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The Future of Climate Tech

A look at the technologies driving a sustainable future

May 2024

Contents

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Executive Summary

Climate Tech Remains Resilient Amid an Innovation Economy Winter

Despite near-term capital challenges, the stage is set for long-term adoption of climate tech solutions. In a world where climate risk is increasingly inherent, the technologies that mitigate that risk will likely flourish by necessity.

Dan Baldi
National Head of Climate Tech and Sustainability
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While the challenges to avert climate change remain considerable, the long-term technology trends are clear and bright. It is now cheaper to develop new renewable energy than it is to maintain fossil fuel generation. Roughly 88% of global carbon emissions are now covered by a net zero goal, and policies such as the Inflation Reduction Act (IRA) are beginning to have a meaningful impact on advancing climate tech solutions and businesses. Entrepreneurs and investors are increasingly turning attention to hard-to-abate emissions sources. For instance, we see significant progress in technologies — such as thermal storage to supply industrial heat at over 1400°C and rapidly improving hydrogen electrolysis and fuel cells which help enable decarbonization of previously hard-to-electrify sectors.

Tailwinds for climate tech abound, but the sector is impacted by the decline of overall venture capital (VC) investment, which witnessed the most significant correction since the dot-com bubble burst in 2000. But climate tech has outperformed, with deal activity falling just 14% compared to the 27% witnessed in the overall market. And investors remain committed to the sector. Amongst the most active corporate venture capitalists (CVCs), climate tech now accounts for 11% of deals, up from 2% in 2020. As VC investment declines and runway shortens, our proprietary data suggests climate tech companies are turning toward profitability with more companies seeing improving EBITDA margins year-over-year (YoY) than at any point in recent history.

As the pace of VC fundings slow and exits remain elusive, there is an increasing focus on finding capital for late-stage companies in the form of less dilutive solutions, including corporate debt and project finance. Many late-stage companies in 2021 had the opportunity to tap public markets for capital, but that window is mostly closed given many of the now-public companies have struggled to meet shareholder expectations of sales and profitability growth. M&A markets have not fared much better, with climate tech M&A deal activity down 35% YoY. But so far in 2024, the US innovation economy is showing signs of stability and normalization, late-stage valuations are stabilizing, Series A deal activity is starting to pick up and exits may be on the horizon.

Despite near-term capital challenges, the stage is set for long-term adoption of climate tech solutions. In a world where climate risk is increasingly inherent, the technologies that mitigate that risk will likely flourish by necessity.

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Four Themes Influencing the Future of Climate Tech

Startups Have Less Capital Available

Outlook

While climate tech was initially sheltered from the VC correction, the market has moved from a period of capital abundance to capital scarcity. Lower VC investment, higher interest rates and low valuations all increase capital costs and make it harder for companies to finance their operations. **As a result, most companies must focus on plotting a path to profitability and efficiency to ensure runway doesn't come up short.** Our data shows continuing declines for the VC-backed climate tech company runway, and as a result, we expect an investor-favorable funding environment in 2024.

Incentives Matter to Climate Tech

Outlook

The IRA is having a measurable impact on climate tech unit economics. The effect is felt across the clean energy landscape from solar and storage markets to hydrogen. Investment in clean manufacturing is up 156% YoY in 2023.[1] **Tax credits have jump-started the carbon capture market, prompting 427 new carbon capture utilization and storage (CCUS) project announcements in the last two years**. The IRA has improved the business case for many startups but it has also opened access to direct funding. Increased US Department of Energy (DOE) loan program funding has created record demand for DOE project financing with a 2x increase in requested capital YoY.[2]

Hard-to-Mitigate Emissions Are in Focus

Outlook

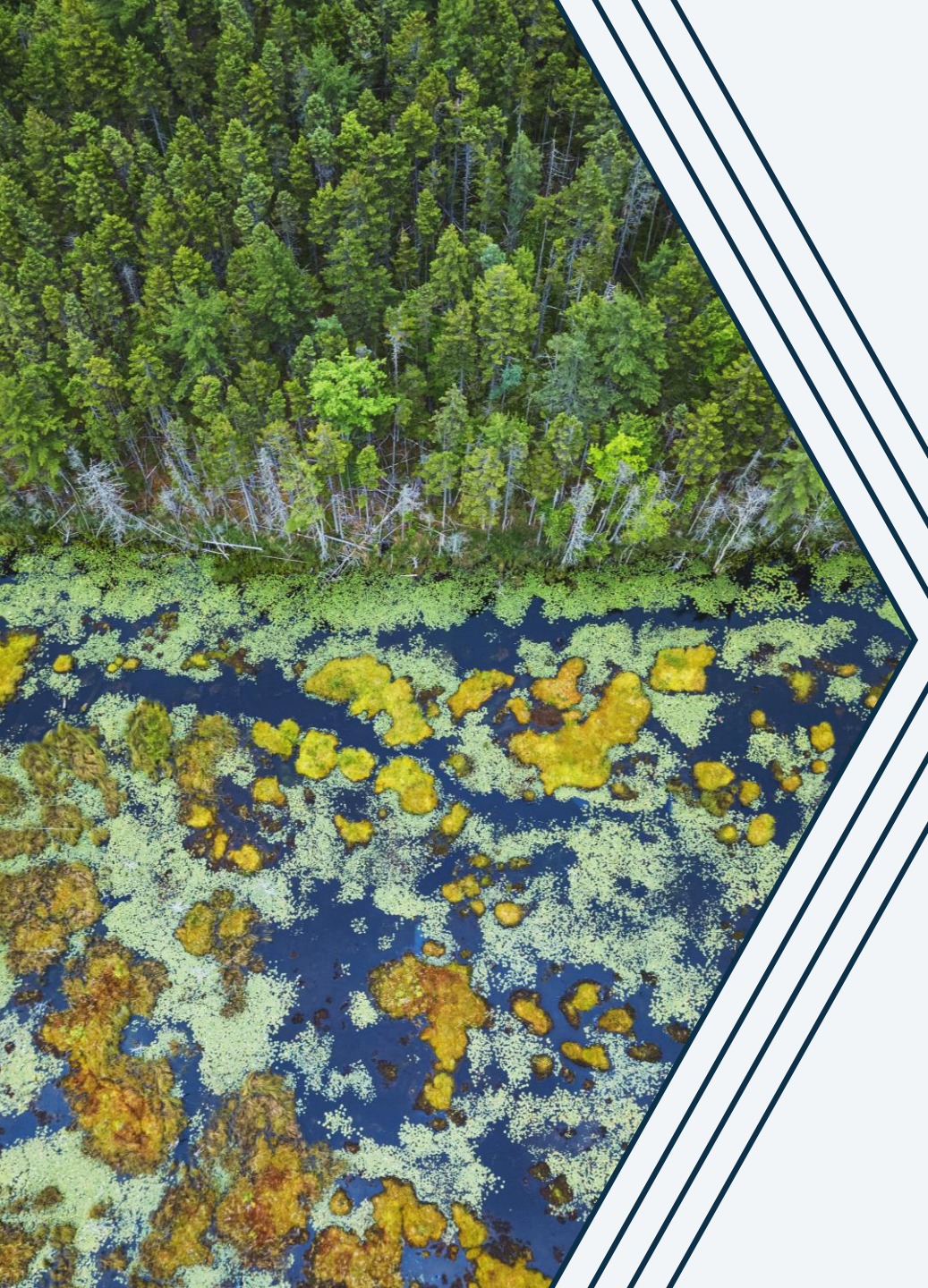
Heavy industries account for about 25% of global CO_2 emissions[3] — more than passenger vehicles and trucks combined. But unlike the auto industry, which is being transformed by electric vehicles (EVs), heavy industry has remained mostly untouched by climate tech. That's beginning to change. Government incentives are creating momentum to tackle hard-to-mitigate carbon sources. **US VC activity for industrial materials and recycling is up 3% from 2021, compared to overall VC activity, which is down 24%.** As incentives gain traction, we expect VC to grow in promising areas such as industrial heat, sustainable aviation fuels (SAFs), green cement and steel, and cleaner baseload power.

A Sector Poised for Exit Activity

Outlook

There is a growing backlog of climate tech companies approaching an exit, with 97 unicorns globally. But exit windows are mostly closed, reflecting the overall market. Poor performance from recent SPACs and IPOs, high interest rates and continuing uncertainty have hampered public exits. **On the M&A side, activity has cut back significantly since 2022, but the seeds of opportunity have been sown.** Corporate appetite has been consistently growing for climate tech. The largest corporations have the cash to scoop up the growing number of companies in the sector. Purchasing will likely be fueled by the accelerating adoption of emerging technologies and companies which will be available at attractive price points.

Notes: 1) According to Rhodium and MIT's Clean Investment Monitor, which tracks manufacturing investment in technologies eligible for IRA incentives. 2) From $118B in requested project funds in March 2023 to $262B in March 2024. 3) For energy-related emissions tracked by the IEA as of 2022.
Source: Preqin, Rhodium Group, MIT CEEPR, DOE, PitchBook Data, Inc., Clean Tech Group, S&P Capital IQ, SVB proprietary data and SVB analysis.

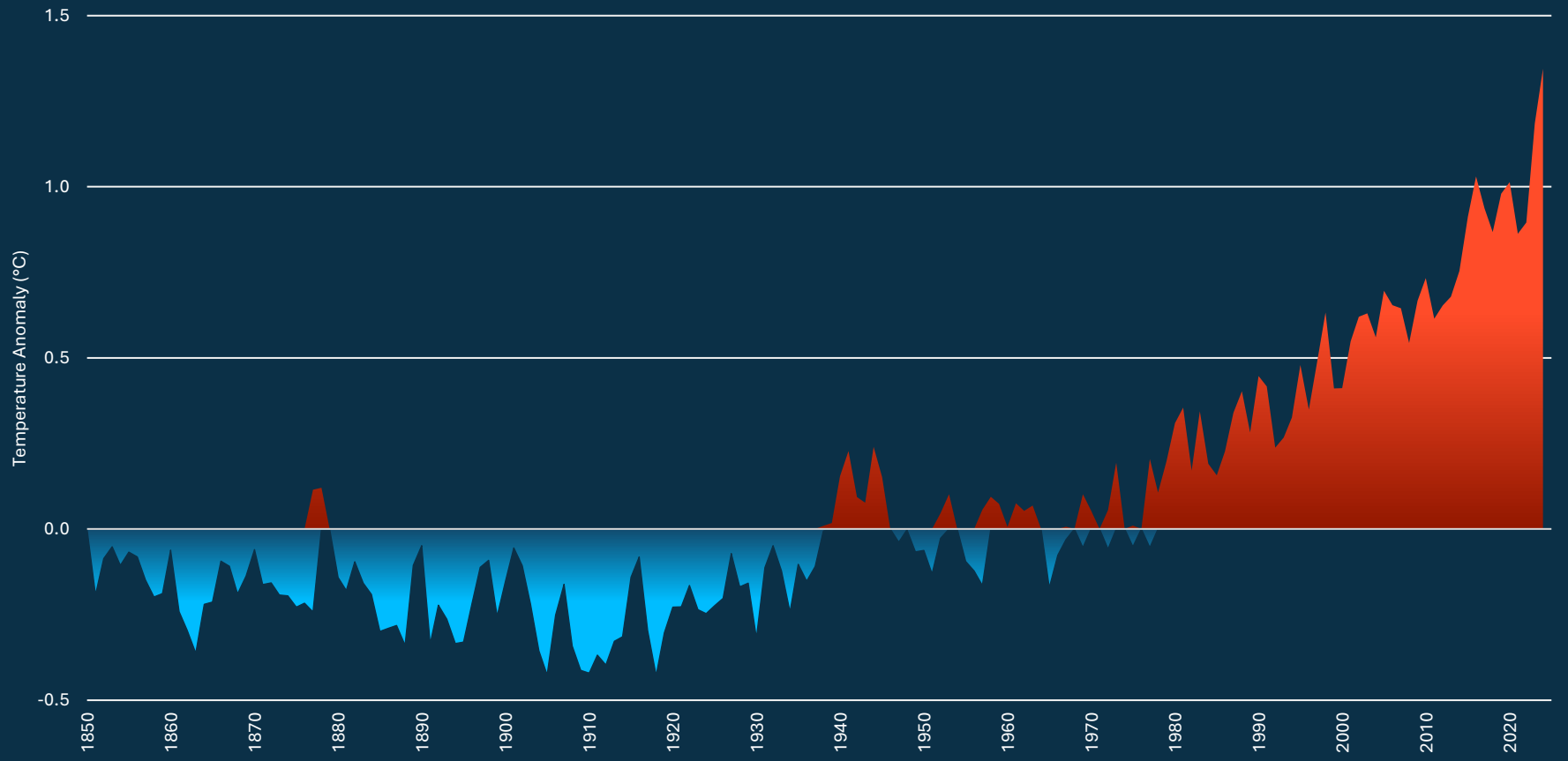


Macro

As the impacts of climate change are increasingly visible, the solutions are increasingly backed by advantageous policies.

