information
    - Product type, defined by compressive strength, category, and/or components
    - Production location
    - Date of production
    - Decarbonization technology(s) and product(s)
    - Applicable regulations and incentives
- GHG information
    - Product emissions intensity (gCO2e per volume or mass of product)
    - Product EPD
    - Product verifier
    - GCCA Low-Carbon Rating label

- Baseline emissions intensity (if applicable)
- Source of baseline (if applicable)

Rationale (5.4):

- *Including detailed product, emissions, and transaction data within the EAC and digital registry ensures stakeholders have transparency, and consistent and standardized information.*
- *Capturing comprehensive information such as production dates, issuance dates, product verifiers, and claimant identities establishes a clear, auditable chain of custody for each EAC, which minimizes the risk of double counting*
- *Including applicable regulations and incentives also enables buyers to determine if an EAC sufficiently clears preferred regulatory surplus.*

6. EAC accounting

This section outlines high-level guidance on how EACs may be accounted and reported by the purchasing company. It emphasizes ensuring claims accurately reflect product and geographic factors while maintaining consistency and environmental integrity.

The purpose of this section is to indicate two paths for reporting and relevant guardrails to increase credibility. EACs should be accounted for in accordance with standards from organizations such as GHGP, SBTi, and the AIM Platform. Methods for accounting could include "direct substitution" or "enhanced substitution."

6.1 Direct substitution is an approach where the EAC purchaser may report in a separate ledger the impacts of the EAC by substituting the EAC emissions intensity for what was previously in their inventory for an equivalent product. For direct substitution, the EAC-generating product must closely match the inventory line item to minimize inherent product or geographical differences. An EAC must match with at least, but not limited to, the following criteria based on functional unit and product criteria.

Table 1: Direct substitution matching requirements

	Geography	Product type	Product performance
Clinker	Global	NA	NA
Cement	National or supranational (e.g., EU)	NA	Concrete produced with the EAC-generating cement must be demonstrably capable of achieving a

			maximum 28-day compressive strength equal to or greater than that of a representative concrete mix from the buyer's inventory, thereby demonstrating performance equivalent to the cement it is intended to replace.
Concrete	National or sub national (e.g., Northeast US)	Ready mix, precast, masonry	**Within-range method:** The maximum 28-day compressive strength of the physical product underlying the EAC must be within 5 MPa or 1,000 psi) of the physical product in the buyer's inventory for which substitution is claimed **Categorical method**: The physical product underlying the EAC and the product in the buyer's inventory must fall within the same 28-day compressive strength category, defined as follows: • <20 MPa or <2,500 psi • 20–25 MPa or 2,500–3,000 psi • 25–30 MPa or 3,000–4,000 psi • 30–35 MPa or 4,000–5,000 psi • 35–40 MPa or 5,000–6,000 psi • 40–50 MPa or 6,000–8,000 psi • >50 MPa or >8,000 psi

**NA indicates that no further matching is required*

Rationale (6.1):

- *Substituting an EAC for a product with different inherent geographic or performance characteristics could result in significant over or under representation of impacts.*
- *Geographic, performance and type are the largest variables of differentiation among products.*
- *Requiring strength matching, which serves as a proxy for functional equivalence, ensures environmental claims made through direct substitution reflect realistic and credible scenarios of material use and avoids crediting*

reductions for substitutions that would not have met performance needs in practice.

- *Clinker is globally traded, with relatively little emissions intensity variation across production facilities; as such, further product matching criteria is not required*
- *Cement varies significantly by region given the clinker ratio and presence of SCMs.*
- *Accounting methods that incorporate product characteristics (e.g., strength class, geography) and credible baselines help maintain trust in the environmental integrity of the system, ensuring EACs align with actual emissions reductions.*

6.2 Enhanced substitution is an approach whereby the emissions intensity of the EAC-generating product is compared to the most likely alternative that is displaced by the product in that market. The difference in the emissions intensity per volume or quantity of the product is used to adjust the emissions intensity of the inventory line item in a separate reporting ledger. This approach enables companies to procure EACs from a wider range of products, including when local availability of products is minimal or inventory data transparency is lacking.

For enhanced substitution, the EAC should be compared to a baseline in accordance with 7.3.

6.3 To be reported and claimed by the purchasing company, the EAC must be retired within the digital registry.

6.4 Only one organization may claim the Scope 1 and 2 emissions of the product. A registry may allow for multiple organizations across the value chain to co-claim the Scope 3 component of the EAC. In the case of multiple Scope 3 claimants, only one entity may claim the EAC at any individual layer of the value chain, which should be outlined within the registry rules. The allowable co-claimant layers should reflect the actual product value chain.

