

# Assessing Carbon Opportunities

## Our Investment Thesis in this Growing, Nascent Landscape

### SUMMARY



While the carbon management industry remains nascent, we expect it to develop into an important market opportunity and a material lever in the reduction of global emissions



Significant uncertainty regarding carbon removal and accounting standards, regulations, and the timing of demand warrant a curious, but cautious, investment approach



Blackhorn invests in digital infrastructure solutions that drive resource productivity and decarbonization across the industrial economy. Given our emphasis on capital-efficient solutions, we're primarily focused on:

1. carbon accounting solutions,
2. measurement, reporting and verification (MRV),
3. financial innovations accelerating access and traceability, and
4. solutions driving fundamental resource efficiency gains with the potential for supplemental carbon revenue.

#### Authors:

**Mark Loch,**  
Operating Partner and Head of Insights  
[mark@blackhornvc.com](mailto:mark@blackhornvc.com)

**Amanda Rohrer,**  
Senior Associate  
[amanda@blackhornvc.com](mailto:amanda@blackhornvc.com)

#### Contributors:

**Bret Kadison,**  
Senior Advisor  
[bret@blackhornvc.com](mailto:bret@blackhornvc.com)

Are carbon markets finally going mainstream? Three watershed events this May point to a fundamental shift in this rapidly evolving space: JP Morgan Chase [made one of the biggest bets ever](#) on carbon removal; Frontier founders [Meta, Alphabet, Stripe, Shopify and McKinsey](#) entered into a contract to buy roughly 10 times the amount of permanent atmospheric carbon removal worldwide than has been purchased to date; and [State Street](#) launched their carbon asset servicing solution for clients investing in carbon-related assets. At the same time, [a key UN panel](#) stated that carbon removal solutions are “technologically and economically unproven,” casting concern over the nascent industry. Plus news that the Zimbabwean government plans to appropriate 50% of revenue from all carbon projects with many other developing countries considering the same. While the impact of these announcements remains to be seen, what is clear is that the carbon market opportunity is likely to be real, massive, and critical in shaping our collective path to net zero emissions over the next 10+ years.

### WHAT HAS HAPPENED TO MAKE CARBON MARKETS MORE LEGITIMATE?

Early signs indicate that a legitimate voluntary carbon market (in contrast to a compliance or regulatory market) is developing, though the quality of removals remains inconsistent given the lack of reliable standards. (If you're brand new to carbon markets, take a look at [CTVC's voluntary carbon market](#) value chain for a quick primer). Global voluntary carbon trade volume is expected to hit \$2 billion by the end of 2023, and McKinsey estimates it could be worth up to [\\$50 billion](#) by 2030. Most credits today are nature-based (which are quickly running out), and the demand vs. supply chicken-and-egg issue for other forms of carbon capture credits remains a critical barrier. Corporates are making record net zero commitments, increasing the expected demand for carbon credits. But developers, who supply carbon credits, need capital and long development timelines for their solutions to produce real and sizable carbon credits to meet that expected future demand.



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## Understanding Carbon Markets

How are carbon offsets bought and sold?