Temperatures Climb Steadily Higher

Global Land and Ocean Average December Temperature Anomaly[1]



1.3°C

global temperature increase above pre-industrial levels in 2023

6.7x

increase in the number of $1B disaster events in the US since the 1980s

66%

of Fortune Global 500 companies have developed plans to mitigate the risks of climate change on their business

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Notes: 1) Anomaly compared to average temperatures from 1960-1990.
Sources: NOAA, Climate Action Tracker, IEA and SVB analysis.

A Tipping Point for Carbon Emissions

Organizers of the Paris Olympics have set a symbolic goal for the 2024 Summer Games: to go green while going for gold. A typical Olympics can release as much as 3.5M metric tons (mt) of CO_2 into the atmosphere — equivalent to the annual output for a city the size of Austin. But this year, by slashing construction and harnessing renewables, Olympic planners have promised to cut that carbon footprint in half. They're not alone. Global pledges to curtail greenhouse gas emissions are stacking up, with current national plans expected to curtail 6.1 gigatons (Gts) of emissions by 2030. Commitments to renewables would remove 84% of the global annual emissions from burning coal, the heaviest source of man-made emissions. But current pledges aren't enough.

While climate policies have helped the US and Europe turn the corner on emissions, the rest of the world, led by rampant growth in China and India, is still dangerously off course. Technology can't create the will to change, but it can help to bridge the gap. **The International Energy Agency (IEA) estimates that most of the CO_2 reductions by 2030 will come from existing technologies, but nearly half of the reductions in 2050 will come from tech that is only being demonstrated now.** The biggest white space is in hard-to-abate industries such as cement and steel production and aviation fuels. Pledges only cover half of the reductions needed for these sectors by 2050.

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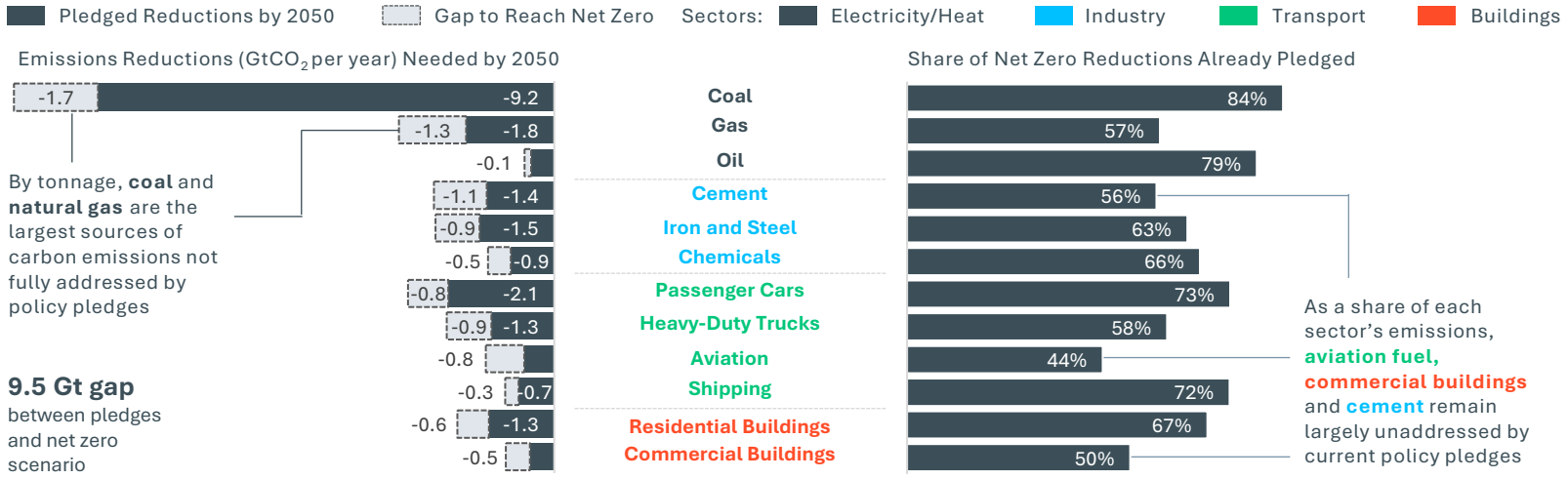
Closing the Emissions Gap, Sector by Sector: What's Pledged and What's Needed?

Global Reduction in CO_2 Emissions[1] Required to Hit Net Zero[2] Targets by 2050



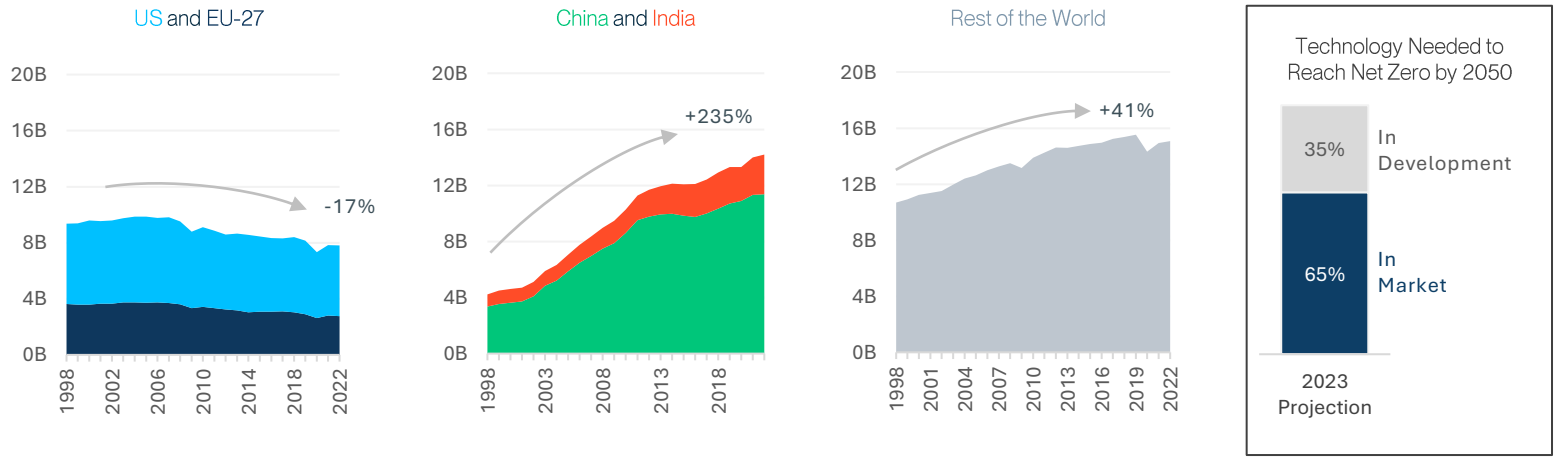
By tonnage, **coal** and **natural gas** are the largest sources of carbon emissions not fully addressed by policy pledges

9.5 Gt gap
between pledges and net zero scenario

As a share of each sector's emissions, **aviation fuel, commercial buildings** and **cement** remain largely unaddressed by current policy pledges

Diverging Paths: US and Europe Stem Emissions, While Most Remain Off Course

Fossil Carbon Emissions by Global Region ($MtCO_2e$)

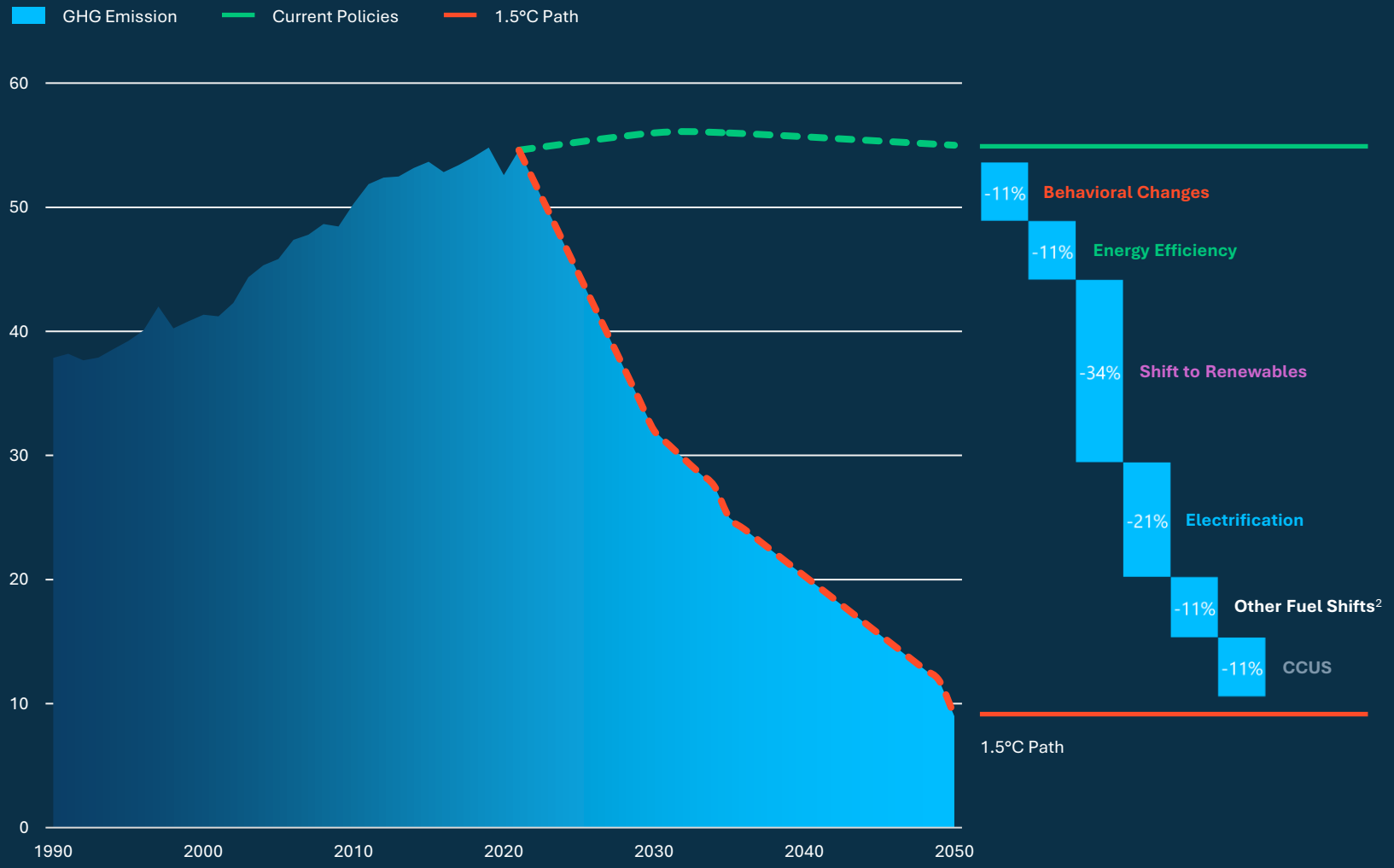


Notes: 1) The announced pledges scenario includes all major national carbon mitigation announcements regardless of whether they have been anchored in legislation or in nationally determined contributions; emissions in gigatons of CO_2 2) Mitigation efforts needed to reach net zero CO_2 emissions by 2050, according to the IEA World Energy Outlook.

Source: International Olympics Committee, Global Carbon Budget, IEA and SVB analysis.

What Will It Take to Meet 1.5°C?

Global Greenhouse Gas (GHG) Emissions ($GtCO_2e$) and Scenarios to Reach Paris Agreement Target[1]



Behavioral Changes: Eating less meat, reducing air travel and recycling more are some of the individual choices that could reduce 11% of unaddressed GHG emissions by 2050.

