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Carbon Direct

The Navigator

Ready or not: New rules of climate engagement | April 2026



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Letter from the editor

I've been thinking about the phrase *breaking* news. What is it, exactly, that's breaking? Sometimes it feels literal. The news arrives like a shelf of Hormuz-shaped wine glass crashing to the floor, each headline another shard to step around. It brings to mind an old black-and-white scene: a figure on a red carpet, photographers pressed close, flashbulbs popping in a cacophony of light and shattering glass. Something is always breaking, and the rest of us are left standing in the debris.

The Navigator is the opposite of breaking–we're relaying only the signals we found genuinely compelling and useful.

The signals this quarter are substantial. **Article 6 has moved from negotiating rooms to live markets** (pg. 6). The abrupt collapse of Kenyan cookstoves developer Koko Networks shows what happens when a business model assumes host-country authorization will follow project development. In Brussels, **CBAM crossed its compliance threshold on January 1** (pg. 8). First payments are due next fall, so producers selling into the EU who aren't modeling their product emissions yet are already behind. And US energy tax credits remain in limbo as developers wait on Treasury guidance, while **data center backlash reshapes what "community benefit" actually means** (pg. 11).

In science, we make the case that **enhanced rock weathering has graduated from "emerging" to actively scaling** (pg. 13); the question now is operational discipline, not scientific plausibility. We also argue that **superpollutants are the VCM's most exciting near-term opportunity** (pg. 16)—a rare case where low-hanging fruit is also high impact. Our **research highlights dig into forests, fisheries, and a big-deal paper on boreal soils** (pg. 18).

On markets, we introduce **CDR 2.0** (pg. 21), a playbook for the operational, commercial, and institutional infrastructure that turns quality project design into delivered tonnes. And SBTi's subtle shift from "beyond value chain mitigation" to "ongoing emissions responsibility" tells us that **corporate action on residual emissions can't wait for perfect guidance** (pg. 23)—the companies building high-quality credit portfolios now are the ones that will enter the next phase of the transition with real credibility. Finally, **gaps in the GHG Protocol's new Land Sector and Removals Standard create new questions as companies await detailed implementation guidance** (pg. 26).

I hope this issue of *The Navigator* is a welcome reprieve from the cacophony. Thank you, as always, for reading.

Bodie Cabiyo, PhD
Editor and Director of Interdisciplinary Science

Acronyms and abbreviations

BECCS: bioenergy with carbon capture and storage
BVCM: beyond value chain mitigation
CBAM: Carbon Border Adjustment Mechanism
CDR: carbon dioxide removal
CNZS: Corporate Net-Zero Standard (Science Based Targets initiative)
CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation
DACS: direct air capture and storage
ERW: enhanced rock weathering
ETS: emissions trading scheme
EU: European Union
FEOC: foreign entity of concern
FIE: foreign influenced entity
GHG: greenhouse gas
GHGRP: Greenhouse Gas Reporting Program
GWP: global warming potential
IRA: Inflation Reduction Act
ITMO: Internationally Transferred Mitigation Outcome
LoA: Letter of Authorization
mCDR: marine carbon dioxide removal
MMRV: monitoring, measurement, reporting, and verification
NDC: Nationally Determined Contribution
OBBB: One Big Beautiful Bill Act
OER: ongoing emissions responsibility
OMGE: overall mitigation in global emissions
PACM: Paris Agreement Crediting Mechanism
PFE: prohibited foreign entity
RED: renewable energy directive
SBTi: Science Based Targets initiative
SFE: specified foreign entity
tCO_2e: tonnes of carbon dioxide equivalent
VCM: voluntary carbon market

Credits

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→ Policy insights

Science

Market

POLICY INSIGHTS

Article 6 gets real: Koko's collapse and the ITMO learning curve

BOTTOM LINE: Article 6 has moved from negotiating rooms to live markets. Governments are buying ITMOs for use toward NDC targets, and corporations face compliance obligations that depend on them. The rules governing who can sell what to whom—and the concrete calculations behind how such decisions are made—are now material to investment decisions, project viability, and credit demand. Koko's collapse shows the cost of misreading those rules. However, the opportunity is substantial for those who understand the rules well.

Chimdi Obienu

New to Article 6?

Our practical primer covers the basics of Article 6.2 and 6.4 before you dive in.

Corresponding adjustments can make or break a carbon project

The abrupt collapse of Kenyan cookstoves developer Koko Networks is a sharp illustration of what happens when a business model doesn't account for how host countries actually make decisions about ITMOs.

Koko's model depended on securing Letters of Authorization (LoAs) at a scale the host country, Kenya, simply wasn't prepared to grant. Trade Cabinet Secretary Lee Kinyanjui was blunt about the reason: authorizing Koko's requested volume would have consumed Kenya's entire carbon allocation, leaving nothing for other sectors or companies. The country's NDC targets and domestic carbon market regulations—including rules governing how revenues flow back to Kenya—shaped what the government was willing to authorize. Koko's projections didn't sufficiently account for any of that.

The lesson isn't that Kenya is inhospitable to carbon projects, or that cookstove projects can't get LoAs. Other cookstoves developers have secured authorization and now have CORSIA-eligible credits. It's that host country authorization is never a given. Developers, investors, and credit buyers all need to understand the factors shaping a country's ITMO decisions: NDC headroom, project eligibility lists, domestic revenue-sharing requirements, and regulatory sequencing. Assuming LoAs will follow project development is a risky strategy.

ITMO demand is building but eligibility details matter

ITMOs are increasingly central to compliance carbon pricing mechanisms. CORSIA already integrates them; so do Switzerland's CO_2 Act and Singapore's carbon tax. International procurement is also picking up, with Singapore and Switzerland leading demand, and Korea, Japan, and the EU expected to follow before 2030.

But understanding which ITMOs qualify is as important as watching the overall demand signal. Eligible project types, source countries, and methodological requirements differ across mechanisms; the list of projects serving Switzerland's compliance demand is different from the one serving Singapore's.

On the supply side, LoAs are multiplying and CORSIA-eligible projects are issuing credits. Still, airlines have been slow to procure in meaningful volumes, likely waiting for confirmation that regulators intend to penalize non-compliance. When that confirmation comes, expect a scramble for long-term offtakes before supply tightens.

Article 6 enters the EU debate

EU member states are debating mechanisms to contain EU ETS compliance costs. One option on the table is integrating ITMOs, which offer more flexibility and lower cost pressure. However, for anyone who remembers what happened with Clean Development Mechanism (CDM) credits, there are obvious concerns.

Before 2020, the EU allowed companies to use UN CDM credits against their ETS obligations. The CDM market was flooded with low-quality credits, which substituted for EU allowances and contributed to a damaging allowance oversupply. This depressed prices, weakened the decarbonization incentive, and ultimately prompted a ban. The scars are real, and appetite is limited for reopening the EU's flagship climate mechanism to external credits while any questions about credit integrity remain.

