Structuring Demand for Lower-Carbon Materials

An Initial Assessment of Book and Claim for the Steel and Concrete Sectors

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About RMI

RMI is an independent nonprofit, founded in 1982 as Rocky Mountain Institute, that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that will cut climate pollution at least 50 percent by 2030. RMI has offices in Basalt and Boulder, Colorado; New York City; Oakland, California; Washington, D.C.; Abuja, Nigeria; and Beijing.

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Introduction

Acknowledging the urgent need for rapid carbon emissions reduction in order to stay well below 1.5°C of warming, companies are increasingly expanding their climate commitments to account for and deeply decarbonize their supply chains. For many organizations, this includes reducing their steel and concrete emissions. This has increased the demand for lower-carbon steel and concrete, yet procuring these materials is challenging. Thus, these sectors require innovative approaches to accelerate and scale decarbonization pathways.

There are several approaches that companies can take to address their material supply chain emissions, all of which can be impactful in driving decarbonization. The three prominent options for procurement in the materials sectors are:

1. **Direct procurement:** This is when organizations directly purchase a lower embodied carbon material from a producer or supplier and then use that material for their end use. When possible and accessible, companies should directly purchase physical products with lower embodied carbon as this is the most direct way to support lower-carbon markets and reduce supply chain emissions.

2. **Out-of-sector offset purchase:** Companies can also purchase a high-quality emissions offset (e.g., a removal credit) that does not necessarily address a specific sector or activity, but rather helps mitigate their emissions impact writ large across all sectors.

3. **In-sector environmental attribute certificate (EAC) purchase:**[i] Companies with limited influence on upstream and downstream suppliers can purchase a certificate representing the environmental attributes of a lower-carbon product within a materials sector found in their supply chain.[ii] These certificates thereby directly fund decarbonization activity in a sector represented in their supply chain.

Although all are important interventions for companies to consider in the path toward decarbonizing their value chains, the last approach — EAC purchases — is the core focus of this report.

EAC purchases are enabled by a standardized certificate mechanism that can be unbundled from the underlying product, transparently tracked, and delivered to customers separately. This chain of custody model is typically called "book and claim," but the approach is also frequently described as indirect procurement or virtualization; certificates are also frequently described as credits, tokens, or book and

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i Note that "EAC" can be used to describe a broader set of certificate mechanisms, but for the purposes of this report, EAC is used only to describe a certificate that represents the attributes of a product in an organization's value chain at a sectoral level.

ii EACs are best applied to technologies that are not at price parity with conventional products, and should be used to drive those technologies toward cost parity.

claim units (BCUs). These are all comparable terms. For the purposes of this report, we use the term "certificate" to represent the environmental attributes of the physical product, "book and claim system" to describe the infrastructure required to create and transact certificates, and "environmental attribute purchases" to describe the purchasing mechanism.

This report explains how environmental attribute purchases structured through a comprehensive book and claim system can support the decarbonization of the steel and concrete sectors. It also explores what market infrastructure is needed to facilitate environmental attribute purchases of steel and concrete, the current market state of play, and learnings from a pilot purchase exploration within these two sectors. Although we focus on steel and concrete supply chains (including iron and cement), many of the insights shared here may also apply across other materials.

Although the terms cement and concrete are sometimes used interchangeably, in this report we distinguish between them as follows. "Cement" specifically refers to the binder material used in concrete, and "concrete" refers to the building material composed of cement, water, and aggregate. Similarly, we use "iron" to refer to the base material used in steel production, and "steel" to refer to the building material composed of iron and carbon.

Why Decarbonize Steel and Concrete?

Production of materials accounts for a significant portion of global greenhouse gas (GHG) emissions. Globally, steel is the most emissive industrial sector and concrete is the second. When combined, these two sectors account for over 10% of global CO_2 emissions and half of heavy industrial emissions (see Exhibit 1).[1]

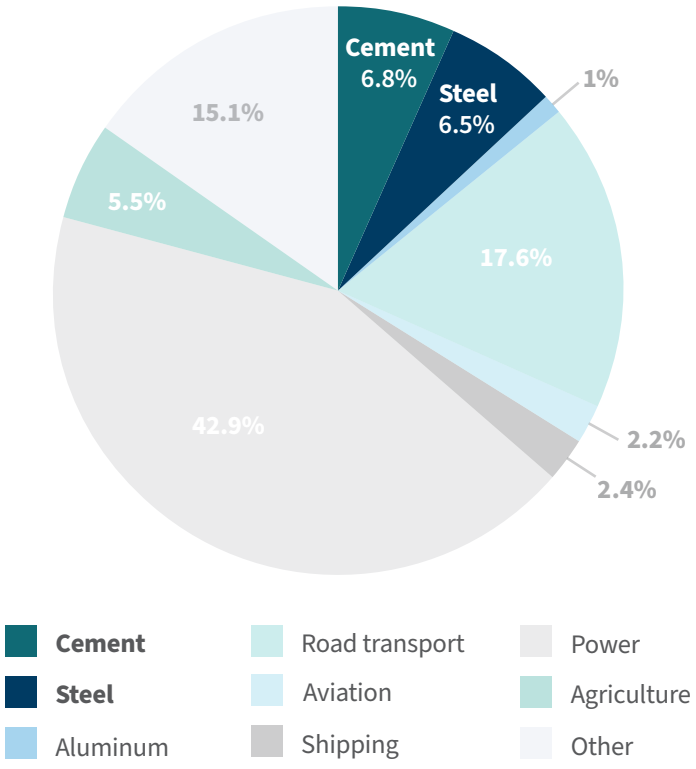
These materials are fundamental to our daily lives. Concrete is the most used material in the world, after water. Beyond its current uses, steel is an integral material for the energy transition, serving as a critical component of many technologies that deliver decarbonization, including wind turbines, electric vehicles, and advanced manufacturing processes.[2] Steel and concrete are also critical to providing sufficient housing and the infrastructure needed to achieve sustainable development goals. By 2050, rising global populations and urbanization are expected to increase concrete demand by 20%,[3] and steel demand by 30%.[4] Although material efficiency, substitution, adaptive reuse, and densification efforts can pare down this additional demand, it is clear that overall steel and concrete demand will remain substantial into the future.

Decarbonizing steel and concrete is foundational to achieving our climate and broader societal goals. However, to move the needle on the decarbonization of these complex commodity sectors, we need to effectively enable capital to flow toward lower-carbon materials production infrastructure if we are to move beyond what today's markets can require, enable, and incentivize.

Exhibit 1

Global GHG emissions by sector

CO_2e, 100 year



RMI Graphic. Source: RMI analysis of ClimateTRACE data, 2024.

Why Are Organizations Interested in Investing in Lower-Carbon Materials?

Leading organizations are setting climate targets that take into account their full supply chain emissions. As these organizations take stock of their carbon inventories, they are finding that in order to meet their goals, they will need ways to decarbonize the materials within their supply chains. For example, in its 2024 sustainability reporting Microsoft stated that "the rise in [its] Scope 3 emissions primarily comes from the construction of more datacenters and the associated embodied carbon in building materials, as well as hardware components such as semiconductors, servers, and racks. [This] reflects the challenges the world must overcome to develop and use greener concrete, steel, fuels, and chips. These are the biggest drivers of [Microsoft's] Scope 3 challenges."[5]

Although datacenters may be unique to technology organizations such as Microsoft, nearly every organization has materials somewhere in its supply chain. For some, such as general contractors, concrete and steel are front of mind because daily interaction with these materials provides a clear lens to observe their respective impacts on the supply chain. Yet for others, such as large technology companies, embodied emissions from concrete and steel are far less transparent because these companies are not typically involved in procuring materials for upstream activities (e.g., processing and fabricating) necessary to construct their offices (owned or leased),[iii] or in manufacturing their IT infrastructure and equipment.

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iii Tenants are not required by the Greenhouse Gas Protocol (GHGp) to account for embodied carbon in leased buildings in their Scope 3 inventory. However, all material emissions embodied in additional construction and renovation projects purchased by the tenant (e.g., tenant improvement projects) must be included.

