



 EMERGING TECH RESEARCH

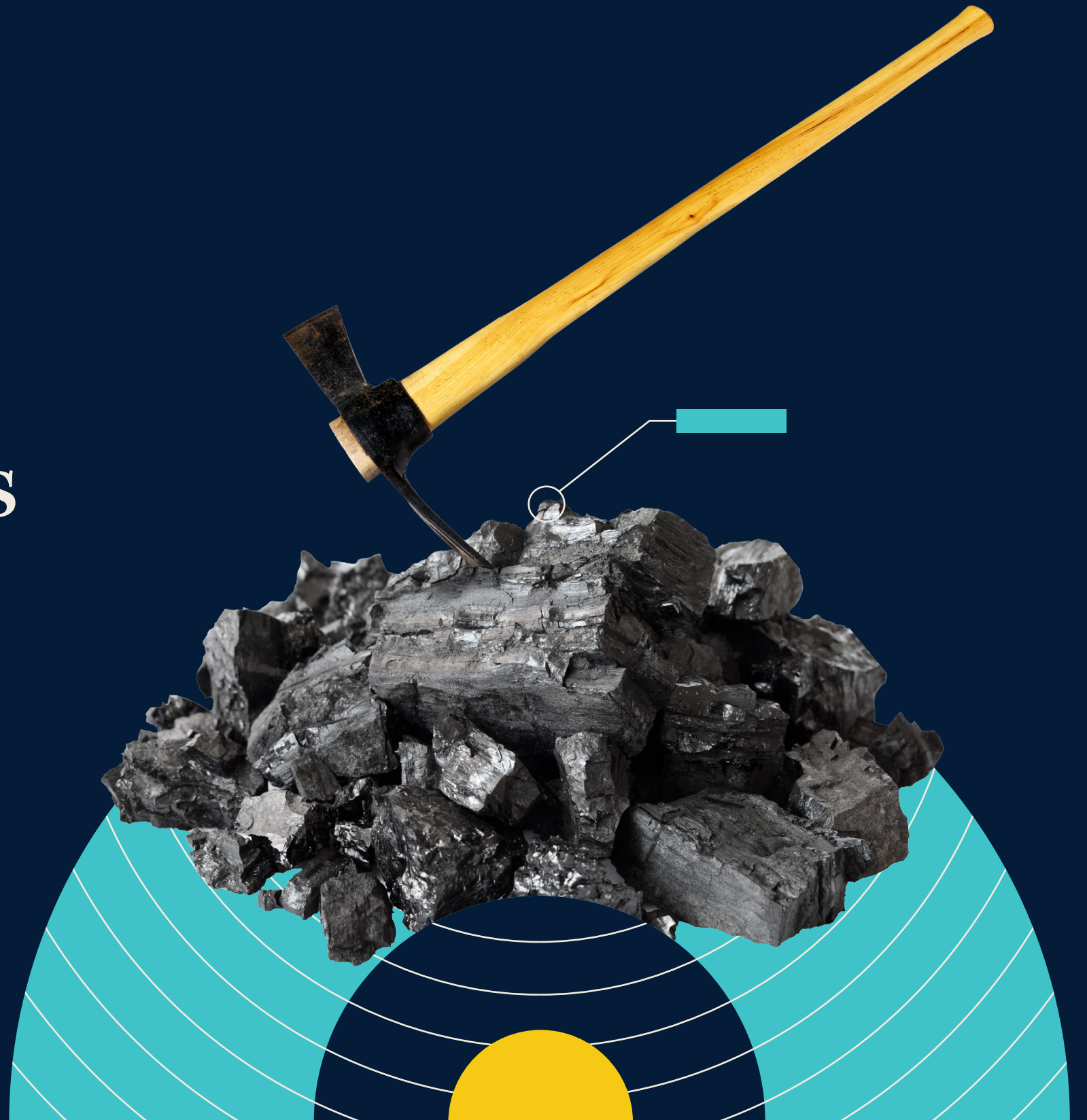
Carbon & Emissions Tech Report

VC trends and emerging opportunities

Q3
2023

REPORT PREVIEW

The full report is available through
the PitchBook Platform.





