



EMERGING TECH RESEARCH

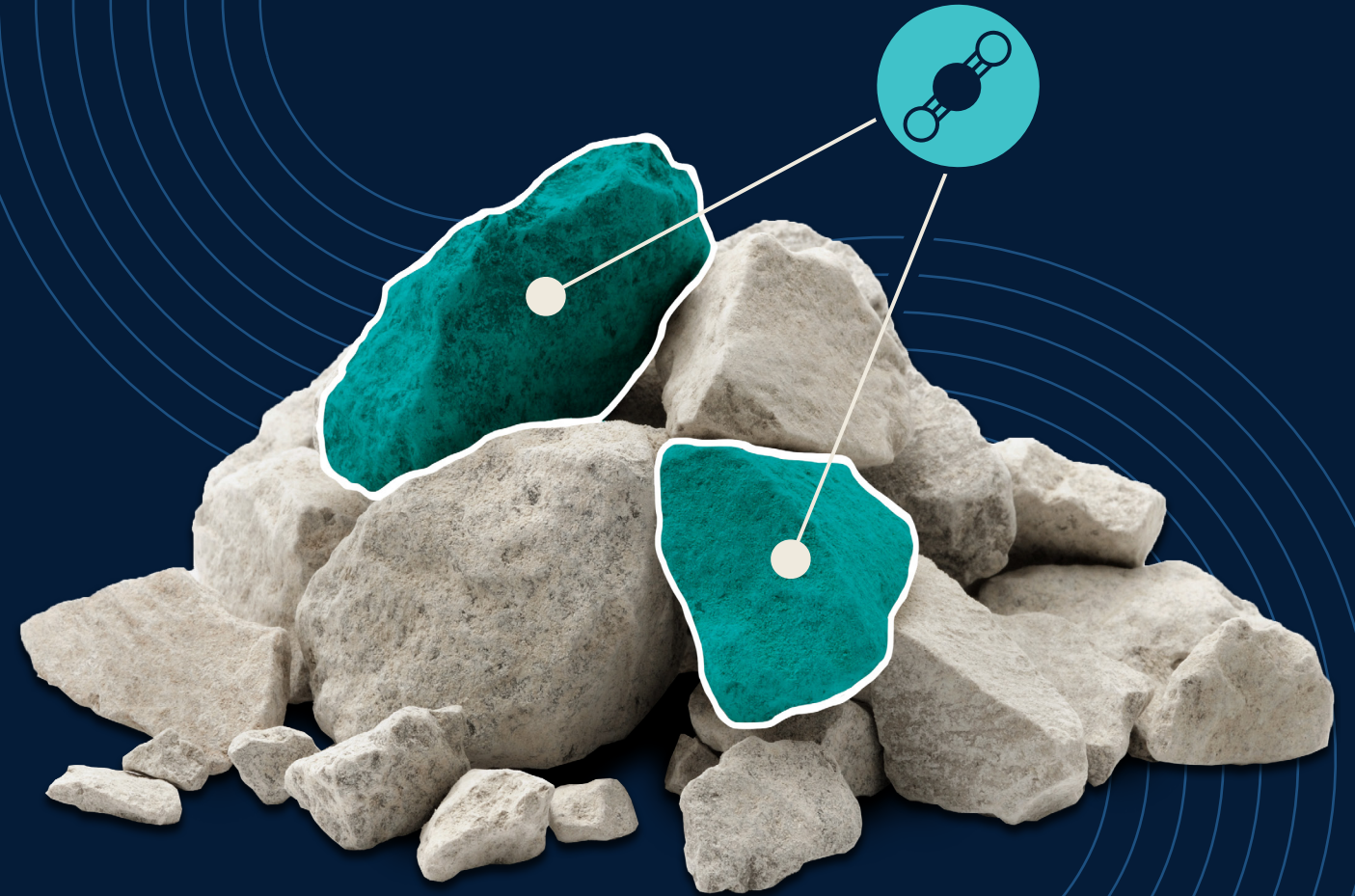
Carbon & Emissions Tech Report

VC trends and emerging opportunities

Q1
2024

REPORT PREVIEW

The full report is available through the PitchBook Platform.