Rationale (6.4):

- *Restricting the Scope 1 and 2 claims to a single organization ensures that direct emissions reductions associated with product manufacturing are only counted once, preserving the integrity of emissions reporting.*

- *Permitting multiple organizations to co-claim some Scope 3 emissions claims is consistent with various downstream stakeholders reporting Scope 3 emissions associated with a given physical product, and provides an incentive for the physical recipient to utilize the product.*[3]

7. Accounting Baseline

A baseline represents the emission intensity of the product that was most likely to be displaced by EAC-generating product. The emissions intensity of the product generating the EAC is compared to the baseline, and the impact is reflected in the purchasing companies reporting or communications.

This section establishes principles and criteria for determining appropriate baselines to assess the emissions impact to be reflected in an EAC, in cases where a baseline is utilized. Baselines are necessary when utilizing the "enhanced substitution" accounting approach outlined in 6.1. For further details and guidance on accounting and reporting, EAC purchasers should follow the forthcoming standard revisions under GHGP and SBTi and publication of the AIM Platform Standard and Guidance.

The section provides guidance to ensure baselines are consistent, accurate, and aligned with standards enabling comparable and credible emissions accounting across diverse applications.

7.1 If using the "enhanced substitution" accounting approach, suppliers should select a baseline that represents the emission intensity of the activity that was most likely to be displaced by the activity that generated the EAC.

The enhanced substitution approach should be used when either (1) the inventory component or subcomponent product information lacks high resolution and detail on specific characteristics, or (2) an EAC-generating product that closely matches the characteristics of product in the company's inventory is not available.

Rationale (7.1):

- *For accounting using a "direct substitution" method, a baseline is not necessary, or, put differently, the baseline is what is currently in the reporting company's inventory.*

[3] Additional details around acceptable co-claiming is provided in the sections below.

- *The enhanced substitution approach is more likely to accurately reflect the benefit to the atmosphere of a product if there is not a high degree of matching between the reporting company's inventory products and the EAC-generating product. Use of this approach allows for greater flexibility and geographic applicability, while also internalizing exogenous market variability in emissions intensities.*

7.2 The baseline emissions intensity value must be calculated according to the same methodology and using the same boundary and scopes as the EAC value.

Rationale (7.2):

- *This ensures that impact is not misrepresented based on accounting differences.*

7.3 The characteristics of the baseline should match as closely as possible to the product associated with the EAC, based on facility or market available data. This includes

- Product type
  - Concrete example: ready-mixed, precast, masonry
  - Cement example: Type I/II, CEM I/II, Type 1L, CEM II/A or B-L, or Type 1T, CEM II/A or B-M OR if unable to match directly to a single product type, the product type(s) that are most likely to be replaced by the EAC (e.g., novel cement products)
- Compressive strength (28-day)
  - Concrete example: Within 1,000 psi (5 MPa) or using ranges <2,500 psi (<20 MPa), 2,500–3,000 psi (20–25 MPa), 3,000–4,000 psi (25–30 MPa), 4,000–5,000 psi (30–35 MPa), 5,000–6,000 psi (35–40 MPa), 6,000–8,000 psi (40–50 MPa), >8,000 psi (>50 MPa)
- Production region
  - Example: local, regional, national, (sub)continental, global

Rationale (7.3):

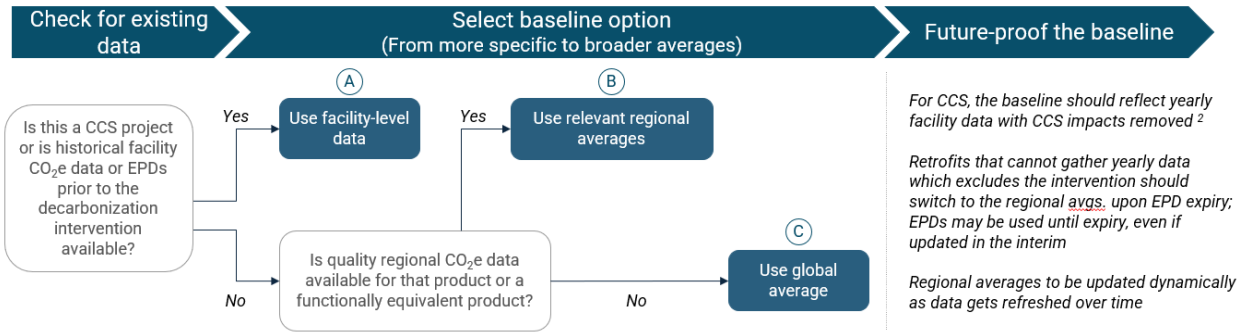
- *Aligning baselines to the highest available granularity, accounting for product type, performance, geography, and facility-specific operations, increases accuracy of the reported emissions reduction impact to the atmosphere rather than artifacts of data inconsistencies or broad assumptions.*

