



Global Cement and Concrete
Association

Cement & Concrete industry

Chain of Custody Rulebook

Design decisions, justifications and outstanding
considerations

Version 1.0

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1. Introduction and value of Chain of Custody for cement industry

The cement and concrete industry stands at a pivotal moment in the global effort to combat climate change. The industry is committed to decarbonization in line with global climate goals. This ambition is reflected in the GCCA Net Zero Pathway¹, which sets out a comprehensive route to Net Zero. While traditional incremental measures, such as efficiency improvements, fuel switching, or clinker substitution, are driving early progress, these will only take the sector part of the way, as for now, these can only abate a fraction of the total emissions.

Achieving deep decarbonization in cement and concrete will require deployment of breakthrough technologies at an unprecedented scale. The vast share of cement's emissions come from the process emissions and the high temperature kilns require. The industry has already achieved significant progress in emissions reduction using conventional technologies and will continue to do so. However, key levers, including solutions like carbon capture, utilization and storage, kiln electrification or alternative chemistries, are also essential to close the gap. While the adoption of these technologies is technically feasible in the long term, the scale of the transformation is significant and entails substantial capital and operational investment. Financing the decarbonization of the cement industry is one of the key challenges on the path to Net Zero. Emerging low-carbon technologies, while capital-intensive and often associated with higher operating costs, have a relatively modest impact on the broader economy. For instance, a +75 to 140% increase in cement prices might raise the overall cost of a new building or infrastructure project by 5% to 15%². As the world moves towards decarbonization, reducing the embodied carbon of buildings has become a key priority on sustainability agendas and with concrete being an essential building material, cement decarbonization is a highly efficient target for investment. Ensuring market structures recognize and support these benefits is key to unlocking the full potential of low-carbon materials.

Today's market structure often fails to reward deep decarbonization efforts. Cement is usually sold in local, short-term transactions, and producers rarely hold long-term contracts that could guarantee a return on major decarbonization investments. Unlike some industries where 15–20-years offtake agreements underpin new projects, construction materials are procured project-by-project, with an overriding focus on minimizing upfront cost. This makes it challenging for cement companies to secure affordable financing for technologies such as CCUS – lenders and investors need assurance that there will be stable demand and a price premium for low-carbon cement. Meanwhile, demand signals, though growing, remain fragmented and misaligned. End-use customers have expressed a readiness to pay extra for greener products, however, connecting that willingness to pay with the producer is rife with obstacles.

The cement and concrete industry faces three main challenges when financing deep decarbonization:

Impact dilution: When a plant implements decarbonization measures but does not use Non-proportional Mass Balance to concentrate the environmental benefits into specific

product batches, the environmental benefit is therefore averaged across all production, weakening its visibility and value per unit. As a result, producers implementing meaningful carbon reductions receive limited recognition and no clear premium, making early action economically unattractive.

Value chain complexity: Demand for low-carbon cement/concrete is often driven by actors who are not direct buyers – such as building owners or developers – who typically do not control procurement decisions. This misalignment makes it difficult to capture and distribute the associated green premium along the value chain.

Geographic disparity: Without stronger regulations in the form of incentives, subsidies or taxes, local demand is insufficient to generate strong or viable business cases. Additionally, the business case in emerging countries (where cement demand is expected to grow the fastest) is hindered by the limited ability to absorb a green premium, due to cost constraints and lack of policy support. It is also important to highlight that transporting physical low-carbon materials would generate additional emissions and costs, which would be counterproductive.

All these factors create a vicious cycle: producers require a business case to invest in expensive carbon reduction, and buyers don't see enough low-carbon options at scale to reliably procure. Breaking this cycle is imperative – and this is where an effective Chain of Custody system becomes transformative.

1.1. The Role of Chain of Custody models in the cement industry

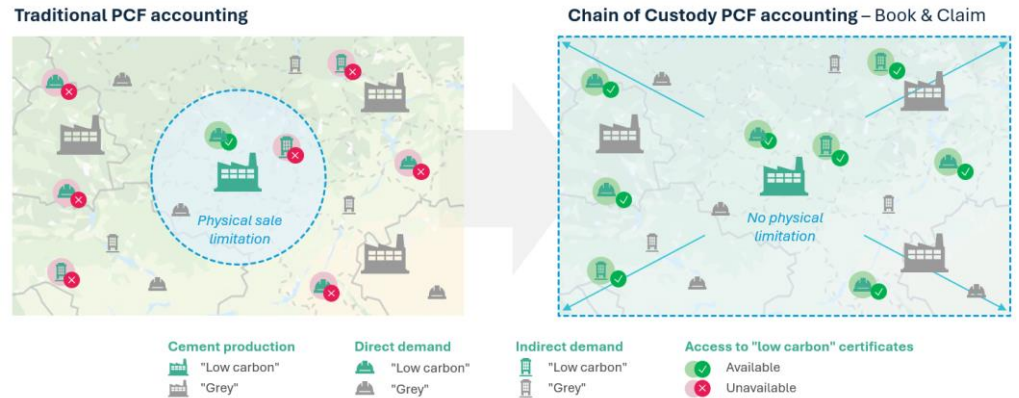
To overcome these barriers and unlock decarbonization at scale, GCCA is defining a new framework to finance deep decarbonization.

This scheme leverages innovative Chain of Custody models, aligned with ISO standards (13662 on Mass Balance³ and 13659 on Book & Claim⁴ – under development), to enable both:

- The concentration of low-carbon attributes through Non-proportional Mass Balance
- The flexibility to monetize the environmental attributes along the value chain via Non-proportional Mass Balance and Book & Claim

By untying the attribute from the physical product, certificates can be traded with greater flexibility, enabling buyers across the cement value chain –addressing barriers imposed by geography or value chain position – to claim, where applicable, the benefits of low-carbon production.

EXHIBIT 1 | Chain of Custody as a solution for key challenges



1.2. About this Rulebook

This Rulebook represents a foundational milestone in the development of a Chain of Custody scheme tailored to the cement and concrete industry. Its purpose is to provide a consistent, credible, and transparent framework for financing deep decarbonization projects – enabling the sector’s transition to Net Zero.

It is the product of months of collaboration across a broad group of industry actors, who have come together to co-design a system that works for the industry and drives real, impactful decarbonization. The structure and rules laid out in this document reflect both technical rigor and the practical realities of cement/concrete markets and operations.

However, this Rulebook does not intend to represent a final version of the scheme. Although several design elements have been defined, certain aspects remain under consideration. This document presents the range of options currently being evaluated for those outstanding areas. The scheme is expected to evolve further, informed by feedback from buyers, value chain actors, standard-setting bodies, and other stakeholders, as well as from upcoming pilot implementations.

Therefore, the rules and design decisions set out in this document are preliminary, reflecting the best assumptions available at this stage and are subject to future revision.

The success of this scheme relies on a broad, coordinated effort across the value chain to establish Chain of Custody models as trusted and widely accepted mechanisms for supporting the deep decarbonization measure business case, enabling the industry to move forward to meet its 2050 Net Zero target.

These schemes are a necessary tool for enabling the initial monetization of decarbonization projects. However, as deep decarbonization scales and geographic constraints fade, their value and applicability are expected to decline – since Near Zero products will eventually become widely available for physical procurement.

2. How the scheme works

A well-structured Chain of Custody (CoC) scheme guarantees traceability and transparency, while ensuring practical implementation.

This section provides an overview of how CoC is applied to the cement and concrete industry, outlining the key processes, eligibility criteria for generating certificates and the geographic boundary for trading these.

Alignment with Scope 3 accounting and target-setting standards (e.g., GHGP, SBTi) and emerging regulatory requirements – such as the EU Construction Products Regulation mandating EN 15804+A2-aligned Environmental Product Declarations (EPDs) by 2026⁵ (see Chapter 6) – is a key design priority. While these frameworks continue to evolve and further define the role and acceptance of Chain of Custody mechanisms, the current scheme has been developed in closest adherence possible to existing guidance, incorporating flexible elements to ensure adaptability through ongoing engagement with standard-setting bodies. Given the accounting frameworks' complexity, avoiding double-counting, either directly or indirectly, is paramount, and the scheme is designed to address it from the outset.

Our scheme is a Book & Claim model for the cement and concrete value chain: it separates the physical product from its low-carbon attribute, which is captured as a digital certificate (issued after third-party verification and recorded in a digital registry). Certificates reflect verified product emissions (per ton of clinker-equivalent) and are sold independently from the physical delivery of the cementitious product. These certificates can then be used to generate a “EPD-equivalent” document for the final product (i.e., cement or concrete) allowing the end-customer to report lower Scope 3 emissions. Each certificate may be claimed once and co-claimed along the value chain within set guardrails that prevent double-counting. Detailed rules on eligibility, timing, boundaries, accounting, and verification are set out in the following subsections.

2.1. GCCA Chain of Custody model principles

As global standard setters continue defining their approach towards CoC, the cement sector is aiming to move forward defining a framework that is pragmatic, transparent and traceable.

Thus, the design of this scheme has been guided by six foundational principles:

Deep decarbonization catalyzation – Establish clear rules to ensure certificates incentivize substantive decarbonization efforts.

Global consistency and decarbonization enablement – Define standardized rules to facilitate comparability and interoperability across geographies, to boost the decarbonization of all geographies, including regions with limited local demand, or low-carbon products.

Transparency and traceability – Build a centralized registry to ensure highest level of transparency and traceability of certificates and transactions, reinforced by third-party verification, to guarantee the robustness of the claims and close the door to “greenwashing”.

Technology agnosticism – CoC scheme should avoid restriction to specific technologies, staying open to innovation, which helps avoid bias towards dominant solutions and supports a more inclusive decarbonization pathway.