Contents

Vertical update	3
Q1 2024 timeline	5
Carbon & emissions tech landscape	6
Carbon & emissions tech VC ecosystem market map	7
VC activity	8
Emerging opportunity	16
Carbon mineralization	17
Select company highlights	19
CarbonCapture	20
Lilac Solutions	22
Fortera	24

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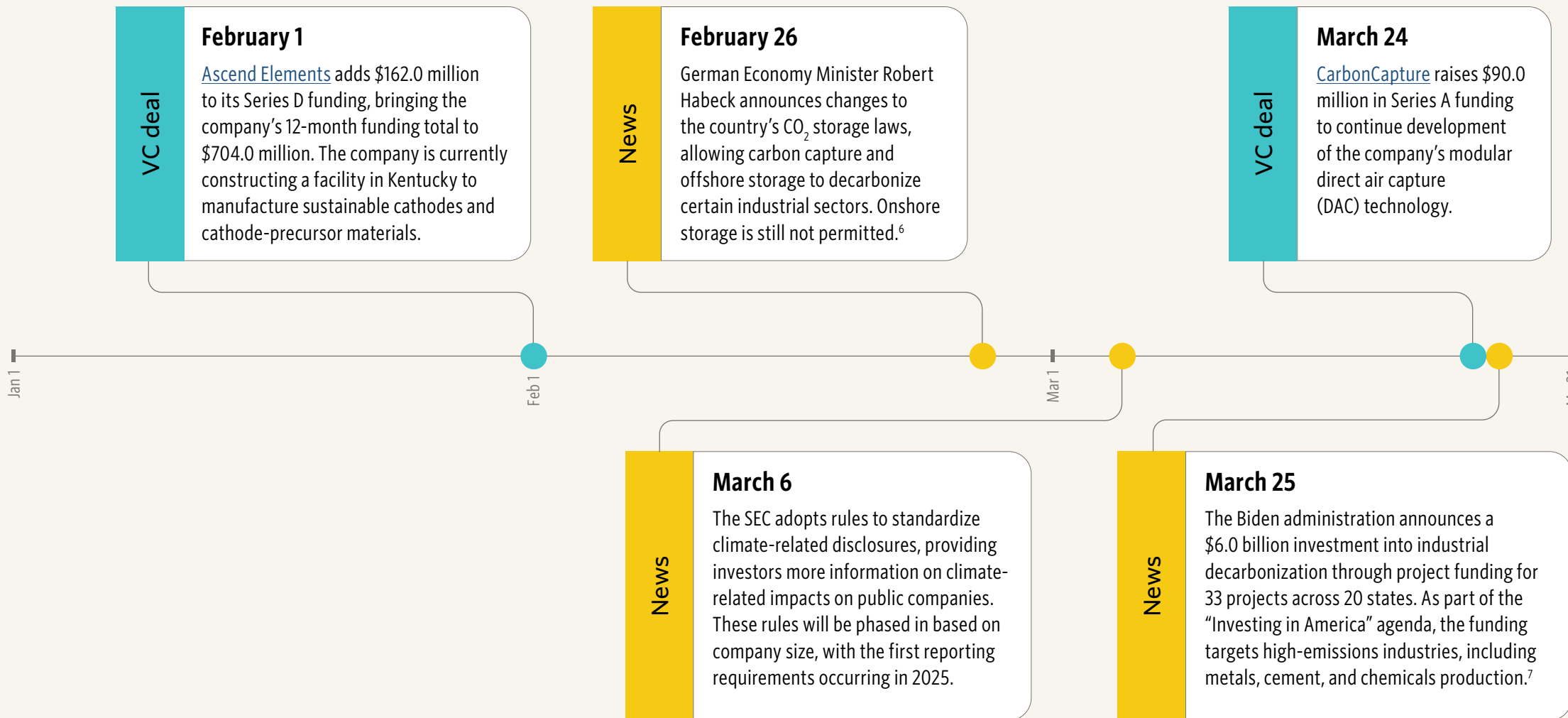
Publishing

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Q1 2024 timeline



6: "Germany to Allow Carbon Transport, Sub-Seabed Storage, Minister Says," Reuters, Riham Alkousaa, February 26, 2024.

7: "Biden-Harris Administration Announces \$6 Billion to Transform America's Industrial Sector, Strengthen Domestic Manufacturing, and Slash Planet-Warming Emissions," US Department of Energy, March 25, 2024.