7.4 If the EAC-generating product is the result of a decarbonization activity on an existing plant (e.g., CCS installation, process change), the baseline must be the emissions intensity of the equivalent product prior to the decarbonization intervention. If the impacts of a decarbonization activity can be separated from the product emissions intensity on a recurring basis after the intervention, (e.g., CCS), the alternative product emissions intensity should be used as the baseline. For example, if a plant installs CCS, the baseline should be the product emissions intensity without considering the stored CO2 and accompanying emissions from capture and storage. If the intervention results in a fundamental change to the emissions accounting and can no longer determine the alternative emissions intensity without the impacts of the intervention, the baseline should be the EPD prior to the intervention until that EPD has expired. After expiry, the baseline should be the lesser of the prior EPD or the market average determined in 7.5.

Rationale (7.4):

- *Plant level data will be the most accurate displacement measurement.*
- *Once the EPD expires, additional retrofits or decarbonization activities may have occurred at the facility separate from the intervention, therefore the baseline must be readjusted to the plant emissions minus decarbonization impact, or market average, depending on data availability.*

7.5 If the product is manufactured at a new facility[4] that did not previously produce an equivalent product, the baseline shall be representative of the local market. If using a market average baseline, the baseline must be updated in line with new publication of the benchmark. Data year of average baseline should reflect the most recent publication and be within a data year approximately 5 years of EAC issuance.



Source: GMA and RMI

[4] The replacement of an existing kiln or addition of a new kiln constitutes a new facility for the purposes of this document

Rationale (7.5):

- *We expect to see gradual decarbonization of the industry from efficiency and at-cost reductions – if these are not reflected in the baseline, the reporting company may be over-stating the impact of their interventions.*
- *If an average is used for many years after the intervention or first issuance of EACs, the market may continue to decarbonize and use of this outdated average may inflate the reported emissions impact of a product.*

8. Physical product recipients

A book and claim chain of custody model separates the environmental characteristics from the physical product, which is used by the "physical (product) recipient". This section establishes safeguards to prevent double counting of emissions reductions between EAC purchasers and physical product recipients, emphasizing the need for clear contractual agreements and guidance on the appropriate use of emissions data.

8.1 Purchasers of EACs should contractually obligate the producers to include language to the physical recipients articulating the appropriate use of emissions intensities and product claims to avoid double counting. The EAC producer and EAC purchaser may contractually determine what parties retain the right to make other claims (such as about technology deployment), so long as no claim is counted by multiple parties within the same layer of the value chain.

Rationale (8.1):

- *Requiring contractual language ensures all parties understand the separation of environmental attributes and prevents inadvertent or intentional double counting across the value chain.*
- *Including clear requirements for the EAC purchaser and physical recipient in contracts enhances transparency regarding how emissions intensities, EPDs, or other product claims may be used by each party.*

8.2 The EAC producer may provide the physical recipient with either (1) a baseline value to use for inventory accounting that does not include the low carbon product, or (2) no emissions intensity value at all. The baseline value should be used by the physical recipient for their inventory accounting.

The baseline emissions intensity could be integrated into the EPD or displayed in an additional "cover page" that must move alongside the EPD to ensure that the low carbon emissions intensity is used for subsequent EPD generation or inventory

accounting. Option (2) could be achieved through either adjusting the EPD to showcase a "null" emissions intensity value or not provide an EPD altogether.[5]

Rationale (8.2):

- *EPDs are a critical tool for tracking emissions, and promoting transparency and comparability of environmental impacts, however existing PCRs do not account for the interaction between EPDs and book and claim systems creating unintentional pathways for double counting.*
- *In the absence of widespread PCR updates or standardized EPD adjustments, a cover page that suggests replacing the emissions on an EPD with a baseline or no emissions intensity for the physical product recipient is a short-to-medium term solution which promotes the further adoption of EPDs, ensures accuracy, mitigates the risk for double counting, and maintains environmental integrity of emissions inventories.*
- *Book and claim market stakeholders should work with PCR Operators to further adjust the EPD to enable efficient book and claim activities and minimize double counting.*

[5] Instances where parties require an EPD then the physical recipient should be provided an additional EPD "cover page" that provides a baseline emissions intensity to use for emissions accounting.