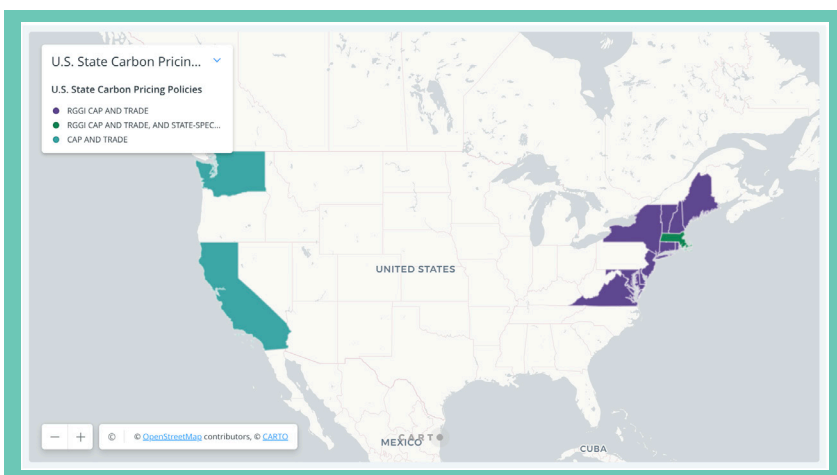


While the market may be nascent today, there are robust macroeconomic tides accelerating the industry. Players like Stripe's [Frontier](#) are trying to change the paradigm from "build it and they will come" to "buy it and they will build" with the use of advanced market commitments. The [Inflation Reduction Act](#) and the [Bipartisan Infrastructure Law](#) includes billions in incentives to accelerate carbon solutions. There is \$3.5 billion in funding earmarked for direct air capture and [\\$20 billion](#) in funding for climate measures in regenerative agriculture and forestry. Additionally, the 45Q tax credit is bolstering carbon removal startups by increasing credit values from \$35/ton of CO<sub>2</sub> sequestered through utilization and \$50 for geologic storage to \$130 and \$180, respectively. Pricing for a ton of carbon removal varies widely in the voluntary market today (up to \$600/ton), though we expect pricing to evolve from a 'per ton' to a 'per ton-year' scheme eventually to better account for differences in the durability or permanence of removal.

### THE OPPORTUNITY IS REAL, BUT UNCERTAINTY REMAINS HIGH.

Companies will have a tremendous opportunity to participate in the growing carbon management landscape. Carbon removal is reminiscent of computer storage. Nearly fifty years after the advent of floppy disks, a USB drive can put 10,000X the storage capacity in your pocket with greater reliability at a similar price. Just as data storage demand drove innovation and investment, carbon removal demand will drive scale in carbon storage markets eventually. We expect carbon management to experience a massive cycle of innovation and an expansion of opportunities followed by some consolidation and contraction, but timing is uncertain. That said, vaccine production during the COVID-19 pandemic showed that political and commercial incentives can dramatically accelerate the deployment of technologies in a crisis, which may bode well for carbon removal.

One major barrier is a lack of clear regulatory or agreed-upon industry standards. What does "net zero" mean? What does "additionality" mean? How do we grade carbon quality? Standards will emerge eventually, but it is unclear who will drive them. Many are watching the results of [Conservation International's \\$200M partnership with Apple and Goldman Sachs](#), and the [Integrity Council for the Voluntary Carbon Market](#). We expect big industry players (such as Stripe [Frontier](#), [Microsoft](#), and [Rubicon](#)) and sector specialists like South Pole, Mercuria, Carbon Direct, and others to continue leading with their own standards and criteria until regulators step in. Yet it is unclear which regulators will take the charge. It is likely that the SEC and CFTC will be involved. But as carbon credits are used on bank balance sheets as collateral, the FDIC and OCC may also have key roles. Finally, states may decide to regulate in the absence of federal oversight. California, Washington, and a block of eleven Northeast states (known as [RGGI](#)) have some kind of cap-and-trade or cap-and-invest program in place today, so they will likely continue to lead with state-driven regulation.



U.S. State Carbon Pricing Policies  
Source: Center for Climate and Energy Solutions, Interactive Carbon Pricing Policies Map.

We believe the hypotheses below will inform market development and shape our evolving approach as an early-stage venture capital investor.

**1. CAPITAL-INTENSE CARBON CAPTURE, UTILIZATION, AND SEQUESTRATION (CCUS) SOLUTIONS SHOULD PLAN FOR A CREATIVE AND COMPREHENSIVE FUNDING SCHEME.** The capital intensity and long development timelines of most CCUS solutions (direct air capture, ocean capture, etc.) make them a poor fit for the scale and speed required for typical early-stage venture capital returns. As such, their valuations and round milestones do not align with typical venture capital expectations (e.g., running demo projects rather than generating revenue by Series A). Such companies should proactively plan for the use of non-dilutive funding, patient deeptech venture capital, project equity, and debt capital. Do not assume that if you build it, late-stage funders will come - begin forming relationships with project equity and debt providers at the Seed and Series A stages.