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We are adding PitchBook Exit Predictor probabilities to our Emerging Technology Research reports. PitchBook's proprietary [VC Exit Predictor](#) estimates the probability that a startup, or VC-backed company, will successfully IPO, be acquired, or merge. The tool is available exclusively to PitchBook subscribers.

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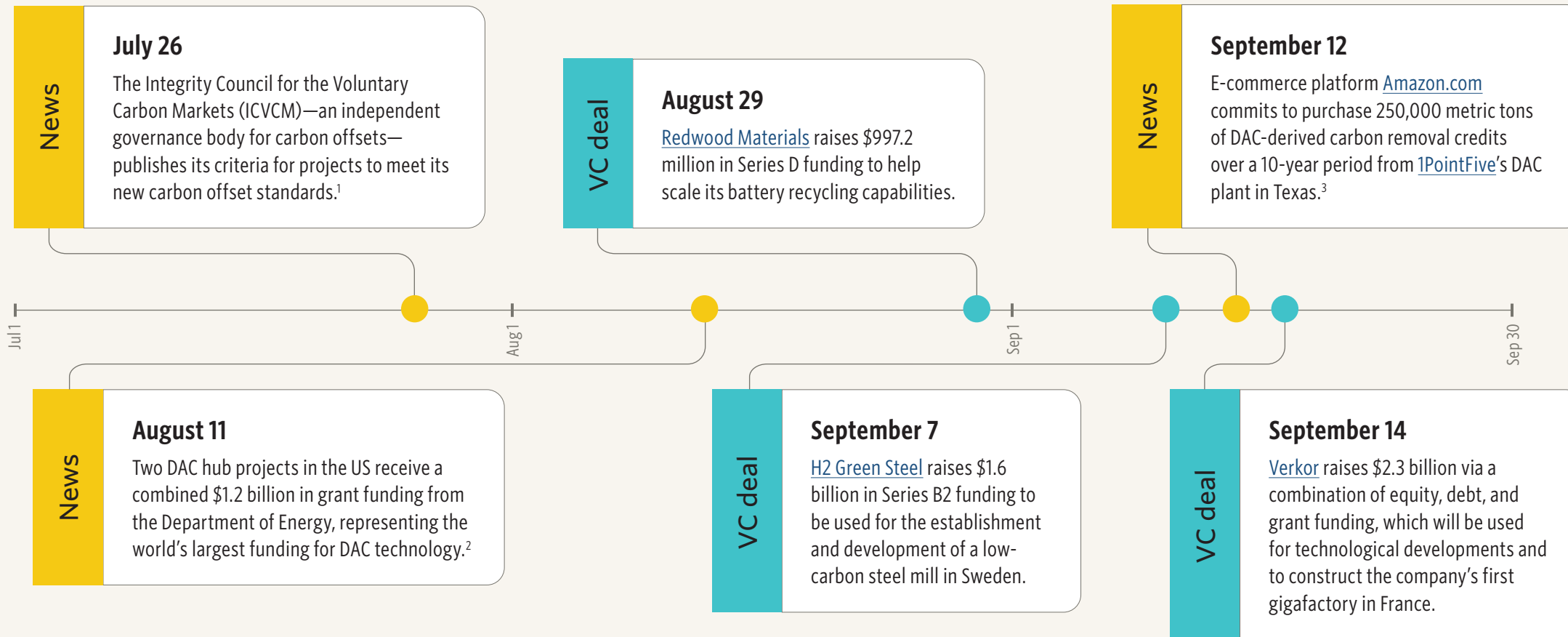
Publishing

Report designed by **Drew Sanders** and **Jenna O'Malley**

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Q3 2023 timeline



1: "The Core Carbon Principles Assessment Framework," The Integrity Council, n.d., accessed October 18, 2023.
 2: "US Awards \$1.2 Billion to Oxy, Climeworks-Led Carbon Air Capture Hubs," Reuters, Valerie Volcovici, August 11, 2023.
 3: "1PointFive and Amazon Announce 10-year Carbon Removal Credit Purchase Agreement," 1PointFive, September 12, 2023.

