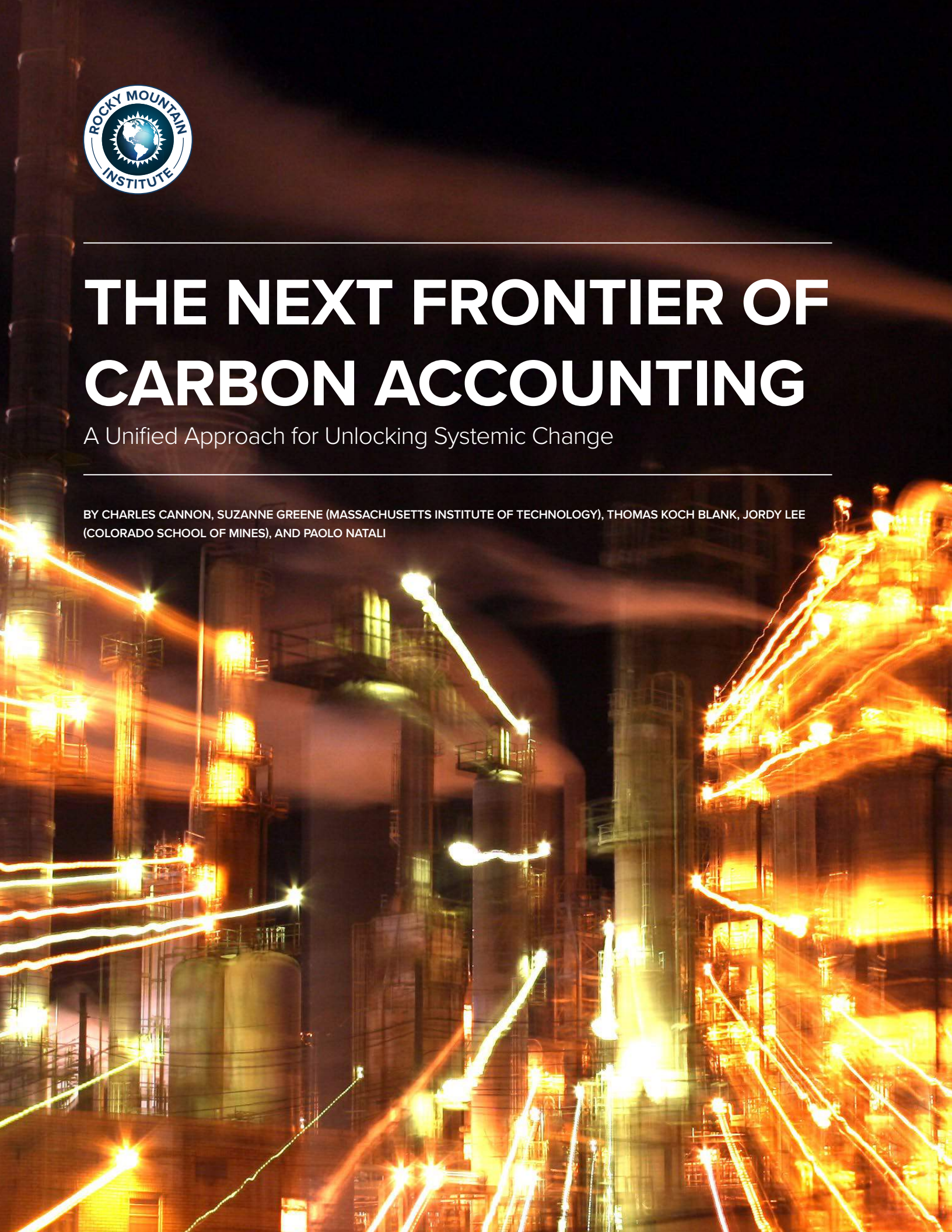

THE NEXT FRONTIER OF CARBON ACCOUNTING

A Unified Approach for Unlocking Systemic Change

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About Rocky Mountain Institute

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; the San Francisco Bay Area; Washington, D.C.; and Beijing.

Highlighted Insights

Corporations experience increasing pressure from consumers, investors, and policymakers to disclose both their direct greenhouse gas (GHG) emissions and supply chain (Scope 3) emissions. There are three sets of stakeholders asking for emissions transparency, with distinctively different use cases and objectives:

1. **Investors** want to manage the risk exposures through their portfolio of assets by assessing the validity of public targets and ensure portfolio-wide progress on decarbonization.
2. **Policymakers** are working to develop policy and incentive structures on asset, corporate, and product levels in ways that maintain a level playing field in the market and avoid unintended consequences.
3. **Buyers and consumers** want to enable operational decision-making to reduce supply chain emissions by associating actual embedded GHG emissions with products and services.

The objectives of these stakeholders require more sophisticated disclosure:

- The concept of "climate alignment," relating emissions to an ideal trajectory aligned with the Paris Agreement, is emerging as a key metric of a company's climate performance.
- In addition to current and historical performance, indicators of the starting point of the asset base will help validate future pathways.
- Embedded and direct emissions need to be allocated with integrity to diverse product streams.
- Commodity traders are looking to use low-carbon attributes as a market differentiator for premium products.

The parallel evolution of partially siloed initiatives to serve the use cases emphasizes the need for harmonization of GHG disclosure:

- The myriad emerging platforms to serve the use cases are causing reporting fatigue for companies, driving demand for more consistency and comparability of reported data.
- Guidance documents for some specific sectors have been developed, but no methods exist that cover entire supply chains of materials.
- Tracking performance against future GHG reduction targets calls for accuracy and harmony of disclosures over the lifetime of an asset portfolio.