Companies at the end of the supply chain are several stages removed from the producers of concrete and steel, yet the cradle-to-gate emissions of a company's contracted buildings and purchased materials are embedded in the supply chain and thus show up in their respective Scope 3 categories. Exhibit 2 uses a technology company's supply chain as an example of how embodied materials are accounted for within its Scope 3 inventory.

Exhibit 2 Accounting for steel and concrete emissions (embodied in buildings, hardware, and equipment) across a technology company's Scope 3 inventory

GHGp scope 3 categories	As technology company owner	As technology company lessee
Category 2: Capital Goods	Embodied emissions of new building, including material production (A1-A3) *(e.g., racks, servers, semiconductors, datacenters, corporate offices, R&D facilities, Experience Centers)*	Product stage (A1-A3) embodied emissions of **materials used for construction and renovation activities** *(e.g., tenant improvement projects)* purchased by Microsoft
	Product stage (A1-A3) embodied emissions of **materials used in critical infrastructure equipment** *(e.g., air handling units, generators)* and mechanical, electrical, and plumbing equipment	Product stage (A1-A3) embodied emissions of **materials used in new building components** purchased by Microsoft
Category 8: Upstream Leased Assets		(Optional) **Life cycle emissions associated with manufacturing or constructing leased assets*** *(e.g., datacenters, corporate offices, R&D facilities, Experience Centers)*

*Note: This is an example of how large companies that do not directly procure materials, like Microsoft, account for steel and concrete emissions today in their corporate carbon footprint. Additional guidance and approved methodologies will be necessary to ensure greater uniformity on how commodities are calculated and reported in corporate emissions inventories. Also note that the year in which embodied life-cycle emissions are reported by companies that operate leased assets has not yet been settled by Greenhouse Gas Protocol (GHGp) guidance.

RMI Graphic. Source: RMI analysis

How Can Organizations Decarbonize Their Supply Chains Beyond Directly Procuring?

Beyond the challenge of visibility of materials, final purchasers who do not directly procure materials face several logistical and economic challenges in making the necessary adjustments to reduce their supply chain emissions. Purchasers in long and complex supply chains are separated from the original supplier by multiple intermediary vendors. This requires the purchaser to incentivize and enable multiple decision-making entities in their supply chains to source from alternative suppliers; options can include ensuring effective cost premium pass-through or directing the physical flow of alternative materials through a web of supply partners. Further, with each additional tier in the supply chain, the end-user's influence is diluted, making it more difficult to encourage suppliers to accommodate new materials in existing manufacturing processes, especially if not all of their clients are willing to pay for those alternatives.

Book and claim certificates allow organizations the opportunity to leverage their role at the end of the supply chain by channeling funds directly to alternative material producers upstream via certificate purchases. This means targeting investment in impactful interventions within the sectors where a significant portion of the embodied emissions in their carbon footprints are sourced. By serving as a catalyst within the clean commodity market, organizations can decarbonize their supply chains and, pending claims guidance from existing reporting standards, meet their Scope 3 targets.[iv]

Book and claim is a model currently leveraged by multiple industries, including electricity, aviation, and maritime shipping, among others. It combines accounting verifiability with purchasing flexibility, allowing the environmental attributes from a lower-carbon alternative to be decoupled from the physical product and credibly "booked" by a producer. This creates a separate certificate that allows buyers who may not have physical access to (or normally contract directly for) a decarbonized product to "claim" the emissions reductions benefit in their emissions inventory (see Exhibit 3, next page). This allows additional supply chain actors the ability to invest in in-sector decarbonization, expanding the demand pool for lower-carbon products.

> **Book and claim certificates allow organizations the opportunity to leverage their role at the end of the supply chain by channeling funds directly to alternative material producers upstream via certificate purchases.**

These certificate purchases enable producers of lower-carbon products to overcome cost burdens that may arise from the creation and distribution of new materials in the supply chain. It also sends two crucial signals to the market: that there is a demonstrated and bankable demand for alternative low- to zero-carbon products, and that supply must scale to meet it.

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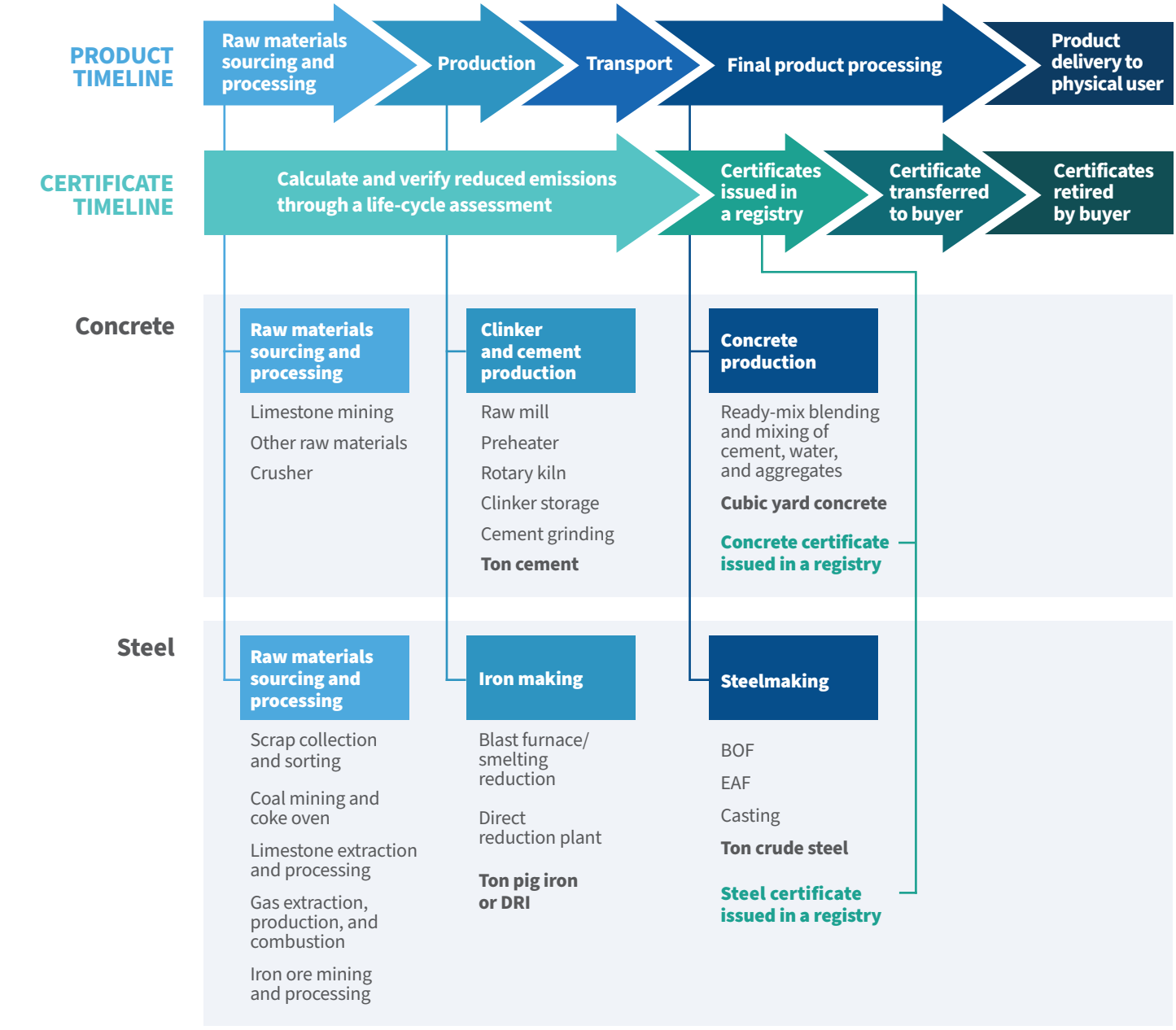
iv International climate disclosure standards such as the GHGp and Science Based Targets Initiative are still in the process of developing rules for how buyers should make certificate claims against Scope 3 inventories.

However, in order to be successful, book and claim systems require comprehensive and standardized market infrastructure that ensures certificates are verified, additional, and catalytic.

Exhibit 3

Steps of book and claim for concrete and steel



Note: The point in the supply chain where certificates are created — at the near-final product stage or further upstream — is a key design choice with trade-offs to either option. While this exhibit illustrates a certificate mechanism based on concrete and crude steel, this design decision will need further discussion and refinement to ensure that the subsequent standards and system design strike the right balance between these complex considerations.