Energy Efficiency: Delivering the same services with fewer resources could make a big difference in curbing unaddressed emissions. Technology advancements will help by developing more durable materials, lighter products and higher-yielding manufacturing processes.

Shift to Renewables: A near-total shift to renewable energy sources for electricity and heat production is required to meet net zero emissions targets. So far, current policies fall far short of the mandates that will be needed.

Electrification: The transition to electric vehicles and building upgrades will drive the largest share of electrification, though an overhaul of global electric grids is needed to enable this shift. Under an net zero emissions scenario, annual investment in grids must double to $750B by 2030 and keep growing.

CCUS: Technologies such as direct air capture (DAC) and other nature-based carbon capture solutions hold great promise for carbon reductions, but these projects must be massively scaled to make a difference.

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Notes: 1) The 1.5°C path is consistent with the goal of reaching net zero CO_2 emissions by 2050, the threshold needed to avoid catastrophic warming.
2) Other shifts include switching from coal and oil to other sources such as natural gas, nuclear, hydropower or marine energy.
Source: UN Emissions Gap Report, IEA and SVB analysis.

Two Years In, IRA Shows an Impact

The IRA was passed nearly two years ago, and the impact is already being seen and felt among climate tech companies. Investment in public and private energy projects has jumped 73% from 2021 as incentives for renewable energy production spur the manufacture of technologies to produce clean energy. Solar installations jumped 51% in 2023, driven by IRA tax credits and an enhanced ability to trade tax equity. Retail investment from households and businesses in heat pumps, electric stove tops and electric vehicles has continued to steadily rise since 2020.

The CHIPS and Science Act has also helped to spur growth in clean energy by bolstering domestic production of energy-efficient semiconductor production for EVs and other GHG-reducing technologies. Another essential technology bolstered by the IRA is battery production. Batteries have received 70% of clean manufacturing investment in 2023.

Climate-friendly policies aren't just creating better unit economics; they are also opening more paths for direct funding of energy projects. An influx of funding from the IRA expanded the DOE's loan capacity from ~$40B to $400B. As a result, loan applications for clean energy spiked last year. While the approval process can take time, there are over 200 active applicants that have requested a total of $263B in funding.

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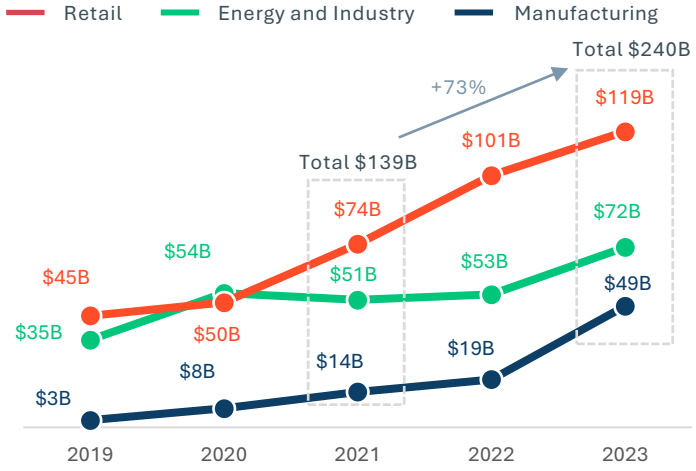
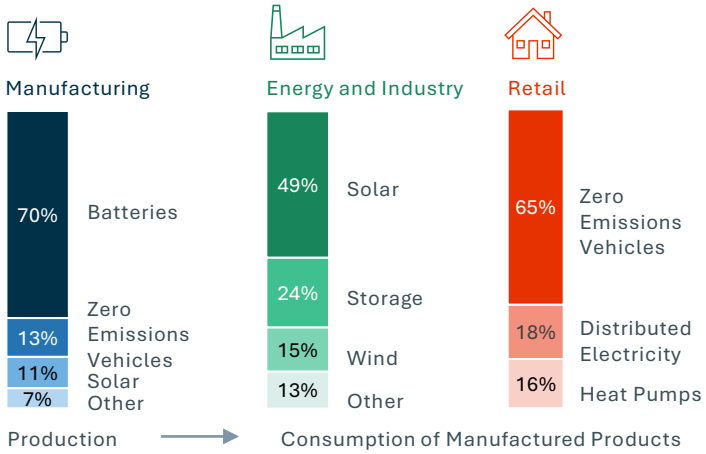
Incentives Jolt Clean Energy Investment

US Public and Private Investment in IRA-Eligible Technology[1]



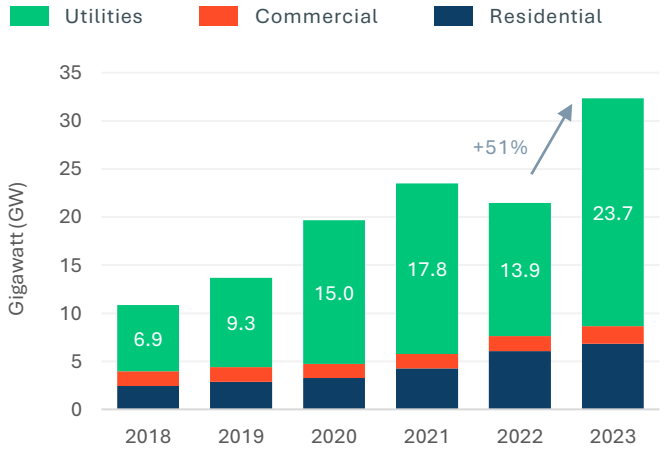
Solar and Batteries See the Biggest Bump

2023 US Clean Investment Breakdown by Segment[1]



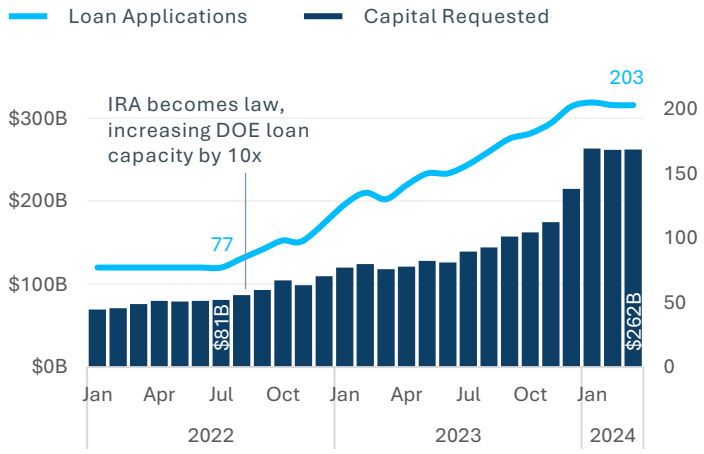
IRA Boosts Solar Installation

Annual New US Solar Capacity Installed



Demand for DOE Loans Hits New High

Department of Energy Loan Requests and Active Applicants



Notes: 1) US Investment in the manufacture and deployment of GHG emission-reducing technologies. "Retail" includes purchase and installation of GHG-reducing technology by individual households and businesses. "Energy and Industry" includes the deployment of GHG-reducing technology to produce clean energy and reduce industrial emissions. "Manufacturing" includes investment in the manufacture of GHG-reducing technology.

Source: Rhodium Group, MIT, DOE Loan Program Office and SVB analysis.

Capital

In an environment of increasing capital scarcity, climate tech fares better than the overall innovation economy.

Raising the Floor: Climate Funds Reset

Climate tech VC fundraising has settled at a robust level, similar to 2020, far outpacing overall US VC fundraising, which hit a six-year low. **We are seeing relative fundraising resilience despite the headwinds caused by anti-ESG narratives.** Enthusiasm for sustainability efforts have waned, as greenwashing coupled with a rise in skepticism over the merits of carbon credits undermine the confidence in companies' sustainability claims. This effect is felt especially in the public markets where net flows into ESG equity funds were negative for all of 2023.

Despite all this, significant funding dollars are continuing to be raised. Chevron Ventures is doubling down on its venture strategy as it launches a new $500M Future Energy Fund. Future Energy Fund III is their largest commitment yet to clean energy technologies — the previous Future Energy Funds raised a combined $400M.

Limited partners (LPs) also have sifted through the noise. **Over the last several years, LP interest in climate solutions has steadily increased.** As of the first quarter of 2024, 86% of LPs in the innovation economy claim to have an interest in the climate tech sector. This could likely be a significant factor in mitigating the funding downturn for climate tech.

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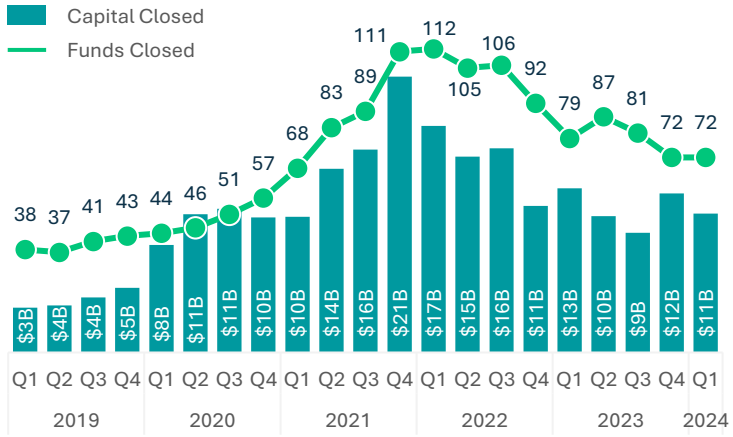
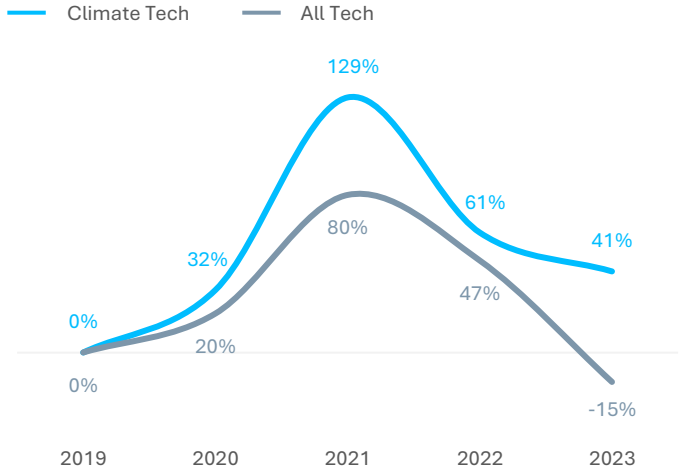
Fundraising Fell, but Historically High

Trailing 4-Quarter US VC Fundraising for Funds with a Focus on Climate Tech[1]



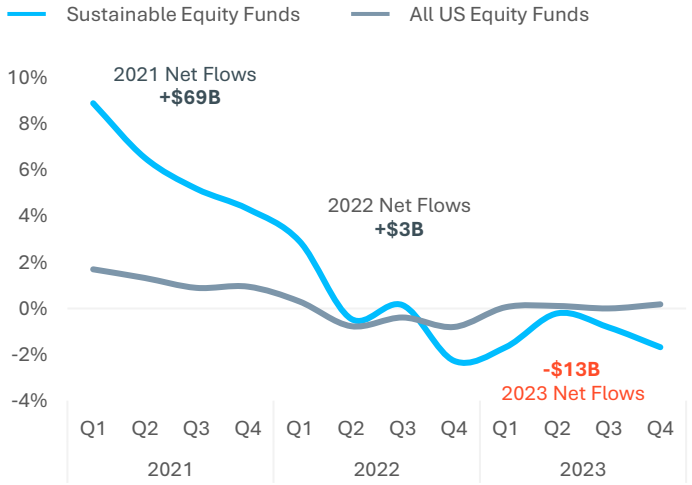
Climate Tech Fund Closes Outpacing Tech

Index Since 2019: Percent Change in US Funds Closed per Year



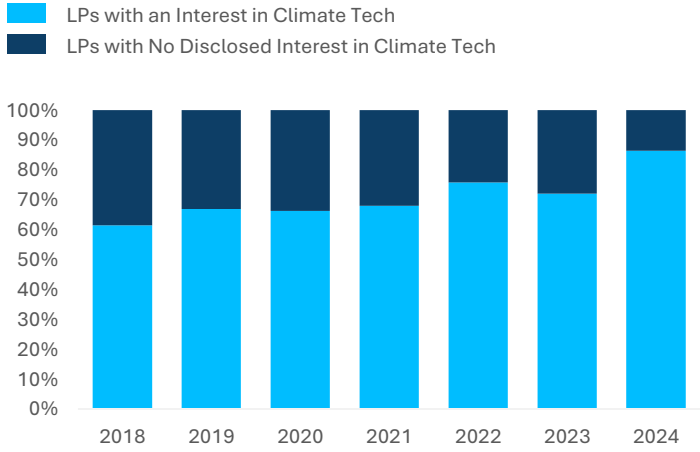
Sustainable Equity Fund Flows[2] in the Red

Organic Growth Rates for US Sustainable Equity Funds



Piqued Interest in Climate Tech

Proportion of LPs with an Interest in Climate Tech



Notes: 1) For US funds with a stated interest in climate tech and related sectors; including generalist funds investing in climate tech. 2) Data from Morningstar report: Global Sustainable Fund Flows: Q4 2023 in Review. Equity Funds include Mutual Funds and ETFs.