Q1 VC deal count summary



Q1 VC deal value summary





Carbon & emissions tech landscape

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





Carbon & emissions tech VC ecosystem market map

This market map is an overview of venture-backed or growth-stage companies that have received venture capital or other notable private investments. [Click to view the full map on the PitchBook Platform.](#)

1 Carbon tech

Direct air capture	Biological carbon removal	Carbon fintech & consumer
Point-source carbon capture	Carbon accounting/analytics	Carbon utilization

2 Industry

Green mining	Manufacturing & chemicals	Recycling - polymers
Lithium battery recycling	Recycling - metals	Recycling - analytics

3 Built environment

Green construction	Building energy efficiency	Heating & cooling
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4 Land use

Climate/Earth data

tomorrow... Orbital Insight semios UMBRA one concern

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Ecosystem health & monitoring

BETTER PLACE FORESTS ceres Terraformation AIDASH NCX

NATURE METRICS Anomera Hydrosat dendra

Fertilizer alternatives

PIVOT BIO Insect ATLAS AGRIC Sound Agronutris

APHEA TerraMera DUCTOR concentric KULA BIO



VC activity

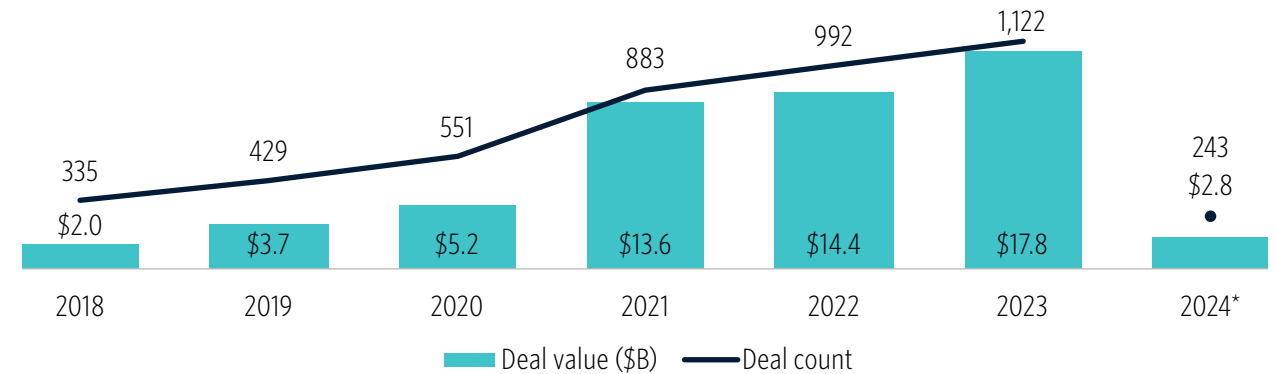
Quarterly growth in VC deal value reached 37.9%, for a total of \$2.8 billion in VC deal value. Deal count fell to a seven-quarter low, from a record high of 305 in Q4 2023 to 243 in Q1 2024. Regional trends continue to show similar annual deal count for Europe and North America—since 2021, European and North American deal counts have each accounted for between 36% and 42% of the total annual deal count, making up approximately 80% of total deal count when combined.

In Q1 2024, six deals exceeded \$100.0 million, with 14 total deals raising \$50.0 million or more. The two largest deals were:

- Sodium-ion battery manufacturer [Natron](#)'s \$189.3 million Series BB funding. The company focuses on the development and production of sodium-ion batteries—an alternative battery chemistry to lithium-ion, and one that has lower requirements for rare minerals.
- Battery recycling technology developer [Ascend Elements](#)' additional \$162.0 million funding—one tranche of its Series D funding—intended to develop US-based recycling infrastructure.⁸

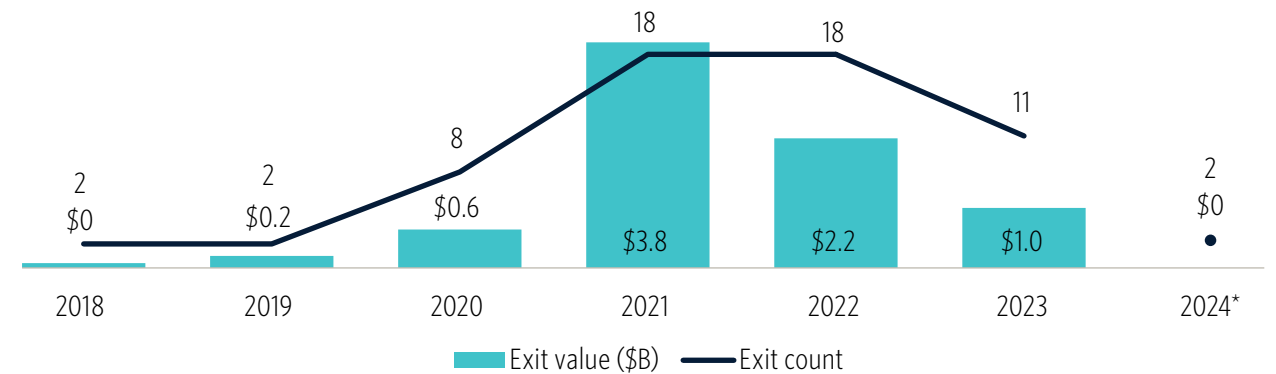
⁸: "Ascend Elements Raises Additional \$162 Million to Build Sustainable Lithium-Ion Battery Materials in United States," Ascend Elements, February 20, 2024.