RMI Graphic. Source: RMI analysis

Examples from Other Markets: Renewable Electricity and Sustainable Aviation Fuel

The renewable electricity market operates a well-established example of a book and claim model via renewable energy certificates (RECs). RECs, also known as Guarantees of Origin, I-RECs, and TIGRs in various regions, represent the environmental attributes of a megawatt hour of electricity produced by, for instance, solar or wind projects. These attributes can be decoupled, sold, and purchased separately from the electricity itself.

RECs convey the most impact today when purchased through a power purchase agreement (PPA), or through a virtual PPA (VPPA) where the buyer is not physically offtaking the electricity, just purchasing the associated environmental attributes. PPA and VPPA are long-term certificate purchase agreements that maintain the linkage between the certificate and its funding to a specific production asset, for example, a wind or solar farm. Both types of agreements channel the certificate funding toward the capital and operational costs of that site. And because PPAs and VPPAs typically operate as long-term purchase contracts, they provide the guaranteed demand needed to demonstrate bankability and unlock the funds to finance the capital costs of developing the site. PPAs and VPPAs and the environmental attributes that enable them are fundamental drivers of the successful expansion of renewable electricity markets.[6]

A similar book and claim mechanism is gaining momentum in the sustainable aviation fuels (SAF) market,[v] called a SAF certificate (SAFc), which represents the environmental benefits of a metric ton of neat (unblended) SAF. SAF incurs a significant price premium over conventional jet fuel, so it also needs innovative mechanisms to overcome cost barriers and promote development of production infrastructure to scale. SAFc purchases are happening today, including purchases by companies such as Microsoft and other members of the Sustainable Aviation Buyers Alliance.[7]

How Does Book and Claim Catalyze Decarbonization?

Book and claim approaches expand the market for clean commodities by allowing stakeholders who do not typically procure materials directly to still invest directly in the lower-carbon materials market. Because book and claim systems can rigorously track and validate certified environmental attributes throughout the supply chain, buyers can have increased confidence that the certificate they are purchasing represents verified and additional emissions reductions that have the potential to, when scaled, spur deep decarbonization across the relevant sector. This is increasingly important as the current landscape of lower-carbon product claims (i.e., existing environmental labels and declarations) offers buyers low levels of comparability and assurance that their purchases have sectoral impact (see *Checking It: Certification Schemes* for more detail).

Although book and claim systems have significant potential to channel impact, checks must be in place along the way to increase confidence that every purchase of a certificate will deliver its expected outcome. We see three criteria — verifiable, additional, and catalytic — as foundational metrics in evaluating the impact of a book and claim certificate. See *Appendix: Procurement Guide* for additional information about how to evaluate an offering against these metrics.

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v SAF is jet fuel created from alternative feedstocks — wastes, residues, and byproducts that replace crude oil as the source of carbon and hydrogen. It currently represents less than 0.1% of jet fuel supply globally but its market penetration is growing annually.

- **Verifiable:** Through third-party site-level product certification standards, independent auditors can verify the environmental attributes of a product's supply chain to assure buyers that the emissions intensity reflected in each attribute purchase is credible and accurate. For example, a company seeking to reduce its Scope 3 emissions from steel purchasing can buy an EAC "booked" by a producer that has verified its production site to meet a near-zero emissions threshold by independent auditors based on a certification standard such as ResponsibleSteel.

- **Additional:** A buyer should ensure its certificate purchase is additional, that is, it supports the expansion of lower-carbon materials markets that would not have existed without the certificate purchase. Financial and regulatory additionality of a certificate purchase can be evaluated using project-specific details regarding relevant regulatory requirements and how certificate funds are allocated (see *Appendix: Procurement Guide* for additional guidance).

- **Catalytic:** Purchasers should also try to ensure that their certificate purchases are enabling outcomes that are consistent with the transitions needed to decarbonize a sector, in terms of the underlying technologies and their potential to scale.

Securing sufficient demand for existing or new lower-carbon materials production infrastructure is in large part enabled by the additional pool of buyers that a book and claim system can unlock. Because the transaction does not require the purchase of the physical product, buyers can be located in geographies or segments of the supply chain that would not ordinarily enable purchasing from the producer. Additional demand segments capable and willing to pay a premium may prove critical for a producer to justify investment in lower-carbon technologies, particularly if there is an insufficient willingness to pay among local customers or the organizations who traditionally directly procure the physical product.

When tied to a forward contracting model, the additionality of book and claim purchases is further strengthened, as certificates are explicitly tied to the financing and viability of new lower-carbon materials production facilities. This is particularly important for accelerating capital-intensive technology transitions necessary to stay on track with a 1.5°C-aligned pathway. For example, in the steel sector, reducing emissions requires converting conventional blast furnaces to clean hydrogen-based direct iron reduction (DRI) plants. Investing in green hydrogen-based steelmaking requires capital expenditure in the billion-dollar range, as well as additional financing to secure the appropriate supply partners to build the enabling upstream infrastructure (e.g., green hydrogen production, storage, and transmission). By leveraging certificate purchases in a forward contracting mechanism, a producer can secure offtakes for a sufficient share of capacity from a new certified lower-carbon steel production plant, and provide the certainty required by financers to support a final investment decision.

If approaching markets alone, buyers may not have significant enough demand to interest a producer or secure appropriate terms for offtake. Fortunately, the broadened demand pool enabled by book and claim purchasing can allow buyers to send a larger signal to indicate the significance of existing market opportunity that can boost the necessary infrastructure development. Commitment platforms and pledges such as First Movers Coalition (FMC) and Climate Group's SteelZero among others have already made significant strides toward demonstrating a large existing demand pool for lower-carbon products. With proper levels of assurance, a book and claim system is one way leading corporations can invest directly in lower-carbon materials markets to make good on these commitments.

Book and Claim Is Not the Only Model — The Role of Other Chain of Custody Models and Direct Procurement

Tracking specific information (like sustainability criteria) through complex supply chains functions on a spectrum. These range from physical segregation, which is incredibly stringent and does not allow any mixing, to mass balance, which is much more flexible and allows mixing, to book and claim, which allows complete decoupling of the physical supply chain and the related information (see Exhibit 4, next page).

In steel and concrete, information is typically tracked through environmental product declarations (EPDs), which are linked to the physical product. Book and claim, as noted above, is uniquely well suited to unlock tricky chicken-and-egg challenges in early stage and complex markets. However, it is not the best choice for every supply chain and every procurement circumstance, and particular focus should be given when establishing book and claim infrastructure alongside incumbent systems, like EPDs, to ensure harmony between the two structures.

If a company can and does directly purchase cement and concrete or steel, it should prioritize this where it is possible for them to physically source lower-carbon options (leveraging a mass balance, controlled blending, or even a physical segregation chain of custody model). However, achieving scale quickly through solely physical procurement will challenge most companies from a product transportation and cost point of view, let alone a transparency and access standpoint.

How Is a Book and Claim Certificate Different from a Carbon Credit?