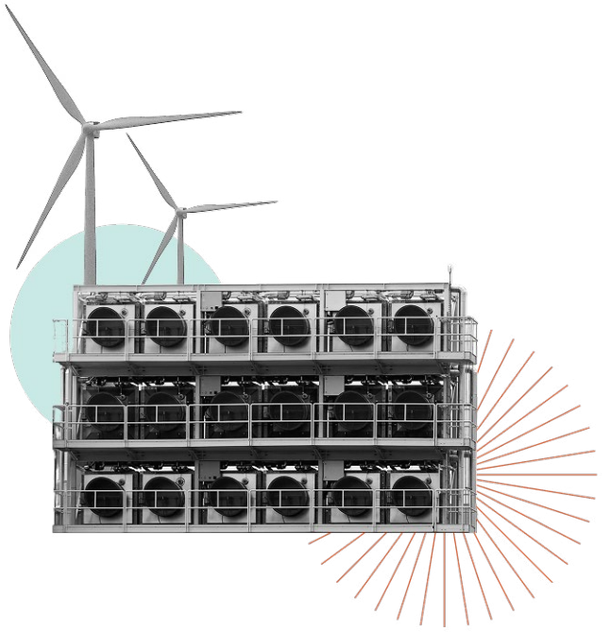
Beyond the ETS, the EU is expected to issue guidance on ITMO eligibility toward its 2040 climate target. The stakes here are significant: the EU has indicated it may use up to 230 million tCO_2e in credits toward that target. How the EU defines ITMO eligibility will be one of the most consequential demand signals in the market this decade.

Article 6.4's market position is still an open question

The first full Article 6.4 methodology was published in 2025, with more expected in 2026, likely covering avoidance and reduction projects. Whether buyers will actually prefer credits issued under the Paris Agreement Crediting Mechanism (PACM) over comparable VCM-certified credits remains unclear.

The case for PACM credits is based on their UN stamp of approval. Methodologies endorsed by the international community carry a certain credibility. The case against PACM credits is related to the conditions attached to them: mandatory 5% deductions for the Adaptation Fund and the 2% overall mitigation in global emissions (OMGE) requirement. These conditions reduce the credits a project can sell, affecting economics.

The draft COP30 decision to consider re-opening Article 6.4 standards for nature-based projects adds a further wrinkle. Two concerns follow. First, standards could keep shifting, creating uncertainty for developers and buyers. Second, and more fundamentally, that loosening of methodological rigor to channel more finance could undermine the very quality signal that makes PACM credits attractive. If Article 6.4 credits aren't best-in-class, buyers may not see the point in purchasing them, which would work against the mechanism's core purpose.



POLICY INSIGHTS

CBAM is here: Now what?

Chimdi Obienu

BOTTOM LINE: CBAM is central to the future of the EU ETS, which funds low-carbon innovation. CBAM's integrity is deeply consequential for the clean energy transition. As a compliance cost and a policy signal, CBAM is already influencing carbon pricing decisions beyond Europe's borders. Any producer selling goods into the EU market, whether they are in scope today or tomorrow as coverage expands, should be thinking carefully about their position. CBAM costs will affect suppliers' price competitiveness. The emissions and certification profile of products will determine their eligibility to serve demand driven by EU RED requirements. Getting ahead of both is the strategic imperative.

The EU's Carbon Border Adjustment Mechanism (CBAM) crossed a major threshold on January 1, 2026. From that date, imported goods entering the EU, and covered under CBAM, will carry a carbon cost. The first payments are due in September 2027. For affected entities, the compliance clock is running. Here's what you need to know.

What is CBAM, and why does it exist?

CBAM prices the embedded emissions of carbon-intensive goods imported into the EU. Its core purpose is twofold: prevent carbon leakage (the risk that the EU ETS simply pushes dirty production offshore) and protect the cost competitiveness of EU industry as the ETS transitions away from free allowances.

There's also a third goal: Incentivize other countries to price carbon themselves. Early evidence suggests it's already having an effect. CBAM is cited as one influence behind carbon pricing developments in Türkiye, Egypt, and India. This is a meaningful sign that the EU's CBAM is already shifting global policy incentives, even before full enforcement begins. The proof, of course, will be seen in compliance rates and the strength of enforcement once costs land.

What's covered?

CBAM currently covers imports of iron and steel, cement, aluminium, fertilizers, hydrogen, and electricity. For now, this primarily includes basic material goods such as steel pipes and aluminium billets. Obligations apply to EU-based importers bringing in more than 50 tonnes of regulated goods in a reporting year.

The European Commission has proposed extending CBAM's coverage to more downstream products like vehicle parts from 2028, though the Parliament and Council have yet to respond. This wider scope has industry backing because, under the current framework, there are concerns that foreign producers could sidestep CBAM by exporting finished or semi-finished goods rather than the basic materials currently covered. Closing that gap is essential to maintaining the mechanism's integrity.

How are costs calculated?

Costs are calculated based on emissions from material production at the facility, not raw material extraction or transport, using either conservative EU default values or verified actual values. Those emissions determine the number of CBAM certificates required, and certificates are priced at the average ETS allowance price. The logic is straightforward: by tying import costs to the same carbon price faced by EU producers, CBAM aims to level the playing field so that all sellers in the EU market are subject to an equivalent carbon cost.

Crucially, the EU accounts for carbon pricing already paid in the country of production: fewer certificates are required for product emissions that were subject

to a carbon price in the source country. The EU is still working out how to treat cases where producers met those obligations using carbon credits rather than a direct carbon price. This pending rule has significant implications for how countries design their carbon pricing systems, and for the role carbon credits will play in compliance.

What's happening today?

The financial reality of CBAM has finally arrived. Companies importing CBAM-covered goods in 2026 will be able to to purchase certificates covering all of those imports from February 2027, with surrender due by September 2027. Meantime, the European Commission will publish quarterly certificate prices. The first, published on in April 7, 2026, gives importers visibility on their accruing costs ahead of payment.

Alongside this, there's growing noise around EU ETS cost containment measures, partly driven by CBAM. As CBAM phases in, free allowances for covered industrial sectors are scheduled to phase out through 2034. Entities that have historically received most or all of their ETS allowances for free are now facing real ETS price exposure. That's driving pushback and proposals to contain costs within the ETS itself. CBAM isn't under direct threat from these discussions, but any ETS cost containment measures will flow directly through to CBAM certificate costs.

How does CBAM impact trade?

The EU and UK are exploring re-integration of their respective emissions trading schemes. Successful integration would eliminate reciprocal CBAM obligations and significantly reduce administrative burden on entities operating across both markets. The two schemes have diverged structurally since the UK ETS launched in 2021, and negotiations are underway to reconcile those differences.

The EU-India trade deal, meanwhile, offers a preview of how trade agreements may interact with CBAM going forward. The deal included no CBAM carve-outs, but reduced tariffs on covered goods such as iron and steel may partially offset the added cost burden for Indian exporters. Expect carbon pricing exposure—alongside product eligibility for green procurement requirements and incentives—to become an increasingly important factor in trade negotiations, particularly for countries with major export flows into the EU.

How should producers respond?

CBAM creates a direct financial incentive for cleaner production: lower facility emissions mean lower CBAM costs, which means better price competitiveness in the EU market. For producers outside of the EU, modeling their product emissions is a worthwhile exercise.

Beyond cleaning up production processes, there are three other strategic levers worth pulling:

1. Verified reporting

Since defaults are deliberately conservative, most importers using EU default emissions values will pay more than those using verified actual values. Whether the CBAM cost reduction from verified reporting justifies the investment is a facility-level question, but for high-volume importers it often does.