Q3 VC deal count summary

219
total deals

-17.0%
QoQ growth

-19.2%
YoY growth

9.9%
YTD growth

Q3 VC deal value summary

\$7.6B
total deal value

119.7%
QoQ growth

110.0%
YoY growth

48.4%
YTD growth



Carbon & emissions tech landscape

- 1** Carbon tech
- 2** Industry
- 3** Built environment
- 4** Land use

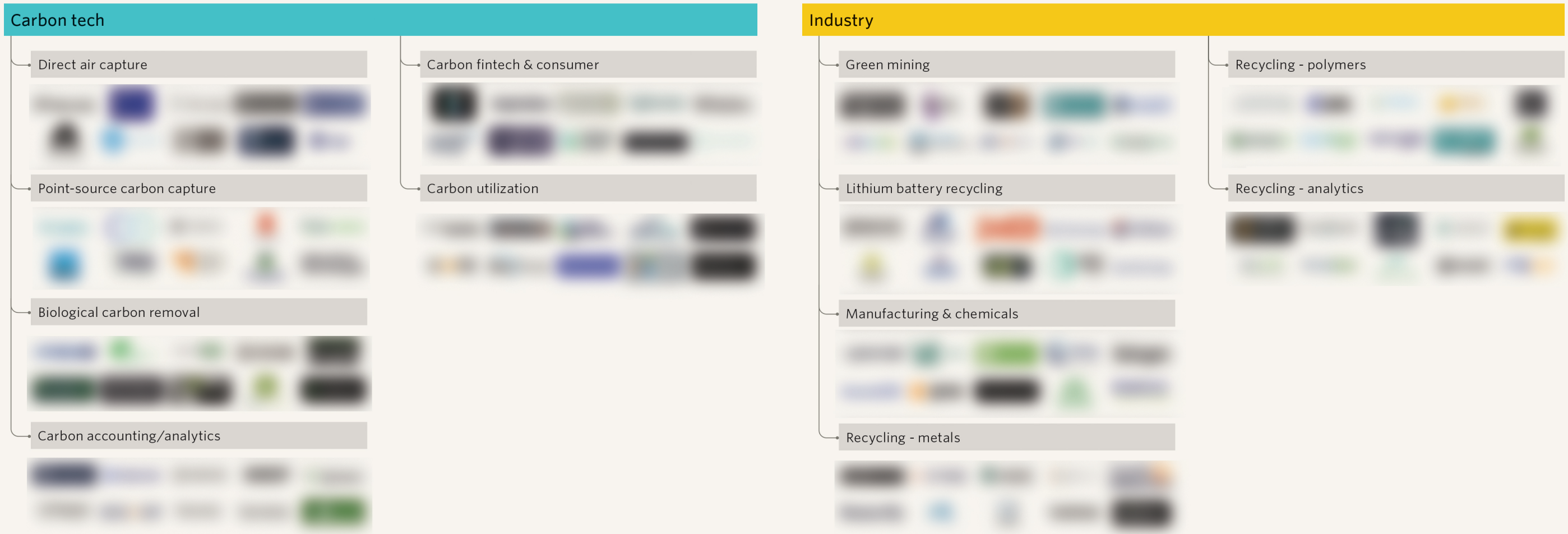




Carbon & emissions tech VC ecosystem market map

Click to view the interactive market map on the PitchBook Platform.

Market map is a representative overview of venture-backed or growth-stage providers in each segment. Companies listed have received venture capital or other notable private investments.





Carbon & emissions tech VC ecosystem market map

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Built environment

- Green construction
- Building energy efficiency
- Heating & cooling

Land use

- Fertilizer alternatives
 - PIVOT BIO, Yisect, ATLAS AGRO, Sound, APHEA^{bio}, Agtronutris, Terramera, OSTARA, DUCTOR, concentric
- Ecosystem health & monitoring
 - BETTER PLACE FORESTS, ceres, Pachama, NCX, NATURE METRICS, Anomera, Hydrosat, Terraformation, vibrant planet
- Climate/Earth data
 - tomorrow, Orbital Insight, semios, 1KOMMA5°, one concern, ON X, Climavision, CIBO, KAYRROS, Clobotics



