J.P.Morgan

INNOVATION ECONOMY

Sector Spotlight: Climate Technology

2024

Executive Summary

"Climate technology, or climate tech, is an important part of advancing the transition to a low-carbon economy. Climate tech enables companies to decarbonize operations via transformative innovations, such as sourcing renewable energy, intelligently managing energy use and transitioning to electric fleets. Financing is key to realizing these technologies and is unique to each startup: it is based on the company's stage of development, industry dynamic, and operational needs. This report explores the maturity and market adoption of various climate technologies, delves into industry trends and offers an insightful look into notable factors and considerations. It's exciting to support founders developing cutting-edge technologies that address climate change and promote a more sustainable future."

- Kelly Belcher

Author:

Kelly Belcher
Head of Climate Technology,
Commercial Banking

Contributors:

Nick Candy
Head of Innovation
Economy Insights

Julie Tsang
Innovation Economy
Insights Analyst

Vincent Harrison
Innovation Economy
Insights Analyst

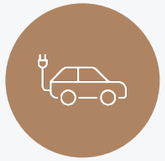
Climate technology definition and taxonomy

Climate technology encompasses solutions to mitigate or adapt to climate change, including energy efficiency, carbon capture and renewable energy.

Industries within climate technology[1]

Battery and grid technology

Includes battery recycling, lithium mining, battery production, grid technology and battery management systems (BMS).



Clean mobility and charging infrastructure

Includes electric vehicle (EV) charging, clean mobility original equipment manufacturers (OEMs), clean mobility components, fleet electrification, shared mobility and marine mobility.

Food and agriculture technology

Includes alternative proteins, indoor farming, agricultural biology (AgBio) and land use, waste mitigation and precision agriculture.

Built environment

Includes smart buildings, construction technology, and water and waste technology.

Industrial technology

Includes green and synthetic biology (SynBio) chemicals, green manufacturing and circular economy.

Decarbonization technology

Includes emissions tracking and analytics, carbon utilization, climate and Earth data services, and adaptation technology.

Note: (1) For the purposes of this report, we are concentrating on these six specific industries. Other industries within climate technology are not included here, making this list non-exhaustive.