Standard setter acceptance – Endorsement needs to be maximized to guarantee applicability and scheme value. Alignment with standard bodies reduces the risk of market fragmentation and helps the scheme serve as a unifying mechanism across frameworks.

Demand alignment – The buyer needs must be reflected in the CoC scheme, which should also deliver clear value to ensure meaningful market participation. Beyond issuing certificates, the priority is to establish credibility in the decarbonization outcomes they reflect.

2.2. Product certificates concept and approach

Product certificates enable the monetization of low-carbon production within the cement and concrete value chain, without altering the producer’s Scope 1 emissions reporting, allowing cement producers to sell certificates and still claim its emission reductions within their Scope 1 inventory. This scheme intends to enable keeping a verified record of the product’s reduced emissions in a certificate, which can then be used to abate clinker-related Scope 3 emissions, strictly tied to the consumption of cement or concrete within the value chain.

Certificates issued under this scheme follow an attributional accounting approach, meaning they reflect the actual emissions associated with a given product unit (e.g. kgCO₂e/ton of clinker equivalent).

“Uncoupled” product certificates, with potential to be sold beyond the company customer, (see Section 3.1.), separate the low-carbon attributes from the physical product, enable matching between dispersed buyers with available supply and help build scale for low-carbon cement in otherwise hard-to-reach markets.

Attributional accounting avoids the growing scrutiny and decreasing acceptance of carbon reduction and avoidance credits in corporate emissions accounting, which could potentially be excluded from key emissions accounting standards such as SBTi – GHGP moving in same direction; applicability being reduced to voluntary compensation with no significant recognition in major reporting frameworks. This corporate-accounting limitation does not extend to Article 6 of the Paris Agreement, where carbon reductions and avoidance credits remain valid for government NDC compliance.

Whilst the CoC scheme would permit parallel generation of carbon credits, this is only acceptable if they refer to distinct emission sources. Double-counting (i.e., monetization of same project through both schemes) is not permitted under any circumstance.

By focusing on real, product-based emissions within the value chain, attributional product certificates provide a transparent mechanism to reward decarbonization efforts and are well aligned with current and emerging climate accountability frameworks.

2.3. Key steps in the process from certificate generation to claiming

This Chain of Custody scheme is comprised of four main steps. These processes are further detailed in the next sections and will be refined in *Appendix 2 (pending finalization)*.

I. Emissions measurement and Non-proportional Mass Balance application

Producers quantify emissions of low-carbon inputs based on primary production data, ensuring accuracy.

Low-carbon attributes are concentrated into specific clinker-equivalent product batches, ensuring compliance with Non-proportional Mass Balance (Non-proportional MB) boundaries (detailed in Section 3.3.). Each ton of clinker-equivalent product with low-carbon attributes attached is associated with one clinker certificate, issued on the basis of attributional accounting and verified Non-proportional MB. The operational mechanics of certificate issuance will be specified in *Appendix 2 (pending finalization)*.

Non-proportional MB application is verified by independent third-party auditors to prevent double-counting and ensure proper rules are applied.

II. Certificate Issuance

The tokenized digital certificate is generated based on verified Non-proportional MB, reflects the attributional carbon footprint of the clinker-equivalent unit, backed by verified reductions in reported emissions under the scheme's recognition rules.

In parallel, the corresponding physical batch of clinker-equivalent product which is "unlabeled" (i.e., the physical product once a certificate has been uncoupled), must be linked to an applicable residual value, ensuring that every physical ton carries a complete, non-overlapping share of the plant's emissions and that certificate claims remain fully credible (dimension further defined in the *Appendix 2, which is pending finalization*).

III. Certificate Transfer

Certificates are made available for purchase to value chain participants (with boundaries set in Section 4.1.), such as construction companies or asset owners.

Transactions must be recorded in a registry or traceable/auditable system, ensuring full transparency.

Once claimed, the certificate is retired from the system, ensuring it is not reused or double-counted.

The certificate can be passed up and down the value chain to transfer the reduction benefit, allowing for co-claiming at different value chain levels. Rules for co-claiming are outlined in Section 4.1.

IV. Use of certificates for reporting

Buyers purchase low-carbon clinker certificates through the registry, which then generates a verified EPD-equivalent document that serves as the basis for the buyer to report their Scope 3 emissions, reflecting the abatement of their clinker-related emissions. This verified document can also be used for other applications (e.g., to support Scope 3 reporting, for green building certifications, for public procurement etc.) – if accepted by standard setters.

This EPD-equivalent document provides a clear, verifiable audit trail with upward traceability to the origin of the emission reductions and may serve as a basis for certification by independent third-party auditors.

These steps ensure that each certificate accurately represents verified emissions, and that proper Non-proportional Mass Balance is applied, maintaining traceability throughout the value chain, and preventing double-counting (further details in *Appendix 2, pending finalization*).

By following a standardized approach from generation to claiming, the scheme provides a clear and reliable mechanism for buyers to integrate low-carbon products into their accounting, procurement, and sustainability strategies.

2.4. Scheme design framework

Cement production is an integrated process that starts with clinker production, follows with cement grinding, concluding with mixing cement with aggregates and other materials to produce concrete. Along this process, most of the emissions – approximately 90% of those related to concrete – originate from clinker production.

Thus, the scheme will generate clinker based (functional unit) certificates. Selection of this unit is explained in detail in Section 3.2.

Emissions from clinker production can be categorized into fuel emissions (~40% of clinker emissions) and process emissions (~60%); however, other direct and indirect cradle-to-gate activities (A1–A3), such as raw-material transport, typically contribute a further ~5–10% in LCA terms. Different technologies being applied to decarbonize each of the sources include:

Fuel emissions: Reduced by implementing energy efficiency levers and mitigated by using alternative fuels or by implementing kiln electrification and procuring renewable electricity.

Process emissions: Resulting from the calcination of limestone, these can be partially reduced through the replacement of limestone with Decarbonated Raw Materials (DRMs) and can be captured by direct capture technologies such as Leilac technology.

Carbon Capture and/or Storage (CCS) is currently necessary to nearly fully abate fuel and process emissions from clinker production. Other technologies under research to produce alternative binders may significantly reduce emissions but typically do not achieve near-

zero unless combined with other technologies, such as CCS. These solutions require significant upfront investment (CAPEX) and entail high operating costs (OPEX).

Other relevant cement and concrete decarbonization technologies under development focus on reducing clinker content, by incorporating Supplementary Cementitious Materials (SCMs).

Cement producers are progressively investing in decarbonizing their production. The GCCA CoC scheme allows to apply Non-proportional Mass Balance, to concentrate these low-carbon inputs into specific products, maximizing the value of certificates by enabling higher level of decarbonized products. This attribution will follow stringent rules to ensure proper attribution, which are explained in detail in Section 3.3.

2.4.1. Eligibility criteria for certificate generation

Defining clear eligibility criteria for certificate generation is about establishing the guardrails of the system to ensure integrity, effectiveness and real impact.

Key design choices include:

- Technology scope: The technologies with which certificates can be generated
- Limit of Emission Factor: EF level to be reached for monetization via certificates
- Additionality: Additionality requirements for certificate generation
- Minimum thresholds of low-carbon: Minimum portion of decarbonized production required for monetization
- Non-proportional MB attribution perimeter: Scope at which Non-proportional Mass Balance may be applied
- Certificate of storage: *(Only applicable to CCS projects)* Evidence requirement for CCS projects to register CO₂ stored

Technology scope

The scheme is designed to be technology-agnostic, allowing certificates to be generated through the application of any deep decarbonization technology, as long as the other criteria are met. The objective is to promote the business case for deploying capital-intensive decarbonization technologies, while still promoting innovation.

Limit of Emission Factor

To ensure the scheme rewards and promotes deep decarbonization (first design principle), only Near Zero clinker will be eligible for monetization in the long term. Initial inclusion of A/B low-carbon levels is under consideration. Emissions eligibility thresholds shall be assessed using net emission factors, aligned with GCCA Low-Carbon and Near Zero Cement definitions (Exhibit 2)6, for a 1.0 clinker-to-cement ratio (100% clinker).

Additionality

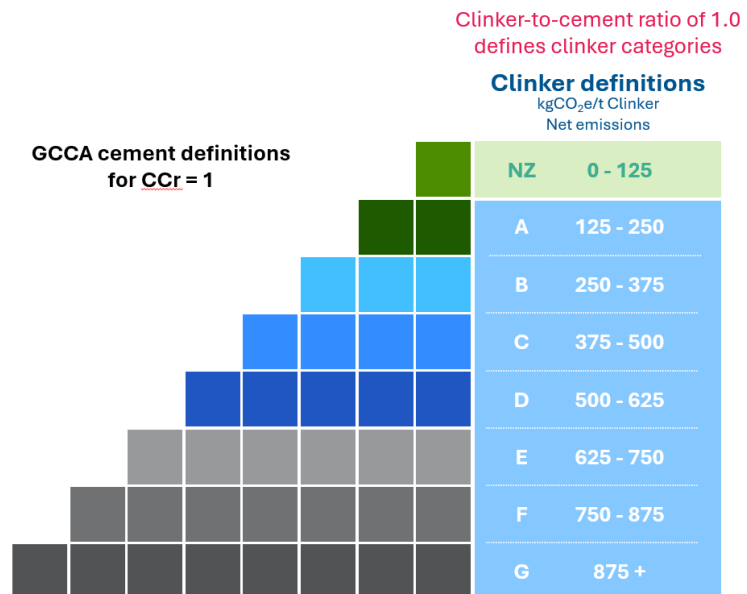
Restricting certificate eligibility to Near Zero products ensures that the scheme meets additionality requirement, both in terms of emissions and economics.