Appendix

A. Glossary

This document includes a glossary of terms commonly used within book and claim design, as well as the cement and concrete industry. While not exhaustive, this resource aims to bridge any gaps in terminology.

Term	Definition
Aggregates	Sand, rocks, crushed stone and other materials added to cement and water to create concrete; in concrete mixes these components are "bonded" by cement.
Blended cements	Mixtures of Portland cement and other materials like limestone, slag, calcined clays or pozzolans. Blended cements generally have lower CO2 emissions because they have a lower portion of cement.
Book and claim	Chain of custody model in which the administrative record flow is not necessarily connected to the physical flow of material or product throughout the supply chain. Book and claim decouples environmental attributes from the physical products or services that would ordinarily directly carry those attributes, creating a separate certificate (see EAC) that allows buyers to financially support the decarbonization of the associated industry and claim its benefits.
Certification	Official documentation proving that a person, product, project or attribute has met a particular standard.
Clinker	Raw materials (limestone, clay and sand) are quarried, ground up, combined with other materials (shale, iron ore), preheated and then fired in a kiln to 1,500 C to form a pebble like substance called clinker. A majority of the emissions associated with concrete are due to the process and combustion emissions from clinker production.

Clinker ratio	The clinker ratio refers to the proportion of clinker in the final cement product. It is typically expressed as a percentage by mass. A lower clinker ratio indicates that a greater share of the cement is composed of supplementary cementitious materials (SCMs), such as calcined clay, which generally have lower associated carbon emissions. Reducing the clinker ratio is a key decarbonization strategy for cement and concrete sector.
Co-claiming	When mitigation outcomes, generated by emissions reductions and/or removals in Value Chain Interventions can be claimed by two or more organizations within the same value chain for their Scope 3 Category of their GHG inventory; assuring no double counting. Co-claims allow sharing the environmental attributes of the full amount of mitigation outcomes generated in an intervention through a set of criteria for attribution and must include safeguards to avoid double counting of the intervention's mitigation outcomes and enable transparency. These safeguards are currently not regulated by voluntary frameworks or guidance but are enforced by diverse actors in the ecosystem at different stages and in different manners. These sets of criteria and safeguards need to be transparently communicated.
Concrete	A mixture of sand, aggregates, a binding agent (typically cement), chemical additives (admixtures) and water. When mixed, the binding agent is activated by the water and admixtures and bonds the mixture together.
Direct substitution approach	An emissions accounting approach which replaces the emissions intensity of a product in the purchaser's primary inventory with the emissions intensity associated with the EAC, assuming the EAC represents a product that is functionally equivalent. This approach allows the buyer to claim the emissions profile of the lower-carbon product tied to the EAC.

Double counting	Refers to the erroneous, duplicate, or improper accounting of emissions reductions arising from three main scenarios: duplicate creation of certificates for the same solution, multiple parties claiming the same certificates [at the same layer of the value chain], and repeated utilization of a single certificate by the same party for multiple purposes.
Double issuance	Occurs when more than one certificate or claim is created for the same environmental benefit in a book and claim system, allowing it to be sold or claimed multiple times. This undermines credibility and must be prevented through robust safeguards.
EAC	An environmental attribute certificate (EAC) represents the environmental attributes (including carbon intensity, GHG emissions reductions, and other sustainability characteristics that substantiate a claim) associated with a given quantity of lower carbon product (e.g., ton of cement). This is also commonly referred to as a book and claim unit (BCU), credit, or token.
Emissions intensity	Emissions intensity refers to the quantity of greenhouse gas (GHG) emissions associated with producing a specific unit of product, typically expressed in terms such as kilograms of CO_2 equivalent ($kgCO_2e$) per ton of cement or per cubic meter of concrete. It provides a measure of the carbon footprint relative to the amount of material produced and is commonly used to evaluate and compare the environmental performance of different products or production methods. Note that on an Environmental Product Declaration (see EPD), emissions intensity is reported under the term "Global Warming Potential (GWP)," typically expressed in $kgCO_2e$ per mass or volume of product.
Enhanced substitution approach *(previously change per functional unit approach)*	An emissions accounting approach which calculates emissions reductions based on the difference in emissions intensity per functional unit between the low-carbon product represented by the EAC and the most likely alternative that would have been used in its absence. This approach attributes only the marginal emissions benefit of the lower-carbon option, rather than substituting its full emissions intensity into the purchaser's inventory.