Agenda

01 Macroeconomic Overview

02 Climate Technology Innovation Quadrant

03 Industry Breakdowns

04 Factors and Considerations

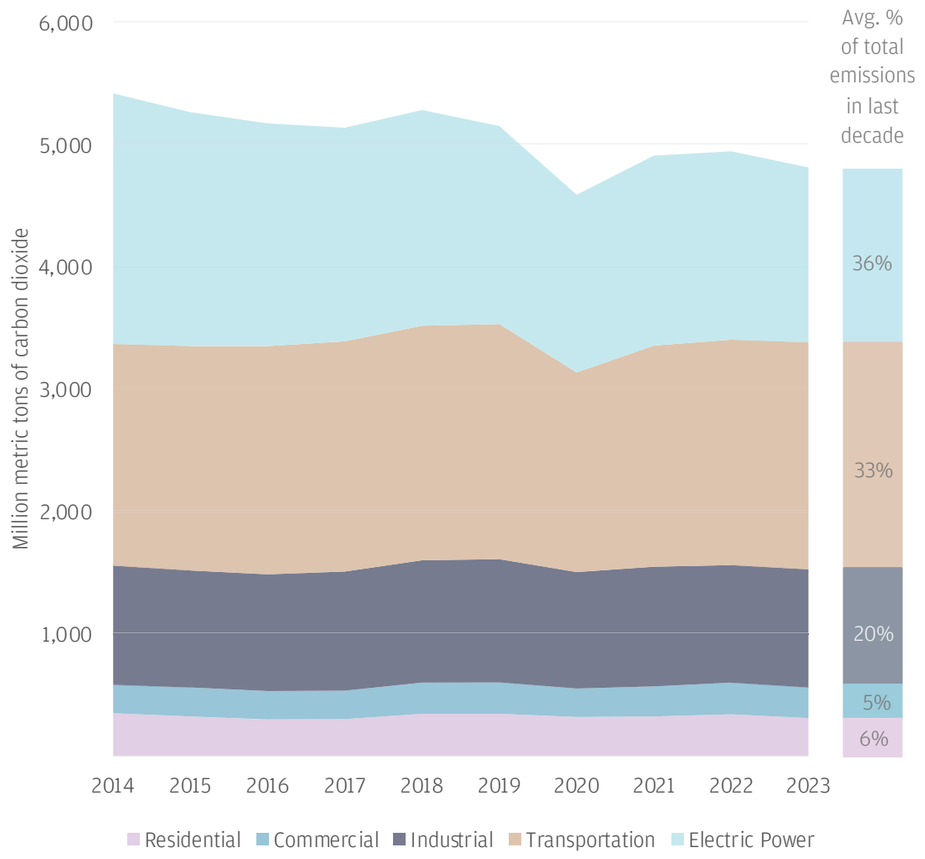
J.P.Morgan

01 | Macroeconomic Overview

The current state of emissions and climate technology investment

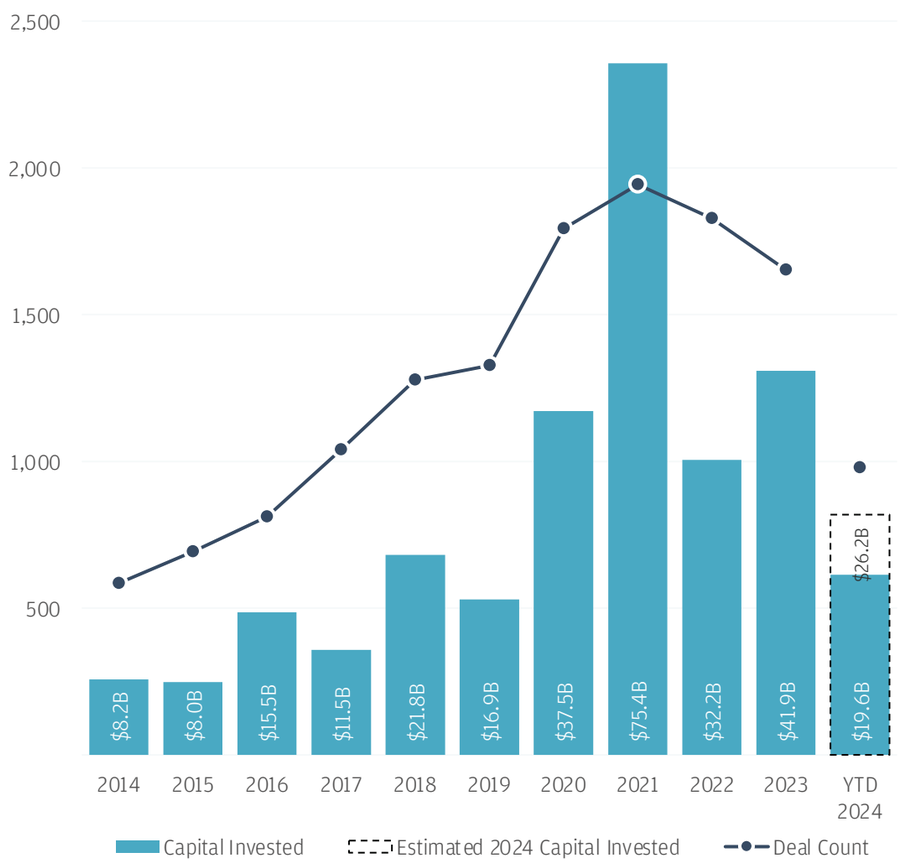
U.S. EMISSIONS DECLINING

U.S. CO_2 EMISSIONS BY SOURCE[1]



INVESTMENT IN CLIMATE TECH REMAINS ACTIVE

U.S. VENTURE INVESTMENT IN CLIMATE TECHNOLOGY[2,3]



Reducing emissions is an important part of addressing climate change. The U.S. has committed to the Paris Agreement, an international treaty which includes commitments from participating countries to reduce emissions and work together to adapt to the impacts of climate change.

Most of emissions in the U.S. come from the electric power, transportation and industrial sectors.[4] There are several opportunities to decarbonize these sectors and funding innovation is an important part of progress in terms of decarbonization goals. U.S. venture investment into climate technology startups remains active and could reach approximately $26 billion by the end of 2024 if the year-to-date run rate is maintained.

Notes: (1) Electric power sector consists of electricity production from sources of energy, like fossil-fuels and solar. (2) Climate Technology as categorized by taxonomy and definitions on page 3. (3) Outlier deal removed from 2018 to provide a more accurate representation of the overall trend. (4) According to the U.S. Energy Information Authority.

Sources: U.S. Energy Information Authority. Pitchbook. Data has not been reviewed by PitchBook analysts.

J.P.Morgan

02 | Climate Technology Innovation Quadrant

Climate technology innovation quadrant

Technology innovations within Climate Technology vary in terms of maturity and market adoption, influenced by factors such as policy and regulation, consumer sentiment, and cost, among others. Bringing these innovations to the mainstream is an important opportunity, given their potential to help reduce emissions.

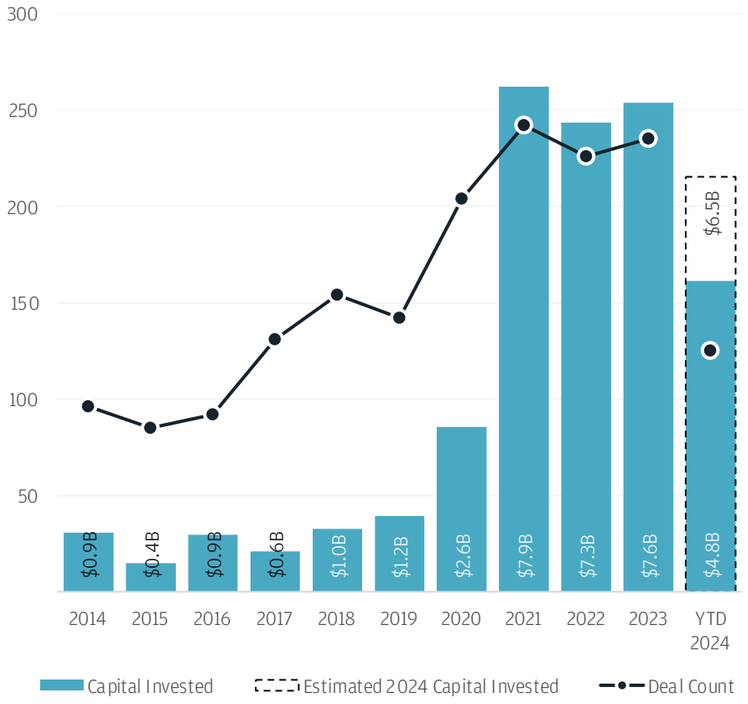
For example, carbon accounting & analytics software use is increasing, as it can enhance transparency and accuracy in tracking emissions. This can help companies identify emission reduction opportunities more effectively.