2. The EU RED–CBAM intersection

EU demand for low-carbon fuels like hydrogen and ammonia will be shaped significantly by the Renewable Energy Directive (RED). Entities supplying these markets will want to be both RED-compliant and able to provide verified CBAM emissions reports. The two frameworks have different scopes and requirements. RED covers full life cycle emissions with third-party certification, whereas CBAM covers production emissions only. So, optimizing across both requires deliberate due diligence rather than assuming one framework covers the other.

3. Supply chain exposure

CBAM costs are embedded in goods, and not just at the final import stage. Sourcing decisions for pre-cursor materials factor into total exposure. Entities supplying EU buyers can expect growing pressure to provide verified emissions data for their products and supply chain, and those unable to do so may find themselves at a competitive disadvantage.

WHAT WE'RE WATCHING IN POLICY

Uncertain landscape for US energy tax credits

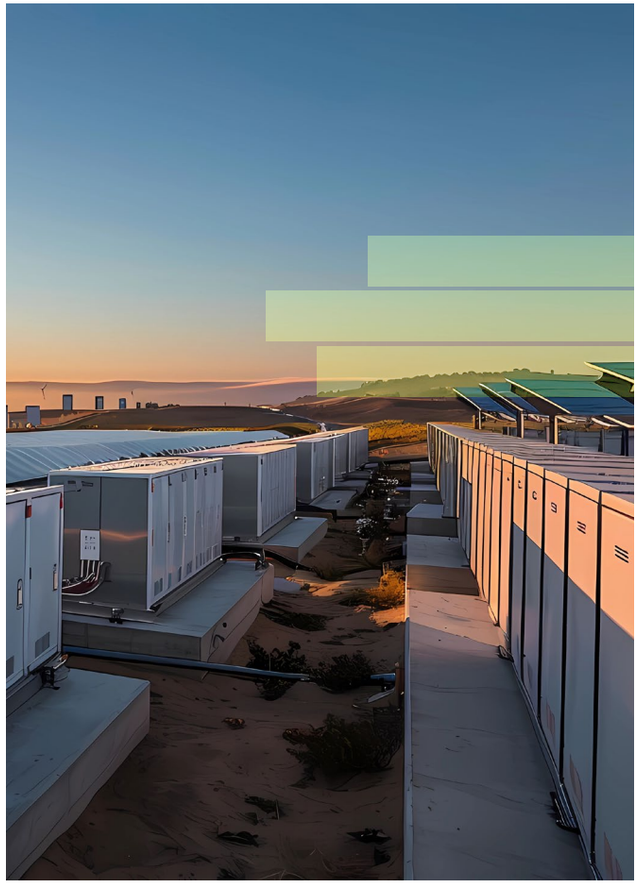
Rory Jacobson

WHY IT MATTERS: While the repeal of the endangerment finding stands as a significant and lasting constraint on future administrations' ability to regulate emissions, many of the administration's broader regulatory ambitions remain unfinished. Final rules are still pending across several fronts. Notably, there are responsible paths forward that balance reducing administrative burden with preserving the credibility and long-term viability of energy tax credits—but those paths narrow quickly without swift, clear guidance from the Treasury. More than any particular policy outcome, what the market is waiting for is certainty.

It has been a challenging year for energy project developers in the US. While the modifications to clean energy tax credits enacted through the One Big Beautiful Bill Act (OBBB) may read as relatively straightforward on paper, investors and developers have been left waiting on updated guidance from the US Department of the Treasury—this guidance provides the legal foundation that converts statutory language into binding commitments on credit scope and value. Without it, financial models remain provisional and long-term investment decisions stall.

Compounding this uncertainty, the OBBB introduced restrictions that go well beyond adjustments to credit values and timelines. New foreign entity of concern (FEOC) provisions now apply to a far broader set of clean energy tax credits than the EV-focused restrictions originally established under the IRA. The OBBB introduces layered new categories—prohibited foreign entities (PFEs), specified foreign entities (SFEs), and foreign influenced entities (FIEs)—that restrict not only finished product sourcing but upstream material inputs as well. For technologies like solar, batteries, and wind, where supply chains remain deeply intertwined with China, compliance will require significant due diligence, supply chain restructuring, and in many cases, entirely new sourcing strategies.

Meanwhile, the Trump administration's regulatory rollbacks threaten to further erode the practical utility of remaining incentives. The the recision of the endangerment finding and the proposed repeal of the EPA's Greenhouse Gas Reporting Program (GHGRP)—which provides facility-level emissions data that underpins verification requirements for credits including 45Q, 45V, and 45Z—leaves developers in a holding pattern that modest Treasury safe harbor provisions have done little to resolve. Beyond domestic impacts, eliminating this reporting framework risks undermining US competitiveness in carbon-conscious export markets like the EU, where border fees are tied directly to demonstrated emissions performance.



WHAT WE'RE WATCHING IN POLICY

Days of data center dejection

Rory Jacobson **Adrianna Sutton**

WHY IT MATTERS: As data centers and their associated infrastructure and resource demands enter or expand in communities across the US, project developers, community liaisons, and policymakers need to align on common principles for reasonable and responsible engagement, as well as disclosure and benefits-sharing procedures. Communities are no longer viewing data center development in the positive light of previous years. Policymakers and developers alike will need to take a more holistic approach to considering community impacts when striking these deals.

Not long ago, data centers were the golden ticket of local economic development prompting ribbon cuttings, tax incentives, and breathless press releases that promised jobs, economic growth, and a shiny new entry in the municipal budget. States and counties competed enthusiastically for the opportunity, and for a time, most parties seemed happy with the arrangement. That enthusiasm has cooled considerably.

Across data center hotspots from Virginia to Oregon, the community narrative has shifted. Residents are showing up to town halls with pointed questions about the hum of cooling systems, the volumes of water required to keep servers from overheating, residential electricity bills climbing as utilities strain to meet surging industrial demand, and long-term community consequences. What was once framed as a straightforward economic win is now, in many communities, a more complicated conversation.

The stakes of that conversation are now evident, as many state legislatures are currently developing more comprehensive policy frameworks to address a range of concerns, including grid and generation cost allocation, water consumption, demand response, and other zoning and environmental regulations. In June of 2025, Minnesota's legislature enacted HF 16, which tempers tax incentives for data centers, enhances community benefit requirements, and establishes a suite of environmental and labor protections. This policy is already driving improved outcomes within the state. Google's Pine Island project will bring 1600 MW of new clean generation to power the data center, and Google has also committed to cover 100% of the costs for grid infrastructure needed to support the project. The approach taken with Pine Island exceeds the requirements of Minnesota's state laws, signaling that policy may drive better grid and environmental stewardship.

Where legislation has lagged, litigation is filling the gap. As a case in point, *Pearson v. Port of Morrow* recently saw a US$20.5 million settlement from a hyperscaler operating in Oregon. This class action lawsuit, filed by residents of Morrow County, alleged that wastewater from data center facilities contributed to nitrate contamination of the primary drinking water source for tens of thousands. This decision illustrates how neglecting to fully assess community impacts can pose material risks and may set a precedent for community advocates nationwide.

For policymakers, the adjustment has been difficult to navigate. Officials who spent years crafting incentive packages to attract major infrastructure investment are now fielding constituent pressure that runs in the opposite direction. For hyperscalers looking to expand responsibly, the path forward requires more than finding the right site—it means building genuine trust in communities where, increasingly, that trust must be earned.