Source: Preqin, Morningstar Inc. and SVB analysis.

Venture Funding Cools Down

While the innovation economy is in the midst of the most significant contraction since the dot-com correction, climate tech has remained relatively resilient. Deal activity in climate tech is down only 14% since 2021, with many subsectors bucking the trend. Carbon tech, for example, boomed in the last three years as the 45Q tax credit for CCUS rolled out and the SEC worked on Scope 1 and 2 emissions reporting. But it isn't all rosy. Some sectors like transportation and logistics or food and agriculture have fallen out of favor after mega deals into EV startups and alternative protein companies have not resulted in lucrative exits for investors. Graduation rates are better for climate tech too — 55% of climate tech companies that raised in 2021 have raised again, vs. only 45% of all VC-backed companies.

Deal activity has remained robust, yet the capital invested has dropped over 50%, driven by a decline in deals over $100M. These mega deals comprise just 3% of deal activity, but they make up a whopping 44% of all capital invested today (sliding from 61% in 2021). By contrast, seed activity has increased to 56% of all deals done in 2023, up from 45% in 2021, signaling investors are still placing bets on new climate tech companies. Anecdotally, bankers are seeing more convertible notes, which generally skew smaller than the priced rounds. This is yet another reason capital invested has fallen more steeply than deal activity.

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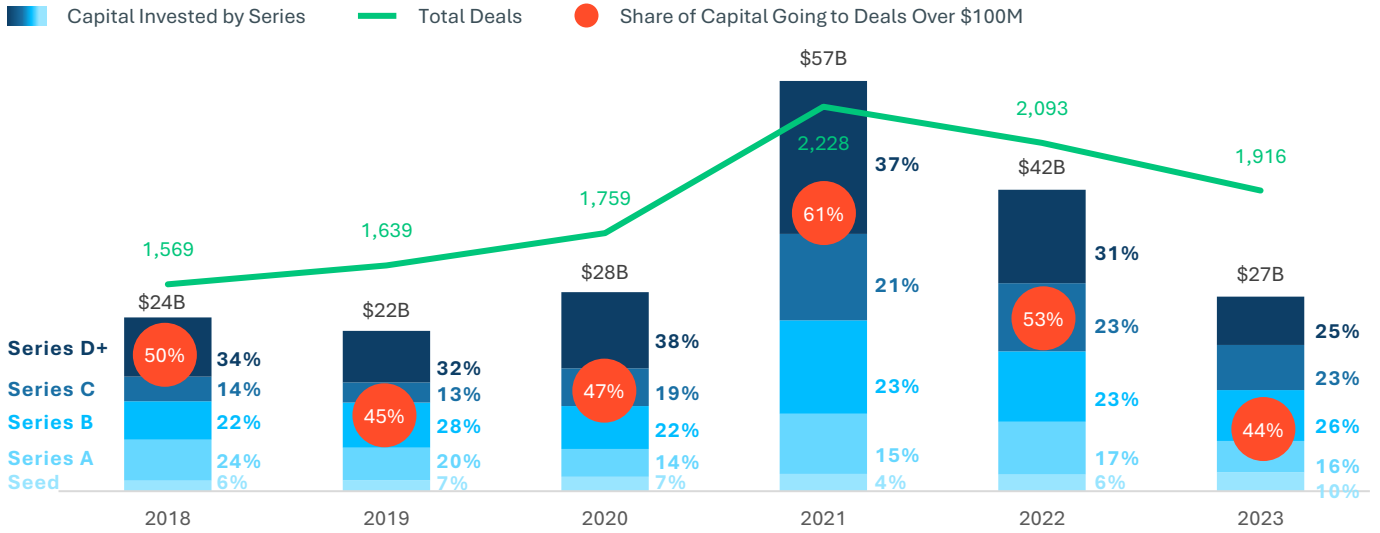
Climate Tech VC Investment Falls by Half Led by $100M Deals

Capital Invested in US VC by Stage and Share of Deals over $100M



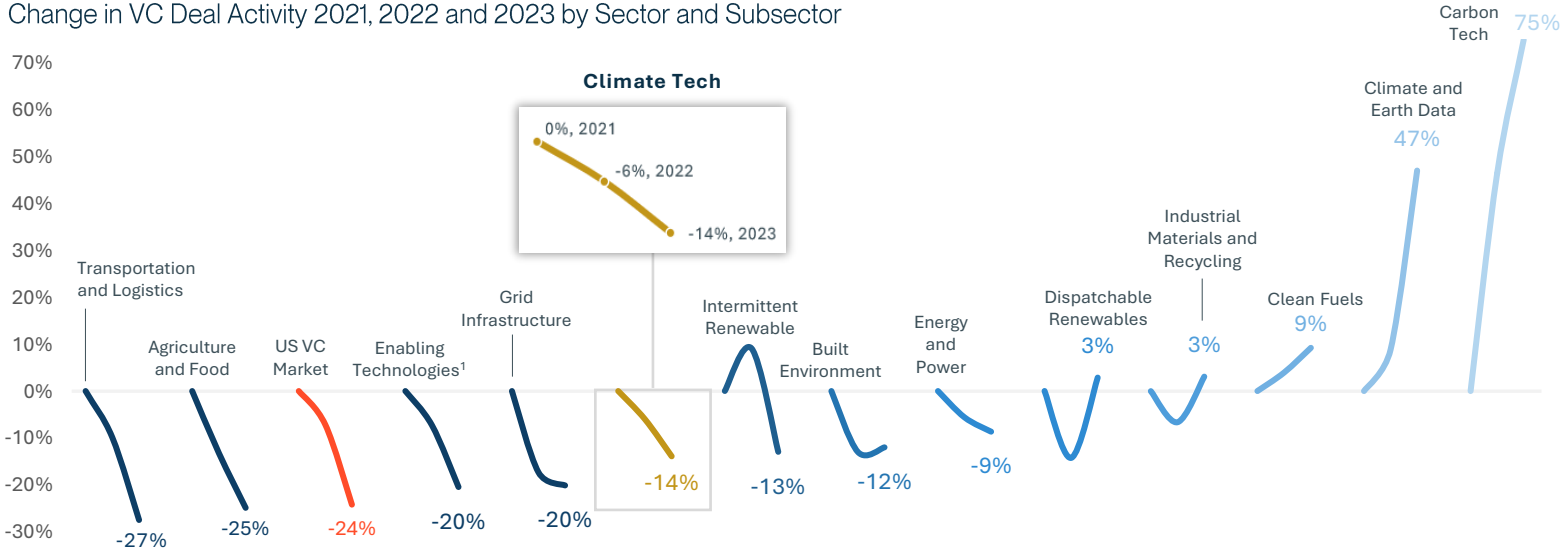
14%
decline in climate tech deal activity compared to 24% in overall US VC

52%
Seed-Series B deal activity's share of capital invested, the highest since 2019

3%
of deals in 2023 were at least $100M

Deal Activity for Climate Tech Remains More Resilient than the US VC Ecosystem

Change in VC Deal Activity 2021, 2022 and 2023 by Sector and Subsector



Notes: 1) Enabling technologies are not explicitly climate tech, but play a key role in enabling climate tech, such as certain edge computing, which could enable enhanced demand response.

Source: SVB proprietary taxonomy, Clean Tech Group, PitchBook Data, Inc. and SVB analysis.

Valuation Obfuscation

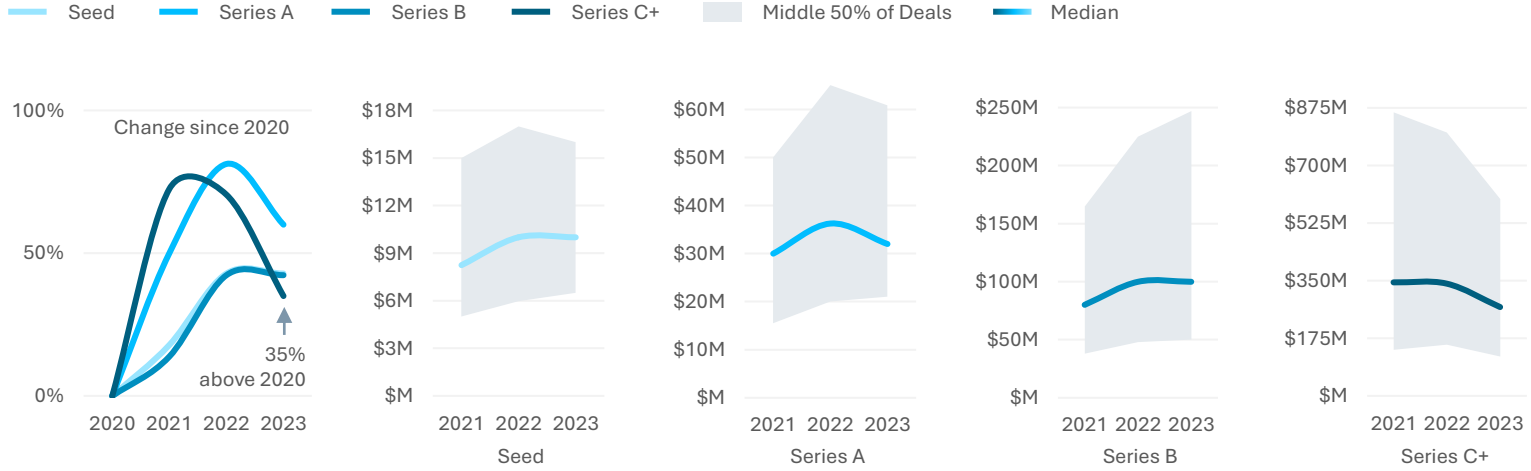
As investment has declined and many companies have struggled to raise, deal dynamics have swung in investors' favor to the tune of lower valuations, higher liquidation preferences and smaller checks. Mirroring overall tech, later-stage companies have seen the most significant valuation contraction. For example, the median Series C+ valuation has fallen 22% below 2021 levels while seed remains 21% above. There are a few reasons for this trend. First, later-stage companies are easier to value based on performance and growth. Second, they are generally closer to an exit and easier to compare to other recent exits.

While climate tech founders overall may be frustrated with recent declining valuations, they are raising more capital while at the same time taking less dilution than they were five years ago.

Commentary on valuations in recent years needs to be qualified given the growing number of undisclosed valuations. The proportion of later-stage companies reporting valuations has been cut in half since 2018. The uptick in undisclosed valuations coincides with fewer up rounds, suggesting that down rounds may be hiding from the public eye.