J.P.Morgan

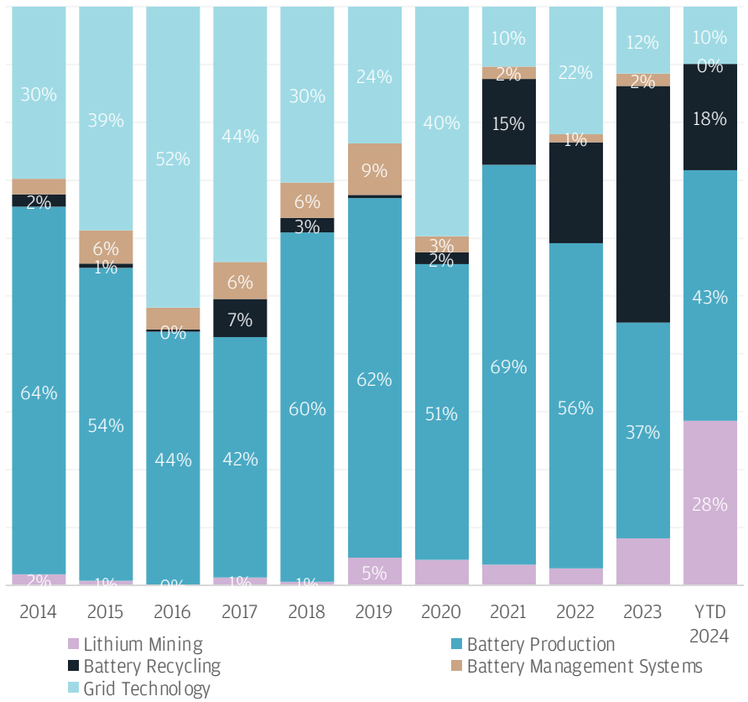
03 | Industry Breakdowns

Industry snapshot: Battery and Grid Technology

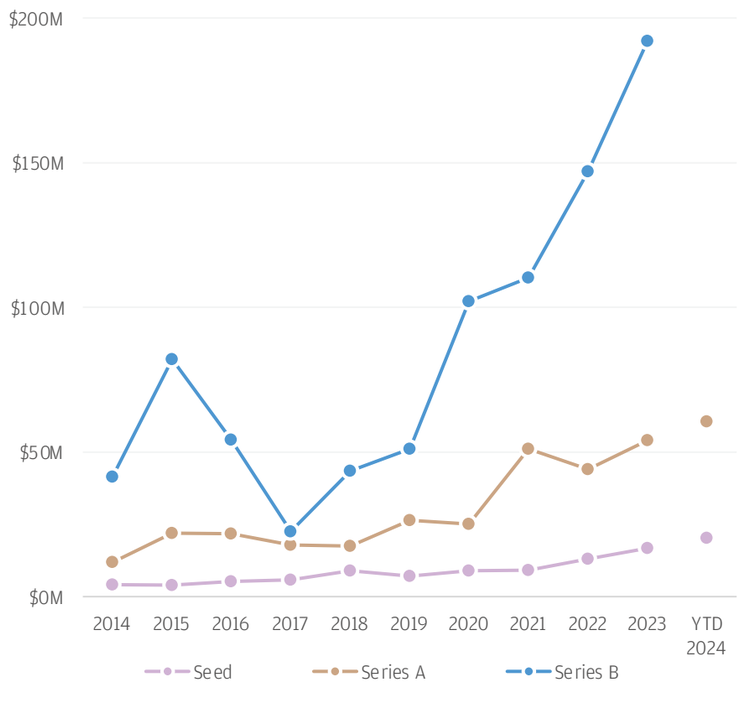
U.S. VENTURE DEAL ACTIVITY[1]



INDUSTRY INVESTMENT SHARE



MEDIAN POST-MONEY VALUATION BY SERIES[2]



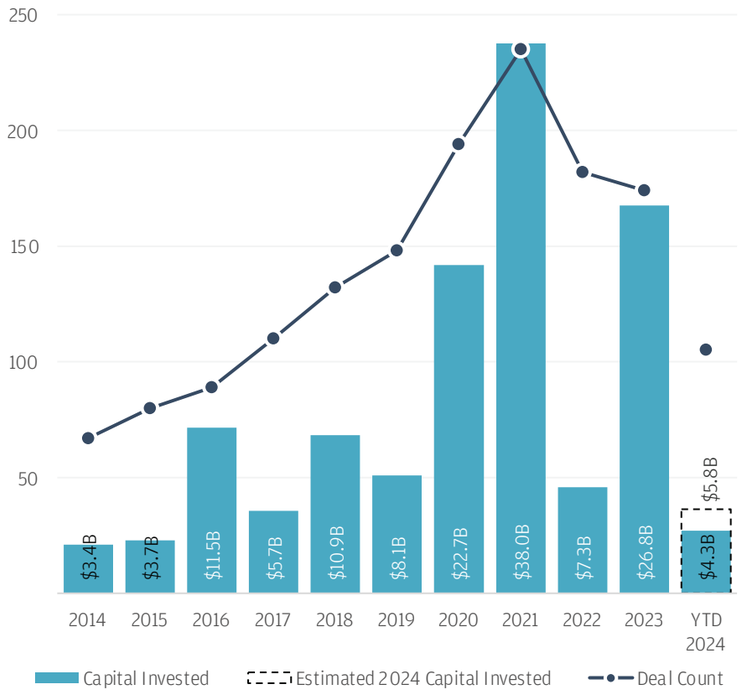
Batteries play an important role in the electrification of residential, commercial, and industrial environments. Venture investment into this industry increased significantly beginning in 2021 and is on track to reach an estimated $6.5 billion by the end of 2024 if the year-to-date run rate is maintained. This influx of investment in recent years has partially contributed to the rise in median valuations, particularly for startups raising their series B round. Startups focusing on battery production have raised over 35% of the industry's total funding in the last decade, likely reflecting an increased focus on powering EVs and other reliant technologies. Lithium mining has taken up a greater investment share in 2024, as companies look to source EV and grid-scale energy storage battery materials. Grid technology startups have also made up a sizeable proportion of funding, likely due to the increasing need to modernize and stabilize aging energy infrastructures.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Series B YTD 2024 and Series C excluded due to limited data.

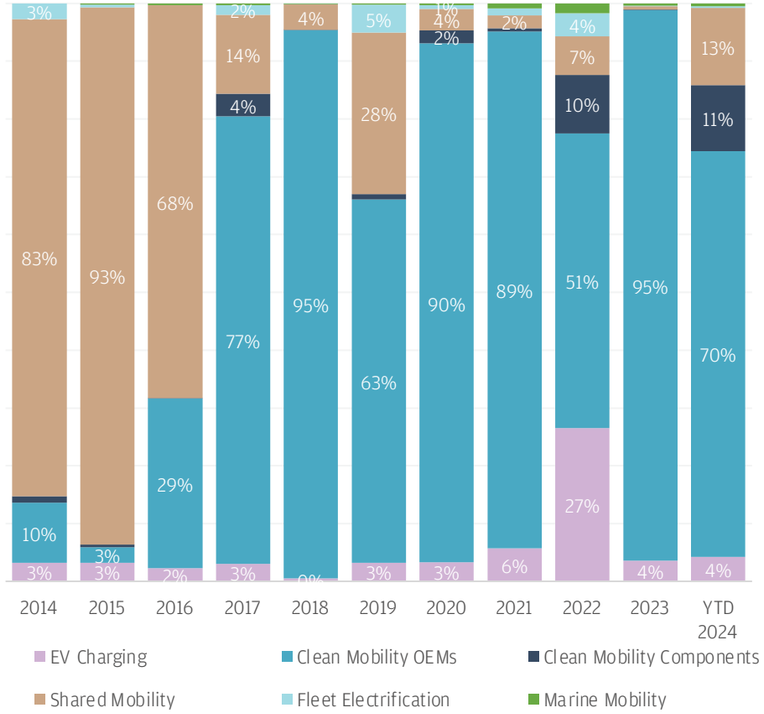
Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