Policy

→ Science insights

Market

SCIENCE INSIGHTS

Stop treating ERW like an emerging CDR solution

Katherine Vaz Gomes

Michael Schaefer

BOTTOM LINE: Five years ago, ERW was an academic journal article. Today, the science has been validated, measurement systems have matured, and serious buyers are building ERW into durable portfolios. Now the industry must prove operational discipline at scale: moving rocks, building monitoring networks, and converting field applications into delivered credits. ERW's unusual economics, where revenue is delayed by the pace of natural weathering instead of permitting or construction, will require novel financial instruments that the industry has yet to structure. Whether ERW can transition from deployable to delivered is the defining question of 2026 for this CDR pathway.

In five short years, enhanced rock weathering (ERW) has jumped off the pages of academic journals and landed in the center of durable CDR portfolios: by the end of 2025, almost 850,000 tonnes of ERW had been contracted. That is not the profile of a technology waiting to be proven. It is the profile of a technology that is scaling as we speak. For years, ERW has been described as "emerging," a label that signals scientific plausibility without proven scale. ERW has emerged and is actively scaling. Contracts are larger, measurement systems are improved, and governments and standards bodies recognize that ERW can significantly contribute to meeting climate goals—with some estimates predicting it could provide 0.5–2 Gt of CDR per year. For buyers building durable CDR portfolios, the question is no longer whether ERW might work but how quickly the industry can deliver high-quality credits at scale.

Building climate infrastructure from rubble

ERW works by spreading crushed rocks across agricultural fields, where natural soil processes break down the added rock and pull CO_2 from the atmosphere. The CO_2 is then converted to dissolved bicarbonate and eventually carried through water systems to the ocean where it is stored long term. ERW occupies an unusual niche: It operates within agricultural ecosystems like nature-based CDR solutions, but delivers the durable CDR of engineered approaches like direct air capture.

2025: A year of signals

Microsoft demonstrated growing interest in ERW throughout 2025, purchasing almost 70,000 tonnes from ERW projects in Brazil and Canada in agreements that extend to 2029, representing the company's largest ERW commitments to date, and demonstrating a broader trajectory for the field at large. This growing offtake ambition signals confidence that ERW has evolved from early demonstrations to meaningful impact. With deal sizes now reaching hundreds of thousands of tonnes and more than 100 unique buyers in the market, ERW isn't peaking: it's maturing.

The market signals of ERW's maturation have been matched by institutional signals. In late 2025, the Enhanced Weathering Alliance joined the Carbon Business Council, bringing together leading developers to coordinate on policy, scientific standards, and stakeholder education. This kind of sector-wide collaboration indicates a field that is thinking about scale and taking action to see it realized. Further, Mati Carbon won the XPRIZE Carbon Removal grand prize for their implementation of ERW on smallholder farms in India. Mati's win sent a strong signal that ERW could deliver scalable, high-durability CDR with incrementally deployable capital costs and

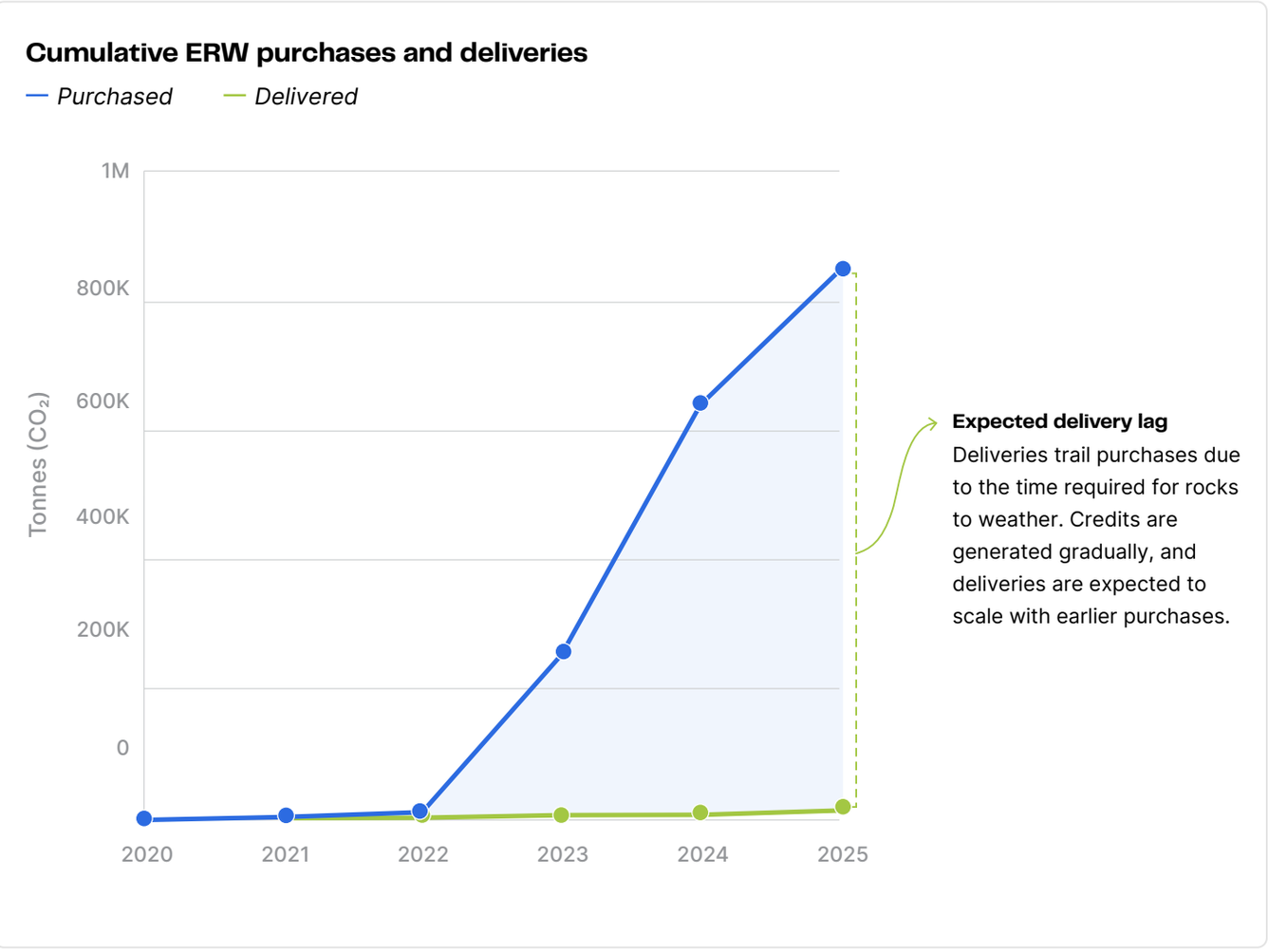
meaningful benefits for communities. ERW spent the past few years earning credibility, the kind that tends to precede scale and delivery.

While 850,000 tonnes is still small compared to the total CDR market, ERW's deployment trajectory is impressive. Since the technology leapt from the page into the market, contracted ERW volume has grown more than a hundredfold.

Solving the measurement problem

For a long time, with ERW, measurement was the thing keeping serious buyers on the sidelines. Projects relied on models that estimated carbon drawdown from proxy variables, like rock application and assumed weathering rates, without directly observing what was happening in the ground. For sophisticated buyers, that wasn't good enough.