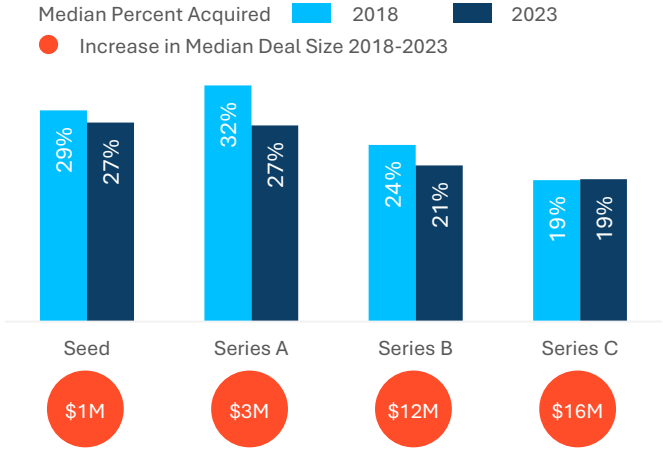
Valuations: One Step Back, but Still Two Steps Ahead

US Climate Tech Median Pre-Money Valuations by Series



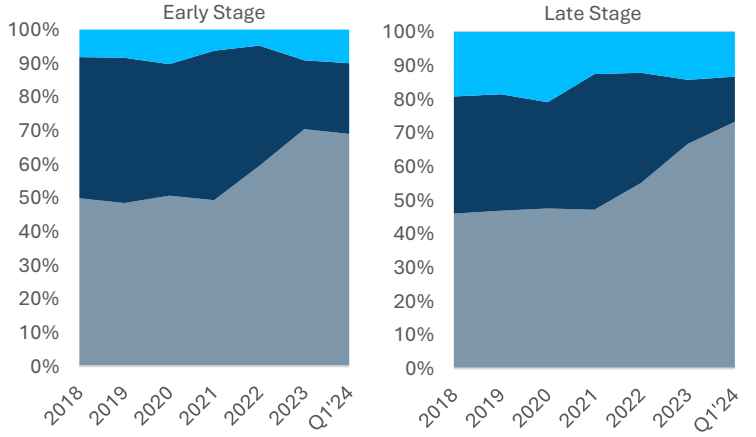
Founders Are Better Off Today

Median Percent Acquired by Round and Increase in Deal Size for US Climate Tech



Undisclosed Valuations Are All the Rage

Climate Tech Down/Flat, Up and Undisclosed Rounds



Source: SVB proprietary taxonomy, Clean Tech Group, PitchBook Data, Inc. and SVB analysis.

FOAKs Need Low-Cost Debt to Scale

Over the last five years, at least 74 high-value[1] US climate tech hardware companies have raised capital from infrastructure funds. These companies are at an inflection point in their journey down the capital cost curve from highly dilutive and expensive equity to off-balance sheet financing of projects. **This journey down the cost curve parallels the declining risks through proven contracts and deployments. Most importantly, it drives unit economics that benefit customers. As these companies approach scale, they will need to raise "first-of-a-kind" (FOAK) bank project financing.** At this stage, companies seek non-dilutive long-term asset financing instead of equity. Many climate tech companies need to build manufacturing infrastructure to create their products, but many don't want to own the assets those plants produce, so the shift from on-balance-sheet to off-balance-sheet is imperative to their business models to scale. But getting to project finance is a long journey requiring significant capital and innovative financiers to fully understand the technology and risks. Some climate tech solutions hit most standard project finance characteristics, but require various credit enhancements for banks to support the finance.

With large VC rounds >$100M decreasing, this type of financing may become more important — especially given the underperformance of many recent climate tech de-SPACs, which perhaps isn't the best path for financing pre-revenue climate tech hardware companies.

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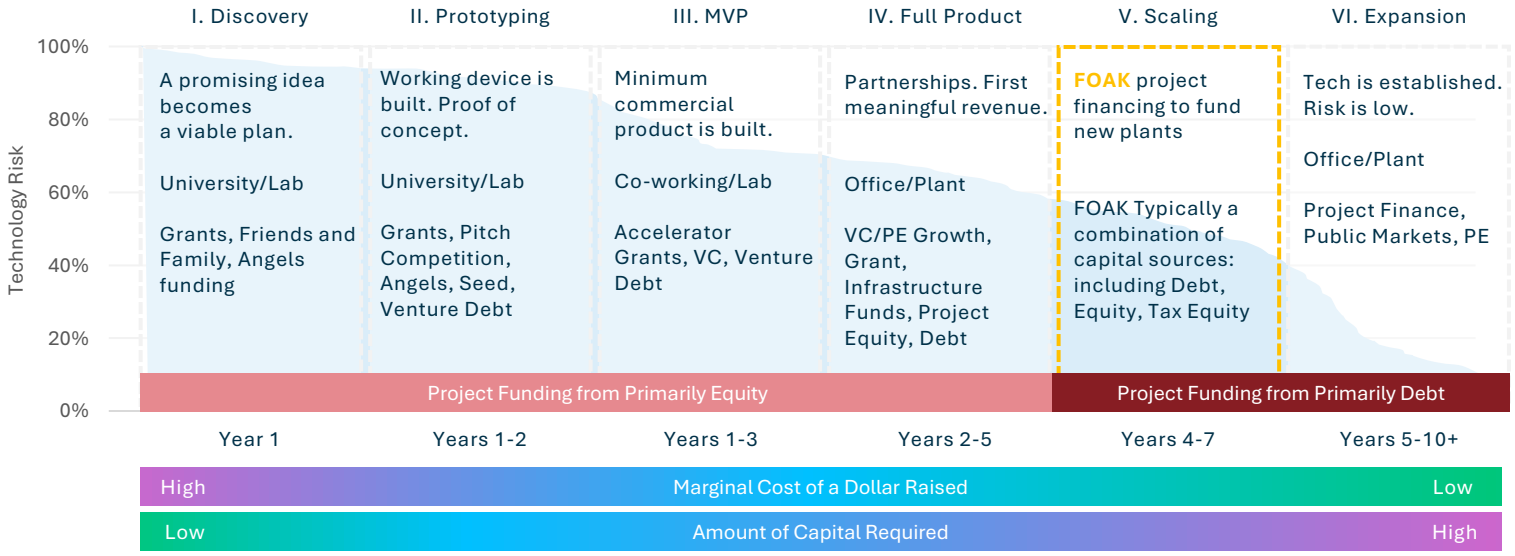
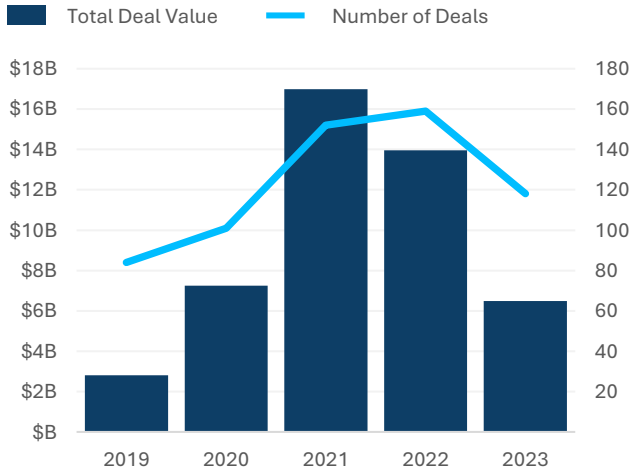
The Climate Tech Startup Journey: How FOAK Financing Enables Scaling



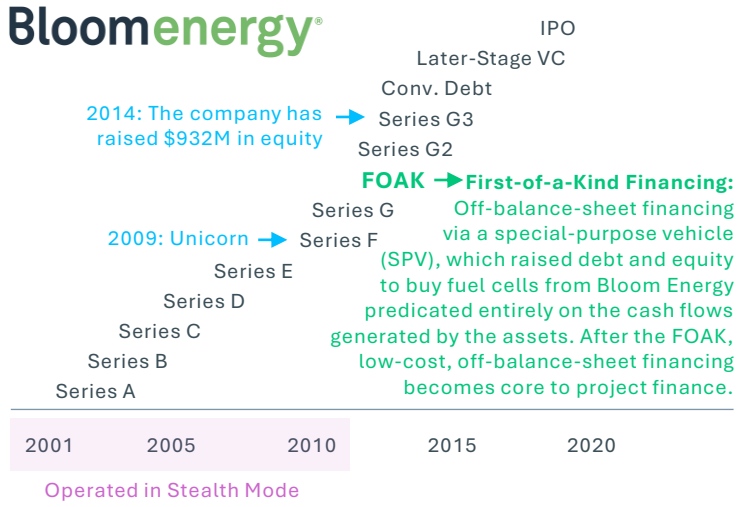
Companies Are Approaching Scale

Climate Tech Hardware: Deals and Capital Invested Involving an Infrastructure Investor



FOAK Financing: Fuel Cells

Bloom Energy: A Long Financing Journey to Success[2]



Notes: 1) Companies that have raised at least $500M or are valued north of $1B. 2) Produced using data from PitchBook Data Inc. and press releases.
Source: SVB proprietary taxonomy, Clean Tech Group, PitchBook Data, Inc., New Energy Risk and SVB analysis.

Financial Benchmarks

Unpacking the typical burn, profitability and growth metrics for climate tech companies.

Deep Tech Takes Patience

Real science takes time. Disrupting major markets takes time. Many emerging technologies in climate are in deep tech where meaningful scientific discovery has to occur to develop a minimum viable product. Given the longer product and go-to-market cycles, many companies take years or even decades before achieving meaningful revenue. In fact, by Series C only 63% of climate tech companies with a hardware component have achieved meaningful (>$5M annually) revenue. But this challenge is not entirely unique to climate tech; life science and semiconductor companies often face similarly long development cycles.

The differences between climate tech hardware (or full-stack solutions) and climate tech software companies are visible in growth rates as well. Software companies generally see higher growth rates earlier in their progression. For example, the median Series B climate tech hardware company is growing at 87% YoY compared to climate tech software companies that are growing at 108% YoY.

The costs are different, too. **Climate tech hardware companies are less efficient than climate tech software at turning capital into new revenue.** The typical Series C hardware company spends $3.60 to grow revenue by $1 compared to a climate tech software company of the same stage that burns $2.70.

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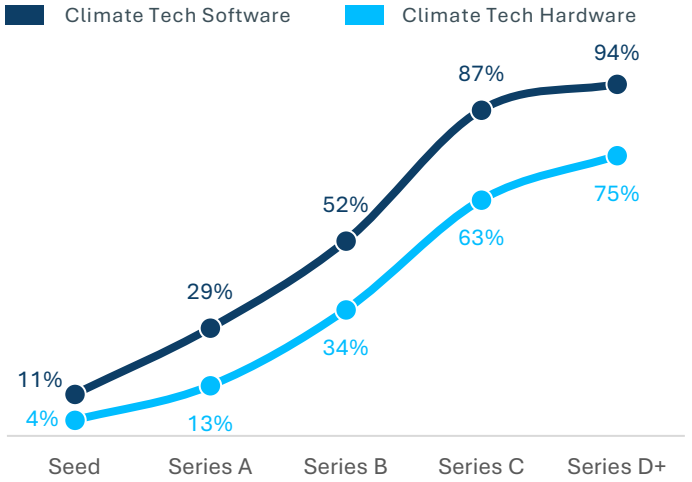
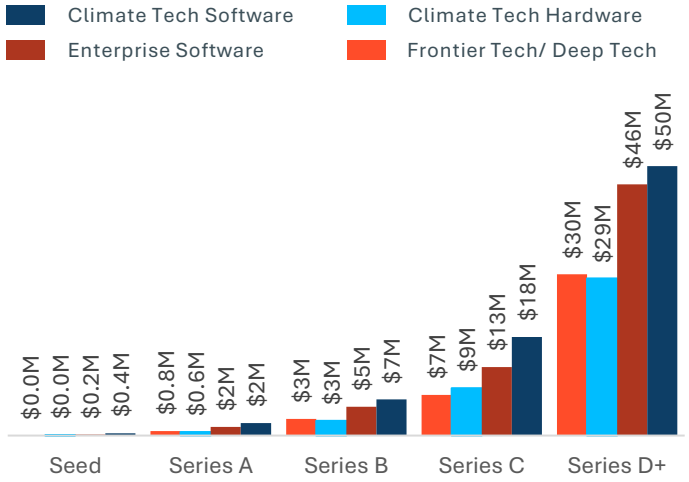
Real Science (and Revenue) Takes Time

Percentage of US Companies with $5M in Revenue by Series[1]