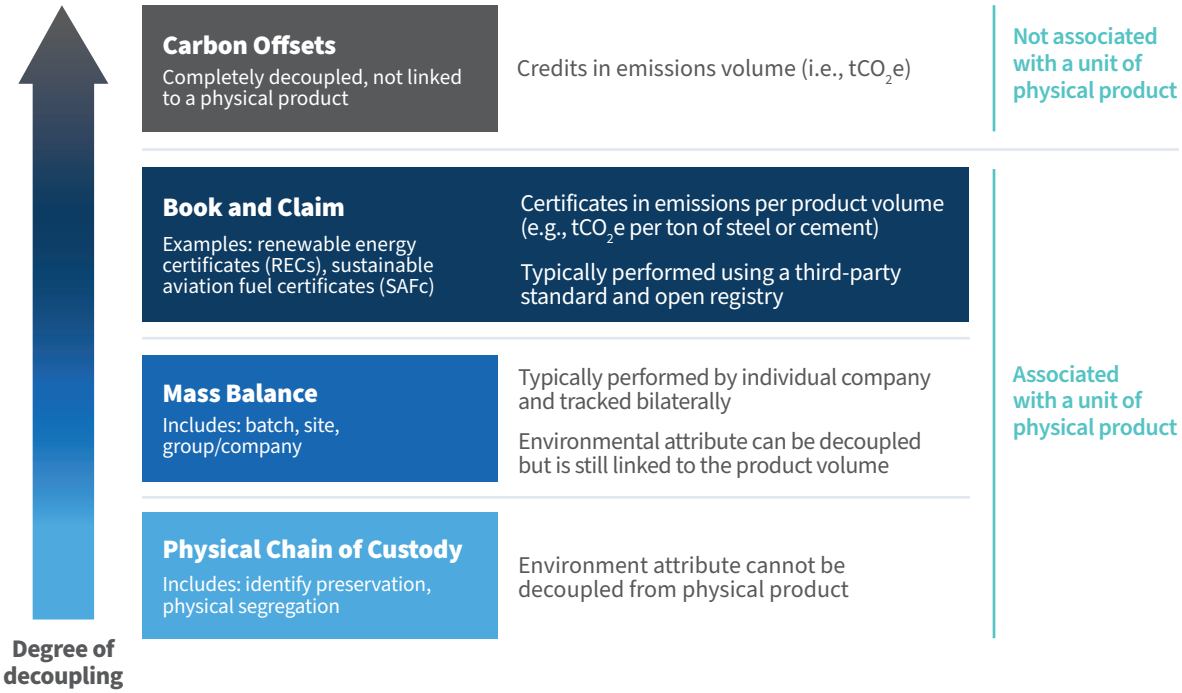
A book and claim certificate differs from a carbon credit in two primary ways:

1. **A book and claim certificate is linked to a physical product**, and the certificate's units are both the product's unit (e.g., cubic yard of ready-mix concrete) and the environmental attributes (e.g., tons of CO_2) associated with that unit of physical product.

2. **A book and claim certificate directly corresponds with a supply chain activity**, for example, addressing concrete use from constructing a new building with a concrete book and claim certificate. Conversely, a carbon credit typically represents an emissions reduction, avoidance, or removal activity outside of the value chain, without needing to demonstrate a direct correlation between an emissive activity and the intervention (e.g., covering emissions from electricity use with planting trees).

Book and claim certificates represent more specific value chain interventions as compared with carbon offsets because the certificate remains tied to a specific product volume that displaces a conventional product in the company's physical supply chain. This approach makes it easier for purchasers to ensure that the emissions impact is tied to the same sector and in the relevant volume for their supply chain.

Exhibit 4 The spectrum of product and credit models



Note: For further details on differences between various chain of custody methods, refer to **ISEAL**.

RMI Graphic. Source: RMI analysis, ISEAL, **https://www.isealalliance.org/get-involved/resources/iseal-guidance-chain-custody-models-and-definitions**.

A note on concrete carbon credits: A handful of carbon credit methodologies (both removal and reduction credits) do exist in the concrete sector, for example, the VERRA methodology for CO_2 utilization in concrete production.[8] These credits represent an intervention in terms of carbon emissions reductions, whereas EACs, used in the book and claim model, represent the carbon intensity of a product volume.

Although both are legitimate market mechanisms that can support investment in lower-carbon products, the book and claim model is a more appropriate approach because it uses an attributional accounting approach, which is also used in corporate Scope 3 emissions inventories. Conversely, carbon credits use a consequential accounting methodology, which results in different accounting methodologies being applied to a company's Scope 3 emissions inventory. Additionally, by being linked to a physical product, this model can provide more granular information about the underlying product and its environmental attributes.

Is Book and Claim a Logical and Catalytic Mechanism for Decarbonizing Steel and Concrete?

Book and claim is a logical chain of custody model when any of the following conditions are present:

1. The organization looking to decarbonize cannot directly procure or does not normally contract with the supplier of the lower-carbon product directly.

2. Geographic or infrastructural limitations prevent the lower-carbon materials from being used directly in the organization's facilities.

3. There are high financial costs and infrastructure investments needed to produce or expand the lower-carbon product that flexible purchasing can uniquely support by expanding the pool of demand.

Many steel and concrete decarbonization pathways and purchasing circumstances share these conditions, making them strong candidates for book and claim (see Exhibit 5, next page). However, the materials sector still has many challenges that must be uniquely considered when designing book and claim systems. These challenges include:

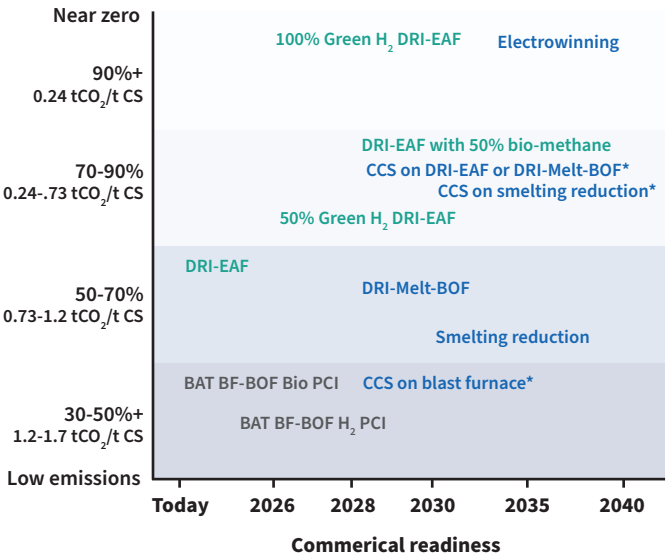
1. **Lack of a singular or uniform product:** For example, in concrete, precast and ready mix are both common end products, and the products within these categories vary significantly in end use — high compressive strength ready-mix concrete for high rise versus lower compressive strength blends for sidewalks — and carbon intensity. Further, different regional geographies also vary in carbon intensities. This complicates baselining as it significantly increases the quantities of and variability within the emissions baselines needed to account for reductions.

Exhibit 5

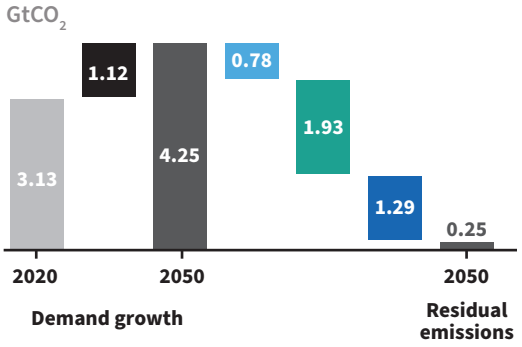
Leading lower-carbon technology pathways and expected commercial availability in steel and concrete

STEEL

Emissions reduction potential from average BF-BOF



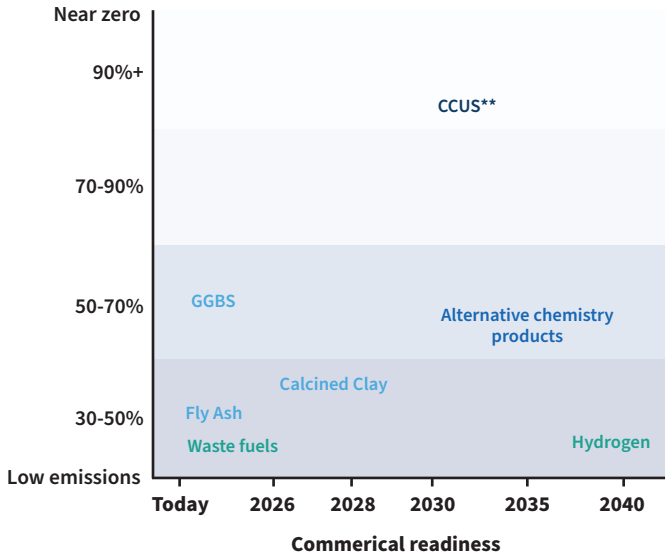
Annual emissions (Scope 1 and 2) reduction per decarbonization lever