The concept of emissions additionality refers to the principle that only emission reductions made possible by the implementation of the scheme – i.e., those that would not have occurred otherwise – are eligible for monetization. This is upheld by setting a threshold low enough to achieve this.

Financial additionality assessment guarantees that only investments which are not financially viable in the absence of support from the scheme are eligible for monetization. This principle is critical, as the primary objective of the scheme is to enable transformative decarbonization efforts – rather than to generate a profit. At this stage, financial additionality is inherently upheld, as no existing technology capable of achieving a Near Zero Emission Factor through the application of proper Non-proportional MB is currently economically feasible without incremental monetary incentives.

If A/B low-carbon levels are included during the first stage, financial additionality assessment would also be inherently upheld by the implementation of deep decarbonization measures.

EXHIBIT 2 | GCCA definitions for Low-carbon and Near Zero cement⁶



GCCA’s numerical definitions for Low-Carbon and Near Zero cement were developed using the following EPD methodology, the most widely used globally:

- Standards: EN 15804+A2, PCR-001 – Cement and building lime (EN 16908)
- Database: ecoinvent

- Scope: cradle-to-gate (A1-A3)
- “Net GWP”: Emissions from treated waste accounting as per ISO 21930 and EN 15804+A2.

Min. threshold of low-carbon production

A minimum threshold of 25% of low-carbon production over total kiln production will be set to be eligible for monetization. This ensures that appropriate decarbonization projects can access monetization. This threshold will be increased with time, aligning with industry objectives.

With these limitations for certificate generation, GCCA aims to ensure deep-decarbonization is driven – aligned with the first foundational principle.

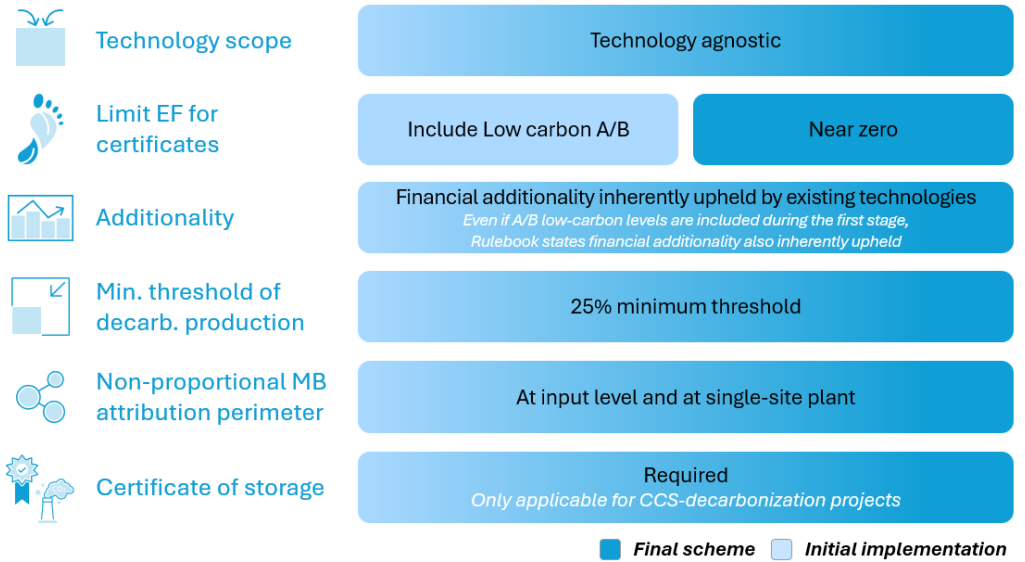
Non-proportional Mass Balance attribution perimeter

Non-proportional Mass Balance (Non-proportional MB) applies only at input level and within a single production site; cross-site mixing is not permitted. At output level, certificates/attributes are not site-bound and may be transferred to products of other plants under the uncoupled model. Further details provided in sub-section 3.3.1. Non-proportional Mass Balance Attribution.

Certificate of storage

When the decarbonization lever is carbon capture and storage (CCS), a Certificate of Storage must be provided at registration. The certificate is a formal attestation by the storage operator that captured CO₂ has been injected into a permitted geological formation and placed under the operator’s monitoring and stewardship. It identifies the operator and storage site, the quantity recorded by the operator, and confirms permanent storage, and it is subject to independent third-party verification. The registry records the certificate’s reference to ensure traceability.

EXHIBIT 3 | Design choices on eligibility criteria for certificate generation



2.5. Geographic boundary

The geographic boundary of the scheme defines both where certificates can be generated and where these can be sold. Establishing a well-defined geographic scope is critical to fostering market participation and enabling scalability.

Scheme aims to be global, allowing all regions to participate and access supply and demand, ensuring alignment with the global decarbonization goal.

However, initial implementation may benefit from a regional approach to facilitate adoption, regulatory alignment, and market development. Launching in specific regions – potentially through small-scale pilot programs – can provide valuable insights, build stakeholder confidence, and create a foundation for broader expansion. Reaching regulatory and standards alignment is key to enabling the transition to a global scheme.

Nonetheless, the framework is being designed from the outset with a global vision to ensure consistency across regions and scalability potential. The registry, accounting frameworks or eligibility criteria for certificate generation foundations should remain uniform across different geographic regions, preventing market fragmentation and ensuring the comparability of certificates worldwide.

That said, to account for regulatory differences and diverse market conditions, the possibility of regional sub-models is under consideration. This approach aims to ensure a competitive level playing field whilst possibly enabling the inclusion of A/B low-carbon performance levels in some geographies, while avoiding misalignments that could

undermine the scheme’s global scalability. Both sub-models will share a common scheme architecture and a unified Rulebook to preserve consistency.

Keeping this alignment would allow the transition to an ultimate global scheme, enabling decarbonization across geographies.

3. Chain of Custody considerations

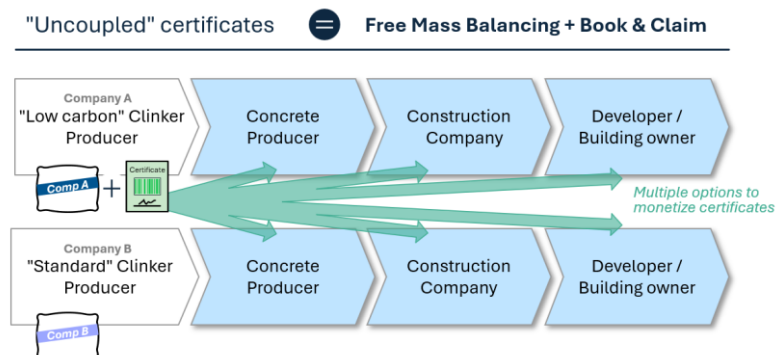
This section outlines the “uncoupled” model for the Chain of Custody scheme and the selected functional unit. Afterwards, it outlines the guardrails for Non-proportional Mass Balance, and it introduces the approach to emissions accounting; detailed accounting rules will be provided in *Appendix 2 (pending finalization)*.

3.1. Chain of Custody models

“Uncoupled” / “Book & Claim” model is the target for our scheme. It provides largest flexibility, allowing all producers to participate, and demand in any geography to access low-carbon material production.

The “Uncoupled model” or “Book and Claim” allow certificates to be traded independently of physical cement purchase – for example, certificates from Company A could be claimed by a consumer of Company B physical cement/concrete.

EXHIBIT 4 | Chain of Custody model



3.2. Functional unit definition

The functional unit is the unit of reference for the certificate, emissions being measured against it (i.e., if choosing clinker as functional unit, certificates report the emissions attributed to 1 ton of clinker). Defining a robust functional unit is a critical element in ensuring the effectiveness and reliability of the scheme.

The most essential attribute of a functional unit is fungibility – enabling certificates to be easily exchanged without structural equivalence challenges, thereby ensuring seamless market transactions.

Within the cement value chain, functional unit options include clinker tons, cement tons, or concrete volume (m³).

Given the existence of few types of clinker (Portland clinker being the most common one), compared to approximately 160 cement variations and over 7,000 concrete formulations, clinker offers the highest degree of fungibility. Additionally, regional differences in cement

and concrete types and standards further limit global fungibility. For these reasons, clinker could be considered the most suitable functional unit.

Clinker production is also the primary and hardest-to-abate source of emissions in the value chain, further reinforcing its relevance as the basis for certificate generation and exchange.

To accommodate alternative binders based on novel chemistries that produce materials functionally equivalent to conventional clinker, the functional unit will be defined as “clinker-equivalent”. By establishing an equivalence based on the clinker content of a comparable standard cement, these alternative binders can generate “clinker-equivalent” certificates, making them eligible for monetization within the Chain of Custody scheme.

Thus, “clinker-equivalent” functional unit (i.e., kgCO₂e/ton of clinker equivalent) provides a standardized approach that ensures market liquidity, facilitates certificate generation, and effectively targets decarbonization at the main emission source.

However, clinker presents several challenges that need to be addressed: limited customer awareness of clinker concept, traceability complexity across the value chain and inclusion of decarbonization levers not directly impacting clinker production.

Customer awareness and traceability

End-users often lack familiarity with the concept of clinker and may not have access to detailed information regarding its proportion in the final products they procure. While a range of clinker content is generally disclosed in cement Environmental Product Declarations (EPDs), this is not commonly the case for concrete EPDs. Furthermore, asset owners aiming to substantiate the use of low-carbon concrete in their projects may not have precise data on the volume or composition of concrete used in their buildings.