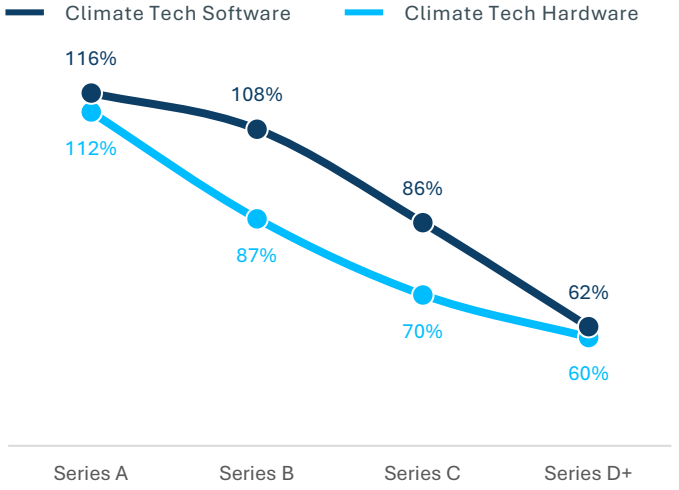
The Hockey Stick: Revenue Growth Trajectory

Median Annual Revenue by Series[1]



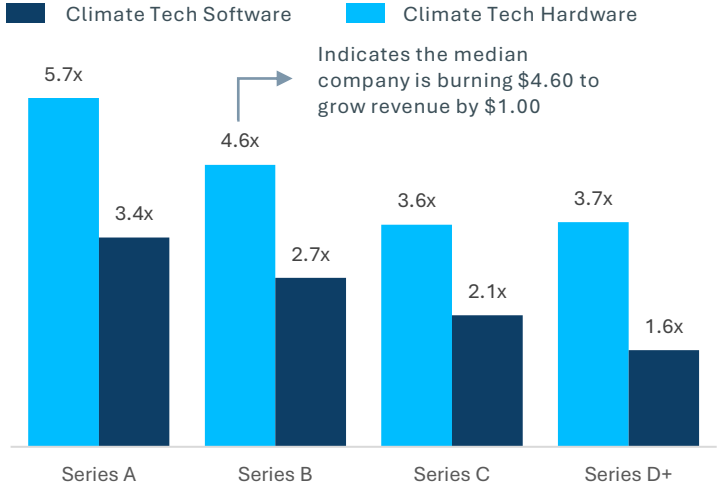
Growth Rates Slow with Age

YoY Revenue Growth Rate by Series[1]



It Costs More to Grow Hardware

Burn Multiple by Series[1]



Notes: 1) A hardware company includes any company with a hardware component; thus it includes full-stack hardware/software companies. Revenue at time of round for companies that have raised in the last five years.
Source: SVB proprietary data, SVB proprietary taxonomy, Clean Tech Group, PitchBook Data, Inc. and SVB analysis.

To Profitability and Beyond

The high product development costs and longer go-to-market cycles of climate tech hardware can not only manifest in lower revenue at the early stage, but lower profitability as well. At the median, climate tech hardware companies with less than $10M in revenue have EBITDA margins lower than software companies, **but hardware companies quickly achieve parity with software as revenue grows. It takes scale to offset the fixed costs of building manufacturing capacity.** While these economics can be daunting, the market opportunity for many hardware companies is huge.

Today, both hardware and software companies are increasingly focused on improving profitability as many companies have reduced headcount and are concentrating on core product offerings. **This has resulted in 76% of climate tech software companies seeing improvements in EBITDA margin YoY and 65% of climate tech hardware companies also seeing gains.**

But while margins are improving, fewer companies are meeting the "Rule of 40," which states that a software company's combined profit margin and revenue growth rate should equal or exceed 40%. This decline has resulted from slowing revenue growth as sales cycles increase, churn rises and companies reduce burn, thus slowing growth efforts.

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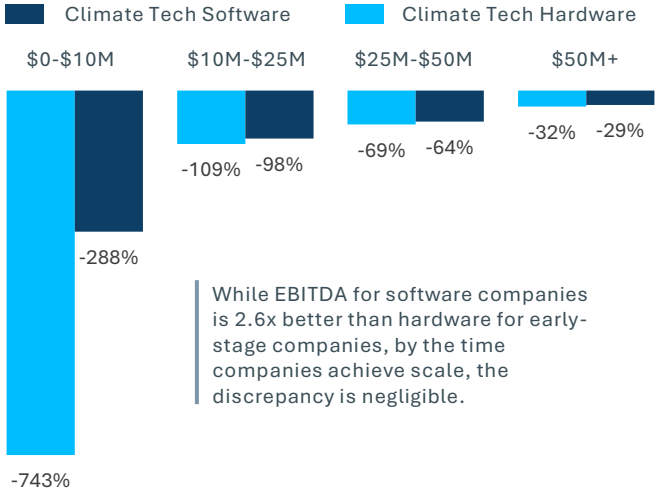
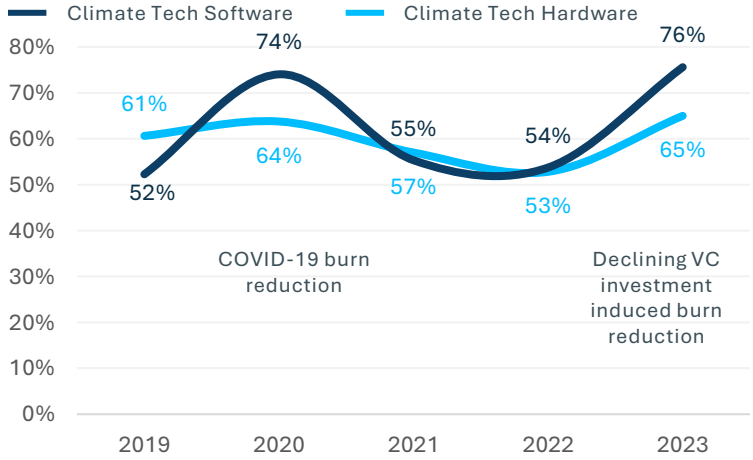
It's a Long Path to Profitability

Median EBITDA Margin by Company Size[1, 2]



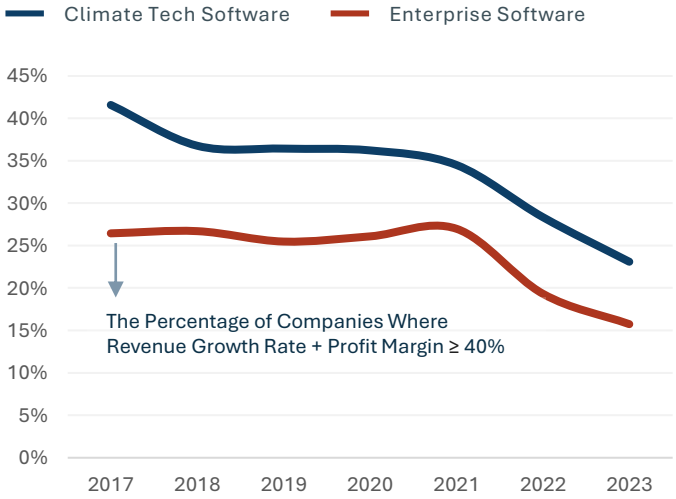
Improving EBITDA Margins

Share of VC-Backed Companies with Improving Profitability YoY[1]



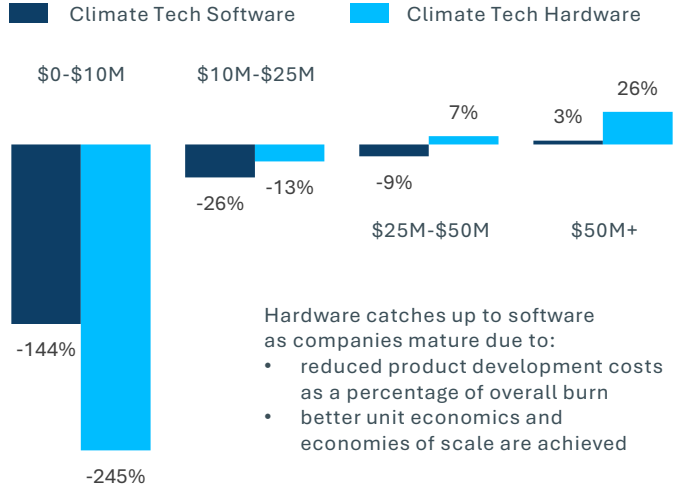
Balancing Growth and Profitability

Percentage of Companies at or Above Rule of 40



Hardware Catches Up Quickly

Median Rule of 40 by Annual Revenue[1, 2]



Notes: 1) A hardware company includes any company with a hardware component; thus it includes full-stack hardware/software companies.
2) Revenue at time of round for companies that have raised in the last five years.
Source: SVB proprietary data, SVB proprietary taxonomy, Clean Tech Group, PitchBook Data, Inc. and SVB analysis.

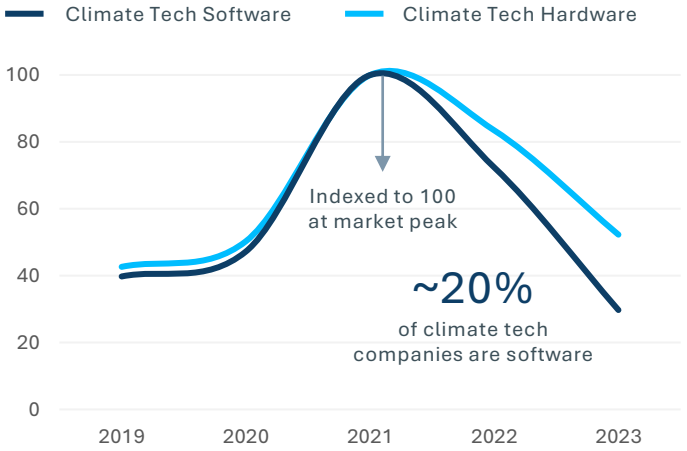
Runway: Back to Pre-COVID Levels

Climate tech VC investment doubled between 2020 and 2021, and with more capital flowing in, climate tech companies held more cash on their balance sheets than ever before. This trend continued into 2022 when investment, while falling, remained historically high. With most companies having plenty of cash on their balance sheet, burn remained high through H1 2022. In H2, companies began reducing OpEx, but these changes didn't immediately show up in financial statements. Runway began to fall in 2022 and has declined steadily since.

Currently, a majority of climate tech companies have less than 12 months of runway with 60% projected to be cash out in the next 12 months relative to 53% of all tech companies. Climate tech companies generally have shorter runway than overall tech given many generally have higher CapEx for equipment costs and the added costs of developing physical technologies. While some companies are able to rely on debt capital to finance their CapEx (e.g., many later-stage hardware-as-a-service (HaaS) companies), this is not the case for all.

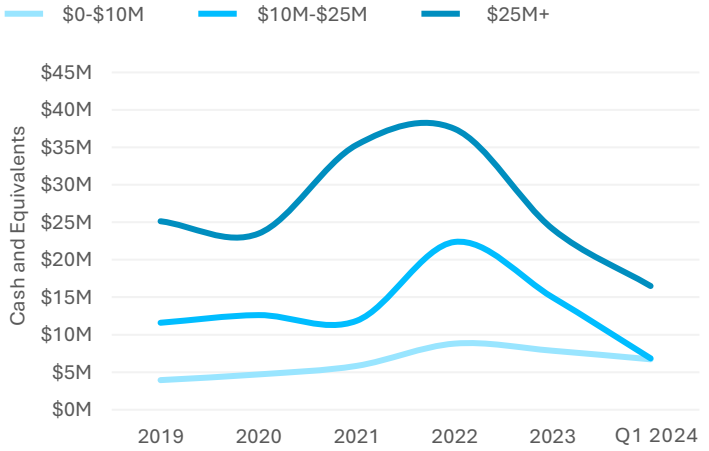
Software Saw Greatest Decline in VC

US Climate Tech VC Investment Indexed to 100 at Peak[1]



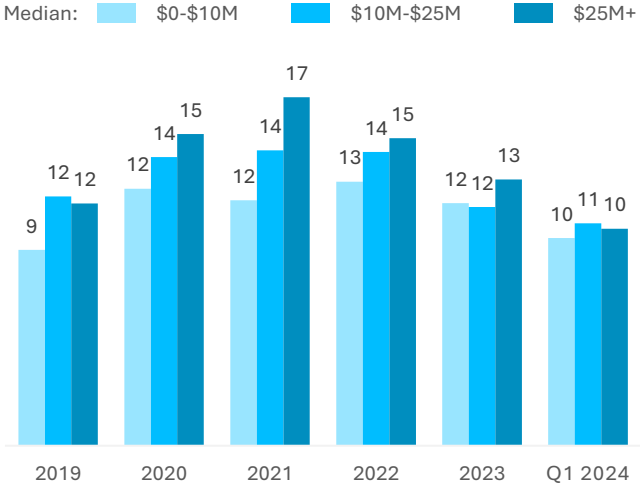
Decline in Cash Follows VC Investment

US VC-Backed Climate Tech Cash and Equivalents by Revenue



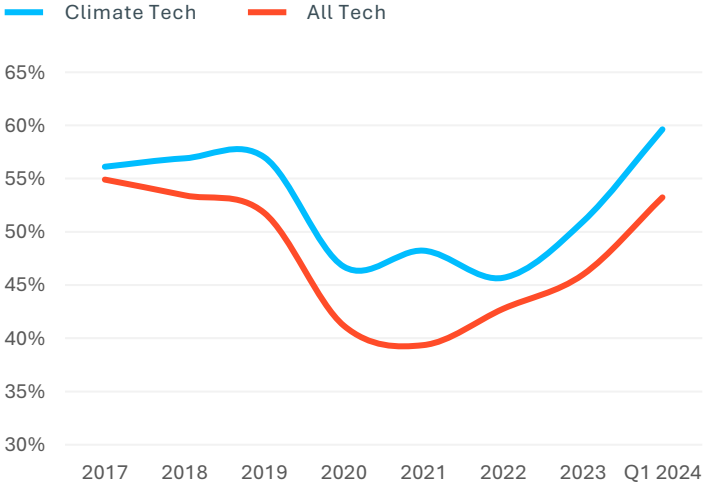
Runway Is Ticking Down

VC-Backed Climate Tech Months of Cash Runway by Revenue



More Companies Will Need to Raise

Share of VC-Backed Companies with <12 Months of Runway



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Sector Deep Dives

Electrification and new generation sources, the decarbonization of industry, and a rapidly growing carbon capture market.