VC activity

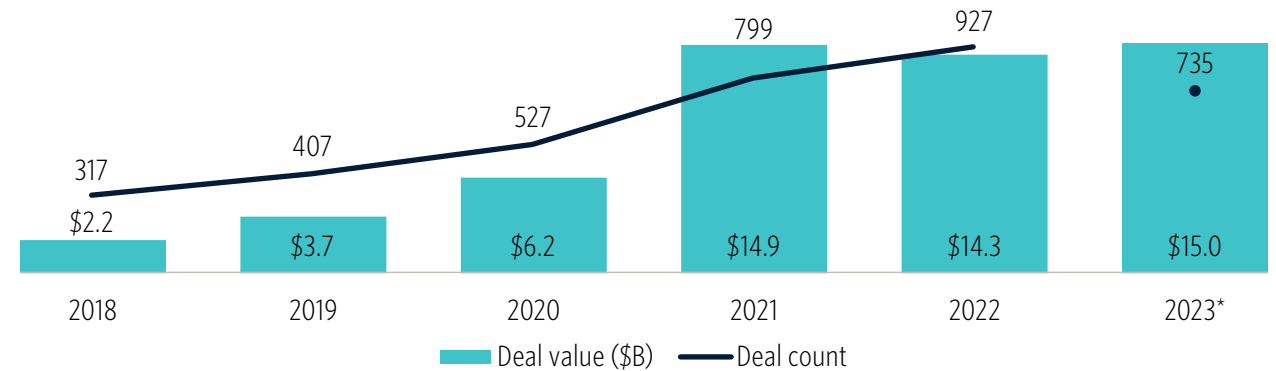
Even though deal count dropped slightly relative to deal count in the four previous quarters, Q3 2023 saw \$7.6 billion in VC deal value across 219 deals, making it the largest quarter for deal value on record. A core factor in this increase in deal value is several large deals in the vertical. [H2 Green Steel](#) raised \$1.6 billion in early-stage VC funding, [Redwood Materials](#) raised \$997.2 million in Series D funding, and [Verkor](#) raised \$918.6 million in Series C equity, alongside \$648.5 million in debt and over \$650.0 million in grant funding. Further, six additional companies raised between \$100.0 million and \$500.0 million in VC funding in the quarter. The four largest of these deals occurred in the industry segment and represent funding intended to construct and scale-up manufacturing and production capabilities via the construction of new production sites and gigafactories.

In addition to strong VC deal value for both the manufacturing & chemicals and lithium battery recycling categories, green mining saw its highest ever quarter for VC deal value, with \$394.9 million across 11 deals; as did building energy efficiency, with \$638.7 million over 24 deals. Companies in carbon tech raised \$760.0 million, which is below average for the segment over the last four quarters; however, it follows a particularly strong H1 for carbon tech. Median deal size has been somewhat flat overall—relative to 2022’s median value—rising from \$4.4 million to \$4.5 million. Prior to this, median deal value grew more sharply between 2019 and 2022. Looking at median deal value for specific funding stages, comparing 2022 to the first three quarters of 2023:

- Pre-seed and seed funding increased from \$2.0 million to \$2.3 million.⁴
- Early-stage VC funding decreased from \$5.6 million to \$4.1 million.
- Late-stage VC funding increased from \$9.2 million to \$10.7 million.
- Venture growth funding increased from \$11.7 million to \$14.5 million.