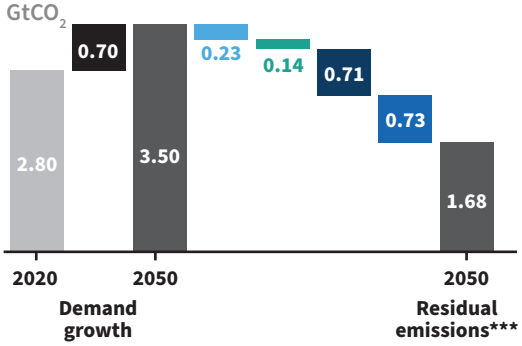
- **Secondary steelmaking:** Increasing availability and usage of scrap
- **Direct reduction ironmaking:** Iron reduction with natural gas, green hydrogen and bioenergy
- **Other low-carbon technologies:** Include low-carbon tech, novel technologies, and point-source carbon capture utilization and storage

CONCRETE

Emissions reduction potential from ordinary portland cement



Annual emissions (Scope 1 and 2) reduction per decarbonization lever



- **Supplementary cementitious materials**
- **Fuel switching**
- **Carbon capture utilization and storage**
- **Other low-carbon technologies:** Includes efficiency in design and construction, decarbonization of electricity, efficiency in concrete production, and alternative production methods

Note: BAT = best available technology; BF = blast furnace; BOF = blast oxygen furnace; CCS = carbon capture and sequestration; CCUS = carbon capture utilization and sequestration; EAF = electric arc furnace; GGBS = ground granulated blast-furnace slag; and PCI = pulverized coal injection. Mission Possible Partnership sector transition strategy reports for steel and cement provide more detail about each of these technologies and the archetypes; *assumes capture rate of 50%; **assumes capture rate of 90%; ***excludes emissions reductions from natural recarbonation.

RMI Graphic. Source: RMI analysis; Mission Possible Partnership, Making Net-Zero Steel Possible, https://3stepsolutions.s3-accelerate.amazonaws.com/assets/custom/010856/downloads/Making-Net-Zero-Steel-possible-steel.pdf; Mission Possible Partnership, Making Net-Zero Concrete and Cement Possible, https://www.missionpossiblepartnership.org/making-net-zero-concrete-and-cement-possible-report/

In a mature market, buyers may opt to prioritize purchasing EACs from a product in a specific geography for a particular material end use (i.e. ready-mix C30 concrete in California) to more clearly map their investments to their physical materials footprint. However, as the market emerges, mapping a certificate to both the geography and end use of a material is likely unrealistic; accepting a less granular definition of the geography and end use may be necessary and is sufficient.

2. **Supply chain complexity causing a lack of visibility for product end-users:** As discussed previously, supply chains can be extremely long and complex such that material producers and asset owners are completely disjointed. An additional complexity within concrete production is the sheer number of producers. In the United States alone there are more than 90 cement plants and over 8,000 ready-mix concrete plants varying in size from small family-owned businesses to large vertically integrated corporations. Extra care is needed to ensure each step of the supply chain is accounted for and that sufficient data is transferred between steps to allow for both the creation and purchase of the certificate, and maintain the accounting integrity associated with the product. Understanding the volume of materials in a purchasers' supply chain is critical to enabling accurate and comprehensive purchasing of certificates to use toward a corporate's emissions inventory. This will require standard-setting bodies to develop additional guidance and methodologies for calculating and reporting commodity quantities in corporate carbon footprints. There are ongoing efforts to help companies that are not large direct buyers understand their cement and steel footprint – which is key to an even stronger demand signal.

3. **Potential double counting risk through the existing environmental product declaration (EPD) system:** Because EPDs are the leading mechanism for lower-carbon material tracking in the steel and concrete materials sector, it is important to understand the expected interaction of certificates with on-product claims such as EPDs or other product carbon footprints (PCFs). On-product claims via EPDs (or otherwise) could present a risk of double counting emissions reductions.

   For example, if the emissions savings in a certificate are recorded by the certificate purchaser and then again by the purchaser of the physical product(s) from which those emissions reductions originated via the information in the EPD, this would result in multiple parties claiming the same emissions (double claiming). In other markets (e.g., electricity) this is addressed through a dual-reporting approach and the use of residual emissions estimates. For buyers seeking to understand the makeup of the physical product they are using, interoperability of an EPD and book and claim system potentially using a similar approach will be needed to ensure attributes are not double counted across multiple corporate inventories.

4. **Lack of uniform accounting methods:** Widely agreed-on standards for emissions accounting and reporting are necessary to support transparency, credibility, and comparability of product-level emissions claims for the materials sector. Although some methods and norms for emissions accounting exist — EPDs convey a level of certified emissions information, and some carbon credit methodologies targeting specific technology interventions can be used as a placeholder — they are not fully fit for purpose. And in cases where thorough methodologies do exist, such as the ResponsibleSteel International Production Standard, they lack widespread adoption.

These differences do not prevent book and claim from being a useful model in the materials sector, but they must be kept in mind when building the market infrastructure.

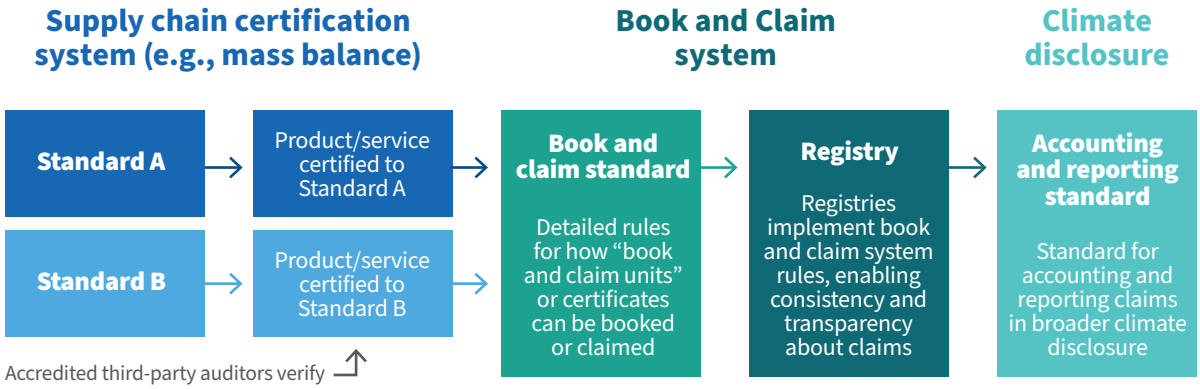
What Infrastructure Is Needed to Enable a Robust Book and Claim Approach?

Because book and claim systems involve completely separating the environmental attributes from a physical product, they require extra attention to detail on a number of fronts to ensure that these mechanisms do in fact deliver impact. In order to do so, they must guarantee the quality of the certificate and the comprehensiveness of the process and must be easy to use for all system users, including materials producers and certificate purchasers.

To ensure the system effectively enables decarbonization efforts, book and claim systems need several carefully designed parts to ensure standardization and transparency at each step.

Robust book and claim systems require certification schemes, purchasing and contracting processes, registries, and reporting guidelines (see Exhibit 6). However, it is important to note that the market infrastructure can grow in parallel and there is no need to wait until all infrastructure is in place to begin exploring purchases. In fact, this is critical to signal demand, demonstrating to infrastructure developers and materials producers that there are certificate buyers interested in using their systems and products. Diligence steps and measures for participating in markets with incomplete infrastructure are outlined in *Microsoft's Pilot Process: Lessons Learned* and *Appendix: Procurement Guide*.

Exhibit 6 **Book and claim infrastructure steps**



RMI Graphic. Source: RMI analysis

Checking It: Certification Schemes

The foundation of a book and claim system is true decarbonization within the sector. As a critical first step, the physical product must be independently verified to meet sustainability criteria via an established certification process that provides assurance to a buyer about the accuracy of the claims it will make about

the product's attributes. These certification systems typically include a detailed accounting methodology, which can provide consistency in evaluating comparable products.

EPDs — and specifically the underlying product category rules (PCRs) that specify the life-cycle assessment rules[9] — are a helpful starting point. However, many PCRs/EPDs lack the granularity to be directly suitable for a book and claim system, both in terms of being tied to primary data on products and emissions from individual sites as well as being regularly (e.g., annually) updated.