Decarbonized Electrification

To reach our net zero goals, it's clear that electrification of our homes, cars and factories using zero carbon generation must occur. According to BloombergNEF data, based on what is economically likely, electricity generation will jump nearly 60% by 2050. Anticipated growth in wind and solar should drive them to become the primary generation sources — making up 65% of all generation by 2050.

A decade ago, the now infamous duck curve was introduced by CAISO, the entity responsible for overseeing about 80% of California's electricity supply. Today, the duck curve is deeper than ever as solar comprises over 60% of generation capacity, meaning that during the day, over-supply is increasingly common, but as solar goes offline in the evening, other generation resources must ramp up quickly to meet demand. **The dynamics of this market have created opportunities for climate tech companies to provide grid flexibility and load shifting.** For example, OhmConnect (just merged with Google Nest to form Renew Home), Stem and Leap work on demand response, while Antora Energy and Form Energy that offer storage allows for better matching of demand and supply. But in addition to enhanced flexibility, there is a need for more clean generation to supply baseload power, which can reduce the need for costly transmission build-outs and curtailment. As we will see on the next page, there are many possible solutions to provide clean baseload power generation.

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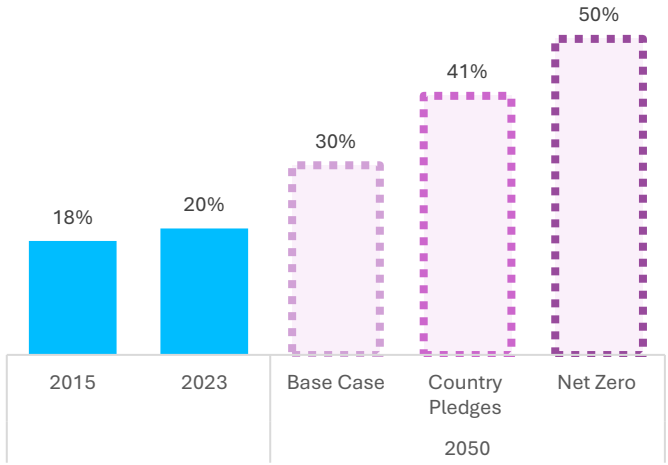
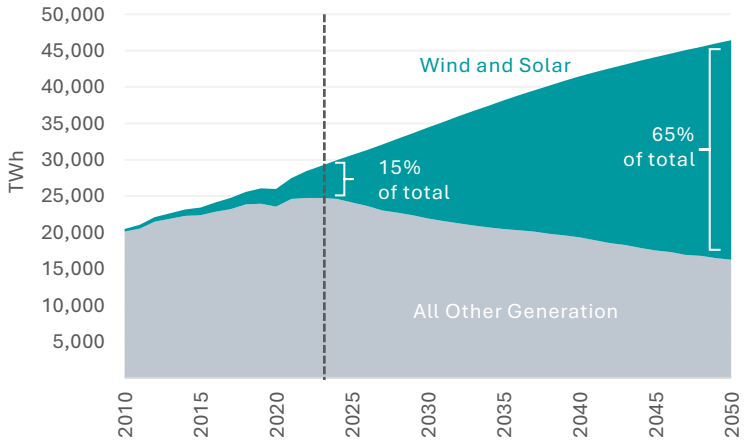
Electricity Demand Is Forecasted to Grow...

Electricity Share of Global Energy Demand[1]



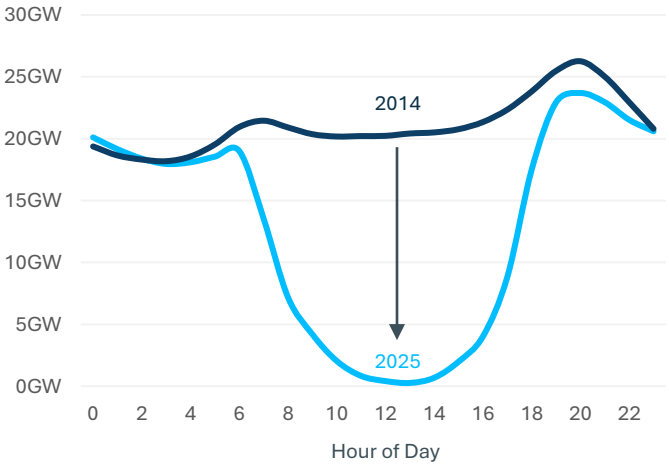
... And Wind and Solar Will Expand

Global Electricity Generation by Source Given a Cost-Based, Economically Driven Energy Transition[2]



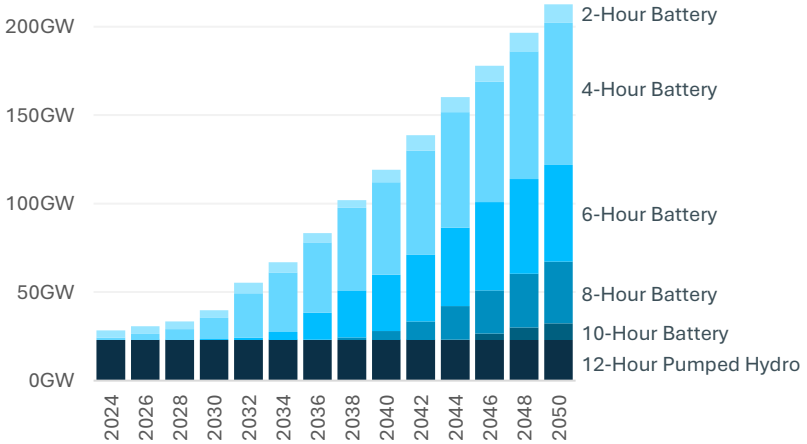
A Growing Need for Grid Flexibility

Average Daily Net Load for CAISO by Hour in April



Storage to Grow Alongside Renewables

≤12-Hour Utility-Scale Storage Capacity Deployment Under Base Case Scenario[1]

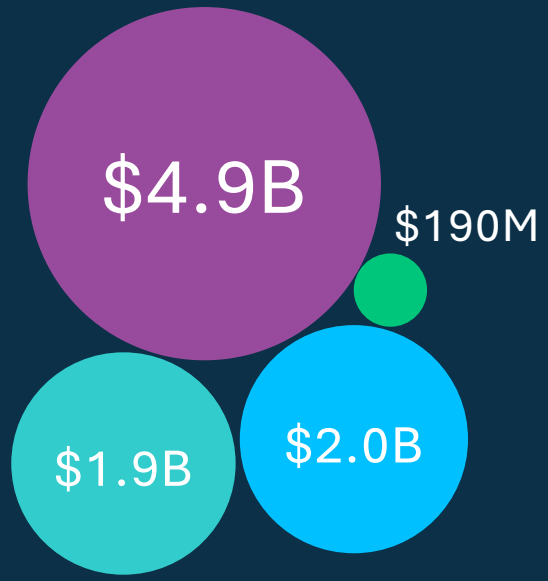


Notes: 1) Forecast by Wood Mackenzie. 2) Forecast by BloombergNEF.

Source: Wood Mackenzie, BloombergNEF, California Independent System Operator (CAISO), National Renewable Energy Laboratory (NREL), PitchBook Data, Inc. and SVB analysis.

On the Horizon of Possible: Clean Baseload Generation Technologies

All-Time Global VC Investment by Generation Source



Why Clean Baseload Generation?

- Reduces oversupply and curtailment of renewables
- Increases production of consistent power year-round, reducing the need for expensive long-duration storage
- Reduces the amount of new transmission needed compared to the scenario of a grid built exclusively on renewables[1]

Fusion

Nuclear fusion has fascinated physicists for decades but only recently (December 2022) did the Lawrence Livermore National Lab achieve net energy gain (ignition) for a fusion reaction using an inertial confinement reactor. Investors with long time horizons and large sums of capital see the promise in the space, placing large bets on several companies taking diverse approaches to fusion development. Notable companies include Commonwealth Fusion Systems, Helion, TAE Technologies, Thea Energy, Xcimer Energy, Realta Fusion and Blue Laser Fusion — all of which have plans to complete demonstrations by 2027.

Geothermal

Advances in drilling technology have jump-started geothermal technology. The DOE's EarthShots Initiative aims to build on these advances and reduce enhanced geothermal systems (EGS) costs by 90% by 2035. If achieved, this would bring the cost of EGS down to just $45/MWh according to BloombergNEF, making it a viable component of baseload supply. This is especially true given the high-capacity factors of EGS plants. Notable companies include Fervo Energy, Brimstone Energy, Bedrock Energy and Dandelion Energy.

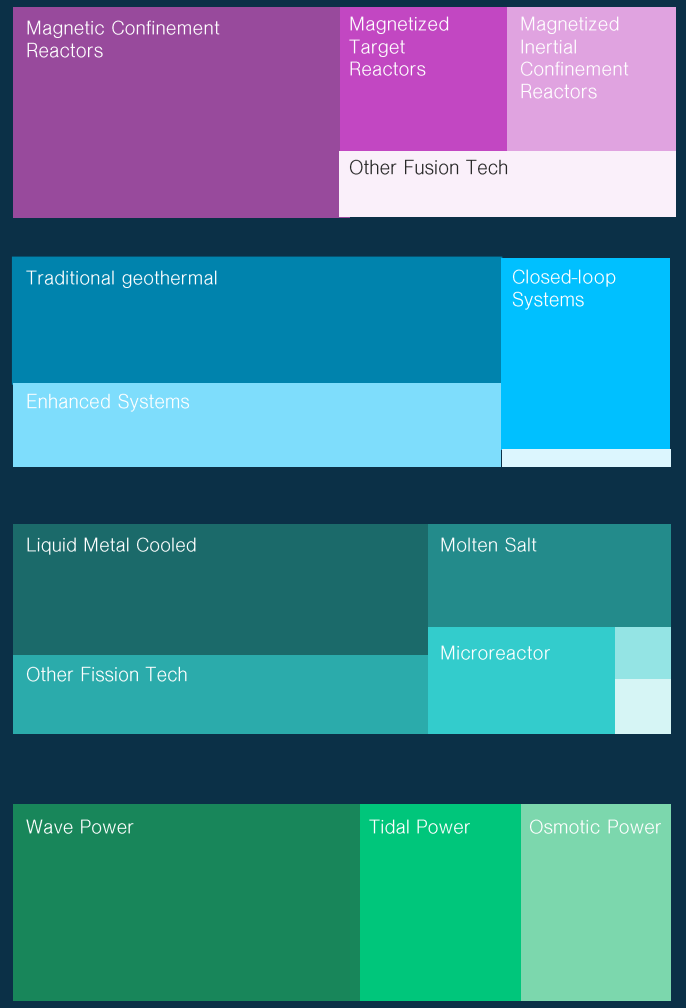
Fission

Smaller, modular form factors; novel coolants and fuels; and passive safety features characterize innovation in the space. Light water reactors are most common, using water as a coolant for nuclear fuel rods, with recent innovations enabling reactors less than 50 megawatts (MW) in size. Molten salt reactors (MSRs) use molten fluoride salts as the primary coolant and do not produce dangerous pressurized radioactive fission gases, as the gasses naturally absorb into the molten salt. High-temperature gas-cooled reactors (HTGRs) use helium as a coolant, achieve very high fuel utilization rates and can reduce the amount of spent fuel. Notable new fission companies include NuScale, TerraPower, Oklo and X-energy.