Industry snapshot: Clean Mobility and Charging Infrastructure

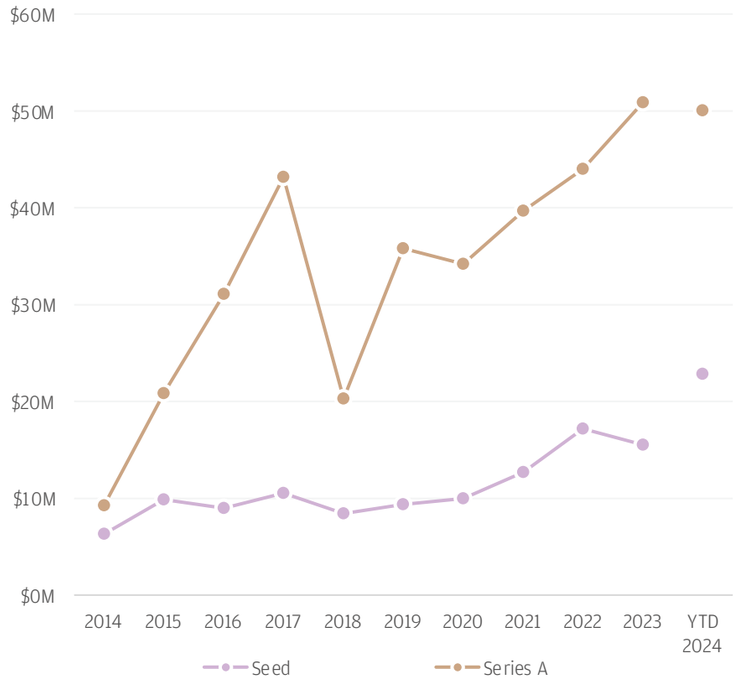
U.S. VENTURE DEAL ACTIVITY[1,2]



INDUSTRY INVESTMENT SHARE[3]



MEDIAN POST-MONEY VALUATION BY SERIES[4]



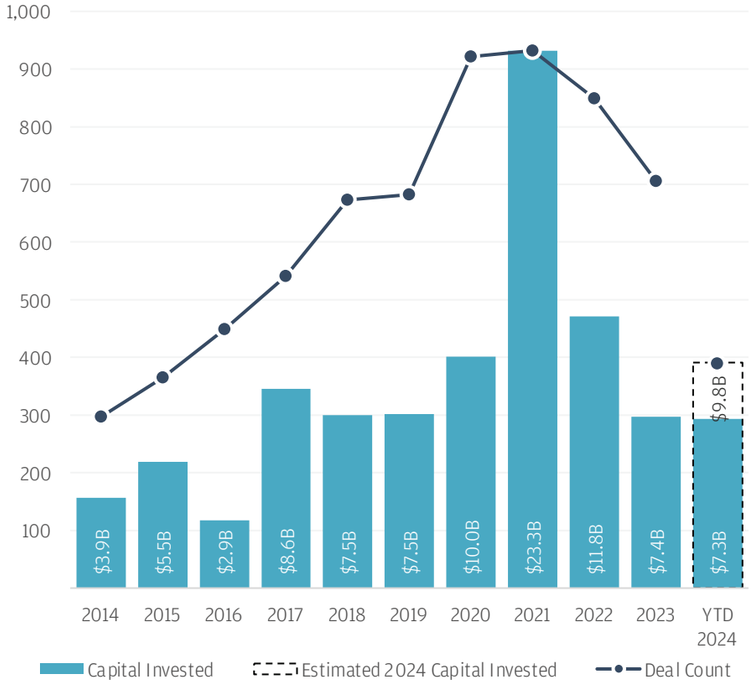
Clean mobility is an important component for a sustainable future and many opportunities persist within the industry. Venture funding, while down relative to prior years, is on track to reach an estimated $5.8 billion by the end of 2024 if the year-to-date run rate is maintained. Over the past seven years, Clean Mobility OEMs have received the majority of industry funding, driven by the demand for sustainable transportation and market potential. To support this demand and clean mobility solutions more broadly, technologies like accessible charging infrastructure are likely to become increasingly necessary. Additionally, many opportunities exist for fleet electrification, encompassing public transit systems, freight vehicles, and delivery services. The shift towards clean mobility is likely to not only reduce emissions but may also enhance operational efficiency and lower long-term costs.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Outlier deal removed from 2018 to show a more accurate representation of the overall trend. (3) Shared mobility includes car sharing and ride hailing. (4) Series B and C excluded due to limited data.

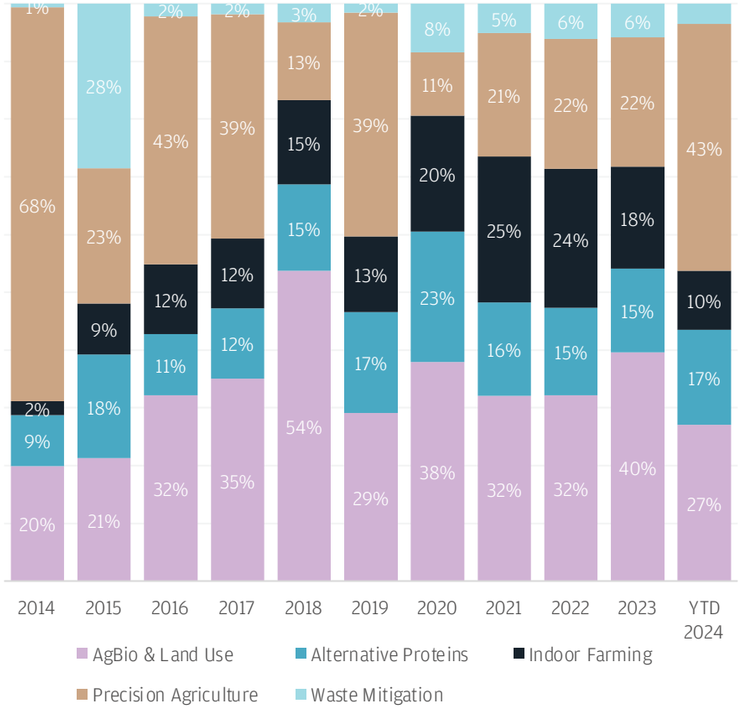
Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