EPD (Environmental Product Declaration)	A third-party verified report displaying the results of a life cycle assessment for a specific product, or group of products. Typically includes the environmental impact of the product's value chain from material extraction through manufacturing, usage and end of life.
Functional Unit	The unit in which the environmental attribute certificate is measured and denominated (e.g., clinker, cement or concrete).
GCCA	Global Cement and Concrete Association is an international organization representing the cement and concrete industry. GCCA works with members to share knowledge, drive sustainability initiatives, and support industry standards worldwide.
GHGP	Greenhouse Gas Protocol is a widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas (GHG) emissions. Developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), it provides standards and guidance for measuring and reporting emissions across various sectors.
Intervention	Any action taken by an organization to address its Scope 3 greenhouse gas emissions, i.e., indirect emissions from its value chain, including, for example, monetary support for a discrete decarbonization project and the purchase of an environmental attribute certificate, regardless of the accounting approach implicated.
LCA (Life Cycle Assessment)	Assessment of environmental impact, particularly emissions, from a product's full life cycle.
Masonry	Blocks of concrete that can be used in structural applications.

Mass balance	Chain of custody model in which materials or products with a set of specified characteristics are mixed according to defined criteria with materials or products without that set of characteristics.[9] Although the physical inputs may be mixed with other materials that do not meet the specific criteria, and cannot be discerned in the final product, certified bookkeeping allows the attribution of sustainability or GHG emission data to the final product in a manner where both the input and output are balanced over a specified period of time.
PCR	Product category rule - the rules that dictate how to perform an LCA for a specific product category and how to summarize the results in an EPD. PCRs are created, published and updated by program operators (i.e. NSF, EPD international, SCS Global Services, UL solutions)
Precast	Concrete products that are mixed and cast into a mold at a production facility then delivered to a construction site. Precast typically has a higher degree of quality control due to mixing and pouring at the same facility but traditionally includes a higher cement content due to rapid production and stripping of formwork.
Ready-mix	A concrete product that is pre-mixed according to a specific mix design and then typically delivered to a work site to pour in-place.
Registry	A trusted digital platform that ensures environmental attribute certificates (see EACs) meet standards or certification criteria and are accounted for appropriately by transparently recording certificate generation and retirement (claimed by a company).
Regulatory surplus	Outcomes (i.e. emissions benefits) that go beyond what is required by law.
SBTi	Science Based Targets initiative: A global partnership that helps companies set greenhouse gas emissions reduction targets aligned with climate science. It is supported by the World Resources Institute (WRI), the World Business Council for Sustainable Development (WBCSD), and CDP, among others. SBTi provides guidelines to encourage businesses to commit to targets that contribute to limiting global warming to 1.5°C or 2°C.

SCM	Supplementary cementitious materials - Materials that are used in blended cements to replace some or all the cement and therefore lower the emissions intensity Traditional SCMs: fly ash, ground granulated blast-furnace slag Newer and novel SCMs: ground glass pozzolan, calcined clay, other types of fly ash (bottom ash, coal ash), natural pozzolans
Scope 1, Scope 2, Scope 3	Scope 1: Direct emissions that occur from sources controlled or owned by an organization Scope 2: Indirect GHG emissions associated with the purchase of electricity, heat, steam, or cooling Scope 3: Indirect GHG emissions associated with a company's upstream or downstream activities across the value chain
Value Chain	A value chain is used to describe the full range of activities – including design, production, marketing, distribution and use -- linked to a particular business. In the case of cement and concrete, the whole value chain includes raw materials quarrying, energy supply, production and use, design, construction, buildings use and end of life.