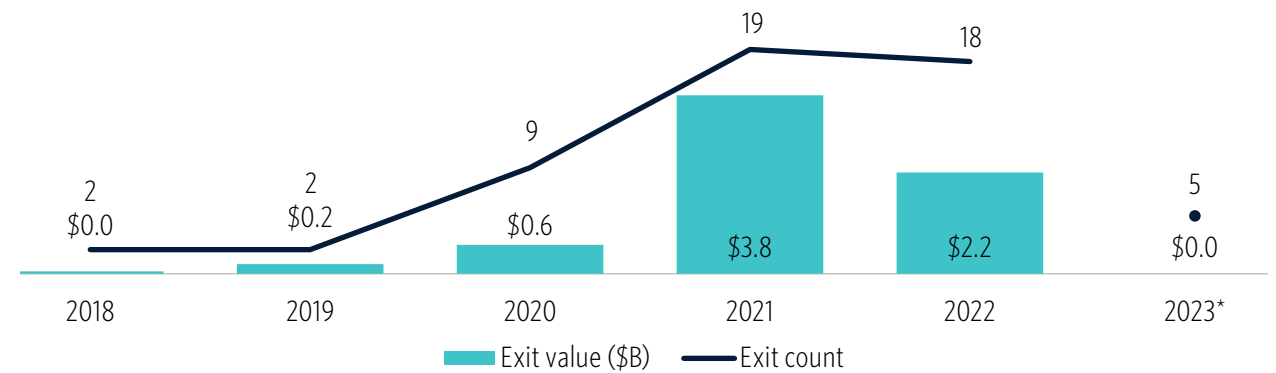
⁴ We have launched a pre-seed report methodology to more accurately and comprehensively capture deals from the earliest phase of venture. Going forward we will sunset “angel” as a specified stage of venture in all of PitchBook’s venture-focused reports.

Carbon & emissions tech VC deal activity



Source: PitchBook • Geography: Global • *As of September 30, 2023

Carbon & emissions tech VC exit activity



Source: PitchBook • Geography: Global • *As of September 30, 2023



VC ACTIVITY

Key carbon & emissions tech early-stage VC deals in Q3 2023*

Company	Close date (2023)	Category	Stage	Deal value (\$M)	Post-money valuation (\$M)	Lead investor(s)	Valuation step-up
H2 Green Steel	September 7	Manufacturing & chemicals	Early-stage VC	\$1,629.2	N/A	Altor Equity Partners, GIC, Hy24, Just Climate	N/A
Atlas Agro	August 14	Fertilizer alternatives	Series A	\$325.0	N/A	Macquarie Bank	N/A
AVNOS	July 13	Direct air capture	Early-stage VC	\$80.0	N/A	N/A	N/A
Sylvera	July 18	Carbon accounting/analytics	Series B	\$57.0	N/A	Balderton Capital	N/A
Andorix	August 22	Building energy efficiency	Early-stage VC	\$40.0	N/A	Voya Investment Management	N/A
Traceless Materials	September 25	Manufacturing & chemicals	Series A	\$39.3	N/A	SWEN Capital Partners, United Bankers	N/A
Laconic	September 12	Ecosystem health & monitoring	Early-stage VC	\$19.1	N/A	N/A	N/A
Toopi Organics	September 12	Fertilizer alternatives	Series A	\$17.3	N/A	VisVires New Protein	N/A
Dioxycle	July 25	Carbon utilization	Series A	\$17.0	N/A	Breakthrough Energy, Lowercarbon Capital	N/A
Yard Stick	August 3	Carbon accounting/analytics	Series A	\$16.2	\$45.6	Toyota Ventures	1.2x

Source: PitchBook • Geography: Global • *As of September 30, 2023



VC ACTIVITY

Key carbon & emissions tech late-stage VC deals in Q3 2023*

Company	Close date (2023)	Category	Stage	Deal value (\$M)	Post-money valuation (\$M)	Lead investor(s)	Valuation step-up
Verkor	September 14	Manufacturing & chemicals	Series C	\$1,567.1	N/A	Macquarie Group	N/A
Redwood Materials	August 29	Lithium battery recycling	Series D	\$997.2	\$5,250.0	Capricorn Investment Group, Goldman Sachs Asset Management	N/A
Ascend Elements	September 5	Lithium battery recycling	Series D	\$460.1	\$1,400.0	Decarbonization Partners, Qatar Investment Authority	1.1x
Boston Metal	September 6	Green mining	Series C	\$262.0	\$860.0	ArcelorMittal	3.6x
Ovo Energy	July 21	Building energy efficiency	Late-stage VC	\$256.4	N/A	N/A	N/A
Accenta	September 18	Building energy efficiency	Late-stage VC	\$116.4	N/A	N/A	N/A
Aphea.Bio	July 11	Fertilizer alternatives	Series C	\$76.4	N/A	Innovation Industries, Korys Investments	N/A
Aeroseal	July 20	Building energy efficiency	Series B	\$67.0	N/A	Breakthrough Energy, Climate Investment	N/A
Dcbel	August 16	Building energy efficiency	Series B	\$53.0	N/A	Idealist Capital	N/A
Mighty Buildings	September 12	Green construction	Series BB	\$52.0	\$342.0	Bold Capital Partners, Wa'ed Ventures	1.4x