The field has since made significant progress toward direct measurement. Projects now deploy monitoring systems and robust sampling plans to track soil chemistry, water chemistry, and pH across agricultural sites, combining field data with statistical models to better estimate and quantify carbon drawdown. While the result is not perfect certainty, it has substantially reduced dependence on theoretical estimates. ERW operates in an open system with inherent uncertainties. These are quantified and deducted from projects to ensure conservative accreditation, consistent with other comparable pathways.



Operational discipline is the next frontier

ERW's next big challenge is more mundane: moving rocks to fields. Delivering ERW at scale means sourcing crushed rock, transporting and spreading it on farms, building monitoring networks, and integrating each step into carbon accounting systems. Moving beyond running field trials, ERW's next phase is akin to scaling an agro-industrial supply chain with all the attendant integration and management challenges that entails.

The same players that proved the science of ERW now need to prove it can operate at scale. Variables such as procurement, logistics, quality control, and mineral supply costs will determine whether ERW becomes a durable fixture of the CDR market or stalls as it tries to grow. In the new era of ERW, operational discipline will define the class of developers who are ready to deliver on scale.

Addressing the skeptics

The strongest counterargument to the ERW enthusiasm is a simple one: contracts are not delivery. Until developers consistently convert applications of rock into verified, high-integrity CDR at scale, calling ERW "operational" may be getting ahead of the evidence.

It's a fair objection, but these skeptics may be too rigidly interpreting what "operational" means. No high-durability CDR pathway has arrived fully proven. Direct air capture is still demonstrating its cost curve. Biochar still carries durability uncertainty. The question is not whether ERW has achieved perfection, but whether it has crossed from "plausible" to "deployable." Buyers who wait for certainty may find themselves late to the party. ERW credits don't appear on signing day: rock has to be spread, have time to weather, and then be measured, which means buyers who wait for additional maturity in 2026 are the ones who may miss out on ERW credits in 2030.

The real test is still ahead

Most contracted CDR from ERW has not yet been delivered. Publicly announced deliveries only represent a small fraction of contracted volume. Large quantities of rock have already been applied to fields and credits will be delivered as the field data rolls in. That data and its associated deliveries, not the contracts, will ultimately decide ERW's place in the market.

Unlocking scale will require unlocking project financing. This is no small task for a technology with a cost structure that looks unlike almost anything climate lenders have priced before. Asking a traditional project financier to underwrite ERW is like asking a mortgage lender to finance a vineyard where the grapes won't be harvested for years and the collateral is the growth of the grapes year over year, but the payoff is a fine wine. ERW's economics are different than traditional capital assets, and revenue is delayed not by permitting or construction timelines but by the pace of natural weathering. First-of-a-kind financial instruments will almost certainly be needed to bridge that gap, and structuring them is the next hard problem the industry must solve.

For buyers building diversified portfolios, ERW offers something hard to replicate: low or rolling capital requirements, durable storage, and the ability to scale quickly within existing agricultural systems. However, that combination is only valuable if the industry can deliver on it. The question now is not whether ERW has emerged, but whether the industry can build the operational discipline and financial mechanisms to justify the confidence currently being placed in it. Making good on the strong signals from 2025 is the work that remains for 2026 and beyond.

SCIENCE INSIGHTS

Superpollutants: The VCM's exciting near-term opportunity

Hattie Whittaker Adrianna Sutton

BOTTOM LINE: The time to act on superpollutant mitigation is now. Supply is available and ramping up, frameworks are maturing, and the Superpollutant Action Initiative is proof that corporate ambition is arriving at scale. With careful project diligence, companies can include high-quality, readily available superpollutant projects in their decarbonization strategies and deliver outsized near-term climate impact. By pairing superpollutant mitigation with durable CDR, buyers can build strategies that produce sustained climate benefits for years and decades to come. And those positioned to go further can adopt annual radiative warming matching as a more rigorous alternative to GWP accounting—grounding their claims in science, not convention.

A potent, underappreciated piece of the climate puzzle

Superpollutants are potent climate-warming molecules, including methane, nitrous oxide, F-gases, and black carbon, that have an outsized near-term warming impact. Superpollutants have near-term warming potentials that can be hundreds or even thousands of times greater than CO_2 per unit of mass. They're responsible for roughly 35–50% of warming to date, yet they remain strikingly underrepresented in most corporate climate strategies.

That's starting to change. Credit issuances from superpollutant mitigation projects on the VCM nearly tripled between 2020 and 2025, a clear signal of growing traction. High-quality mitigation projects spanning methane, nitrous oxide, and F-gases have been available on the VCM for over a decade, and supply is now ramping up in anticipation of broader corporate demand. For buyers looking to optimize their near-term climate strategy, superpollutants are the rare case where low-hanging fruit is also high impact.

Corporate commitments are arriving at scale

The newly announced Superpollutant Action Initiative makes the scale of corporate ambition concrete. Organized by the Beyond Alliance, the initiative brings together Amazon, Autodesk, Figma, Google, JPMorganChase, Salesforce, and Workday around a commitment to deploy US$100 million through 2030 to fund high-impact superpollutant projects globally. Google has already announced partnerships with Recoolit for F-gas destruction and Cool Effect for landfill methane mitigation, targeting the elimination of more than 25,000 tonnes of superpollutants by 2030. These early movers are sending a demand signal that can catalyze standards development, attract new project developers, and unlock investment at scale.

The strategic case for pairing superpollutants with CDR

Superpollutant mitigation can be a powerful complement to durable CDR because these interventions act on different timescales. Short-lived superpollutant mitigation delivers potent near-term cooling, while durable CDR addresses warming that persists for centuries. When paired, they can create a consistently negative warming profile with rapid impact now and sustained drawdown later.

To track this sustained impact accurately, buyers can use an accounting framework called annual radiative warming matching. Currently, the most common carbon accounting approach is to standardize the complex atmospheric dynamics

of different pollutants using a global warming potential (GWP) conversion factor, applied over an arbitrary 100-year horizon. Annual radiative warming matching offers a more rigorous approach because it tracks the actual future warming impact of mitigation activities year by year. It captures the magnitude of near-term cooling from superpollutant mitigation as well as how that benefit fades as short-lived gases decompose, pinpointing exactly when durable CDR needs to pick up the slack.

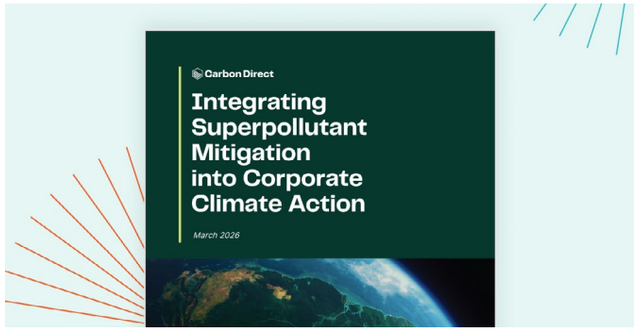
Buyers that move beyond conventional GWP-based accounting and adopt annual radiative warming matching as a supplementary framework will have a more accurate picture of their actual climate impact over time. It provides a more accurate approach to measuring near-term cooling, and a more accurate picture of the actual climate impact of voluntary corporate mitigation over time. Buyers that adopt this paired approach, and use annual radiative warming matching to account for it, can make highly defensible climate claims grounded in real atmospheric impact.

Diligence still separates the good from the risky

Growing momentum in the superpollutant space is exciting, but it doesn't change a fundamental reality: quality varies by project, and diligence matters.