To address this, the registry will use a clear and accessible language for customers and will automatically calculate the clinker content equivalence based on the final product's composition.

Clients will input end-product data, including two possible scenarios:

- Product-specific data – If the customer provides concrete EPDs, the system will automatically estimate the clinker content using predefined equivalence factors, ensuring accuracy and consistency
- General building information – If only building structural dimensions are provided, the registry will estimate the clinker content using standardized conversion factors, ensuring a reliable approximation

The registry will be designed to accommodate a diverse range of users with varying levels of data availability, ensuring accessibility and usability for all.

GCCA will develop an equivalence table for the Uncoupled Indirect model, to bridge client input data to clinker content, ensuring the most accurate estimations. This dimension is defined in more detail in the *Appendix of this Rulebook*.

It is important to highlight that these estimations will never be used for certificate generation. They are intended solely to estimate clinker content in cases where exact product information is not available. All certificates will be generated strictly based on actual production data and verified emissions data.




Integration of other decarbonization levers

The second relevant challenge is ensuring the integration of decarbonization levers that do not directly impact clinker production.

Supplementary Cementitious Materials (SCMs) or clinker substitution is a key lever in the decarbonization of the cement sector. While certain SCMs show promising potential, most do not yet achieve full functional equivalence to clinker.

Under this scheme, SCM use is not eligible for certificate generation since certificates are issued only for decarbonized clinker-equivalent production. Nevertheless, SCMs are recognized indirectly by reducing clinker content in final products, thereby lowering the number of certificates required to decarbonize the final product.

EXHIBIT 5 | Pros & cons of functional unit options

	Pros	Cons
 Clinker	<ul style="list-style-type: none"> • Clinker solves for structural equivalence challenges and eases standardization • Generates highest market liquidity and fungibility • Tackles decarbonization at the main emission source • Facilitates certificate generation 	<ul style="list-style-type: none"> • Requires equivalence mapping to cement and concrete for downstream users • Not intuitive for buyers
 Cement	<ul style="list-style-type: none"> • Recognizes all decarbonization efforts • Provides a more direct link between emissions and the final product • Low-carbon and near-zero products already defined • More intuitive for buyers 	<ul style="list-style-type: none"> • Hinders flexibility due to cement variations • Uncertainty in applications affects interchangeability • Difficult certificate booking as it needs to be done further along the value-chain • Challenging traceability across the value chain upstream and downstream
 Concrete	<ul style="list-style-type: none"> • Recognizes all decarbonization efforts • Provides a more direct link between emissions reductions and the final product • Low-carbon and near-zero products already defined • More intuitive for buyers 	<ul style="list-style-type: none"> • High rigidity (limits the benefits of CoC) • Extremely complex to standardize, with thousands of mix designs • Difficult certificate booking as it needs to be done at the end of the value chain • High administrative burden to track and verify certificates

3.3. Emissions measurement and Non-proportional Mass Balance boundaries

Emissions calculations must be based on a Life Cycle Assessment (LCA) compliant with ISO 14040⁷ and ISO 14044⁸ and new upcoming LCA CoC Standard (ISO/WD 14077 “CoC approaches in LCA”)⁹. The LCA must be product-specific and directly linked to actual production, ensuring traceability.

The assessment must cover cradle-to-gate (A1 “Raw material supply”, A2 “Transportation” and A3 “Manufacturing”) emissions, which includes Scope 1, Scope 2 and upstream

Scope 3 emissions related to clinker production, aligning Environmental Product Declarations (EPDs)^{11,12}.

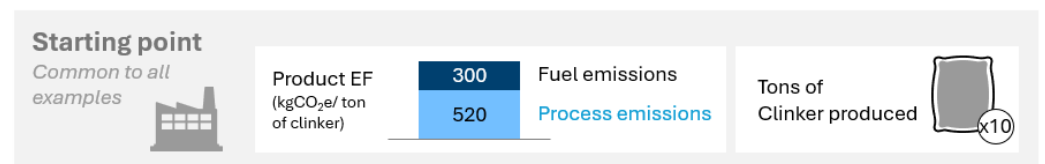
To ensure accuracy and credibility, primary data must be used for key emission sources, such as process emissions and energy use, with minimal reliance on secondary data (e.g., “Transport” category in Scope 3 upstream). This aligns with the IDDI Whitepaper “Driving consistency in the Greenhouse Gas Accounting System”¹³, which reinforces the relevance of robust data collection and transparent verification. While methodologically aligned with EPDs, accounting in this framework must be dynamically linked to actual product-specific manufacturing data, ensuring higher timely accuracy rather than serving as a static reference document.

3.3.1. Non-proportional Mass Balance attribution

New ISO/DIS 13662 (under development)³ defines new Chain of Custody models. What we call “Non-proportional Mass Balance” is introduced by ISO as “Mass Balance Credit Method”. We have adopted this terminology to avoid confusion with traditional credit concepts based on consequential attribution.

This method provides flexibility to attribute low-carbon inputs to certain output products, allowing its concentration to obtain relevantly decarbonized products. Defining clear guardrails to Non-proportional Mass Balance is key to ensure scheme credibility, as could otherwise be perceived as greenwashing.

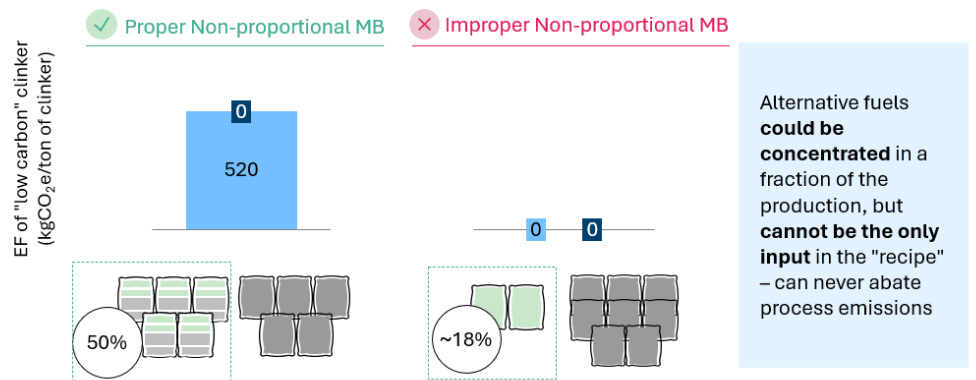
EXHIBIT 6 | Proper vs. Improper Non-proportional Mass Balance examples



Decarbonization project - Example I : Change to alternative fuels

50% of total fuel consumption is replaced with biomass with zero emission footprint

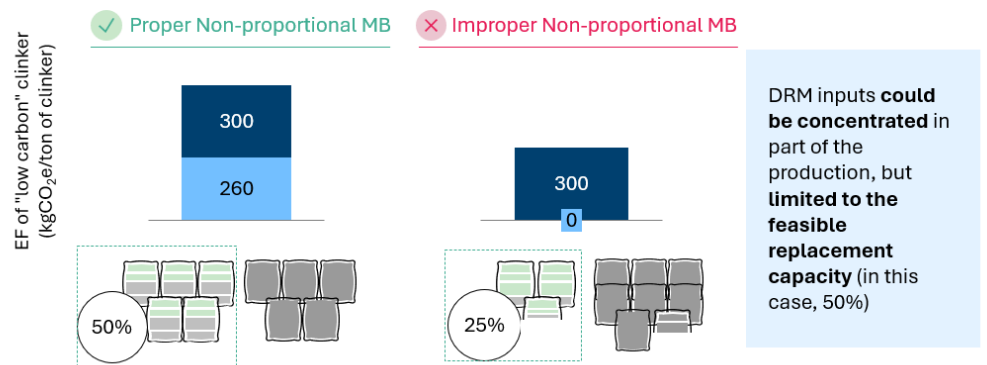
> This results in the reduction of total **fuel emissions** by 50%



Decarbonization project - Example II : Use of Decarbonated Raw Materials

25% of total kiln inputs replaced with DRM and the maximum **technical limit** of DRM limestone replacement is 50%

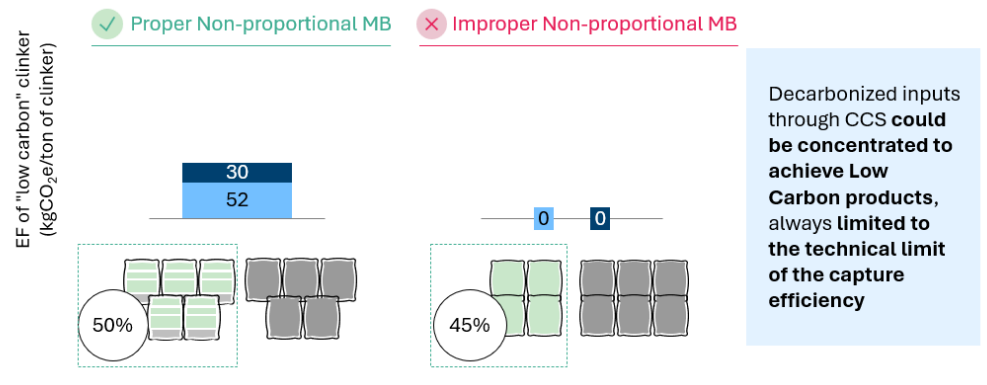
> This results in the reduction of total **process emissions** by 25%



Decarbonization project - Example III : Carbon Capture & Storage deployment

CCS captures 50% of absolute emissions (inc. process and fuel emissions), with a capture efficiency of 90%

> This results in the reduction of total **process and fuel emissions** by 45%



ISO 13662³ states that attribution should be technically feasible, which means that attribution of inputs should be done following physically possible "recipes". In other words, Non-proportional Mass Balance attribution is only allowed against the inputs to which the reduction technology applied is relevant. When applied, it should not alter the volumes of mass and energy required to produce a ton of output product.