Industry snapshot: Food and Agriculture Technology

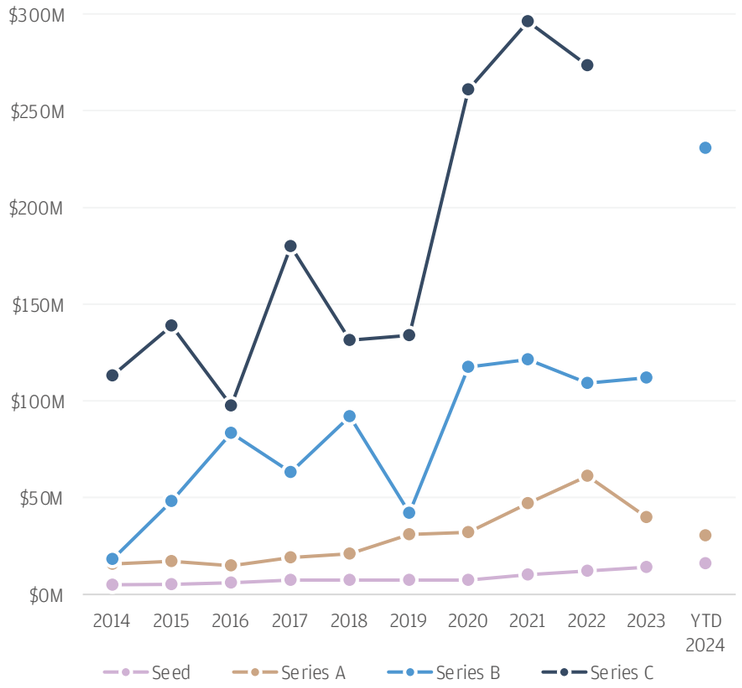
U.S. VENTURE DEAL ACTIVITY[1]



INDUSTRY INVESTMENT SHARE



MEDIAN POST-MONEY VALUATION BY SERIES[2]



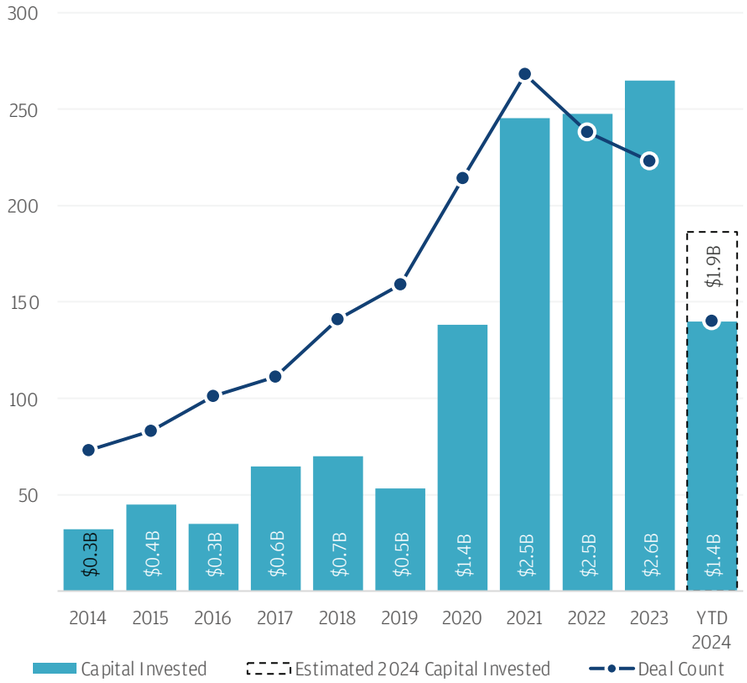
Many traditional practices remain within the food and agricultural industries. Entrepreneurs have recognized the opportunity to bring new technologies to the field, aiming to enhance efficiency and promote sustainable practices. Venture investment into food and agriculture technologies is on track to reach an estimated $9.8 billion by the end of 2024 if the year-to-date run rate is maintained. Recently, the share of venture investment into precision agriculture startups has increased due to emerging hardware and software solutions becoming more accessible, like satellite-enabled field mapping and autonomous tractors. Founders can develop solutions that enhance the cost profile of farming operations, focusing on affordability and efficiency to boost productivity and sustainability.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Series C 2023 and 2024 excluded due to limited data.

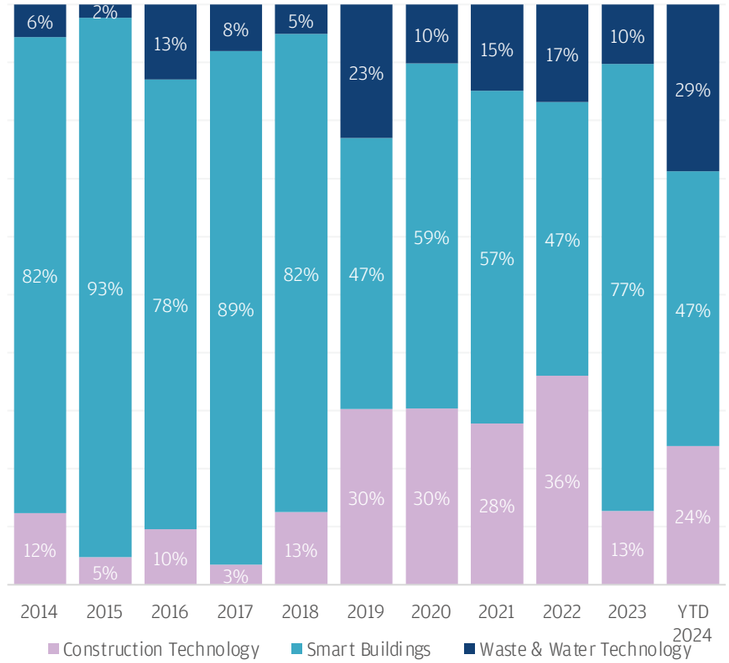
Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