**INNOVATORS:** There is a select group of deep tech climate VCs designed to meet these unique needs, such as Breakthrough Energy Ventures, Microsoft, Capricorn, Lowercarbon Capital, Carbon Direct, DCVC, and Evok Capital. See more deep tech investors in [CTVC's](#) running list of climate venture firms.

**2. CARBON ACCOUNTING "GUESSTIMATES" NO LONGER SUFFICE - COMPANIES NEED ACCURATE MEASUREMENTS OF THEIR SUPPLY CHAINS AND SCOPE 3 EMISSIONS TO INFORM REAL ACTION.** The average company's supply chain GHG emissions are [5.5 times](#) higher than the direct emissions from its own assets and operations. With the US Securities and Exchange Commission's proposed new climate disclosure rule, companies need transparent and accurate measurements of supply-chain carbon impacts. We hypothesize that firms specializing in a vertical or a level of complexity will demonstrate a competitive advantage as they leverage domain expertise and accrue a big, related data pool to help them scale efficiently. These carbon accounting firms are likely to be desirable targets for large corporations seeking to integrate carbon accounting into their existing platforms, such as ERP vendors. Increased measurement by carbon accounting and ESG data platforms will eventually drive meaningful climate action, including the purchase of carbon removal.

**INNOVATORS:** [Optera's](#) smart software - augmented by expert consulting services - specializes in calculating, managing, and driving action in Scope 3 by connecting users with their suppliers and partners. [Carbon Title](#) and [EnergyRM's](#) platforms empower building owners, developers, and contractors to understand a building's CO2 emissions over time, invest in decarbonization projects, and track their progress over time. [Singularity](#) is providing granular pricing and emissions profiles on the path to 24/7 carbon free electricity.

THE AVERAGE COMPANY'S SUPPLY CHAIN GHG EMISSIONS ARE 5.5 TIMES HIGHER THAN THE DIRECT EMISSIONS FROM ITS OWN ASSETS AND OPERATIONS.

RATHER THAN DETAILING A COMPREHENSIVE LANDSCAPE, WE'VE HIGHLIGHTED A FEW PLAYERS WE CONSIDER TO BE PARTICULARLY INNOVATIVE IN THESE AREAS.

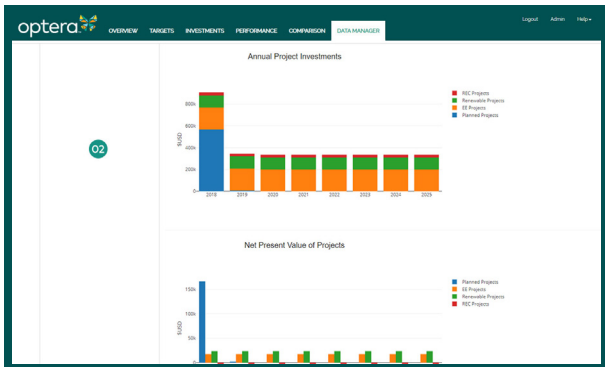
#### INNOVATORS

[optera](#) 

[EnergyRM](#)

 [Carbon Title](#)

 [Singularity](#)



A snapshot of Optera’s dashboard: that helps companies calculate and manage their scope 3 emissions.



**3. VERTICALLY SPECIALIZED MEASUREMENT, REPORTING, AND VERIFICATION (MRV) SOLUTIONS PROVIDE QUALITY AND SCIENTIFIC RIGOR, BUT THE CURRENT LANDSCAPE LACKS COMMERCIAL EXPERTISE.**

Verifiers are incentivized for quantity, not quality today. They get paid when they bring new credit volume to the market, incentivizing them to keep low quality stock in trading. We believe a quality-aligned alternative in which verifiers are compensated for action rather than outcomes will emerge as verifiers come under more scrutiny from corporate buyers and eventually from regulators. The current landscape that leverages non-profit carbon registries, while well intentioned and scientifically rigorous, lacks the capacity needed to provide verification at commercial scale. Moreover, the registries academic and scientific acumen is impressive, but the lack of commercial expertise makes them ill-suited to identify more esoteric risks in niche segments of the markets. MRV platforms may ultimately be acquired or integrated into ratings agencies (puro.earth, acquired by NASDAQ, is arguably the leader in this space).