For example, if implementing an emissions reduction project in a plant based on using 100% carbon neutral fuels, process emissions would never be mitigated at product level. All products in the plant would have the same EF: pre-project process emissions as.

Exhibit 6 shows different examples for proper vs improper attribution. The technical limit values presented in the examples are indicative; GCCA will issue a binding technical protocol establishing the technical feasibility thresholds and calculation methods for all deep decarbonization technologies in scope. Producers shall apply these thresholds as inputs to Non-proportional Mass Balance calculations.

Non-proportional Mass Balance perimeter

To ensure proper implementation and greater control of the scheme, and to encourage the development of deep decarbonization projects, Non-proportional Mass Balance will only be allowed to be applied at input level and at a single site. At output level, certificates are not bound by these restrictions and may be transferred to products of a different plant. This allows inputs to be concentrated into outputs only when the decarbonization technologies and processes have been applied at the same production facility.

For example, two different plants belonging to the same producer, each pursuing separate decarbonization efforts, cannot combine their individual reductions using Non-proportional Mass Balance to create a single low-carbon product. It is important to underline that this perimeter restriction is applied at input level. Inputs can only be combined at single site level. Afterwards, the outputs or the certificates generated can be sold to a customer of another company under the “Uncoupled model”.

To guarantee consistent implementation, GCCA will issue a binding Non-proportional Mass Balance methodology protocol defining attributional rules, tracking requirements guardrails, data-quality criteria and calculation steps. Non-proportional MB verification will assess the correct application of the published technical thresholds and the integrity of input-output mass-balance tracking.

Residual emissions

Residual emissions management refers to the process of assigning the appropriate emissions to the “unlabeled product”, i.e., the physical product once a certificate has been uncoupled. This is a critical aspect of the scheme, as maintaining a consistent global emissions balance is essential to guarantee its integrity and credibility. This dimension will be defined in more detail in the *Appendix 2 of this Rulebook (pending finalization)*.

4. Market rules

Market participants will engage in the Chain of Custody system through the purchase, trade, and use of certificates for claims. This section defines the key actors within the registry and their roles. To ensure the scheme operates effectively and with integrity, verification is a relevant step and requirements are explained.

4.1. Participants, roles and responsibilities of key stakeholders

This Chain of Custody scheme is sector-specific, restricting participation to stakeholders within the cement and concrete value chain. Companies falling within the categories outlined in this section are eligible to engage in the system by booking, claiming, or transferring certificates.

The value chain is structured into four levels. Level one entities are responsible for generating certificates, while levels two, three, and four are entitled to purchase, transfer, and co-claim them. At each level, only one entity is permitted to claim a given certificate, with distinct entity types assigned to each category. This tiered structure ensures clear attribution of Scope 3 emissions reductions and prevents overlaps or double-counting.

Level 1 – Clinker and clinker-equivalent producers

Clinker and clinker-equivalent producers: Companies that produce clinker and cement; these producers are often integrated into cement and concrete production in some regions.

These will generate the “clinker-equivalent” certificates after applying Non-proportional Mass Balance and will *book* them in the registry, in the Uncoupled model. Certificate generation will always be subjected to third-party verification.

Level 2 – Cement and Concrete/Precast producer

Cement and Concrete/precast producers: Companies that produce cement without being involved in clinker production (e.g., grinding units) and/or companies that manufacture RMX concrete and precast elements for use in construction projects and other direct cement consumers.

These companies may claim certificates in the registry to report low-carbon attributes in their final products, RMX concrete or precast materials. They may transfer them downstream (e.g., construction companies, asset owners) for co-claiming.

RMX concrete and precast operations are often integrated in some regions into cement production companies, rendering them ineligible for Level 2, as decarbonization projects would be accounted for under the company’s Scope 1 and 2 emissions.

Level 3 – Construction companies

Construction companies: companies that execute building projects, sourcing and utilizing building materials.

These will be able to *claim and pass* the certificates to report that the raw materials used for their construction activities are low-carbon.

Level 4 – Asset owners

Finally, various types of asset owners will be able to claim that their buildings are made with low-carbon cement or concrete. This level includes different types of entities, but only one entity at this level may claim a specific certificate.

Real Estate owners/developers: Owners of the final buildings constructed, could be individuals or institutional investors.

Public sector stakeholders: Government agencies and institutions involved in public construction projects (mainly infrastructure).

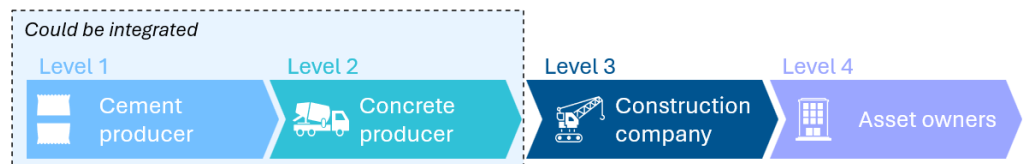
Other asset intensive businesses: Companies in sectors such as data centers, utilities, or retail that own and manage large-scale physical assets, often requiring significant construction investments.

These indirect customers will be able to pass and claim the certificates, always within the registry.

Categorizing value chain players into these four levels prevents double-counting and guarantees that all Scope 3 claims remain compatible throughout the value chain.

When registering, a participant must specify its level within the value chain. If an organization operates across multiple levels, it should select all applicable levels.

EXHIBIT 7 | Cement & Concrete value chain roles



4.2. Processes and timings for the generation, claiming and reporting of certificates

This section outlines the permitted actions within the registry. It also includes preliminary time limitations for each action, which will be reviewed and adjusted following the external engagement and pilot phases.

Certificate generation or “Booking”

Cement producers first manufacture clinker and/or clinker-equivalent, which is then used in cement production. To ensure the environmental impact is real, certificates will only be generated once the physical low-carbon cement or clinker has been sold and has entered the market.

Cement producers will have to certify Near Zero (or A/B low-carbon level in case those are included as eligible) production and Non-proportional Mass Balance proper methodology application before they can issue certificates.

Timing parameters for verification, recognition and issuance will be defined in *Appendix 2 (pending finalization)*. These parameters must ensure that data remains current and auditable, prevent backdating or speculative issuance, while considering the operational reality of the cement industry.

When booking a certificate, a token will be generated in the blockchain network, which will be fully traceable.

Organizations seeking to generate or book certificates in an Uncoupled model must be first approved by the registry owner. During account creation, the registry will request information to verify that the company is generating certificates at the highest level of integrity.

Claiming & co-claiming

The initial claiming of certificates may be executed by any eligible entity within levels 2, 3, or 4 of the value chain. Any customer within the Uncoupled model is entitled to directly purchase certificates from the cement producers.

Once a certificate is claimed for the first time, it becomes attached to the product consumed and can then be co-claimed along the value chain, both down and up the value chain.

For instance, if a construction company acquires the certificate, the asset owner of the building under construction can then co-claim it. The construction company will be required to designate the recipient in the registry, which will then automatically assign the certificate to that entity.

Similarly, if an asset owner purchases the certificate, the construction company responsible for project execution, further upstream, may co-claim it.

Certificates will remain valid only for a defined period after issuance, applying to both claiming and co-claiming along the value chain. Establishing a clear validity timeframe is essential to prevent accumulation without use, to ensure timely application in line with natural accounting cycles, and to safeguard the environmental credibility and operational effectiveness of the scheme. Specifics will be detailed in *Appendix 2 (pending finalization)*.

Reporting

After claiming the certificate in the registry, participants will be able to use the certificates for its different uses – for example, for its Scope 3 accounting and reporting (under the assumption that the model will be accepted by GHGP and SBTi) or for getting green building certifications (also under the assumption that the model is accepted by building label owners such as USGBC, BRE or DGNB).

Certificates should be used for Scope 3 accounting and reporting, only if these have been claimed within the natural accounting period. For green building certifications and cases related to the physical building – rather than to a specific volume of concrete consumed – statements can be made at any point in time after the certificate has been claimed.

Forward purchasing

Offtake agreements are essential to scaling up low-carbon cement production by providing developers with the demand certainty needed to unlock investment and bring new technologies to market. Forward purchasing of CoC certificates for low-carbon cement should follow clear and consistent rules to ensure environmental integrity, contractual clarity, and market credibility.

First, agreements should only become binding once the underlying project reaches Final Investment Decision (FID), unless the contract includes specific conditions precedent linked to project milestones. Forward contracts should define key terms including volume, duration, delivery conditions, and remedies for default, ideally following standardized frameworks adapted from adjacent sectors like SAF or green hydrogen.

Each certificate in the offtake agreement must correspond to a verified ton of Near Zero (or A/B if included) cement and shall be issued, transferred, and retired through an audited registry to prevent double-counting. Buyers must also commit to applying the certificates transparently and follow strict Rulebook standards.

Certificates shall only be registered and tokenized once they have been issued, or within a short, clearly defined time window. Offtake agreements themselves may remain outside the registry, being treated as private commercial instruments. Accordingly, while the registry records the issuance and retirement of the contracted certificates in line with the offtake schedule, the corresponding “unlabeled” physical product shall be sold and reported using the applicable residual emission factor, as set out in *Appendix 2 (pending finalization)*, thereby keeping physical and attribute flows consistent and preventing double counting.

4.3. Verification and auditing

Verification is a foundational pillar of a Chain of Custody scheme, ensuring that the issuance, transfer, and retirement of certificates reflects real and measurable decarbonization impact. The verification process guarantees the credibility of claims made using the system, supports trust from buyers and regulators, and underpins alignment with international standards.