Industry snapshot: Built Environment

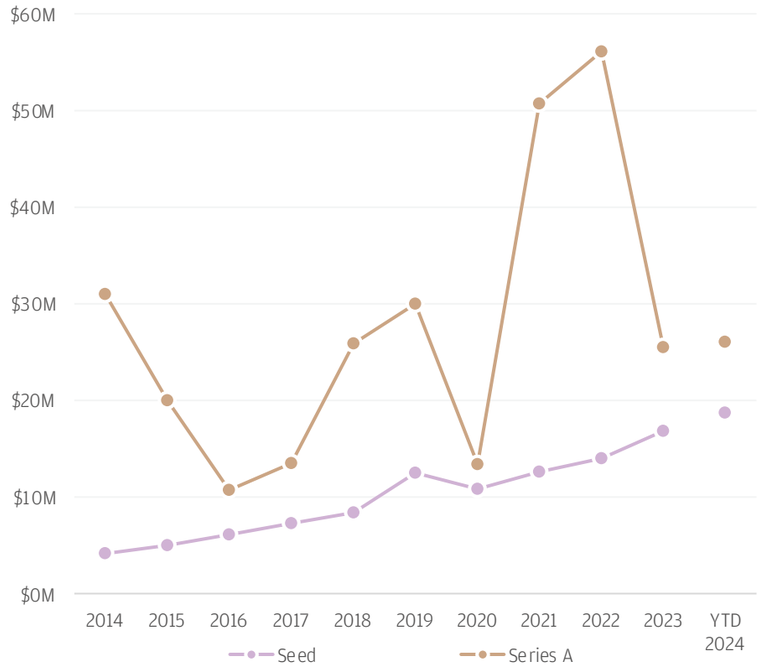
U.S. VENTURE DEAL ACTIVITY[1]



INDUSTRY INVESTMENT SHARE[2]



MEDIAN POST-MONEY VALUATION BY SERIES[3]



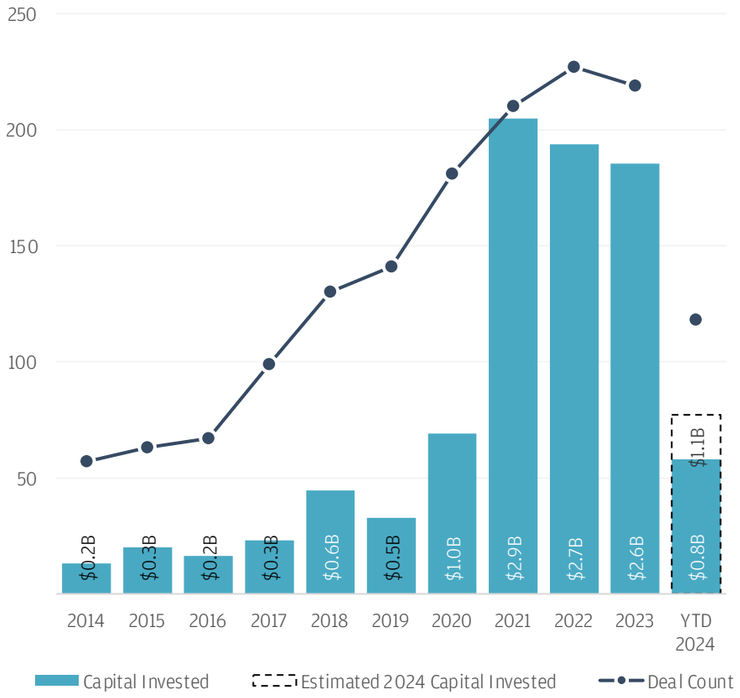
The commercial and residential sectors account for a sizeable proportion of emissions. As a result, many of the highest-funded startups in the Built Environment industry are developing energy management systems to manage emissions and enhance grid reliability. Venture investment into this industry is on track to reach an estimated $1.9 billion by the end of 2024 if the year-to-date run rate is maintained. Startups developing smart building technologies are leveraging data-driven insights and automation to enhance energy efficiency in office buildings, homes, and other spaces. This is driven by the growing demand for smart, connected environments that can optimize energy use and operations autonomously. Similarly, construction technology startups, such as those developing green cement and concrete, are transforming many traditional construction processes by introducing sustainable materials that are less carbon-intensive to produce.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Waste & Water Technology includes wastewater analysis tech, recycling tech, smart water management, and leak detection tech. (3) Series B and C excluded due to limited data.

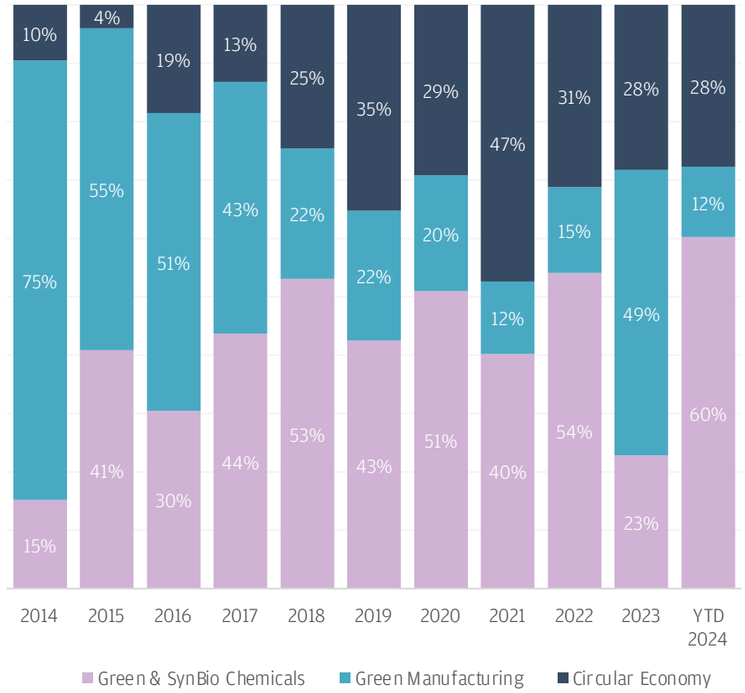
Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