Carbon & emissions tech VC deal activity



Source: PitchBook • Geography: Global • *As of March 31, 2024

Carbon & emissions tech VC exit activity



Source: PitchBook • Geography: Global • *As of March 31, 2024



VC ACTIVITY

Key carbon & emissions tech late-stage VC and venture-growth deals in Q1 2024*

Company	Close date	Category	Stage	Deal value (\$M)	Post-money valuation (\$M)	Lead investor(s)	Valuation step-up
Ascend Elements	February 20	Lithium battery recycling	Series D	\$704.0	\$1,600.0	Decarbonization Partners, Qatar Investment Authority, Temasek Holdings	1.3x
Natron	January 10	Manufacturing & chemicals	Series BB	\$189.3	\$469.3	N/A	2.6x
Lilac Solutions	February 12	Green mining	Series C	\$145.0	\$800.0	Breakthrough Energy, Lowercarbon Capital, Mercuria Energy Trading	1.2x
Watershed	January 22	Carbon accounting/analytics	Series C	\$100.4	\$1,700.4	Greenoaks Capital Partners	1.5x
instagrid	January 23	Building energy efficiency	Series C	\$95.0	N/A	Morgan Stanley Investment Management, Ontario Teachers' Pension Plan, Teachers' Venture Growth	N/A
CarbonCapture	March 12	Direct air capture	Series A	\$90.0	\$215.0	Prime Movers Lab	1.0x
Fortera	March 14	Green construction	Series C	\$70.0	\$320.0	N/A	1.9x
Lohum	March 13	Lithium battery recycling	Series B	\$54.0	\$500.0	Baring Private Equity Partners India, Singularity AMC	N/A
Greenly	March 21	Carbon accounting/analytics	Series B	\$52.0	N/A	Fidelity International Strategic Ventures	N/A
Insight M	February 15	Climate/Earth data	Series D	\$52.0	\$182.0	BlackRock	1.5x

Source: PitchBook • Geography: Global • *As of March 31, 2024



VC ACTIVITY

Top VC-backed carbon & emissions tech companies by total VC raised to date*

Company	VC (\$M) raised to date	Segment	Category	IPO probability	M&A probability	No exit probability
Northvolt	\$6,867.5	Industry	Lithium battery recycling	95%	3%	2%
H2 Green Steel	\$1,988.5	Industry	Manufacturing and chemicals	40%	31%	29%
Verkor	\$1,956.2	Industry	Manufacturing and chemicals	96%	2%	2%
Redwood Materials	\$1,815.8	Industry	Lithium battery recycling	66%	30%	4%
Ascend Elements	\$1,056.9	Industry	Lithium battery recycling	24%	74%	2%
Enerkem	\$893.9	Industry	Manufacturing and chemicals	41%	34%	25%
Vital Thin Film Materials	\$831.9	Industry	Manufacturing and chemicals	N/A	N/A	N/A
Climeworks	\$786.6	Carbon tech	Direct air capture	85%	7%	8%
Crusoe	\$708.1	Carbon tech	Carbon fintech and consumer	77%	21%	2%
Xpansiv	\$703.0	Carbon tech	Carbon fintech and consumer	75%	23%	2%

Source: PitchBook • Geography: Global • *As of March 31, 2024
 Note: Probability data is based on [PitchBook VC Exit Predictor methodology](#).