While recent analyses indicate that superpollutant projects on the VCM are generally of higher quality than the majority of other project types, over half of superpollutant projects still fall into lower-quality categories. That's a meaningful share of the market where buyers could end up with credits that don't deliver the climate impact they're paying for.

This highlights the vital need for careful, project-level diligence so that corporations can integrate high-quality superpollutant mitigation into their portfolios with confidence, avoiding the reputational, financial, and climate risks that come with lower-quality credits.



Read Carbon Direct's newly published report to learn more about how corporate buyers can integrate superpollutants into their decarbonization plans.



WHAT WE'RE WATCHING IN SCIENCE

New research highlights

Shirin Mavandad

The right forest, in the right place

More than mitigation: The role of forests in climate adaptation ↗

CONTEXT TL;DR

Forests get plenty of attention as carbon sinks, and rightly so. But their role in climate adaptation is equally important. Beyond carbon storage, forests govern local temperature, water cycles, and how heat moves through ecosystems. Those effects vary substantially by geography, forest type, and scale. Understanding this variability has big implications for policy.

WHAT THEY FOUND

Forests buffer local temperatures, cooling daytime highs and modestly warming nighttime lows. Tropical forests drive the strongest cooling, while high-latitude forests can produce net warming due to albedo effects. Forest restoration helps control flooding in most cases, but can reduce streamflow and groundwater recharge in others. Carbon uptake remains significant, but albedo and hydrologic trade-offs complicate the net climate picture. The greatest climate benefits occur in locations where forests are native to the landscape.

THE WONKY DETAILS

Across 98 global sites, forests lowered maximum air temperatures by 4.1°C while raising minimum temperatures by 1.1°C. Afforestation reduced streamflow by 44% on average, with the steepest declines seen in dry climates. Net warming, due to albedo effects, offset carbon benefits in up to 72% of temperate savannas, but in fewer than 3% of tropical forests.

IMPLICATIONS

Though most policy frameworks still treat them primarily as carbon sinks, forests drive both climate mitigation and adaptation, but not everywhere and not always in the same ways. Protecting native, old-growth forests delivers the most reliable climate benefits. Planting trees in water-stressed regions can worsen water scarcity and undermine local livelihoods. Forest-based strategies need to account for biophysical trade-offs, and they can't substitute for cutting emissions at the source. Protecting the right forests, in the right places, matters enormously, but indiscriminate afforestation can do real harm.

Don't cast off fisheries

The importance of engagement with fisheries, aquaculture, and Indigenous communities in the planning and implementation of marine carbon dioxide removal (mCDR) ↗

CONTEXT TL;DR

mCDR is gaining traction as a complement to emissions reductions for stabilizing the climate. But mCDR happens in the oceans and oceans are already serving as workplaces, food sources, and cultural homes. Fisheries, aquaculture, and Indigenous coastal communities depend heavily on marine resources for livelihoods and cultural continuity, and mCDR deployments could directly affect those resources. Early community engagement isn't a nice-to-have; it's a prerequisite for responsible development.

WHAT THEY FOUND

Expanding mCDR research and deployment could generate both benefits and real risks for marine ecosystems and the seafood industry. The paper asserts that projects developed through meaningful, early collaboration between scientists, policymakers, fishing communities, and Indigenous groups are

far more likely to identify trade-offs, integrate local knowledge, and realize mutually beneficial outcomes. Skip that engagement, and projects court opposition, misinformation, and ecosystem harm that could set the whole field back.

THE WONKY DETAILS

The stakes are significant. Fisheries and aquaculture provide roughly 15% of global animal protein and employ over 60 million people worldwide. mCDR methods aim to remove atmospheric CO_2 through ocean processes and store it for centuries. But at climate-relevant scales, deployments could meaningfully alter ocean chemistry, ecosystems, and spatial ocean use, with direct consequences for fishing and aquaculture operations.

IMPLICATIONS

The paper's message is clear: engage early, engage meaningfully, and don't wait for deployment decisions. Key priorities include co-designing projects with affected communities, building interdisciplinary collaboration networks, and developing shared engagement frameworks. Done right, inclusive planning increases the odds that mCDR delivers climate benefits without gutting coastal livelihoods, food sources, and cultures. Offshore wind offers a cautionary tale, where rushed deployment without genuine fisheries engagement generated lawsuits and lasting distrust. mCDR has a narrow window to get this right before the same patterns take hold.

Old growth, big stakes

Higher carbon storage in primary than secondary boreal forests in Sweden

CONTEXT TL;DR

Boreal forests are a cornerstone of global carbon storage. As wood demand intensifies, primary boreal forests are increasingly converted to managed secondary forests. The carbon consequences of that swap have been poorly quantified, and previous global estimates may have substantially understated the losses. Getting this right matters for climate policy and for any nature-based solution that touches northern forests.

WHAT THEY FOUND

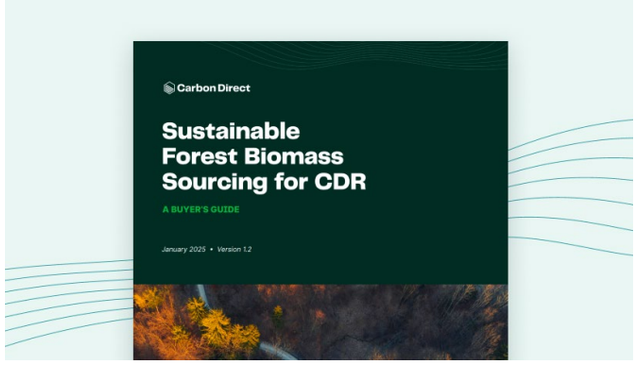
Primary forests store roughly 70–72% more carbon than managed secondary forests, across live trees, deadwood, soils, and harvested wood products combined. That gap is 2.7–8 times larger than previous global estimates suggested. Soil carbon drives the difference: it's both the largest carbon store in primary forests and the biggest source of divergence between primary and secondary forests. Even accounting for carbon stored in harvested wood products, managed forests don't come close to making up the deficit.

THE WONKY DETAILS

Researchers combined Sweden's national forest inventory with targeted field measurements across 24 lowland primary forests, sampling live trees, deadwood, and soils to 1-meter depth. They used three methods, a paired analysis and two statistical models, to control for environmental differences between forest types. Soils hold roughly 64% of total carbon in primary forests, with primary forest soils storing 68% more carbon than in managed secondary forests. Deadwood carbon is 334% higher in primary forests than in managed secondary forests.

IMPLICATIONS

Protecting primary forests is an essential component of both forest management broadly and BiCRS feedstock sourcing specifically. This paper highlights one key reason why: the carbon cost of converting primary boreal forest to managed secondary forest is far larger than previously estimated. Most BiCRS projects already include protections against sourcing from primary forests, and Carbon Direct's forest biomass sourcing guide requires it. This paper reinforces that those guardrails are doing important work and should be treated as non-negotiable.



Policy
Science
→ Market insights

MARKET INSIGHTS

From promises to performance: The CDR 2.0 playbook

Matt McDaniel

Julio Friedmann, PhD

BOTTOM LINE: CDR 1.0 defined the need and defined quality. CDR 2.0 is about delivering it. This requires moving beyond principles and frameworks to the operational discipline of project management, bankable contracting, and project assurance, the same toolkit that built the energy, chemicals, and infrastructure industries. Buyer interest is real and growing. Every stakeholder has a role in project assurance: buyers must commit to binding offtake, developers must embrace stage-gate discipline and independent oversight, standards bodies must converge on quantitative thresholds, and governments must condition public investment on project oversight. The projects that succeed first will set the precedent for those that follow.