**Innovators:** [Isometric](#) is a carbon removal registry and verification service underpinned by scientifically rigorous due diligence and analytics that acts as an independent third party that sits between buyers and suppliers. [Chloris Geospatial](#) uses remote sensing technology to monitor natural resources and measure carbon stock, gains, and losses.

**4. THE PROLIFERATION OF CARBON MARKETPLACES WILL RESULT IN A GRAVEYARD OF STARTUPS AS ONLY A FEW MARKETPLACES WIN.** We hypothesize only a handful of carbon marketplace startups will evolve to have the scale and capacity to provide the financial backing and insurance demanded to protect against carbon defaults. Sector-specific marketplaces, which have grown as many suppliers seek to avoid intermediaries taking a cut, will be short-lived as the financial backing of carbon offsets (allowing for replacement of carbon default) eliminates greenwashing risk and allows for the grading of carbon quality.

**INNOVATORS:** We don’t believe this is an attractive space for startups today and encourage MRV providers to remain separate from marketplaces to avoid conflicts of interest. Carbon credit suppliers (i.e. project developers) and MRV providers should instead ensure their: 1) measurement methodology is robust enough to allow them to adapt to changing standards for their niche, and 2) their IT systems are sufficiently audit-ready (or adaptable) to respond to an evolving regulatory landscape.

INNOVATORS



**5. SOME OF THE MOST ATTRACTIVE CARBON OPPORTUNITIES WILL NOT BE WITH PURE-PLAY CARBON COMPANIES, BUT WITH COMPANIES LEVERAGING CARBON CREDITS OR SUBSIDIES FOR SUPPLEMENTAL REVENUE GIVEN THE INHERENT EMISSIONS SAVINGS OF THEIR CORE PRODUCT.** As domain experts, we seek to understand the highest carbon potential levers within our target sectors: energy, the built environment, transportation and logistics. Many point-source solutions allow for efficiency and cost savings alongside carbon capture. Additionally, as avoidance offsets - certified emissions reductions from projects that reduce emissions compared with the baseline scenario - become more widely recognized and demanded, we see tremendous opportunities for companies to access carbon markets to monetize the inherent emissions-reducing impact of their core business offering, especially when focused in local markets with favorable regulations in place.

**INNOVATORS:** [Thalo Labs](#) measures NYC building emissions and permanently captures CO2 over a wide range of input conditions - from ambient to combustion point source-capture. [Ecworks](#) plans, constructs, and installs prefabricated facade and roof panels to convert apartment buildings to a net zero standard within weeks, while generating government carbon subsidies for the avoided emissions. [Agerpoint's](#) 3D plant models and smart analytics tools provide actionable insights on plant health, expected yield, and risks. By leveraging the data they already collect, Agerpoint's 'Know Your Carbon' MRV tool provides credibility and transparency for Natural Climate Solutions.

## INNOVATORS



Ecworks carbon neutral prefabricated facades and roof panels installed at project site.



Sample of Agerpoint's 3D plant model, providing precise plant measurements alongside accessible, digital MRV carbon solutions for reforestation, afforestation and agroforestry projects.

Carbon management inherently aligns with Blackhorn's financial and impact objectives as it provides an avenue for companies to generate revenue tied to a clear impact outcome - less CO2 emissions. In addition to constantly learning and evolving our approach, Blackhorn is committed to building the capabilities needed to help our portfolio companies measure and articulate the impact of their solutions and tap into opportunities associated with carbon markets.

## CONCLUSION

The carbon management industry is in a period of rapid growth and transformation. Even if we cut all additional greenhouse gas emissions tomorrow, we would still need to remove billions of tonnes of emissions from the atmosphere to avoid catastrophic global warming. While uncertainty remains high, so does upside. We will continue experimenting and learning as the industry evolves and look forward to the emergence of new technologies and business model innovations to accelerate this critical transition.

Are you a carbon management founder with these early signs of traction? Or a fellow carbon-curious investor looking to collaborate? If so, reach out to us at [info@blackhornvc.com](mailto:info@blackhornvc.com). We'd love to hear from you!