In alignment with ISO 13662 “Mass Balance”³ and ISO 13659 “Book & Claim”⁴, verification applies at the point of certificate generation and during transfers and retirement, including confirmation of the accuracy and integrity of:

- Greenhouse gas emissions data from production sites
- Application of Non-proportional Mass Balance (Non-proportional MB) rules
- Certificate issuance volumes
- Registry entries and ownership transfers
- Certificate retirement and claims attribution
- *(Only applicable for CCS-decarbonization projects)* Certificate of storage

In all cases, verification activities shall conform to standards of competence, impartiality, and consistency, and should be conducted by independent, competent and accredited bodies under ISO/IEC 17029¹⁴ or ISO/IEC 17065¹⁵ frameworks.

Verification Bodies must be independent, competent organizations recognized under international conformity assessment schemes.

Aligned with ISO 13659⁴ section 6.5, the scheme enforces multiple safeguards against double-counting that must be verified:

- One certificate per emission reduction event
- Retirement of certificates before claims can be made
- Disallowance of multiple claims against a single certificate (Scope 1/2 vs. Scope 3 separation)
- Unique registry identifiers for certificates
- Rules for residuals

In the event of a breach, verification bodies have the authority to execute withdrawal, invalidation, or reissuance of affected certificates.

Registry Operator must also ensure the traceability of verified certificates and that only authorized entities are permitted to submit claims, request transfers, or initiate retirements.

Each certificate-issuing entity must undergo annual verification to confirm compliance. All data must be retained for a minimum of five years and must be made available for audit upon request.

5. System acceptance and compatibility with compliance/ voluntary schemes

The scheme has been designed with methodological robustness and forward compatibility in mind, aiming for alignment with key regulatory and voluntary frameworks.

Although many standard-setting bodies are still finalizing their positions on Chain of Custody models, likely requirements and constraints have been integrated from the outset. The scheme will be updated as needed to reflect future guidance and ensure it remains credible, applicable, and widely accepted.

This section outlines the main regulations and standards the scheme is intended to align with, goal always being to maximize CoC scheme value for buyers.

5.1. Overview of scheme acceptance and engagement plans with key stakeholders

The target is to maximize the value of the Chain of Custody system and ensure that certificates can be used across the widest range of applications – corporate GHG inventories accounting, Scope 3 target meeting, participation in green procurement tenders or making product-level disclosures.

Standard-setting bodies define how emissions are measured, attributed, and disclosed, and their formal acceptance will determine whether CoC certificates are recognized as valid instruments in both voluntary and compliance frameworks, including:

Science-Based Targets initiative (SBTi)

The scheme aims to ensure that CoC certificates can be used to meet Scope 3 emissions reduction targets.

While SBTi currently allows these in specific sectors (e.g., SAF in aviation), broader applicability – especially for cement – is not yet established. SBTi's *Net Zero Corporate Guidance* is under revision, and the aim of GCCA is CoC (incl. Book & Claim) certificates to be accepted as valid instruments for meeting Scope 3 targets in future versions.

Greenhouse Gas Protocol (GHGP)

GHGP sets the foundational rules for corporate and value chain emissions accounting. Acceptance of market-based instruments such as CoC certificates for Scope 3 accounting is a central priority.

GHGP is revising both *Corporate Accounting Standard* and *Scope 3 Standard*, while also developing new guidance through its *Actions and Market Instruments* working group. GCCA seeks to ensure that CoC, and specifically B&C systems are treated as valid instruments for emissions accounting under these standards.

International Organization for Standardization (ISO)

ISO provides technical definitions and standards for emissions accounting, Chain of Custody, and Environmental Declarations. The B&C scheme aims to align with the following ISO standards (all under revision or being developed, except for ISO 21930¹²):

- *ISO 14077* (in development)⁹: Chain of Custody in LCA – will link emissions tracking methods with lifecycle assessments. Relevant to ensure that LCAs implemented and being monetized through the scheme are aligned.
- *ISO 14067*¹⁰: Carbon Footprint of Products – provides guidelines for product-level carbon accounting (LCAs). Relevant for ensuring recognition of CoC approaches - B&C methodology in carbon footprint calculations.
- *ISO 13662* (under development)³: Mass Balance – clarifying the rules for mass balance attribution, critical for free attribution models. Scheme is aligned with the draft version.
- *ISO 13659* (under development)⁴: Book & Claim – defining how B&C systems are structured and verified. Scheme is aligned with the draft version.
- *ISO 21930*¹¹: Environmental Product Declarations (EPDs) – defines rules for EPDs in construction. The scheme seeks recognition of B&C-compatible accounting methods within future versions of this standard to enable certificates to be used for all EPD uses (e.g., public procurement policies, sustainable building certifications, building embodied carbon assessments etc.)
- *ISO 14060.2*¹⁷: Near Zero Aligned Organizations – will provide standardized accounting rules for organizations to claim Near Zero status

European Committee for Standardization (CEN/TC 350)

CEN governs EN standards for sustainable construction in Europe, particularly *EN 15804+A2*¹², the reference standard for EPDs. This standard will be enforced for drafting compulsory EPDs under the Construction Products Regulation (CPR)⁵.

A revision focused on CoC models' compatibility with the standard is currently underway. GCCA objective is to ensure that this revision allows the use of Non-proportional Mass Balance or B&C as legitimate methods for emissions attribution in EPDs. This is essential for product-level claims to be compatible with the CoC scheme.

Being able to attach B&C certificates to EPDs would allow the scheme to be used for all the current relevant uses of EPDs (e.g., public procurement policies, Scope 3 inventory accounting etc.).

Engagement with standard setters is essential to ensure the system's compliance with these standards, building its credibility and usability. Securing recognition from key standards will allow companies to fully leverage CoC certificates – across reporting, target-setting, and market applications – and strengthen the industry's position in the low-carbon transition.

6. Conclusions

This Rulebook lays the foundation for a new Chain of Custody (CoC) system tailored to the cement and concrete industry. It introduces a standardized way to finance deep decarbonization through product certificates – using Non-proportional Mass Balance/Book & Claim models – to enable the decarbonization of the industry, always ensuring traceability, credibility, and alignment with international standards.

Several key elements have already been defined, including:

- Technology agnosticisms
- Accounting principles for product certificates
- Geographic boundary
- Technical eligibility criteria for certificate generation
- Functional unit
- Roles and responsibilities along the value chain
- Exact emission thresholds eligible for monetization (pending inclusion of A/B low-carbon levels)

However, some design decisions remain open, including the potential inclusion of A/B low-carbon levels, as well as the finalization of Appendix 2, which will detail specificities related to emissions accounting and processes and timings for the generation, claiming and reporting of certificates.

Moving forward, the focus will be on:

- Validating the design choices and finalizing scheme design by incorporating external vision from buyers and other stakeholders
- Launching a public consultation period for the Rulebook to gather additional feedback and refine the system
- Engaging with standard setters (e.g., SBTi, GHGP, ISO, CEN) to secure recognition and maximize value of certificates
- Piloting the scheme in real-world settings
- Defining the governance model for the scheme

This is the first step to a larger process. The Rulebook will continue to evolve as the industry tests, learns, and engages with stakeholders. Its success will depend on broad collaboration to build a system that is both credible and usable – unlocking investment in deep decarbonization and supporting the sector’s Net Zero goals.

Glossary

Additionality

Determination of whether an intervention, such as increased demand for a product or the creation of a new project, has an effect (i.e. increased impact) when compared to the baseline (i.e. absence of such demand or project)

Attribution

Assignment of specified characteristics to outputs or part of outputs (Source: ISO /DIS 13659)

Audit

Systematic, independent, and documented process to obtain and evaluate audit evidence objectively to determine the extent of audit criteria fulfilment (Source: ISO 19011:2011)

Book

Generation of Book & Claim certificates corresponding to the exact quantity of certified material with specified characteristics

Book and Claim model

Chain of custody model in which the administrative record flow does not necessarily connect to the physical flow of material or product throughout the supply chain (Source: ISO 22095:2020)

Certificate

Administrative document that is issued, tracked, and retired within a book and claim system, the ownership of which confers the unique right to claim consumption or use of specified characteristics upon retirement (Source: ISO/DIS 13662:2025 – Referred to as “*Transferrable instrument with entitlement to claim (TIEC)*”)

Chain of Custody

Process by which inputs and outputs and associated information are transferred, monitored, and controlled as they move through each step in the relevant supply (Source: ISO 22095:2020)

Claim

Declared information regarding the specified characteristics of a material or product (Source: ISO 22095:2020)

Credit

Representation of the quantity of attributable *units* with entitlement to claim the ownership of specified characteristics (Source: ISO /DIS 13659)

Double-counting

Accounting for inputs or outputs or specified characteristics more than once (Source: ISO 14050:2020)

Emission categories

Scope 1 emissions include the direct emissions from assets that are owned or controlled by the reporting company

Scope 2 emissions are indirect emissions from the production and distribution of electricity, heat and steam purchased by the reporting company for use in its own logistics sites, electric vehicles or other owned assets requiring electricity

Scope 3 emissions are indirect emissions from the reporting company's supply chain
(Source: GHGP)

Non-proportional Mass Balance

Equivalent to the mass balance credit method applying non-proportional attribution (ISO/DIS 13662)

Functional unit

Unit of reference for the certificate, emissions being measured against it

Fungibility

The property of a certificate to be interchanged with other certificates

Input

Material or product that enters the organization or part of the organization (Source: ISO /DIS 13659)

Mass balance model

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.