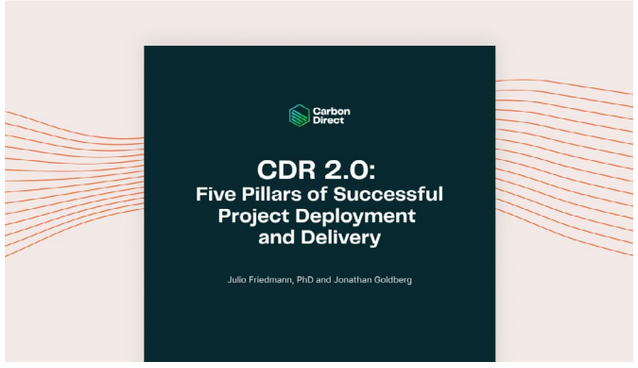
The CDR industry spent its first years getting its story straight. Protocols emerged. Registries and ratings agencies professionalized. Carbon Direct and Microsoft published the criteria that set the industry's baseline for what a high-quality credit looks like.

Call it CDR 1.0: the necessary, hard work of defining what good means. And it's paying off. Forward offtake commitments for CDR have grown sixfold since 2023, with more than 70 million tonnes now under contract across nature-based and high-durability pathways. Buyers aren't just talking about removals; they're signing for them.

But signing isn't the same as building. Projects aren't reaching the final investment decision stage at anything close to the rate the market needs.

Capital sits on the sidelines, waiting for project-level risk to come down. The credibility damage from poor-quality projects across the broader VCM hasn't helped. In that context, more principles, frameworks, and working groups haven't moved a single project forward. The gap isn't knowledge or ambition. It's execution.

In a new whitepaper, Carbon Direct defines CDR 2.0 and the five pillars of successful project deployment and delivery. **CDR 2.0 doesn't replace CDR 1.0. It builds on it.** A project that fails on additionality, durability, or accurate measurement can't be rescued by superior project management. Likewise, a project that passes those tests and then fails to reach operation delivers zero tonnes. CDR 2.0 offers a vision for adding the operational, commercial, and institutional infrastructure that turns quality project design into reliable delivery.



The five pillars of CDR 2.0

For a CDR project to move from assessment to final investment decision, five conditions must be met. While meeting quality criteria is foundational, it is not sufficient.

1. Technical readiness

Core and ancillary technologies must be mature enough for commercial-scale performance, not just pilot-phase promise. Buyers and developers need to be transparent about where a project actually sits on the readiness spectrum, rather than where they hope it will be.

2. Project assurance

CDR facilities are heavy industrial assets. They require the same stage-gate disciplines used for projects in energy and chemicals industries: front-end loading, independent technical review, and rigorous risk assessment across technical, economic, commercial, organizational, and political dimensions.

3. Standardization

The current patchwork of registries, protocols, and principles creates confusion and delays deal flow. Methodologies for MMRV, crediting, and environmental accounting need to converge on consistent, quantitative thresholds that buyers, investors, and regulators can actually rely on.

4. Bankable contracting

Letters of intent don't build projects. Binding offtake agreements, structured with capital stacks that allocate risk appropriately across equity, debt, and public finance are what unlock final investment decisions. Without firm commitments from creditworthy buyers, developers can't secure financing. Full stop.

5. Transactional ease

Every CDR deal today is bespoke. Standardized contracts, syndication structures, and portfolio-level procurement tools would let buyers assess and commit with more streamlined negotiations. Advance market commitments and aggregated purchasing can move CDR from artisanal deal-making to a functioning market.

What mature industries already know

Large-scale energy and industrial infrastructure projects live with a well-documented problem every day: projects without independent oversight consistently experience higher rates of cost and schedule overruns. For example, nuclear projects average cost overruns above 100%. Even solar and wind, generally considered lower-risk, see significant schedule delays when project assurance is absent. The pattern holds across geographies and decades.

The CDR enterprise is now building its first generation of commercial-scale facilities, many of them first-of-a-kind. These projects face every challenge that conventional energy infrastructure faces, plus a few unique ones: immature supply chains, evolving regulatory frameworks, technologies that haven't been operated at scale. The developers building them, including experienced companies operating outside their core business, often lack the in-house expertise to manage all of these dimensions simultaneously.

That's not a criticism; it's a structural feature of a new industry where the required competencies span engineering, environmental science, policy, finance, and community engagement.

The infrastructure and energy sectors solved this decades ago with **independent project assurance**: third-party teams that identify and help manage risks across the full project lifecycle, from concept development through construction and operations. It costs less than one percent of the total project budget. For an industry where early project failures would erode both buyer trust and the case for continued public investment, that's not an overhead cost. It's fundamental.

Buyers, investors, and governments all have a role here. Governments in particular should condition CDR funding on independent project oversight, just as they condition infrastructure grants on independent safety reviews. The first CDR projects to reach the market must succeed, be technically sound, on time, and on budget, because early failures will hobble deployment at the scale the Paris Agreement demands.

MARKET INSIGHTS

The case for acting on residual emissions now

Vish Arora Alex McCann Molly Tucker

BOTTOM LINE: Developing a plan to address residual emissions now represents an integral part of a credible net-zero transition plan; waiting only increases exposure. High-quality mitigation and removal pathways exist today, and the frameworks governing claims and integrity are rapidly maturing. Companies that wait for perfect guidance or future compliance triggers are risking misalignment, internal friction, higher costs, and rushed action down the line. Those that formalize their approach early—aligning internal capital, defining impact priorities, and building portfolios that can evolve over time—will have the advantage. Designing deliberately now means entering the next phase of the climate transition with clarity, credibility, and strategic vision.

When "beyond" isn't far enough

The SBTi's most recent draft of its upcoming Corporate Net-Zero Standard (CNZS) V2.0 introduced a deceptively simple wording shift: it renamed Beyond Value Chain Mitigation (BVCM) as Ongoing Emissions Responsibility (OER). But the rebrand carries real weight. By swapping "beyond" for "ongoing," the SBTi subtly reframes action on remaining emissions as *parallel* to value-chain abatement, not a footnote to it. Climate action outside the value chain is no longer a voluntary add-on; it's becoming an expected component of any credible net-zero strategy.

The mechanics reinforce this message. Under the draft CNZS V2.0, Category A companies (large enterprises and medium-sized firms in high-income countries) face mandatory responsibility to address a share of ongoing emissions from 2035, scaling linearly toward full neutralization of residual emissions by 2050 at the latest. Prior to 2035, a voluntary recognition program offers two tiers of different commitment levels to incentivize early movers who begin taking responsibility for ongoing emissions now.

The SBTi has faced criticism over the timing and ambition of its draft requirements, despite highlighting that V2.0 introduces mandatory CDR purchasing to help bridge the gap between corporate climate commitments and action. Some observers argue that mandatory obligations should begin earlier. Others note that the required share of ongoing emissions companies must address after 2035 may not be finalized until CNZS V3.0 in the early 2030s. This creates a risk that companies may further delay action. Nevertheless, an introduction of mandatory action would mark a clear inflection point for company leaders, underscoring that the bar for credible corporate climate action is rising.