Nonetheless, in principle, appropriately granular PCRs (aligned up to the point at which the environmental attribute is separated from the product) could serve as the underlying mechanism for independent assessment of the environmental attributes of a product, enabling methodological consistency between the EPD use case and the book and claim use case, and facilitating their interoperability. This could also facilitate the uptake of both systems and limit duplication of work as well as cost. At a minimum, a book and claim certification system can build off existing emissions inventories used to create EPDs (or report site-level emissions) to limit the reporting burden on suppliers.

Alongside EPDs, third-party independent standards (such as the ResponsibleSteel International Production Standard[10]) can provide a credible foundation for a certification system need to underpin a book and claim system. However, in some sectors, including cement and concrete, there is not yet a comparable comprehensive methodology and certification system that serves to provide assurance on attribute claims across the product spectrum. Various accounting methodologies exist that target specific cement and concrete products and component technologies, but there is an opportunity to take a more comprehensive and fit-for-purpose approach to sustainability certification for cement specifically and concrete as a whole in light of the transition needed for the sector.

For either the EPD/PCR or third-party independent standard approach, consistency in use is critical. For example, in the steel sector, companies have begun developing "green-branded" products that use a myriad of different accounting techniques to support various definitions of "green." These approaches do not consistently follow guidance from existing internationally recognized frameworks for PCFs, making it difficult for product buyers to understand and have confidence in the product offerings.

This lack of transparency and standardization across accounting frameworks and reporting schemes weakens the comparability between products and the credibility of environmental claims, both of which are necessary to enable the procurement of lower-carbon products today and near-zero carbon products in the future and thus achieve sector-wide decarbonization. A book and claim system can help to overcome these issues by aligning buyers on a common definition for product-level emissions.

Defining It: Standards

Just as certification schemes provide consistency and assurance about how products are labeled, a standard that defines a specific book and claim use case (e.g., book and claim for concrete) provides the framework needed for market actors to structure transactions and registries. Standards define the details of who should do what, when, and with which information in a sector to ensure that double counting does not occur between the physical sale of the product and the sale of the certificate, effectively safeguarding the credibility of book and claim systems.

Standards should be developed by an independent entity in consultation with a broad spectrum of stakeholders and include a clear governance process to make sure that the approach is practical and clear across every relevant use case, avoiding multiplication and confusion.

Although broader standards such as those of the International Organization for Standardization (ISO) can help structure an initial approach,[11] there is a need to harmonize a more granular approach sector by sector to instill confidence in users and broader recognition organizations.

Tracking It: Registries

A registry is a trusted platform that ensures that certificates represent real impact and are accounted for appropriately. Users need a well-governed system that can repeatably issue certificates with the same rules, track their ownership, and house a transparent record of who has "retired" — and can claim — each unit. Such a system, which adheres to a commonly accepted standard, creates an auditable trail of who can use these emissions reduction claims, and actively mitigates double counting risks. Finally, after certificates are retired in a registry, consumers can claim them toward climate disclosure frameworks.[12]

Counting It: Reporting Guidelines

Although there is no formal guidance today for reporting these claims inside an emissions inventory, both GHGp and the Science Based Targets Initiative (SBTi) are in the process of developing comprehensive guidance for market-based mechanisms such as book and claim for addressing Scope 3 emissions:

1. In 2023, GHGp launched a process to update its standards,[13] including a dedicated survey and call for proposals on the role of market-based accounting approaches and project accounting methods. GHGp plans to provide guidance in an upcoming standard to address the role of such methods — specifically methods for quantifying and reporting reduced or avoided emissions compared with a baseline scenario — in GHG emissions reporting and target setting.

2. In November 2023, the SBTi initiated a call for evidence on the effectiveness of the use of EACs in corporate climate targets. In April 2024, the SBTi released a statement acknowledging that the utilization of EACs for abatement purposes in Scope 3 emissions could serve as an additional mechanism, if supported by strong policies, standards, and procedures based on scientific evidence.[14] The SBTi plans to release draft guidance on this by July 2024.

Although there is not formal guidance today for reporting these claims inside an emissions inventory, there are efforts underway to create a clear path for climate disclosure of certificates.[vi] Both GHGp and SBTi have not specified a method for incorporating and disclosing lower-carbon materials certificate purchases within a company's inventory — Scope 3 in this case. Until such guidance is provided, we recommend using a dual-reporting model similar to what GHGp requires for Scope 2 emissions. To dual report materials emissions, we suggest a company reports both its original total emissions ("location based") and the

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vi The AIM Platform as well as initiatives focused on specific sector use cases have developed or are developing guidelines companies can use to inform their disclosure in advance of formal GHGp and SBTi recognition of these mechanisms (in the context of GHG inventory and target setting).

reduced emissions reflecting certificate purchases ("market based") alongside each other. This approach transparently indicates the relative contributions of materials emissions activity and certificate purchases.[15]

Although GHGp and SBTi are on track to clarify how certificates can be reported across all sectors in the context of a GHG inventory, sector-specific stakeholders have an opportunity to further clarify best practices with respect to steel or concrete book and claim reporting. These best practices should be created with broad-based stakeholder input, including civil society, and consistently align with GHGp and SBTi guidance where possible.

Buying It

With this infrastructure in place, buyers will be able to contract directly with a producer or supplier for certificates, specifying the criteria and registry, and agreeing on other key terms. But there is significant value in entering the market and testing the concept with a supplier before this infrastructure is complete, while taking appropriate due diligence precautions for the critical impact measures. See *Microsoft's Pilot Process: Lessons Learned* and *Appendix: Procurement Guide* for more details.

Entering new markets with new tools can be daunting and difficult. Buyers associations or platforms can serve as a key resource for buyers to support early purchases, define common impact criteria, facilitate collective procurements to share and reduce risk, and effectively ensure high-quality offtakes for first-of-their-kind purchases.

Spotlight: Sustainable Steel Buyers Platform

Buyers platforms such as RMI's Sustainable Steel Buyers Platform ("the Platform") can help enable large purchasers to stimulate the supply of near-zero emissions steel necessary to achieve their supply chain targets. In coordination with the FMC, the Platform is pooling the collective steel demand of an initial group of climate-ambitious corporations to support the development of the first near-zero emissions steel facility in North America.

Individual offtake agreements will be structured using a direct procurement model or a decoupled market mechanism (i.e., book and claim) to address the needs of both direct and indirect buyers of steel. To enable indirect purchasing, RMI will work with the platform's buyers and other industry stakeholders — including steel suppliers, nongovernmental organizations (e.g., FMC, Ceres, SteelZero), and sector experts — to design the market rules, governance, and infrastructure (e.g., registry) needed to purchase via a book and claim method. A portion of this purchase is expected to serve as the initial pilot for the book and claim mechanism, which can then be utilized for similar subsequent transactions.

Building the Infrastructure

All of these infrastructure components need to be designed with users in mind in order to reach across and scale up the market. Sustainability certifications should have and convey integrity, but they need to be transparent and achievable for lower-carbon material producers as to not hamstring production. Registries should likewise be built for ease of use with an attention to detail and be able to accommodate the needs of both the producer that is doing the "booking" and the certificate purchaser doing the "claiming."

Regardless of the sector, book and claim systems require high amounts of collaboration from stakeholders across the entire system — from standards setters to product producers to registry operators to certificate purchasers. Establishing strong relationships across all stakeholders, including civil society and standards setters, is crucial for creating consistency and clarity, reducing duplication, enabling interoperability, and maximizing system ease of use and overall success.

Microsoft's Pilot Process: Lessons Learned

To explore the state of the market and the viability of book and claim for lower-carbon steel and concrete, Microsoft pursued pilots in both sectors. Microsoft decided to pursue EAC product offerings that could help it better understand the state of the market and the approach needed to deeply address its concrete and steel footprint. Recognizing the lack of existing frameworks and defined best practices, these pilot efforts were designed to test the boundaries of procurement criteria. Below are the primary lessons learned from that process.

1. The market is in its early stages, so products have not been developed with a book and claim approach.

There is a limited market of certificates available for purchase today and those identified did not meet the book and claim certificate criteria outlined in this report. Certificates should be traceable to a physical product, account for significant and verifiable emissions reduction claims, and support technologies that will catalyze sector-scale decarbonization (see *Appendix: Procurement Guide* for more detail).