For the mass balance model two implementation methods are specified, rolling average percentage method ("Proportional") and credit method ("Non-proportional Mass Balance"). (Source: ISO 22095:2020 - modified)

Output

Material or product that leaves an organization or part of an organization (Source: ISO 22095:2020)

Primary data

Quantified value of a unit process or an activity obtained from a direct measurement, or a calculation based on direct measurements at the original source

Registry

Digital application with a data storage system for the purpose of registering, holding, transferring, and retiring Book & Claim Units (BCUs) in association with ownership information

Residual mix

Attributes of products or materials, within the boundary of a book and claim system, for which no certificates are retired nor specified characteristics allocated within any other reliable tracking system (Source: ISO /DIS 13659 - modified)

Verification

Confirmation of a claim, through the provision of objective evidence that specified requirements have been fulfilled (Source: ISO/17029:2019)

Abbreviations

BRE	Building Research Establishment
CoC	Chain of Custody
CO ₂ e	Carbon dioxide equivalent
DGNB	Deutsche Gesellschaft für Nachhaltiges Bauen
DRM	Decarbonated Raw Material
EF	Emission Factor
Non- proportional MB	Non-proportional Mass Balance
GHG	Greenhouse gas
GHG-P	Greenhouse Gas Protocol
GO	Guarantee of Origin
GWP	Global warming potential
IDDI	Industrial Deep Decarbonization Initiative
ISO	International Organization for Standardization
LCA	Lifecycle assessment
PCF	Product Carbon Footprint
REC	Renewable Energy Certificate
SAF	Sustainable Aviation Fuel
SBTi	Science Based Targets Initiative
SCM	Supplementary Cementitious Material
USGBC	U.S. Green Building Council

References

- 1 [The GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete](#)
- 2 Estimates based on BCG analysis. Estimates based on current technologies and construction methods could vary depending upon geography, decarbonization technology applied and other factors.
- 3 ISO/DIS 13662, Chain of custody - Mass balance - Requirements and guidelines
- 4 ISO/DIS 13659, Chain of custody - Book and claim - Requirements and guidelines
- 5 [Construction Products Regulation \(CPR\)](#)
- 6 [GCCA Global Ratings for Cement](#)
- 7 ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework
- 8 ISO 14044, Environmental management – Life cycle assessment – Requirements and guidelines
- 9 ISO/WD 14077, Environmental management – Life cycle assessment – Requirements and guidelines for application of Chain of Custody (CoC) approaches in Life Cycle Assessment (LCA)
- 10 ISO 14067:2018, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification
- 11 ISO 21930:2017, Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- 12 EN 15804:2012+A2:2020, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- 13 [IDDI Whitepaper – Driving consistency in the Greenhouse Gas Accounting System – A pathway to harmonized standards for Steel, cement and concrete](#)
- 14 ISO/IEC 17029, Conformity assessment – General principles and requirements for validation and verification bodies
- 15 ISO/IEC 17065, Conformity assessment – Requirements for bodies certifying products, processes and services
- 16 ISO/WD 14060.2, Net Zero Aligned Organizations

Appendix 1.1. Calculation of carbon footprint for cement products

A1.1.1. Principles and EPD reporting

The scheme quantifies the carbon footprint (CFP) of each clinker-equivalent product using a cradle-to-gate Environmental Product Declaration (EPD) that complies with ISO 14025 and EN 15804. The EPD covers life-cycle modules A1-A3 modules (raw-material supply, transport, manufacture). Global-Warming Potential (GWP) is reported for A1–A3; module A4 (down-stream transport) may be included at the producer’s discretion. The declared unit is 1,000 kg of clinker-equivalent product. Any reduction in emissions are linked to the product solely through the single-site Non-proportional Mass-Balance (Non-proportional MB) at input level calculation; module A4 emissions remain outside the ledgers’ balancing scope.

Each production site prepares one EPD per clinker type, using normal operating data and without embedding ledger-related adjustments.

Important note in relation to compliance with EN 15 804 and ISO 14025

There are some differences in accounting between the two standards that are either immaterial and/ or irrelevant (co-product allocation, life cycle module, recarbonation) for the sake of this B&C scheme.

Where relevant this rulebook provides the rules for accounting – this is the case for

- Gross versus net emissions reporting
- Permanent storage of biogenic carbon

Global-Warming Potential is calculated with the EF 3.1 characterization factors (IPCC 2013, 100-year), the dataset recommended by the EU’s Environmental Footprint reference package and adopted in the GCCA industry tool. Carbonation is not to be included in GWP for B&C as is outside module A1-A3 – it is part of the use phase and end-of-life.

Additionally, within its cradle-to-gate (A1–A3) boundary, the scheme includes all emissions arising from the implementation and operation of decarbonization projects (covering process, material, and capture routes). For product accounting, Gross CO₂ is adjusted to include these project-associated emissions, allocated to the declared clinker quantity. Detailed operationalization and accounting procedures will be set out in *Appendix 2 of this Rulebook (pending development)*.

A1.1.2. LCA/EPD tools

EPDs must be generated with pre-verified LCA or EPD tools whose models and databases are locked and recognized by an ECO Platform programme operator. Acceptable options include:

- The GCCA Industry EPD Tool for clinker, cement and concrete

- Other national or commercial generators that have obtained “EPD tool with individual verification” or “fully integrated EPD tool” status under the ECO Platform Tool Verification Guidelines

Custom models are allowed only after equivalent third-party tool verification.

A1.1.3. Data

Primary (site-specific) inventory data for fuels, electricity, kiln operation and on-site decarbonization must be ≤ 5 years old and cover 12 consecutive months. This mirrors the GHGP Product Standard and ISO 14044, which both require current, representative data to avoid historic footprints.

Secondary data may come from peer-reviewed databases (e.g. ecoinvent v3.10) or independently verified supplier EPDs, provided those datasets are less than 10 years old. This balances data quality with the practical update cycle of major LCA libraries.

Electricity is modelled with the location-based grid mix unless the producer holds valid energy-attribute certificates that cover part of the consumption; any uncovered share uses the residual mix. That hybrid approach follows ECO-Platform tool-verification guidance and the GHGP Scope-2 hierarchy (market- and location-based).

Any Environmental Product Declaration used for scheme purposes (e.g., booking, issuance) must be no older than 12 months at the time of use. Age is measured from the EPD issue/verification date; where the EPD specifies a data-collection period, that period shall cover 12 consecutive months and end within the past 12 months.

A1.1.4. Organizational coverage

The term organization refers either to a single, specific production site or to a chain consisting of two or more sites where the product is physically transferred from one site to another for further processing (site-to-site). The EPD must always refer to a specific product—such as a particular cement type—from one production site. However, in cases where the product undergoes physical transfer during processing, the EPD must cover the entire production chain.

A1.1.5. GHG coverage

Global-Warming Potential is calculated with the EF 3.1 characterization factors (IPCC 2013, 100-year), the dataset recommended by the EU’s Environmental Footprint reference package and adopted in the GCCA industry tool.

Two values are reported:

- **Gross GWP** – includes fossil CO₂ from waste-fuel combustion, reflecting total stack emissions.
- **Net GWP** – excludes those waste-fuel emissions, following EN 15804’s “polluter pays” allocation rule, which assigns waste-handling impacts to the waste generator.

Publishing both numbers satisfies differing national programme practices and mirrors current GCCA EPD guidance. Biogenic carbon is treated as climate-neutral under EN 15804. Permanent storage of that carbon is not yet credited in construction-product footprints, so any biogenic CO₂ that leaves the system boundary remains excluded from the product's declared GWP. The volumes are linked to certificates or product attribution but logged separately for transparency until the standard is updated.

Appendix 1.2. Equivalences table for functional units

This section will describe in detail how units pertaining to the cement value chain—specifically cement tonnage, concrete volumes (m³), and alternative binder quantities—will be consistently converted into clinker-equivalent tons. These conversions will form the basis for the future issuance of Near-Zero, A, and B clinker-equivalent certificates, as clinker-equivalent is the defined functional unit of this scheme. To accomplish this, the scheme will develop and implement a comprehensive set of equivalence tables. These tables will be issued and periodically updated under a GCCA technical protocol to ensure consistency across applications.

These equivalence tables will be verified independently by accredited third parties, regularly updated, and maintained transparently. By translating diverse, product-specific information into a single functional unit, the tables will underpin all future certificate transactions, ensuring consistency, credibility, and integrity throughout the system.

A1.2.1. Cement-to-clinker equivalence

The first equivalence table will translate reported cement tonnage into clinker-equivalent tons. This step is critical, as certificates will be explicitly based on clinker equivalents. To accurately perform this translation, the future registry will determine two essential factors: the percentage of clinker within each cement type and the share of the cement's total cradle-to-gate Global Warming Potential (GWP) specifically attributable to clinker production.

Environmental Product Declarations (EPDs) typically report only the total GWP for cement, covering life-cycle modules A1–A3. Cement producers rarely disclose precise clinker content or clinker-specific emissions separately within their EPDs. However, in cases where cement producers do provide this detailed information, the registry will use these producer-specific primary data directly. More commonly, in the absence of such detailed disclosures, the registry will rely on standardized estimation methodologies.

When primary, plant-specific data are unavailable, the registry will apply default clinker-content percentages equal to the highest clinker factor within the applicable EN/ASTM range for the declared cement type. These defaults will be based on typical cement formulations defined by recognized standards, always selecting the highest value in the relevant range to provide conservative approximations for wide ranges (e.g., CEM III blastfurnace cement 5–64%), while incentivizing producers to disclose accurate clinker content. Additionally, to identify emissions specifically attributable to clinker production, the registry will use published regional clinker-production emission factors from the GCCA 'Getting the Numbers Right' (GNR) dataset wherever available, based on the most recent complete calendar year. Where suitable GNR data are not available, the registry will establish and maintain appropriate, updated regional clinker-production emission factors, which will be independently verified. These regional emission factors will be derived through independent verification, considering average kiln technologies, regional fuel mixes, and local electricity grids. Accredited third-party

verifiers will review and update these regional factors every six months to ensure ongoing accuracy and relevance.