Industry snapshot: Industrial Technology

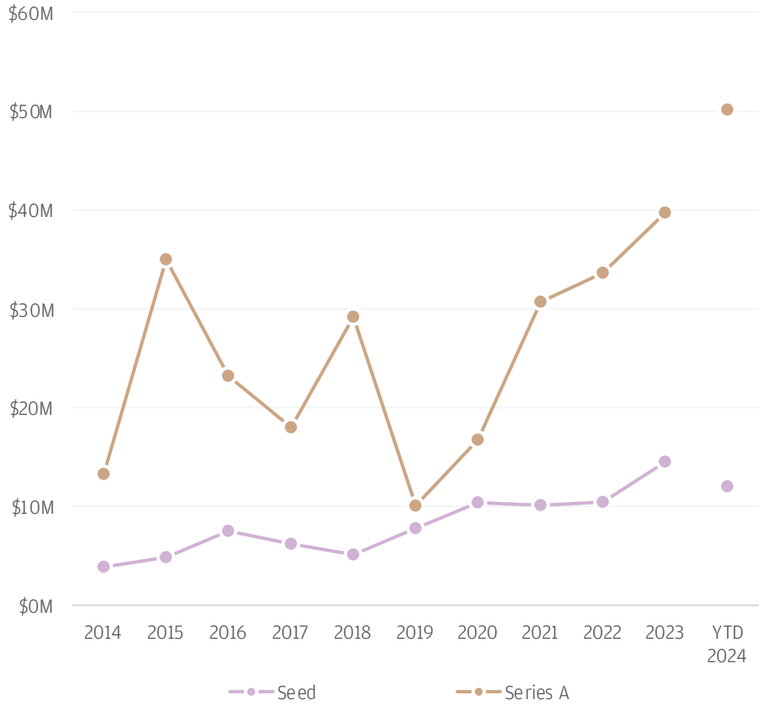
U.S. VENTURE DEAL ACTIVITY[1]



INDUSTRY INVESTMENT SHARE



MEDIAN POST-MONEY VALUATION BY SERIES[2]



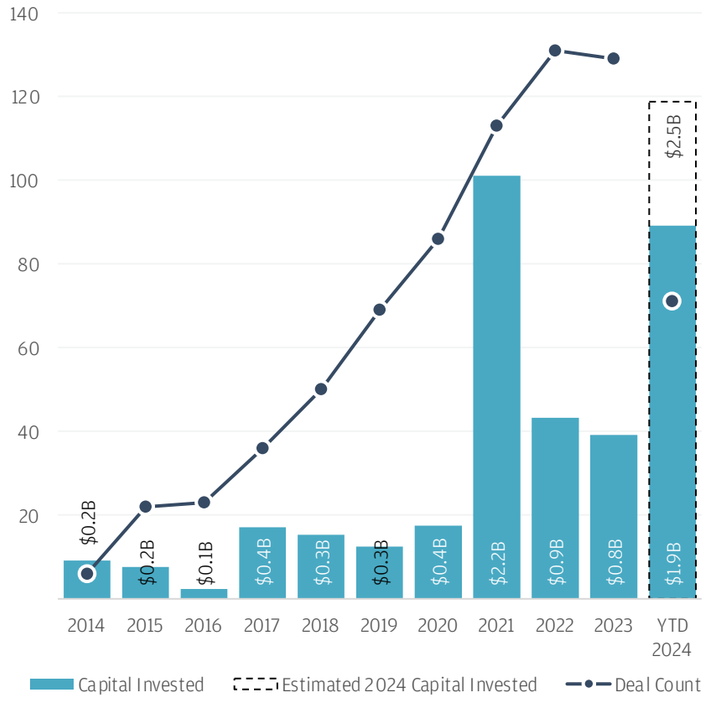
The influence of various government policies and regulations and a growing demand from consumers for more sustainable products creates an opportunity for innovators to adapt or reimagine existing industrial manufacturing processes. Venture investment into this industry is on track to reach an estimated $1.1 billion by the end of 2024 if the year-to-date run rate is maintained. Startups are embracing this opportunity by developing solutions that help minimize the environmental impact of different manufacturing methods, such as electric furnaces that produce fewer emissions. Similarly, with many consumers shifting to online shopping, the increased use of packaging has led to a heightened focus on the product lifecycle, encompassing the development of sustainable packaging and the facilitation of reuse, recycling, or environmentally responsible disposal.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Series B and C excluded due to limited data.

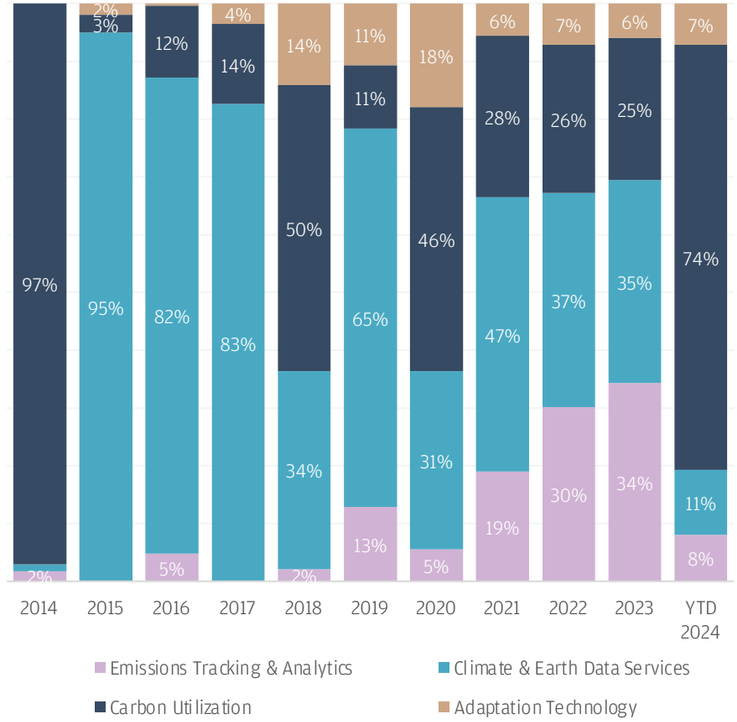
Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