Although many steel and concrete producers do not have an applicable book and claim offering today, there is growing interest in developing and adjusting offerings toward a book and claim certificate model. The willingness of these producers — and especially new market entrants — to develop and expand their product offerings to meet these criteria demonstrates the potential impact that first-of-their-kind purchases led by leading certificate and product buyers can have on a developing market.

Although certificate purchasers should aim to align with the principles described in this report and stimulate the development of high emissions-reduction solutions, they should ensure that perfection does not stand in the way of progress. Buyers can and should start somewhere, even if it is not yet ideal. This could look like trialing an initial short-term offtake agreement to test the model, or a longer-term partnership with suppliers that are willing to evolve their products collaboratively. Certificate buyers in early markets can be open to supporting product offerings that are good today and have a path to becoming great tomorrow.

Spotlight: Are Low-Emissions Steel Producers Ready for Book and Claim?

The current market for lower-carbon steel products generally falls into two categories: (1) those with high scrap fractions coupled with renewable energy purchases (or offsets) and (2) conventional steel products sold alongside a "certificate" that represents an allocated amount of up to 100% emissions reductions. Both product models would require changes to be suitable for a book and claim certificate model.

The high-scrap products can verifiably achieve significantly lower-than-average emissions on the product level because scrap-based steelmaking is much less energy intensive (compared with primary steel production from iron ore) and is already partially electrified (meaning that using renewable electricity can further substantially).

To date, suppliers have not shown appetite to decouple the environmental attribute from these products because a market for their lower-carbon scrap-based products already exists. There would also be a concern with structuring a book and claim system only around these products given that scrap's overall role in the sector's emissions reductions is limited by global scrap availability. This means that deeply decarbonized ore-based production is also necessary.

Currently, most emissions reductions in ore-based steelmaking come from efficiency or fuel-substitution projects at coal-based blast furnaces, with only minor (<5%) emissions reductions. Producers have created this second category of lower-carbon steel products by using an "internal carbon bank" approach, which stacks emissions reduction projects to synthetically achieve "zero-emissions" products. This approach pools emissions from interventions that cannot, on their own, achieve a sufficiently low product-level emissions intensity. As a result, these products are not directly suitable for a book and claim approach, which requires certificates to be directly tied to a product-level environmental attribute, using attributional as opposed to consequential accounting, as mentioned earlier. Further, the projects also suffer from the same concerns about their limited role in the sector's overall decarbonization.

However, reaching the additionality and scale needed for a high-integrity book and claim system with these products is possible if suppliers can expand their decarbonization strategies, for example, by using near-zero emissions ore-based inputs alongside scrap. This would also address the need for deeper decarbonization projects because lower-carbon ore-based technology (such as direct iron reduction) has a greater emissions reduction potential (e.g., 30%+) on the site and product levels.

The existence of green steel certificates in the market shows the desire on both the supply and demand side to accelerate emissions reductions. As suppliers expand their decarbonization strategies to invest in near-zero emissions technologies, the challenge for accommodating a book and claim system will be to build the confidence and know-how to credibly decouple the emissions attributes from certified products and enable their stand-alone purchase.

2. The market needs a stronger collective demand signal.

Although several suppliers were engaged in the opportunity to pilot the book and claim approach, some were not yet confident that the approach would be viable or become a large enough market to be worth their investment. One stand-alone purchase or partnership is not enough to shift the direction of the market, but organized demand can produce results. As new technology providers emerge and incumbent providers begin shifting their processes, the time is arriving for interested certificate purchasers and market stakeholders to align on ideal market outcomes and send a collective demand signal.

3. The market is hindered by a lack of fit-for-purpose accounting methods.

Widely agreed-on sectoral standards for emissions accounting and broader sustainability claims and reporting methodologies are critical to support the transparency, credibility, and comparability of product-level emissions claims. Although some methods and norms for emissions accounting exist — for instance, EPDs convey a level of certified emissions information, and some carbon credit methodologies targeting specific technology interventions can be used as a placeholder — they are not yet fit for purpose. And in cases where thorough methodologies do exist, adoption of these systems is still lacking.
The lack of consistent methodology adoption is due in part to the large variance in inputs and final products. Today, significant variability exists in the methods that suppliers use to calculate the environmental attributes of their physical products. To address this, it is essential to establish sectoral alignment with and market buy-in of existing accounting and reporting guidance from established standard-setting bodies (e.g., ResponsibleSteel). Greater alignment in accounting practices will help remove the complexity and confusion that hinder the transparency required for buyers to initiate sustainable and market-advancing procurement.

4. The market needs robust book and claim infrastructure to de-risk the approach.

Regardless of the sector, book and claim systems require certification schemes, standards, registries, and reporting guidance to operate and maintain integrity. Establishing each of these infrastructure pieces and optimizing their use requires buy-in and collaboration of stakeholders across each sector, from certificate buyers to producers to auditors to registry operators. Establishing strong relationships and governance across stakeholders is crucial to successfully building a commonly accepted and comprehensive book and claim certificate market that drives positive impact.

Next Steps

In order to formalize the book and claim infrastructure needed to scale this procurement approach in the steel and concrete sectors while maintaining integrity and supporting impactful interventions, collaboration is essential. Establishing strong relationships across stakeholders is crucial for ensuring practicality and credibility, reducing duplication, enabling interoperability, and maximizing system usability.

Steel and concrete sector stakeholders should focus on supporting the development of fit-for-purpose and practical certification schemes, sector-specific book and claim standards, registries, buyers platforms, and reporting guidance. However, perhaps most importantly, to bring these systems to life market-leading buyers need to align, aggregate their demand where possible, and take the first steps, ultimately paving a smoother path for the rest of the market.

Appendix: Procurement Guide

It can be daunting to begin the process of indirectly procuring lower-carbon materials. Below, companies can find a procurement guide for early market book and claim purchases of lower-carbon materials based on lessons learned from Microsoft's pilot process.

In early markets, RMI and Microsoft found that the process consists of two phases:

1. Early research and discovery
2. Contract review and technical deep dive

Each phase has its recommended actions, as outlined below.

Early Research and Discovery

This phase is primarily through desktop research and initial conversations. RMI and Microsoft developed a list of four question categories to investigate by combining Microsoft's Procurement Guiding Principles with questions that we found helpful along the way while exploring various companies. The first question in each numbered category outlines a fundamental requirement for a certificate to qualify, followed by explanations related to the guiding question. Finally, the bulleted questions are ones that companies can ask their supplier directly.

1. Are the lower-carbon material's emissions reduction claims significant, verifiable, and additional, and do they play a large role in the long-term decarbonization trajectory of the sector?

a. **Significant emissions reduction claims:** At its simplest, a lower-carbon material should be just that, responsible for a lower-carbon emissions profile than its traditional material counterpart. However, the significance of those reductions must meet the company's procurement standards. The reduction's significance be determined by its percent reduction as compared with the legacy option and other alternatives on the market. For example, a 40% emissions reduction when the other options on the market are 70%–80% emissions reductions is unlikely to be a high-quality choice, but if the market alternatives are 5%–10% emissions reductions, 40% may be a high-quality choice.

- What percent emissions reduction does the technology or product make possible?

b. **Verifiable emissions reduction claims:** High-quality emissions reduction claims depend on stringent and transparent emissions measurements. Where possible, emissions reduction claims should be verified by an independent third party.

- How do you calculate your emissions reductions? How do you track those reductions throughout the product supply chain, particularly upstream and for production processes?

- How are emissions reductions verified (e.g., independent third-party certification, comparative life-cycle assessment, PCF) to demonstrate the product-level emissions performance?

c. **Additional:** High-quality interventions create new net environmental benefits — beyond business as usual — to accelerate market development. A certificate purchase should stimulate the production of sustainable products that might not have transpired without investment.

- Does the short-term success of the technology depend on the certificate purchase (i.e., do certificates help overcome a capital expenditure that was preventing the technology from scaling)?

- Does the long-term business plan of the producer for the technology depend on certificate sales or are certificate sales an initial boost to help the technology achieve cost parity (the latter preferred)?

- How does the product interact with compliance regulations? Has the product already been mandated by a government requirement or supported via a subsidy or tax credit? Do these requirements negate the need for the certificate's funds?