EXHIBIT 8 | Clinker content by type of cement – Illustrative & non-exhaustive

Clinker-to-Cement Ratios
% clinker content in cement type

Cement Type	Clinker Content (%)
CEM I (OPC)	>95%
CEM II Portland-composite cement	65–94%
CEM III Blastfurnace cement	5–64%
CEM IV Pozzolanic cement	45-89%
CEM V Composite cement	20–64%

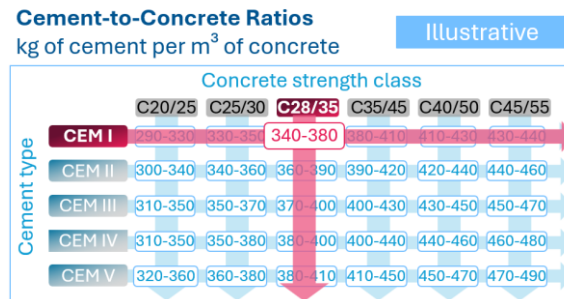
When no specific data are available, the registry will systematically translate any declared cement tonnage into clinker-equivalent tons using the upper band limits. The exact factors and fallback methodologies will be further specified in the forthcoming GCCA equivalence tables technical protocol.

A1.2.2. Concrete-to-clinker equivalence

The concrete-to-clinker equivalence table will convert declared concrete volumes, typically reported in cubic meters, into clinker-equivalent tons through a clear, two-step future process. Initially, the registry will translate declared concrete volumes into cement tonnages, and subsequently, it will convert cement tonnage into clinker-equivalent tons, as outlined in section A1.2.1.

Initially, the registry will establish verified cement-content factors, indicating tons of cement typically required per cubic meter of concrete for each specific combination of concrete strength class and cement type. These cement-content factors will be derived from authoritative industry sources, such as regional concrete mix-design statistics, market surveys, and regularly published regional concrete production data. Accredited third-party verifiers will independently review these factors on an annual basis, ensuring that they remain representative and aligned with evolving market conditions.

EXHIBIT 9 | Cement-to-concrete Ratios – *Illustrative & non-exhaustive*



In addition to determining cement content, the registry will also need to estimate the proportion of the total concrete cradle-to-gate emissions specifically attributable to clinker production. Since concrete LCAs typically provide only aggregate emissions (without separating clinker-specific emissions), the registry will implement a structured regional approach to address this gap. First, the registry will estimate the share of total concrete emissions attributable specifically to cement production, using verified regional averages. These standardized conversion factors will be detailed in the forthcoming GCCA technical protocol. Then, it will apply the regional clinker-specific emission factors developed in section A1.2.1 to quantify the emissions arising solely from clinker production within the cement.

A1.2.3. Alternative binders and their equivalence to clinker

Alternative binders encompass emerging cementitious materials, including alkali-activated binders, electrochemically-produced binders, and other novel chemistries that differ substantially from conventional cement. Due to their diverse properties, developing a single comprehensive equivalence table for all alternative binders will not initially be feasible. Therefore, the scheme will adopt an incremental and flexible approach: an evolving equivalence table that progressively integrates new, commercially ready binders as they enter the market, provided they meet the scheme’s emission-factor eligibility criteria (Near-Zero, A, or B).

When a new alternative binder producer seeks to enter the scheme, the producer will submit a comprehensive technical dossier to the registry’s expert panel. This dossier will include independently verified data on the binder’s chemical composition, mechanical performance, durability, and a cradle-to-gate Life Cycle Assessment (LCA), prepared following ISO 14044 standards.

Using these verifiable technical and functional specifications, the expert panel will identify the closest commercially available conventional cement type whose performance characteristics align most closely with those of the alternative binder. This selection may involve a series of controlled laboratory and field tests, performed by accredited third-party entities, objectively determining the functional and technical equivalence to conventional cement types.

Once an appropriate reference cement is selected based on these assessments, the panel will typically assign a mass-equivalence factor, most commonly 1:1, meaning one ton of the binder directly corresponds to one ton of the identified reference cement. The registry will then apply the cement-to-clinker equivalence calculations outlined previously (section A1.2.1). By determining the clinker content of the reference cement, the registry can derive the final emission factor (kg of CO₂ per ton of clinker-equivalent) from the binder's verified LCA.

Given the rapidly evolving nature of alternative binders, each listed binder's equivalence will undergo re-evaluation at intervals no greater than twelve months. In addition, the registry will initiate immediate re-evaluation if significant changes occur in the binder's production processes, raw materials, or formulations that could materially affect functional or emissions characteristics. Accredited third-party verifiers will regularly review and verify this information, maintaining continuous accuracy, credibility, and market transparency within the incremental equivalence table.

Thus, this incremental equivalence table ensures an accurate, transparent, and flexible method for integrating innovative alternative binders into the registry, allowing them to generate clinker-equivalent certificates aligned with established, market-accepted cement benchmarks.

To ensure methodological consistency across all cases, GCCA will develop a dedicated technical protocol specifying the clinker-equivalence factors for cement, concrete and alternative binders, as well as a certified approach for general building information. This protocol will provide exact figures and standardized conversion methodologies, enabling the registry to generate third-party verified approximations of clinker content where primary data are not available. By relying on standardized, transparent factors, the system will ensure reliable and comparable estimations across the value chain. The protocol will be maintained and updated by GCCA to reflect evolving practices and will be subject to the same independent verification processes described in the following section.

A1.2.4. Third-party verification for equivalence tables

Given their pivotal role in ensuring accurate and reliable issuance of clinker-equivalent certificates, all equivalence tables outlined above will undergo stringent and regular third-party independent verification. Accredited third-party verification bodies, selected for their impartiality and competence, will periodically review and verify the data underpinning each table.

Specifically, default clinker-content percentages and regional clinker emission factors within the cement-to-clinker equivalence table will undergo independent verification at intervals no greater than six months. These verifications will confirm that averages remain representative, regionally accurate, and regularly reflect evolving industry practices and local market conditions.

Similarly, the concrete-to-cement equivalence table, incorporating cement-content factors for each combination of concrete strength class and cement type, will undergo

independent audits at least annually. These audits will ensure that cement-content factors remain accurate, regionally representative, and responsive to shifts in market practices.

For alternative binders, each new product's initial equivalence determination will require third-party verification upon entry into the registry. Following initial approval, all listed binder equivalences will be re-verified at intervals no greater than twelve months, or sooner if significant product or process modifications occur.

Through detailed and regular audits, the registry will uphold the highest standards of transparency, credibility, and consistency across all equivalence tables. Every table revision will be numbered, documented, and traceable, providing a clear and reproducible audit trail for all clinker-equivalent certificates issued. This systematic verification will guarantee the ongoing integrity and market credibility of the registry's equivalence tables and, consequently, of all certificates issued.

Appendix 1.3. Illustrative views on registry and interface

EXHIBIT 10 | SAF illustrative example for calculating SAF certificate needs

SAF example | The SAF B&C scheme shows that calculations can rely on averages and the registry does not need to necessarily speak on functional unit terms

Two options for calculating SAF certificate need

Individual travellers

- Customers introduce travel information in the marketplaces in an easy and understandable way

The screenshot shows a flight booking form with fields for 'From', 'To', 'Class', and 'Passenger(s)'. A 'SKYNRG' logo is visible in the top right corner.

- Travel emissions are calculated using industry averages and calculates certificate needs



- Carbon emission calculations follow the **IATA Recommended Practice**
- Calculations **consider multiple parameters**, including:
 - Aircraft fuel consumption
 - Seat configuration
 - Historical load factors from over 400 airlines

Corporate travels

- Normally use a travel portal to book flights (e.g., Amex) and these calculates emissions using standardized EFs



- Afterwards, corporates access the registry (e.g., SAFc) to buy the required emission reductions

The screenshot shows the 'SAFc REGISTRY' interface with input fields for 'Units to retire (tonnes of SAF)' (value: 23,256) and 'Tonnes CO2e abated' (value: 80). A label points to the output as 'Tonnes of SAF or tCO₂e abated'.

Key takeaways

- Registry **should be easy to use and understandable** for the customer, with no need to speak in functional unit terms
- Averages can be used** to bridge data known by final consumer (travel) to emission sources (fuel consumption)

EXHIBIT 11 | Illustrative view of registry's Customer Interface

Illustrative view of how the registry could solve for traceability

Non-exhaustive

Customer would enter consumption information in the registry in the units they know and understand

The screenshot shows a form titled 'Decarbonize your cement and concrete' with sections for 'Fill your consumption information', 'Select your product type', 'Enter strength class', 'Cement base type', 'Enter the consumed volume', 'Do you need to calculate it?', 'Enter the building type and dimensions', and 'Enter your abatement target'.

The platform will calculate clinker equivalence and provide decarb. options to the customer

The screenshot shows the same form as above, but with a 'To reach for your abatement target of XX%' section and a 'Get to know your options' section listing 'Near Zero' and 'Low carbon A' options with their respective certificates and kgCO₂e/ton values.

EXHIBIT 12 | Visual illustration on registry's role as equivalence table standard setter

The registry could bridge the gap by calculating clinker equivalence, making the scheme simpler and more understandable for the final customer