Establishing GHG disclosure that will support the market objectives requires a cross-sector effort based on a few key design principles:

a. Leverage and build on existing efforts—not "pile on" with yet another method.
b. Ensure that the needs of critical use cases are served.
c. Align GHG and financial accounting to ensure reliability and address the problem of distorted regional incentives (similar to capital flowing toward tax havens).
d. Provide supply-chain-specific guidance.

Mining and mineral processing companies are well positioned to take a leading role in driving harmonization in GHG accounting given their position as the backbone of industry, straddling several supply chains. Buyers of materials, investors, and policymakers each have the responsibility to send signals to decarbonize supply chains, enabled by accurate, reliable, and consistent disclosure of emissions.

Pressure Is Building on Corporations to Disclose Carbon Emissions

Greenhouse gas emissions are responsible for one of the defining challenges of our time: global climate change. Over 40% of GHG emissions come from industrial supply chains. Companies around the world, under pressure from a diverse array of forces, have started making commitments to reduce the direct carbon footprint of their operations—the emissions generated from their production sites and from off-site sources they own or control (largely purchased electricity and heat). Under the most widely adopted carbon accounting guidance, the GHG Protocol, these emissions are defined as Scope 1 and Scope 2 respectively.

Going above and beyond these direct emissions, some companies—such as Shell, Volvo, and Microsoft—decided to take a bolder step and extend their goals to reduce emissions from their entire supply chains. Under the GHG Protocol, this supply chain perspective is described as Scope 3, representing a GHG emissions inventory that includes indirect emissions from value chain activities.

These commitments are, in part, driven by the debate around the climate impact of economic activities. However, we are seeing a renewed sense of stewardship for the world's natural and common resources—the global commons. Ultimately, there are three change levers in how companies account for their greenhouse gas emissions:

1. Investors are showing stronger interest in the performance and risk exposure of their assets to climate-related activities.[1]
2. Leading policymakers are moving aggressively to enable a carbon-neutral future globally, in areas where developmental changes are possible.
3. Consumers are increasingly demanding sustainable products,[2] and manufacturers are demanding visibility for the "embodied carbon" in the products and services they procure.

As the pressure increases for companies to disclose carbon emissions, use of several robust carbon accounting methods and reporting platforms is growing. Responsible minerals certifications are also emerging; their scope is usually broader than carbon disclosures, but the latter are universally included. The basis for these platforms and certifications is anchored in the generic carbon accounting method first defined at the turn of the century by the GHG Protocol[3] and disclosure to reporting platforms like CDP (formerly the Carbon Disclosure Project),[4] later informed by the recommendations of the Taskforce on Climate-Related Financial Disclosures (TCFD).

Sector-specific climate transparency initiatives have generally emerged from the bottom up, been adopted on a voluntary basis, and have addressed only parts of supply chains or specific use cases.

For example, the International Council on Mining and Metals,[5] the ResponsibleSteel Initiative,[6] Copper Mark,[7] and the Aluminium Stewardship Initiative[8] are developing certifications to help raw material providers disclose their emissions intensity. Life-cycle assessment methods have been advanced by sectors like the automotive industry, in an attempt to understand the ultimate impact of fuel efficiency standards. More investor-oriented efforts, such as TCFD, refer to standards but lack a comprehensive framework of methods that can provide climate-related disclosures with the same degree of reliability as typical financial disclosures, for example inventory accounting. In a recent report comparing CDP, the Global Reporting Initiative (GRI), and the Sustainability Accounting Standards Board (SASB), 15 of the 50 TCFD metrics (i.e., 30%) were classified as being substantively different,[9] meaning that information gathered for one framework or standard could not be repurposed to report against the other.

Some methods are anchored in reporting standards developed by international organizations (e.g., ISO standards), while others are considering voluntary guidance, leaving room for interpretation and leading to the lack of comparability among reported data. Consequently, disclosing parties must choose specific platforms for reporting—since the required methods are different—or maintain multiple sets of data. Following this, the users of the disclosed data, whether they are investors or customers, struggle to assess the quality of reported numbers or understand whether the disclosures are comparable between different products or different companies.

What do we mean when we talk about carbon accounting?

With a wide variety of organizations and guidance operating in the emissions reporting space, here are some common definitions to use when discussing the carbon accounting ecosystem:

A **standard** is a formal, highly regarded document establishing uniform rules (e.g., International Organization for Standardization [ISO] standards).

A **method** is a set of processes and procedures meant to deliver a known result (e.g., GHG Protocol).

A **framework** is guidance on a product or activity that unifies existing methods and fills gaps required to report required metrics.

A **disclosure platform** is a voluntary or mandatory medium for reporting carbon emissions information.

Sustainability reports provide emissions information developed and released by a company.

Certification is a qualification conveyed by a third party to certify that a product meets certain criteria.