Industry snapshot: Decarbonization Technology

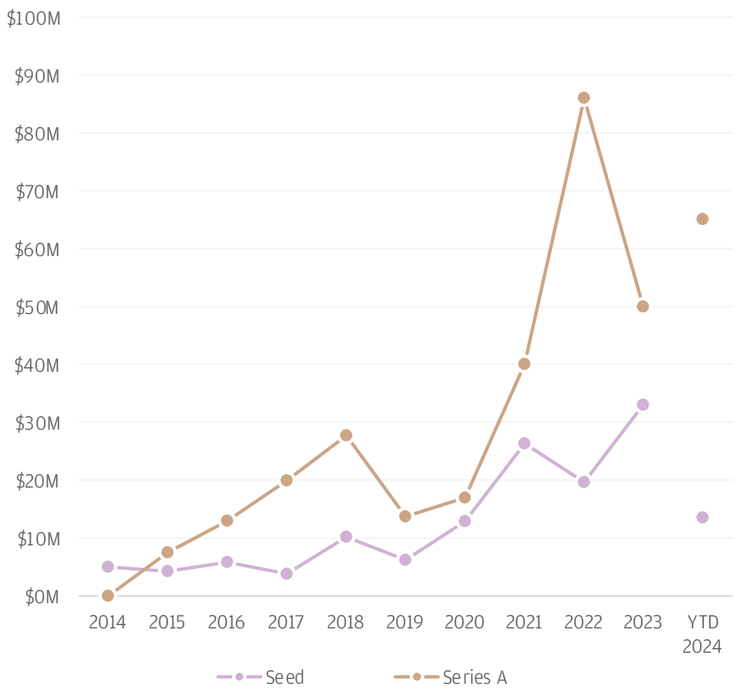
U.S. VENTURE DEAL ACTIVITY[1]



INDUSTRY INVESTMENT SHARE



MEDIAN POST-MONEY VALUATION BY SERIES[2]



Decarbonization technology startups are developing solutions to measure emissions and other environmental data, adapt to changing climates, and repurpose emissions. Venture investment into this industry is on track to reach an estimated $2.5 billion by the end of 2024 if the year-to-date run rate is maintained. Startups in emissions tracking and analytics have seen an increased proportion of venture investment in recent years. This is partially driven by corporate demand for better emissions measurement, with methane emissions tracking being a key focus area. Additionally, several carbon utilization startups, such as those using captured CO2 in fuels, have recently raised larger rounds to reach commercial scale.

Notes: (1) YTD 2024 as of October 1, 2024. (2) Series B and C excluded due to limited data.

Source: Pitchbook. Data has not been reviewed by PitchBook analysts.

J.P.Morgan

04 | Factors and Considerations

Climate Technology notable factors and considerations

Factors	Industries[1]	Considerations
Government Funding and Policy		Government spending and policies can support innovation, foster startup growth, and may require the adoption of certain climate technologies.
Climate Adaptation		As global temperatures have risen, communities around the world are likely to continue adapting to their new environments.
Environmental Regulation		Environmental regulations play an important role in driving the adoption of climate technologies across various industries.
Technological Advancement		Technological breakthroughs are an important step toward decarbonizing various sectors, and while they may take time to scale and commercialize, their potential for making an impact is promising.
Increasing Utility Cost		Many companies are likely to take steps to secure access to resources, such as electricity and water, at a reasonable cost, especially as they aim to procure these resources more sustainably.

Many companies are increasingly committed to incorporating various Climate Technology innovations into their operations, as regulators, shareholders, and competition may require them to adopt more sustainable technologies and reduce their carbon footprint. Extreme weather events, such as hurricanes and tsunamis, are an increasing concern for some business leaders and investors, as they can significantly disrupt operations. The adoption of decarbonization technology may be set to grow, as more companies seek to deploy software and hardware solutions to measure, track, and adapt to the changing environment.

Note: (1) Industry logos correspond to the Climate Technology taxonomy and definitions on page 3.

Sources: Press releases from a range of public companies.

Financing climate technology: First-of-a-kind (FOAK)

HOW CLIMATE TECHNOLOGY MILESTONES ALIGN WITH FINANCING OPTIONS[1,2]

	Financing Stage	Seed	Series A	Series B	Series C	Series D+	IPO
Development Milestones	Startup milestones	MVP	Product/Market fit		Channel/Product fit		Maturity
	Climate tech milestones	MVP	Pilot / Demonstration plant, partnerships		First commercial scale facility/ "First-of-a-kind" (FOAK) plant	Expansion to multiple sites	
Financing	Equity		Equity			Growth equity	
	Debt		Venture debt, Convertible notes, Equipment financing (if applicable)		Cash flow revolver, ABL facility, Project finance		Debt capital markets

How a startups funds its operations varies and is specific to its unique circumstances; often, a combination of different funding types may be required. This is especially true for first/early-of-a-kind (FOAK/EOAK) projects, which are designed to implement and test new technologies at a commercial scale, often requiring diverse funding strategies to address the unique challenges involved. Companies generally build their first commercial-scale facilities – often FOAK projects – when raising their Series C round. They may also have access to revolving lines of credit (revolvers) and Asset-Backed Lending (ABL) facilities. Given the uncertainty of cash flows around FOAK projects, project financing is not usually an option. Instead, companies may rely on a mix of revolvers/ABLs and grants (government and private). However, it's important to understand that there isn't a standardized way to fund capital-intensive, Climate Technology companies.

Notes: (1) Intended to be representative as companies' actual timelines will vary based on technology, development path, and market environment. (2) MVP stands for minimum viable product.

Source: JPMorgan Estimates.