SELECT COMPANY HIGHLIGHTS: LILAC SOLUTIONS



Overview

[Lilac Solutions](#) develops direct lithium extraction technology aimed at improving the efficiency of lithium extraction from brine resources, such as from salars,²⁰ oil field brines, or geothermal brines. Conventional lithium extraction from brine involves large evaporation ponds and high freshwater consumption, and novel approaches can improve sustainability through increased water use efficiency and reduced land use. [Lilac Solutions](#) uses ion exchange beads to absorb lithium from brines, which can then be released through the application of an acid. The lithium compounds released from the beads are then processed into lithium carbonates or hydroxides for use by battery producers.

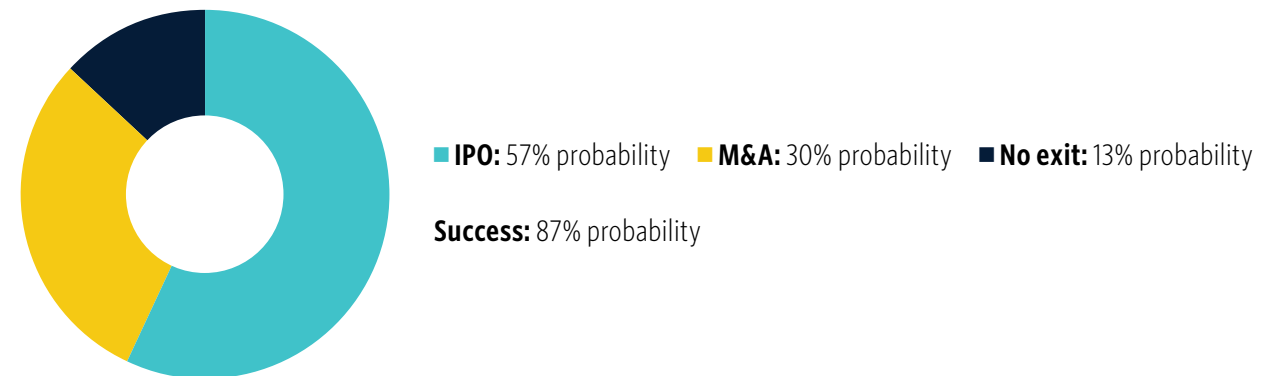
[Lilac Solutions](#)' demonstration plant at the Kachi Project in Argentina is currently operational, and the company recently raised \$145.0 million in Series C funding that will be used to support development of direct lithium extraction in the US. The company intends to deploy a field project at Utah's Great Salt Lake, which, if successful, will allow domestic lithium production in the US.

20: Salars are salt flats, most notably found in Argentina, Bolivia, and Chile.

Key company information

Founded 2016	Last financing valuation \$145.0M in Series C funding	First institutional round \$0.8M in Series A2 funding
Employees 120	Total raised \$318.3M over five deals	Post-money valuation \$800.0M

Exit Predictor



Note: Probability data is based on [PitchBook VC Exit Predictor methodology](#).



SELECT COMPANY HIGHLIGHTS: LILAC SOLUTIONS

Leadership

CEO: Raef Sully
 Chief Technology Officer: David Snyder
 Chief Financial Officer: David Gelinas
 Chief Development Officer: Thomas Wilson
 Chief Legal Officer: Nicholas Goldberg

Competing technologies

Direct lithium extraction technologies compete most strongly with resources for conventional lithium extraction from brine, which is a particularly water-intensive activity. Together with the land requirements of large evaporation ponds, conventional lithium extraction can have significant environmental costs, which is at odds with the potential climate benefits of battery-enabled electrification. In some ways, lithium brine extraction also competes with lithium extraction from hard rock deposits, but given the growing demand for lithium and the global distribution of brines and hard rock lithium deposits, both approaches will be integral to future lithium supply chains.

Financing history

Series A2	Series A3	Series A	Series B	Series C
February 14, 2017	December 24, 2018	February 20, 2020	September 8, 2021	February 12, 2024
Total raised \$0.8M	Total raised \$2.5M	Total raised \$20.0M	Total raised \$150.0M	Total raised \$145.0M
Post-money valuation \$3.8M	Post-money valuation \$16.5M	Post-money valuation \$60.0M	Post-money valuation \$550.0M	Post-money valuation \$800.0M
Investor(s) N/A	Investors PRIME Coalition, Tribeca Early Stage Partners	Investors Breakthrough Energy Ventures, The Engine	Investors Lowercarbon Capital, T. Rowe Price	Investors Lowercarbon Capital, Breakthrough Energy, Mercuria Energy Trading

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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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