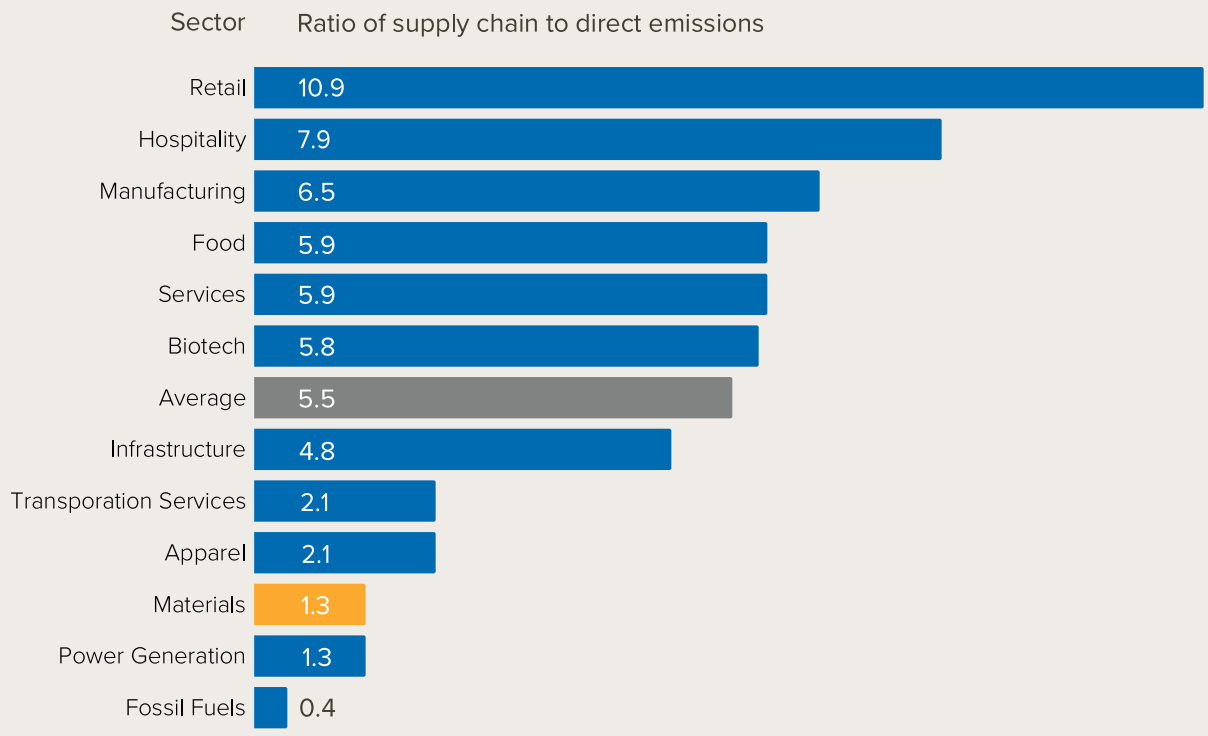
Challenges of Comprehensive Greenhouse Gas Disclosure

When it comes to disclosing a company's carbon footprint, the good news is that industrial emissions take place in relatively concentrated steps, usually corresponding to large facilities such as a steel mill or a mining site. Therefore, it is easier to measure and allocate industrial emissions compared with those from personal mobility, energy use in buildings, or other dispersed and fragmented production steps that take place further downstream in supply chains. But while more and more extractive and processing companies, alongside companies at all tiers of supply chains, provide corporate-level disclosures about direct emissions (Scope 1 and 2), very few companies are able to provide consumers with information on the carbon footprint of their products.

At the heart of this challenge lies the problem that to satisfy the extent of Scope 3 emissions, producers need to report their own performance, as well as the performance of all suppliers, buyers, subcontractors, and other contributors to the product. On top of that, the majority of emissions in most supply chains are released in the initial stages of production, between the extraction and processing of raw materials and fuels. According to CDP, the upstream side of supply chains—the production of materials, which includes activities such as mining and processing (e.g., metal smelting and steelmaking)—includes the sectors with the lowest ratios of supply chain emissions to direct emissions: in other words, these sectors contain large concentrations of the total emissions for the respective supply chains.

EXHIBIT 1

Proportion of Supply Chain Emissions to Direct Emissions by Sector



Source: Carbon Disclosure Project, *Supply Chain Report* 2019.

This distribution of emissions toward the initial stages of production does not make transparency any easier. Many supply chains are composed of a dozen or more intermediate production steps ("tiers"). While companies in these tiers may be diligent with the disclosure of their own direct emissions at the asset and corporate level, the information regarding the carbon content of a product as it travels down the supply chain is hard to track. In fact, to date, there is no system to carry this information all the way through the supply chain.

For transparency to happen, several steps still need to be implemented. Specifically, there are currently three open challenges with the reporting of Scope 3 emissions:

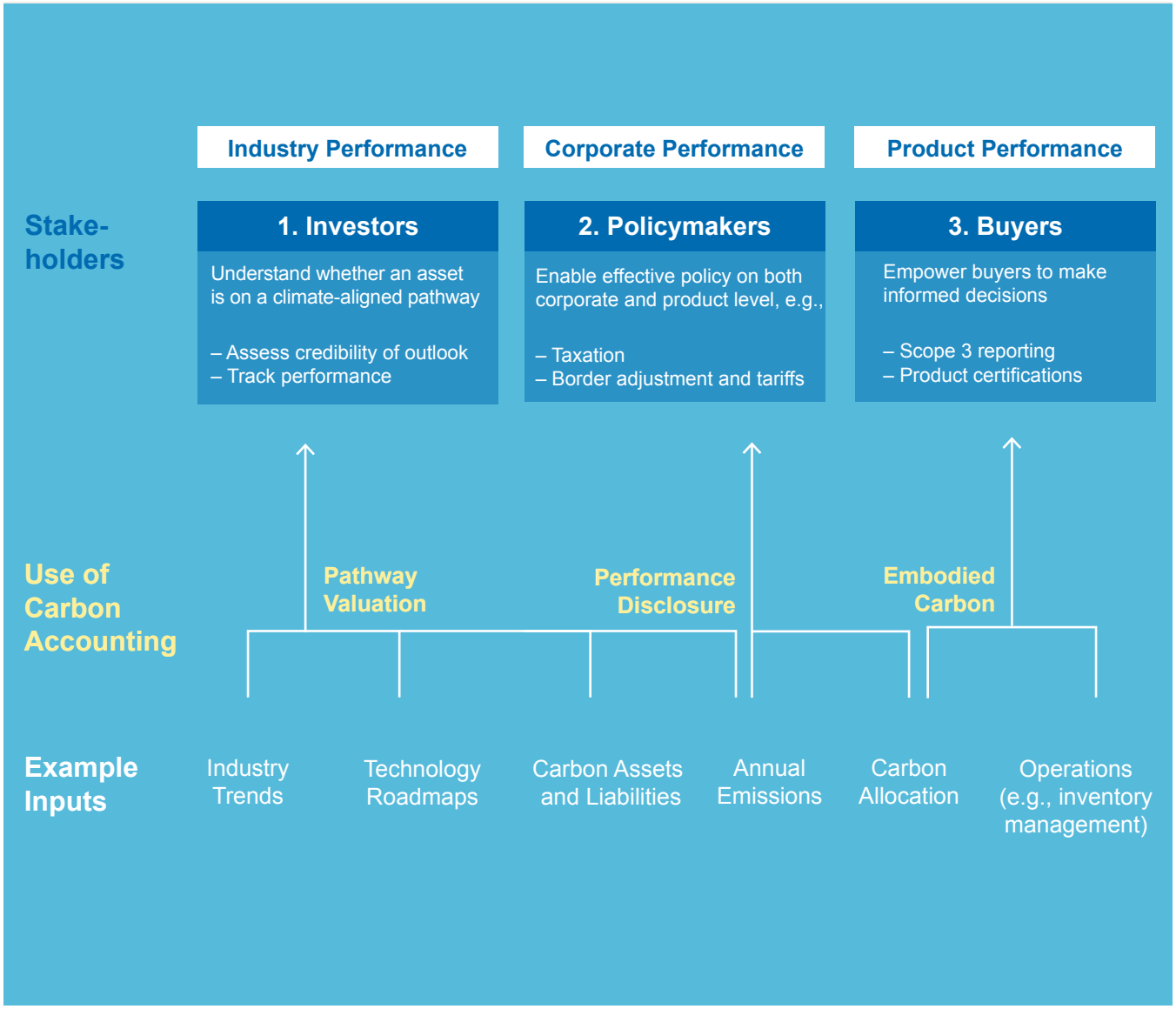
- Disclosure platforms for materials have white spaces, with no sector-specific framework to align accounting across various materials and end uses.
- The interpretation of Scope 3 categories and boundaries differ among players.
- Disclosure is voluntary and results are often unverified.

Shortcomings of current disclosures

As illustrated in Exhibit 2, disclosure platforms have to serve several purposes that are distinctly different across use cases. A platform might be tied to the agent of change, such as for policies or investors. There may not be specific guidance on the method to create a given metric based on ISO standards or the GHG Protocol. Each metric may also require different types of data depending on the end use, such as for a corporate carbon footprint versus embodied carbon in a product.

EXHIBIT 2

Carbon Disclosure Needs of Different End Uses



Different cases for using carbon accounting are discussed in more detail below:

1. **Investors who want to inform their own portfolio-based climate goals.**
   The pressure on the financial sector to play a significant role in the low-carbon transition is converging around the concept of climate alignment.[12] To achieve climate alignment, a financial institution must (1) understand the climate impact of its current portfolio and investment strategy in relation to an emissions pathway consistent with a lower-than-2°C future and (2) commit to take the steps necessary to merge onto that pathway. To impact the real economy and move toward climate alignment, an investor must evaluate a corporation's CO_2-emitting assets and emissions reduction goals. But in addition to knowing current and past performance of an asset, investors are looking for additional indicators to assess these pathways, which in simple terms can be referred to as carbon assets and liabilities.

2. **Policymakers who want to design effective measures in a controlled and fair transition to a low-carbon economy.**
   Policy can be an additional driver of disclosure and transparency, especially as it expands its focus from direct asset-level emissions on to Scope 3 emissions—often referred to as "embodied carbon"—especially in the construction industry and life-cycle emissions. Furthermore, as policy structures evolve at varying pace in different regions, climate-centric border adjustment taxes on imported goods are being increasingly considered to protect inner markets and avoid carbon leakage—where a local carbon tax could move companies to somewhere with a lower carbon tax rate.[11]

3. **Buyers of raw/intermediate materials/goods who have set climate targets and want to engage with suppliers.**
   Consumer-facing industries are sensitive to customer demand signals and strive to align their brands to what their consumers request. For example, automotive manufacturers like Volvo have already set emissions reduction targets that cover their cars' production, supply chain, and ultimate use for as early as 2025.[10] In parallel, several action-oriented efforts (e.g., "buy clean" initiatives[i]) have begun to develop searchable databases to relay emissions estimates for material inputs. These material-specific emissions estimates and proxies are indicative of emissions hotspots that strategically direct efforts where reductions are needed the most. However, the transformational step is to use transparent primary data from suppliers to inform procurement and track improvements. Industry averages for emissions intensity of materials, whether derived from life-cycle analyses or the databases mentioned above, cannot provide a demand signal up the supply chain to reward virtuous practices. To do so would require further site and asset-level disclosures.

[i] For example, the Buy Clean California Act, which requires the provision of Environmental Product Declarations for materials used in public procurement since January 2020.

In addition, for primary goods industries, the ability to differentiate themselves from their competition is the most viable way to justify long-term changes to the way they operate, and for them to benefit from the impending transition. However, by operating in a market that sells fungible goods ("commodities"), there is no market for products like "certified" or "responsible" copper, or low-carbon steel. Until a framework of comparable methods exists, there will always be an essential conflict between financial costs and sustainable development, resulting in a mining and processing industry that operates at the lowest possible common denominator.