The implementation gap

The OER reframing reinforces the expectation that, by 2050 at the latest, companies will need to fully neutralize residual emissions with CDR. However, the bridge between today's BVCM activity and the goal of net-zero emissions is largely unbuilt.

Many organizations already fund climate and nature initiatives outside their value chain in some form (e.g., philanthropic contributions, credit purchases, landscape restoration partnerships), but few have integrated those efforts into a coherent approach that also prepares them for the significant costs and credit volumes neutralization requires. A company with 10 Mt of emissions today, falling to 1 Mt by 2040, could face annual neutralization costs of around US$235 million, based on projected prices for high-durability CDR.

What remains unclear for many companies is how to translate disparate climate initiatives into a cohesive, defensible strategy that increases readiness on the road to neutralization. The ambition is there, but in many cases, the playbook isn't.

Some companies are starting to engage with CDR markets to build institutional knowledge and prepare for future obligations, but hesitation persists. Many are wary of acting, and reluctant to communicate their climate strategies publicly, for fear of greenwashing accusations or unintentional misalignment with evolving voluntary and regulatory guidance. For example, in the VCM, 55% of tonnes retired on the spot market throughout 2023–2025 were retired anonymously. This phenomenon, known as greenhushing, has been on the rise in the VCM since 2023.

What building a real OER strategy taught us

Without translating ambition into action, companies risk allowing BVCM commitments to drift, entering the next phase of the climate transition underprepared for neutralization requirements. Carbon Direct recently supported a client in mitigating these risks developing an end-to-end OER strategy. This included setting internal carbon fees, defining impact pillars, testing portfolio scenarios, and building an implementation roadmap.

Three insights from this process stood out.

1. The constraint is alignment, not ambition.

Many large companies already deploy significant capital toward climate and nature, but funding is often scattered across functions, geographies, and objectives without unifying logic. An OER lens enables organizations to articulate desired impacts, clear eligibility criteria, and governance structures that maximize near-term mitigation while supporting underfinanced options on the path to neutralization. Getting this balance right means weighing quantified outcomes against investments that are harder to measure like providing funding for climate-related loss and damage, advancing climate-positive policies, or supporting resilience for communities and ecosystems.



2. Portfolio design is critical.

Companies that treat OER solely as carbon credit procurement leave value on the table. A well-designed portfolio allocates internal carbon fee revenues deliberately rather than defaulting to a single category, balancing near-term mitigation, societal impact, value chain resilience, and long-term climate impact via durable removals. One approach is to build an impact framework that scores OER activities against organizational priorities and climate goals, including forward-planning to achieve neutralization milestones. OER funding can then be distributed among the pillars in a clear and defensible way. The best strategic OER portfolios also accelerate innovation in hard-to-abate pockets of the value chain, reduce long-term business risk, and empower communities. It's not simply about buying tonnes, but deploying targeted catalytic capital aligned with sectoral risks and supply chain realities. Take a hypothetical global food and beverage manufacturer, as an example. Let's see how different activities can form a meaningful part of the company's OER portfolio (see table below).

3. Waiting increases exposure.

Building an OER portfolio early helps companies put governance in place, define quality standards, and demonstrate a credible net-zero transition plan to stakeholders. Locking in forward offtake agreements for carbon credits now reduces the risk of supply shortfalls later. Companies that wait for perfect guidance forego the chance to build institutional knowledge and supplier relationships today, while terms are more favorable. Market dynamics and stakeholder expectations will evolve in ways no one can precisely forecast. That uncertainty underscores the importance of strategies that are clear in intent yet flexible in execution. Companies that embed adaptability from the outset can refine their approach over time, respond to shifting requirements, and stay aligned with their broader transition plan.

Even with deep decarbonization, residual emissions will remain and must be actively addressed. SBTi's new guidance doesn't ask corporations to radically change their approach to climate mitigation. Instead it's a push to build credible, business-aligned pathways to neutralization that take into account the full spectrum of corporate climate responsibility.

Primary impact pillar (non-exhaustive)	Real-world example of OER activity	Desired impact and rationale for inclusion in the OER portfolio (non-exhaustive)
Direct emissions mitigation	Sign a long-term offtake agreement with a biochar CDR project	• Support the path to neutralization • Reduce long-term business risk
Natural and societal resilience	Invest in landscape-level resilience projects in key sourcing regions	• Achieve progress toward standalone nature protection and restoration target • Reduce long-term business risk
Systemic enablers for climate mitigation	Provide early-stage funding for low-carbon fertilizer alternatives	• Accelerate innovation within the value chain • Reduce long-term business risk

WHAT WE'RE WATCHING IN MARKETS

GHG Protocol's Land Sector and Removals Standard

Mila Stieglitz-Courtney **Ryan McNamara**

WHY IT MATTERS: The GHG Protocol's Land Sector and Removals Standard provides a comprehensive framework for companies to quantify and report land-based GHG emissions and CO_2 removals, but the detailed implementation guidance isn't expected until the second quarter of 2026. This leaves companies with uncertainty on how to operationalize new requirements before they go into effect in 2027. While awaiting implementation guidance, companies can consider a step-wise reporting approach, focusing on implementing more granular measurement approaches in areas with the most material impacts on their supply chain decarbonization efforts. This will help companies align more readily with the finalized requirements and transition more smoothly once guidance is issued later this year.

Overview of the Land Sector and Removals Standard

On January 30, 2026, the GHG Protocol released the Land Sector and Removals Standard v1.0. The Standard establishes requirements and recommendations for quantifying emissions and CO_2 removals from agricultural and land-based activities, and applies to any company with significant land sector operations or value chain exposure. It also covers technological CO_2 removals, including BECCS and DACS.

Among other provisions, the Standard establishes several new requirements relative to the previous draft from 2022. Notably, it recognizes the mass balance approach with safeguards as an eligible chain-of-custody model for establishing physical traceability, and formalizes accounting for land management CO_2 removals at the level of the sourcing region. The Standard also sets stronger requirements for land use and leakage. It requires all companies to report land occupation for both scope 1 and scope 3 emissions, and introduces a new requirement to quantify land carbon leakage whenever high-risk activities displace or reduce food or feed production.

What still remains to be answered

The Standard leaves several important questions open that are key for successful operationalization, with additional guidance expected in the second quarter of 2026. For example, it remains unclear whether regenerative and sustainable management practices qualify as "high-risk" activities under the land carbon leakage requirement, as well as the applicable monitoring protocols or thresholds for determining whether changes in yields or food production necessitate leakage reporting.[1] Similarly, for land management CO_2 removals, key questions remain about how sampling and monitoring requirements will operate in practice, particularly sampling design and buffer pool management. Finally, it is unclear how target-setting bodies will treat alternative pathways for demonstrating traceability (i.e., impact traceability) where physical traceability is limited. For companies in the food and agricultural sector, these gaps raise important uncertainties related to internal measurement approaches and associated impacts on reporting against supply chain decarbonization efforts.

1 Notably, the Land Sector and Removals Standard includes the following as an activity with high risk for land carbon leakage: "significant reduction in crop yields per hectare that occurs over the long-term, resulting from a change in cropland management practices (e.g., practices that reduce chemical inputs but also significantly reduce crop yields), except where such a change is made to improve the long-term sustainability of food production."

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