- Where are the funds from the certificate purchase allocated?
  - Subtext: Is this information transparent and does it suggest with reasonable confidence that the lower-carbon product would likely not have been produced without the certificate purchase?

d. **Sector-wide impact potential:** Companies want to ensure they are investing in a technology that has the potential to scale into something that, if successful, would be able to achieve deep decarbonization across the sector. A technology that has 95% emissions reductions compared with the baseline but can only scale to 5% of market share may be a lower-quality option than a technology that has 70% emissions reductions compared with the baseline but has the potential to scale to 80% of market share.

- What is the long-term business model and ambition of the technology producer?

- Are there any limitations (e.g., feedstock, geography, energy use, final product demand) that would constrain the scaling potential of the technology?

2. How does its cost relate to its production context?

It is important to ensure that the selected technology has a pathway to widespread scale and decarbonization impact over time. New lower-carbon products are likely to cost more (i.e., have a "green premium") than the business-as-usual alternative. The goal is to prioritize investment in technologies that can scale production and seize rising market demand to ultimately drive down cost.

- If the lower-carbon product has already achieved cost parity with traditional offerings, what is the certificate sale funding, and does the producer expect this parity to remain constant?

- If the lower-carbon product is more expensive than the traditional higher-carbon alternative, requiring certificate purchases to cover the green premium, where is its cost concentrated, and how might that change over time?

- What subsidies have enabled the product's development — and what is the longer-term trajectory or viability of the provision of continued financial support?

3. Does the certificate represent both a unit of physical product and the environmental attribute associated with it?

A book and claim certificate, although most often purchased separately from a physical product, is defined in large part by its clear link to the physical product that embodies the environmental attributes of a claim. As mentioned in the body of this report, without this transparent link, a certificate would more closely resemble a conventional carbon offset. In other words, reporting a CO_2 reduction number is not sufficient; the unit of physical product that the CO_2 reduction number is associated with (e.g., ton of crude steel) must be reported alongside the emissions claim. If the certificate is just a CO_2 reduction number, then it is a carbon credit not a book and claim certificate.

- Does the certificate offering include both the emissions reduction metric as well as the unit of the distinct physical product to which it correlates?

4. Is there a clear indication of how the proposed certificates will interface with EPDs?

EPDs and PCFs are important mechanisms for purchasers to understand the makeup of their products. However, it is overwhelmingly clear that the use of on-product claims and an EAC for the same physical product will present a risk of double counting emissions reductions. For example, if the emissions savings in a certificate are recorded by the certificate purchaser and then again by purchaser of the physical product(s) from which those emissions reductions originated via the information in the EPD, this would result in multiple parties claiming the same emissions (double counting).

- How will you prevent both the certificate purchaser and the purchaser of the physical product from claiming the emissions reductions?

Contract Review and Technical Deep Dive

The second phase is more detailed, addressing questions that should be dealt with prior to contracting. These questions are written to be asked directly to the supplier but should be adjusted and selected based on each alternative material provider the company is exploring. Below are general questions with suggested modifications for common steel and concrete products.

1. Fund allocation

a. How is the funding from the sale/purchase of certificate allocated to existing or future mitigation activities?

b. What is the existing or expected cost of production, and what input cost assumptions are used? To what extent do external sources of funding cover the cost premium (e.g., public funding support, such as the Department of Energy's Office of Clean Energy Demonstration grants, hydrogen hub funding, and production tax credits provided by the Inflation Reduction Act)?

c. What rules and verification exist to ensure that funds from certificate sales are linked (allocated) to a seller's decarbonization projects (e.g., certificates are created and allocated to a buyer as close as practical to when the decarbonization activity takes place)?

2. Technology adoption

a. What technology does the producer use to deliver lower-carbon emissions iron, steel, cement, or concrete?

If iron or steel technology:

- What is the expected electricity consumption rate, iron ore grade, and, if relevant (i.e., natural gas–based DRI), the capture rate and methane leakage rate?

If cement technology:

- **Supplementary cementitious materials (SCMs):** What is the implied clinker inclusion rate? What is the carbon intensity of the clinker? Is carbon curing occurring, and if so, at what stage of the value chain and how much carbon is being stored? How much carbon is avoided, and how is it calculated? Where in the value chain does the SCM inclusion occur?

- **Carbon capture:** What is the capture rate? Is the carbon being stored or sold for utilization? How is the carbon being stored? What percent of the CO_2 is biogenic? If carbon is being utilized, how is it being used?

- **Other:** Have third parties verified that the intervention causes the purported carbon reduction? Are the purported carbon reductions achievable when the intervention is deployed at scale? Are the reductions primarily the result of avoided carbon (such as SCMs or alternative blends) or does the intervention reduce emissions?

b. What level of maturity has the technology achieved (R&D/lab, pilot testing, commercial)?

c. Do you face or anticipate any roadblocks or risks to the deployment of this technology (e.g., hydrogen infrastructure, transmission of renewable electricity)?

3. Project-specific questions

a. If the project is under development:

- What is the lead time for constructing/retrofitting the facility and what is the earliest feasible timeframe to produce and deliver lower-carbon steel or concrete?
- What level of maturity has the project achieved (e.g., concept study, pre-feasibility study, feasibility study)?
- What minimum length (in years) of commitment would the steel or concrete producer require from a buyer, through a long-term certificate purchasing agreement, to support the desired investment (and associated necessary funding)?
- Does the contract lay out a clear and transparent data collection and verification process to ensure the environmental attribute claim is accurate and valid?

b. What is the planned or actual annual production capacity of lower-carbon iron, steel, cement, or concrete?

c. What are future plans for further decarbonization (e.g., increasing clean hydrogen substitution for NG to 100% at a DRI plant)

d. What are the sectoral dependencies that feed into the product's emissions performance? Who are the supply partners (upstream and downstream)? For iron and steel, this is iron mining, beneficiation, and pelletizing processes, which all lie upstream from iron and steel production.

Glossary

Additionality
Additionality is a metric for evaluating whether the emissions reductions would have occurred absent the certificate purchase. Specifically, regulatory additionality assesses whether the activity is already required by and used toward meeting a regulatory obligation.

Book and Claim
Book and claim is a chain of custody model that allows environmental attributes to be decoupled from physical lower-carbon products or services that would ordinarily directly carry those attributes. This creates a separate certificate that allows buyers without physical access to lower-carbon products or services to financially enable the decarbonization of a sector and claim its benefits.

Catalytic
A certificate purchase is catalytic when it funds the expansion of a technology that has the capacity to play a large role in sector-wide decarbonization potential. The technology must both allow for significant emissions reductions on the product level and, when scaled, reduce a large share of emissions in the sector as compared with other decarbonization levers.

Certificate
A certificate 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 crude steel). For the purposes of this document, we use the term “certificate,” though this is also commonly referred to as a BCU, credit, or token.

Certification
Certification is the process of evaluating something (in this document, a supply chain’s sustainability) against a set of established criteria by an independent accredited auditor.

Double Counting
Double counting in book and claim systems refers to the erroneous, duplicate, or improper accounting of emissions reductions. This term encompasses three main scenarios: double issuance (duplicate creation of certificates for the same solution), double claiming (multiple parties claiming the same certificates), and double use (repeated utilization of a single certificate by the same party for multiple purposes).

Environmental Attribute
Environmental attributes are characteristics of products that represent specific sustainability aspects of those products. These attributes may include carbon intensity, GHG emissions reductions, and other sustainability characteristics.

Environmental Product Declaration

An EPD transparently reports objective, comparable, and third-party-verified data about a product's environmental performances from a life-cycle perspective. It differs from a book and claim certificate in that it must remain connected to the physical product whereas a book and claim certificate can be decoupled and purchased and claimed separately.

Green Premium

The green premium difference in price between the legacy product and the lower-carbon alternative product. If the lower-carbon product is higher in price than the legacy or traditional product, the cost differential is the green premium.

Mass Balance

Mass balance is a chain of custody model that allows blending of the lower-carbon product with a traditional product. The blend ratio is reflected in the environmental attribute of the final product.

Registry

A registry is a systematic collection of documented information or data that is organized and maintained according to specific requirements.

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