Source: PitchBook • Geography: Global • *As of September 30, 2023



SELECT COMPANY HIGHLIGHTS: ATLAS AGRO



Founded 2021	Total raised \$333.0M over four deals	First institutional round \$3.0M in seed funding
Employees 20	Last financing Raised \$325.0M in Series A funding	Post-money valuation N/A
Exit Predictor		
IPO probability 48%	M&A probability 39%	No exit probability 13%

Overview

[Atlas Agro](#) makes carbon neutral nitrate fertilizers, using air, water, and renewable energy as inputs. Headquartered in Switzerland, the company utilizes green hydrogen production as an intermediate step, using electrolysis to create hydrogen, which is then combined with nitrogen to produce ammonia. This ammonia is then processed into ammonium nitrate for use—a form of nitrogen fertilizer that generates lower levels of post-application carbon emissions.

Global nitrogen fertilizer demand has been slowly growing at a rate of between 0.5% to 2.0% since 2017, reaching a new peak at 111.6 million tons in 2022.²⁷ Conventional nitrogen fertilizer production is a carbon-intensive process, commonly using grey hydrogen—a fossil-fuel-derived hydrogen without carbon capture—as an input, rather than low-carbon hydrogen. Nitrogen fertilizers account for approximately 5% of global carbon emissions. This could be reduced by 80% by 2050 through decarbonization of production processes, with further reductions from replacement of high-emission fertilizers such as urea with alternatives like ammonium nitrate.²⁸ [Atlas Agro](#) currently operates projects in Washington state and in Brazil, and recently raised \$325.0M in Series A funding that will aid construction of green fertilizer plants in the US.

²⁷: "World Fertilizer Trends and Outlook To 2022," Food and Agriculture Organization of the United Nations, n.d., accessed October 18, 2023.

²⁸: "Carbon Emissions from Fertilisers Could Be Reduced By As Much As 80% By 2050," University of Cambridge, Yunhu Gao and André Cabrera Serrenho, February 9, 2023.



SELECT COMPANY HIGHLIGHTS: ATLAS AGRO

Leadership

CEO: Petter Østbø
CFO: Eduard Uraskulov
COO: Knut Karlsen
CPO: Guiseppa Fortuna

Competing technologies

Low-carbon fertilizer production can be achieved through several pathways, including via waste- or insect-derived fertilizers, or through processes using low-carbon hydrogen as an input, with renewable energy where required. This low-carbon hydrogen can be green hydrogen, as is the case for [Atlas Agro's](#) technology. Other forms of low-carbon hydrogen can be used, such as blue or turquoise hydrogen, which is produced using fossil fuel inputs, but with carbon captured either as CO₂ or as solid carbon. These are viable options, though they increase the physical inputs required for fertilizer production, exposing the process to fuel price risk. Without carbon utilization, they also bring additional requirements for carbon transport and sequestration.

Financing history

Seed	Seed	Series A
March 31, 2022	November 20, 2022	August 14, 2023
Total raised: \$3.0M	Total raised: \$5.0M	Total raised: \$325.0M
Post-money valuation: N/A	Post-money valuation: N/A	Post-money valuation: N/A
Sole investor: Farvatn	Lead investor(s): N/A	Lead investor(s): Macquarie Bank

About PitchBook Industry and Technology Research

Independent, objective, and timely market intel

As the private markets continue to grow in complexity and competition, it's essential for investors to understand the industries, sectors and companies driving the asset class.

Our Industry and Technology Research provides detailed analysis of nascent tech sectors so you can better navigate the changing markets you operate in—and pursue new opportunities with confidence.

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