While progress is being made to meet the needs of these stakeholders and unlock the use cases of investor pressure, effective policy, and green procurement, several of these disclosure needs are simply not addressed today, such as well-defined carbon assets and liabilities and clear demand signals.

Scope 3 boundaries are not well defined for individual industries

Although the GHG Protocol defines 15 categories of upstream and downstream supply chain emissions, as well as the allocation of facility emissions to a variety of product buyers, there are differences in how these generic standards are applied to specific materials and product supply chains. For example, there is a view held among some producers of fossil fuels that the Scope 3 category called "use from sold product" should not apply to the combustion of oil and gas. Another widely held belief is that an investor's Scope 3 emissions should include the direct emissions from a facility owned or financed, but not supply chain emissions from either side of that facility.

Several sector-specific guidance documents built on the GHG Protocol have added clarity to these disputed areas.[13] For example, the 2016 Global Logistics Emissions Council Framework offers freight transportation-specific guidance.[14] However, no method exists for the supply chains of materials. As a result, boundary and allocation issues are up to the disclosing party. With individual companies choosing different inclusions and exclusions, it is impossible to compare reported data even across similar cases. Reporting parties are even able to selectively choose what overarching categories and emissions they feel are relevant to their reporting and how these categories are represented in reports. At a company level this can progress through overemphasis of positive developments and low-carbon processes and the exclusion of high-carbon emissions and processes that are harmful to the company's image.

Supply chains are complex

With the advent of a global economy, tracking all the materials and intermediary parts that go into a product is a daunting task. For example, a car has about 30,000 parts,[15] all requiring different raw materials and manufacturing processes. When including suppliers within the automotive industry, the supply chain is estimated to involve almost 300,000 manufacturing facilities in the United States alone,[16] most of them distanced from the automaker by three or four tiers of production. Not only is the collection of accurate data associated with significant efforts in data management, verification, and alignment, but the issue is cascading.

As a result, direct suppliers hesitate to provide actual numbers for embodied carbon in their products for a number of reasons: the traceability of emissions might also lead to traceability of insights on business secrets such as patented technologies; some producers fear comparison over sustainability metrics with their competitors; the complexity of accounting practices exceeds current in-house capabilities, leading to the need for outsourcing and additional costs; and finally, many of them struggle to collect carbon disclosure information from their suppliers.

Adding to this challenge, most material supply chains today are global, with strong market forces pushing toward increased commoditization,[17] which leads to challenges for transparency and tracing material origins. The original source of materials has only been made a consumer priority in select cases, and often with fair trade policy jointly established to govern them. However, broader efforts are emerging in specific industries, such as the ResponsibleSteel Initiative, a mineral certification that covers greater aspects of sustainable sourcing. In so doing, these initiatives are also starting to unpack the challenges of Scope 3 emissions.

In general, it is unrealistic to assume that there will ever be a perfect set of greenhouse gas information to work with. That said, the same can be said of inventory numbers or, in the case of the extractive sectors, reserves estimates, and yet the reported figures have strict standards and auditing in place that ensure reliability. The same reliability needs to be realized for carbon disclosures if they are ever to become capable of driving significant decarbonization. This is also required if they are ever to incentivize monetizable rewards to supply chain actors who take bold action toward emissions stewardship.

From data to dollars—banking on accurate disclosure

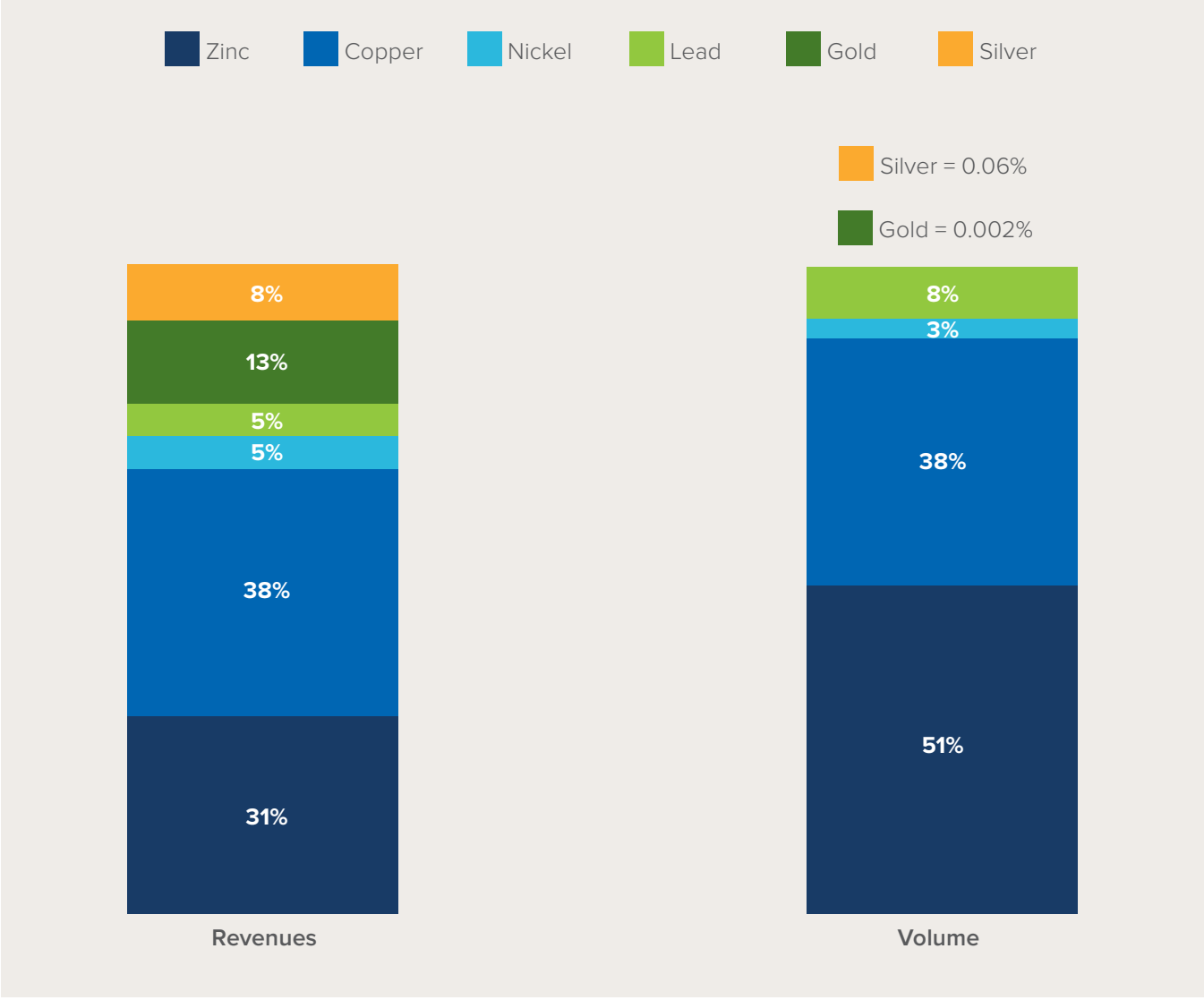
As customers, policymakers, and investors ramp up their efforts to reduce carbon emissions, financial incentives will ultimately be associated with climate alignment metrics, carbon disclosures, or the embodied carbon of a product. An early example of this mechanism can be found in the shipping industry, in which a large group of investors have committed to the Poseidon Principles,[18] a mechanism that has the ultimate goal of providing facilitated finance to shipping companies capable of proving their climate-aligned qualities.