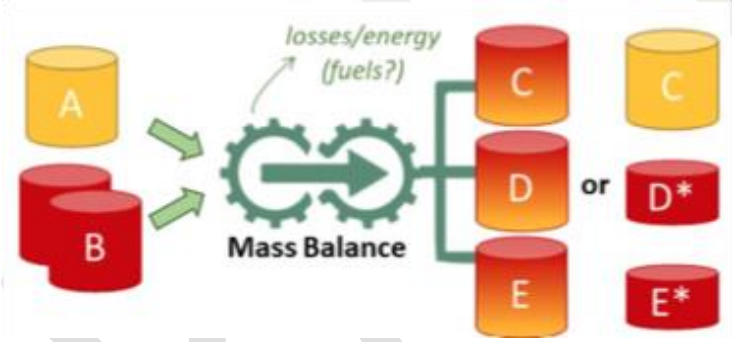
B. Potential Utilization Documentation

Term	Purpose/Function	Unit	Who Uses It	When Used	Region
Bill of Lading	Legal shipping document, receipt, contract, title of goods	Cement and Concrete	Shipper, Carrier, Buyer	During shipment and delivery	US / EU
Delivery Ticket	Confirms delivery details and receipt of specific concrete batch	Concrete	Supplier, Customer	At delivery to job site	US / EU
Invoice	Requests payment for goods delivered	Cement and Concrete	Supplier, Customer	After delivery	US / EU
Declaration of Performance (DoP)	Required in the EU for cement and concrete under the Construction Products Regulation; typically issued when the product leaves the plant.	Cement and Concrete	Manufacturer	During shipment and delivery	EU

C. Chain of custody approaches: mass balance versus book and claim

A mass balance chain of custody model allows low-carbon materials to be physically mixed with conventional materials during production or distribution. Even though these materials are combined, the quantity of inputs with specified characteristics is tracked through the system. The total amount of these inputs documented as entering the system must equal the total amount allocated to outputs, accounting for any process losses. This model permits the characteristics of the inputs to be distributed proportionally across all outputs, or concentrated into a subset of them, as long as the overall balance is maintained. If proportional distribution is not applied, the physical product a buyer receives may not physically contain the assigned attributes; from the buyer's perspective, this outcome resembles a book and claim system.

Figure 2: Mass balance model



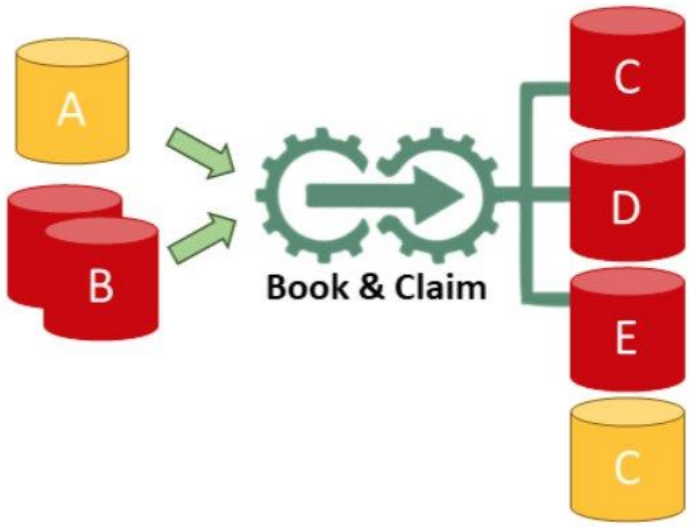
Source: NIST

By contrast, a book and claim system fully decouples the environmental attribute from the physical product. The environmental benefit is issued as a separate tradable unit (e.g., an EAC or certificate) that can be transferred independently of the physical product flow. The physical material can still be tracked for assurance or verification purposes, but the environmental attribute is no longer tied to the product itself.

This decoupling enables greater flexibility in how and where claims are made but also requires robust safeguards to ensure credibility and prevent double counting. While both book and claim and mass balance chain of custody models have merit, book and claim is particularly well suited to the cement and concrete sector at this stage of decarbonization. The industry is characterized by a complex and fragmented value chain, limited availability of low-carbon production, and geographic constraints that make it difficult for buyers to directly procure low-carbon materials. A book and claim system overcomes these barriers by allowing stakeholders anywhere in the value chain to credibly support and claim the use of low-carbon cement and concrete, even if the physical materials cannot be directly

procured. This makes book and claim a practical and powerful tool to channel early demand and investment toward emerging decarbonization solutions in the sector.

Figure 3: Book and claim model



Source: NIST

D. Additional Resources

Greenhouse Gas Protocol, Corporate Value Chain (Scope 3) Accounting and Reporting Standard

Science-based Targets initiative, Corporate Net-Zero Standard

Advanced and Indirect Mitigation Platform, Intervention Quality, Accounting, and Reporting Standard *[forthcoming]*