Product certifications are another example where differentiated commodities would lead to financial incentives. To qualify a product as distinct from the field, and to comply with a certification process with enough rigor to enable market premiums and in turn incentivize company efforts to decarbonize, an individual item must carry its own qualities in each transaction. Through the lens of carbon disclosure, the producer of the material must be able to *allocate specific embodied carbon* to the product. This must be done with specificity (not industrial averages) so that buyers can tell whether a product is low carbon or not, and spend accordingly. However, since many industrial facilities around the world produce multiple products for myriad buyers, this is not a straightforward task.

One of the more important judgement calls that needs to be made is which allocation key to use to translate the emissions of an asset into the embodied carbon of its products. Exhibit 3 shows how two examples of units of allocation—revenues and volume—differ for Boliden Mining, a company that produces an array of minerals. Allocating the embodied carbon based on product volume would make both gold and silver "green," which would make them quite competitive to mining operations where these minerals are the primary output. You could also imagine more intricate allocation methods based on profit contribution, marginal energy consumption, or labor hours spent, for example. While the GHG protocol provides standards on both physical and economic allocation, the specific application of this standard is largely left for each asset to choose.[19]

EXHIBIT 3

Boliden Mining's Breakdown of Revenues and Volume by Mineral[20]



In addition to allocating the GHG footprint of one's own operations, the reported embodied carbon needs to be "passed through" to the corresponding products. With modern large-scale manufacturing and processing, with companies generally having at least two suppliers for each critical input, operationalizing this pass-through constitutes a significant challenge in terms of data collection, management, and validation just to ensure that there is a basis for further accounting. In addition, practical principles need to be implemented around details such as inventory management and time lags in data (e.g., weekly GHG footprint versus produced or sold products). In the case of inventory management, the two universally adopted accounting standards—International Financial Reporting Standards (IFRS)[21] and US Generally Accepted Accounting Principles (US GAAP)[22]—require a clear choice between two very well-defined methods: Last-In-First-Out or First-In-First-Out.

Carbon tracking needs to be integrated broadly into operations management systems, but before that is possible, an underlying framework of methods with specific guidelines is required.

Inventory accounting versus carbon accounting

In financial accounting under both the International Financial Reporting Standards (IFRS) and US Generally Accepted Accounting Principles (US GAAP), inventory can be recorded in one of two ways: Last-In-First-Out (LIFO) or First-In-First-Out (FIFO). The difference between the two methods is in the value of the goods that are taken out of inventory (because they have been used or sold) and written off the company's books: in LIFO, it is assumed that the product that gets used first is the one that was deposited in inventory most recently—hence using the most recent price—while in FIFO the idea is that the oldest item in inventory gets used first. A company needs to elect either one of the two methods, and once this election is made, it is easy for an outside analyst to assess what has been going on with a specific company's inventory numbers over the course of a reporting year. Regardless of whether a company chooses LIFO or FIFO, it must choose a consistent method.

By comparison, carbon accounting does not offer a harmonized method: for example, when reporting TCFD-recommended metrics, companies can choose to include or exclude certain parts of their supply chain, such as the emissions from use of sold products (the CO_2 emitted by a car during its lifetime as its owner drives it), and there are no specific sectoral provisions on the exact manner that allocation needs to take place from a facility to its production. Likewise, while standards do exist for some parts of supply chains and specific uses—such as ISO 20915 on the lifecycle inventory calculation for steel products—there is no requirement for a company to report according to it. A harmonized framework would make carbon accounting more stringent, and therefore more similar to financial accounting, providing the additional clarity needed for outside observers to make financial assessments based on a company's carbon disclosures.

Climate Disclosures Versus Climate Alignment

Each business involved in industrial supply chains has another separate challenge besides the accurate tracking of Scope 3 emissions: with many companies now pledging to reach carbon reduction targets by specific dates, there is a need to describe long-term pathways. With these developments comes the realization that no such effort is feasible without describing the carbon emissions that are inherent in the portfolio of current assets (described in Exhibit 2 above as carbon assets and liabilities). This is something the Science-Based Targets initiative has taken on by defining sectoral decarbonization, though for metals and minerals, only aluminum has been defined at this time.

If the annual corporate carbon disclosures can be looked at as the "carbon income statement" of a company, then there must be such a thing as a "carbon balance sheet." This should be inherent in a corporation's portfolio of assets, and should also be aligned over time to trajectories of reduction that are commensurate to the pathways required to align with the IPCC medium- and long-term reduction targets[23]—50% by 2030 and net-zero by 2050 across sectors. Using marginal abatement cost curves (MACC), a portfolio can be stacked in terms of carbon intensity, and guidance provided as to how a business strategy can be aligned to these targets. Before that is possible, however, the calculations need to be standardized. While it is entirely possible for a company to create one's own internal accounting methodology as regards direct emissions (Scopes 1 and 2), it is unthinkable for the same company to have a Scope 3 target that does not follow a supply-chain-wide framework. This is, in part, because the numbers would be extremely difficult to collect—but more importantly because they would be absolutely impossible to influence.

An iron ore producer today knows its inherent carbon exposure risk lies not in direct emissions, but rather in the Scope 3 emissions from the steelmaking process which is immediately downstream; these emissions are easily an order of magnitude greater than a mining operation's emissions, and without a framework to consistently translate standards and methods into comparable metrics, they are impossible to influence. Large mining companies that have been investing in Scope 3 reduction efforts are keenly aware of this problem, and some of them are already taking proactive measures that are—not surprisingly—in line with fostering the emergence of a harmonized framework to calculate and trace emissions along the supply chain. In the case of specific minerals, some certifications such as ResponsibleSteel have emerged, which can drive adequate transparency provided they are underpinned by a specific framework of methods to ensure data adequacy and consistency.

Changing the Path of GHG Reporting Midflight

Establishing robust GHG reporting protocols and ensuring adoption is a massive undertaking. Despite decades of work, the demand for transparency and access to reliable data still seems to be one step ahead of what is available. For reporting, this means the methods are being constructed in parallel with implementation and disclosure—the aircraft is being built while someone is trying to fly it.

However, building on the flight analogy, there are many aircraft in the air at the moment, all communicating with ground control using slightly different metrics—some in imperial units and some in the metric system. Some call the control tower speaking in Mandarin Chinese, others in French. Some carry frustrated passengers that are held back from landing because air traffic control is trying to educate the pilots—between languages and radio disturbances—over which landing path to adopt. But efforts are constantly being made to streamline these languages and, as the aviation industry has grown massively over the last decades, standardizing communication has taken the form of using a common language and a specific alphabet in order to avoid confusion. Hence the use of terms as "Roger" or "Charlie Charlie," which have a common meaning among aviators all over the world. Similarly, building and adopting a unified framework of methods for accounting and reporting GHG emissions is a difficult but possible task—and one of extraordinary importance to the success of industrial decarbonization.

Increased adoption of reliable carbon accounting is critical to achieving the goals set out under the Paris Agreement to limit the temperature increase to 1.5°C above pre-industrial levels.[24] This will mean that we are looking at an ecosystem of more disclosure platforms, reporting lines, and software platforms and tools to help companies manage the disclosure. To achieve this without a complete administrative meltdown we will need a common base—building on the GHG Protocol—underpinning all different certifications, product definitions, reporting formats, and more.

Design principles for establishing such harmonization include:

a. **Leverage and build on existing efforts—not "pile on" with yet another method.**
   In particular, we need to rely on the Greenhouse Gas Protocol and existing ISO standards to help integrate efforts led by industry initiatives (e.g., Responsible Steel, GLEC Framework). The objective of harmonization must be to enable innovation in certifications, product differentiation, and regulation, not to force adoption of specific methods and frameworks.

b. **Ensure that the needs of critical use cases are served.**
   Several existing disclosure platforms, such as TCFD or CDP, already represent an identified market need for climate-related information. From a consumer perspective, these needs are exemplified by multiple "buy clean" initiatives, such as those in California and the European Union. As such, it is important not to neglect the existing calls for emissions transparency presented by investors, policymakers, and consumers. The methods that shape the metrics required by these disparate stakeholders must be comparable throughout, as well as across, supply chains, which suggests that the working groups developing this framework cannot be structured along industry lines.

c. Align GHG and financial accounting to ensure reliability—avoid creeps and leakages into different markets or geographies over time.

GHG accounting is becoming increasingly linked to financial incentives through price premiums, regulations, and cost of capital or corporate value. Because of this, full harmonization between operational judgments and emissions accounting methods are necessary to avoid endless reconciliations or misalignments.

d. Provide material-specific guidance and contextualization.

Having material-specific guidance will allow for more robust examinations of material supply chains and a better understanding of the points of intervention. Part of the reason that industry-driven initiatives (e.g., Responsible Steel), have been able to make progress toward certification schemes and emissions reductions is that individual materials present their own geographic, environmental, and economic considerations. In this sense, specific guidance designed around industry-focused concerns, instead of broader corporate concerns, will allow for more focused reporting and emissions reduction pathways.

Achieving such a collaborative pivot will require strong leadership from institutions, as well as strong collaboration with representatives and organizations leading different end uses. The extractive industries will be a critical element of the structure, not only because that's where physical supply chains "start," but also because there already is strong momentum in the ecosystem. Sure enough, an industrial transition that is truly sustainable in the long term needs to be grounded in the tenet of resource efficiency, and therefore focused on reducing the use of resources and materials in final products wherever possible; but as some leading thinkers are purporting, the low-carbon energy transition will multiply the demand for certain minerals, at least in the foreseeable future, especially as relates to the need for infrastructural improvements and electrification. In this scenario, it is paramount that the supply chains of the minerals most implied in the transition make a low-carbon transition as well. These improvements can take place only with a universal system for emissions accounting and reporting that allows for differentiation of products by how materials were mined, processed, and transported. By making efforts bankable, an incentive emerges for the "hard-to-abate"—and often less visible—parts of supply chains to take bold action in reducing their own carbon footprint.[25]

There's a role for everyone to play. Mining and mineral processing companies are a key part of the global economy and, together with a growing circular economy, need to provide the materials that are the backbone of industrial supply chains. These sectors are also well positioned to take a leading role in driving the harmonization of carbon accounting, since they own the majority of emissions in their respective supply chains and inherently straddle several supply chains. Some of their products tend to grow substantially to serve the energy transition, and there is tangible momentum in the industry. Buyers of materials, investors, and policymakers have the responsibility of sending the right signals for their supply chains to decarbonize. Any such signals start with the accurate measurement and disclosure of carbon.

The Next Frontier of Carbon Accounting

Creating the architecture for the accurate measurement of an externality might look like a daunting task from the perspective of the complexity of modern supply chains. As the late Edwin Land, co-founder of Polaroid, famously put it: “Never undertake a project unless it is manifestly important, and nearly impossible.” Coalitions need to be built. Mechanisms need to be created, put in place, and made to work for green commodity markets. Investors need to exert effective pressure via facilitated finance. Policy needs to be optimized via the correct regulation of emissions in ways that do not give rise to other types of involuntary externalities, such as carbon leakage.

Humans have always been good at solving complex problems, once the urgency has become apparent and the bottlenecks to act upon have been identified. This is where carbon accounting is at: it is time to take it to the next level.

Endnotes

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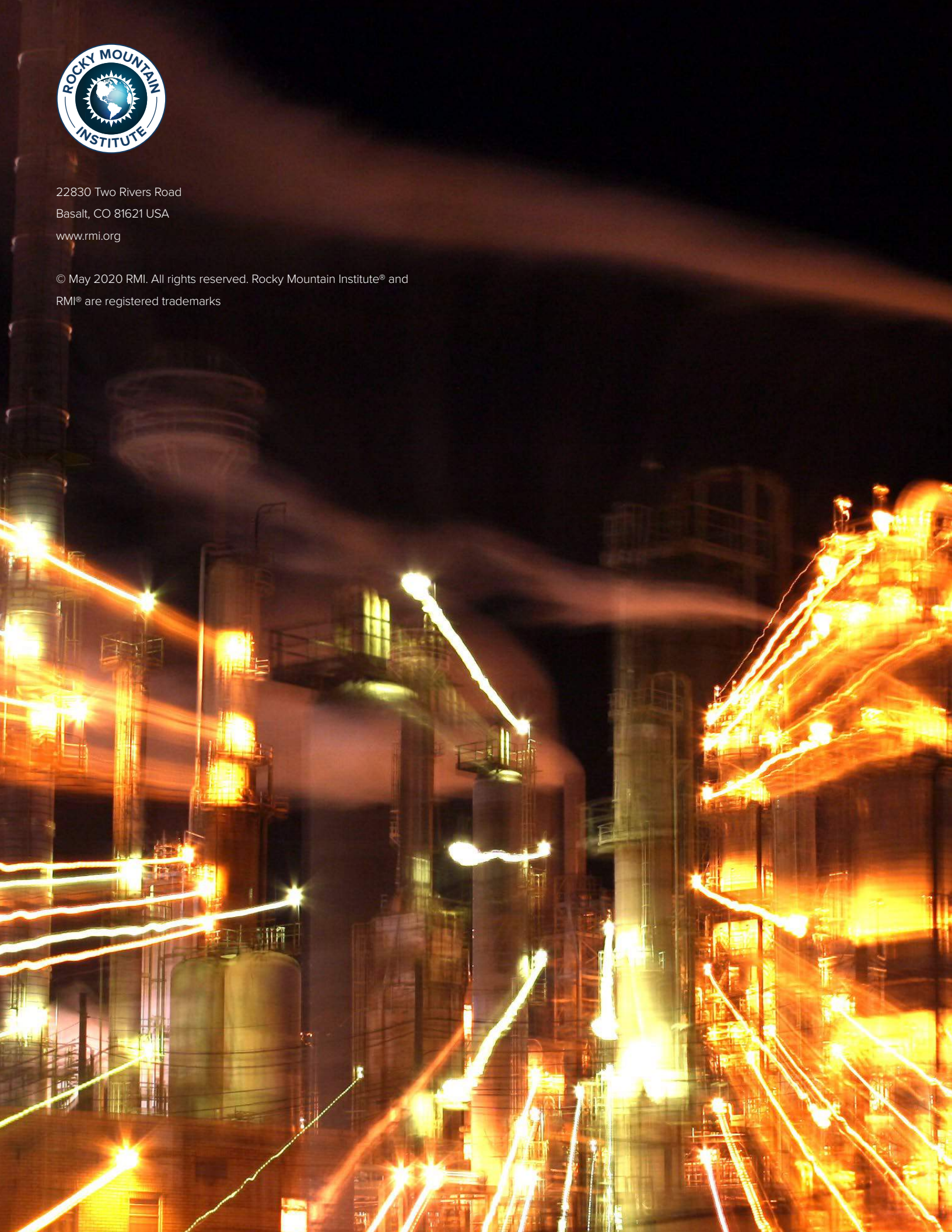

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