Marine

While the current generation from marine power is small, only about 500 MW globally, the potential is huge — nearly double the current global electricity demand according to the International Renewable Energy Agency (IRENA). However, the technology readiness level, high costs and difficult interconnection process to the grid make it uniquely challenging for small companies to build projects. But as technologies scale, the price of wave and tidal power is expected to become cost-competitive with coal over time according to the EU Strategic Energy Technology Plan. That said, it is still early days for marine baseload technologies.

Share of Investment by Technology



Notes: 1) According to analysis by CAISO.
Source: CAISO, Clean Tech Group and SVB analysis.

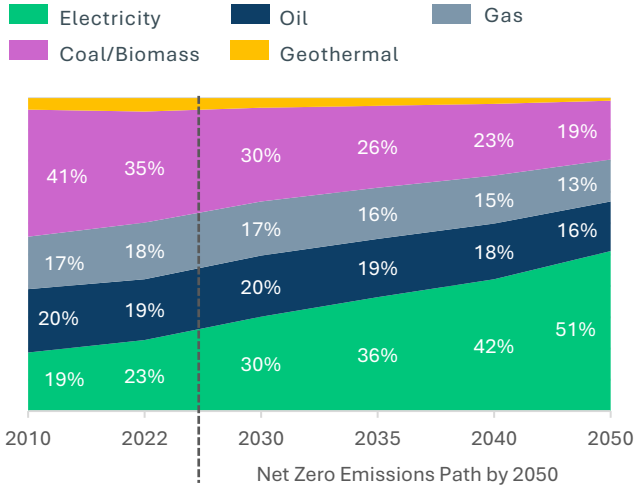
Heavy Industries: A Big Lift for Tech

The production of chemicals, metals and cement accounts for about 24% of global emissions, yet progress to reduce these emissions has been slow. While sectors such as power and transportation have taken great strides in recent years, the complexity involved in industrial manufacturing makes these emissions among the hardest and most expensive to eliminate. In a recent poll, 95% of heavy industry executives said they believe it will take more than 20 years for net-zero products to approach price parity with high-carbon alternatives.[1] Speeding up that timeline could depend on innovating new materials and new processes.

A net zero scenario calls for more than half of industrial energy to come from electricity by 2050, up from 23% in 2022. This will require industries to transition away from fossil fuels. Steel, for example, produces 2.75 lbs of CO_2 per 1 lb of steel produced, with the majority coming from energy use in heat production. Cement is trickier because not only do emissions come from energy consumption, but also the chemical reactions involved. Startups are thus taking a two-pronged approach to creating green cement: either by reducing the heat required in the process or by reducing the emissions released from the base materials being heated. While chemicals have garnered the most VC investment among segments in industrial climate tech, green cement is carrying momentum in 2024 with 51% of industrial VC YTD.

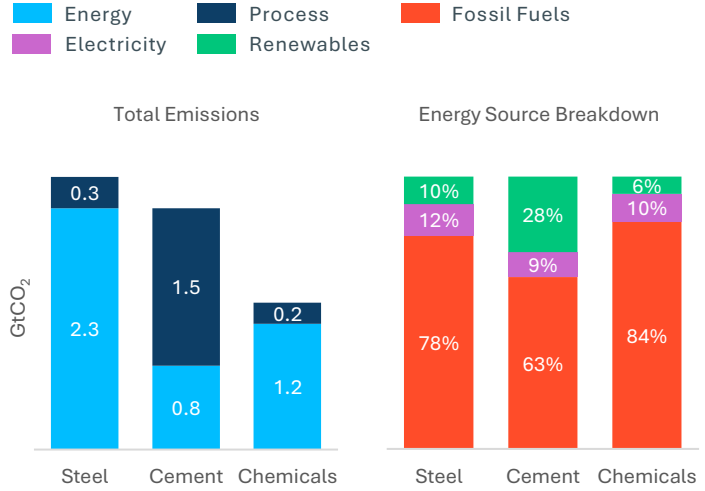
Industries Must Race to Electrify

Energy Consumption for Global Industries by Source



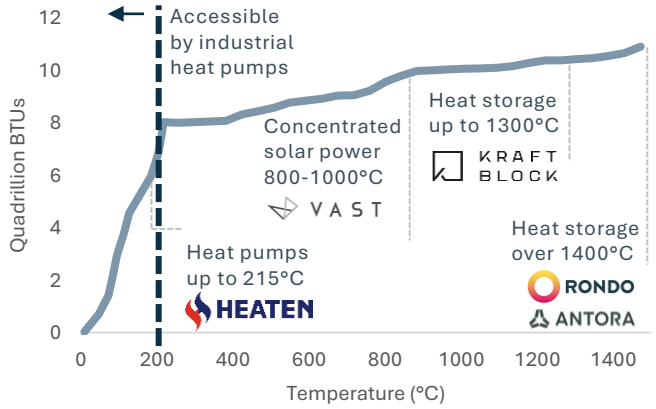
Weaning Isn't Easy: Industry Stuck on Oil

CO_2 Emissions and Energy Demand from Heavy Industries[2]



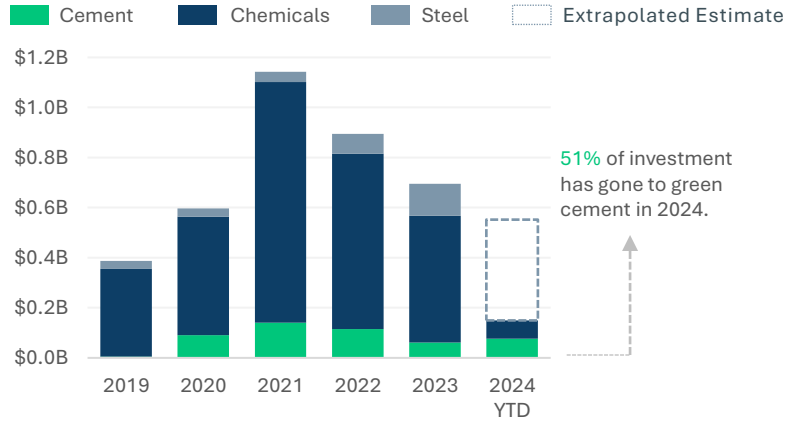
Technology That Can Handle the Heat

Cumulative Industrial Process Heat Use by Temperature



Green Shoots for Green Cement

US VC for Green Cement, Steel and Chemical Companies



Notes: 1) Deloitte surveyed 1,000 executives in April and May of 2023. 2) Based on energy consumption and emissions levels in 2019.
Source: IEA, National Renewable Energy Laboratory (NREL), PitchBook Data, Inc. and SVB analysis.

Carbon Captures the Moment

In theory, it's a great idea: offset carbon emissions in one place by preventing or capturing emissions somewhere else. That's the premise that carbon credits were built upon more than two decades ago, fostering a multi-billion-dollar industry today. In practice, it's proven complicated to implement. Concerns have mounted around the accuracy and efficacy of avoidance credits, which can be hard or even impossible to verify. This understanding has spurred a flight toward high-quality carbon credits in DAC and carbon sequestration, creating demand for new projects. This trend, coupled with government policies such as the 45Q tax credit in the US, has put the industry at an inflection point.

The number of announced CCUS projects jumped 4x in 2021 and has stayed at that pace for the last two years. **Planned projects would add 1.1Gt of carbon removal capacity per year by 2030, just shy of what's needed under the net zero emissions pathway.** Most of the capacity is going toward storage projects, but VC-backed tech companies are leading the way with novel uses for carbon. Charm Industrial, for example, uses carbon to produce hydrogen, while Twelve converts it into electrochemicals that can be used in consumer goods like running shoes in place of petrochemicals. Scaling more use cases for carbon could improve the economics and further accelerate development in CCUS projects, extending a longer plank over the emissions gap.

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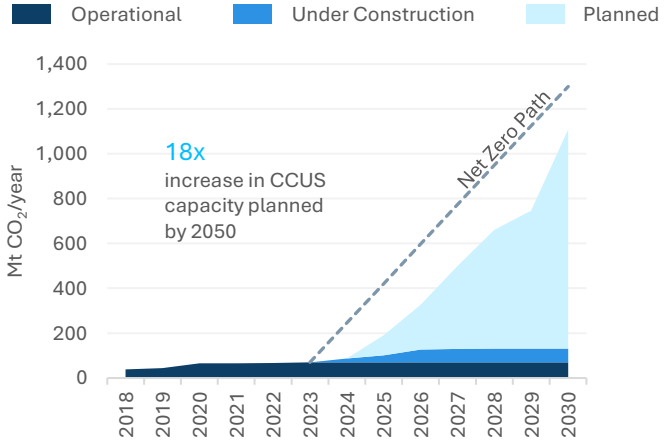
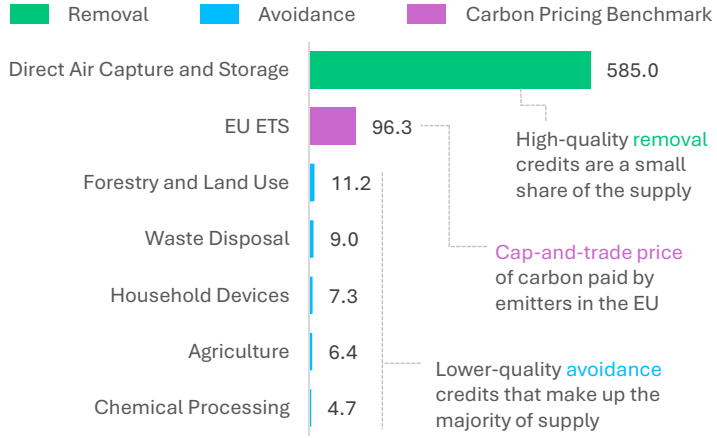
Carbon Capture Takes Flight

Global CCUS Capacity, $MtCO_2$ per Year[1]



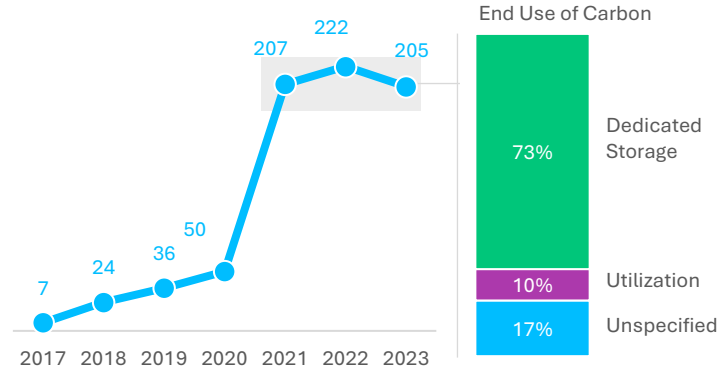
A Good Carbon Credit Is Hard to Find

Global 2023 Price of Carbon Credits by Category (USD/tCO_2)[2]



Storage Dominates CCUS Projects

Global CCUS Project Announcements by End Use



Have Your Carbon and Use It, Too

Notable VC-Backed CCUS Startups by Total VC Raised

Company	VC Raised	Description
ENTROPY	$384M	Extracts CO_2 from air and stores it underground
NEWLIGHT TECHNOLOGIES	$366M	Uses microorganisms to turn GHG into products
twelve	$205M	Transforms CO_2 into electrochemicals
CHARM INDUSTRIAL	$123M	Converts biomass into green hydrogen
Heirloom	$58M	Transfers carbon from DAC into concrete

Notes: 1) The net zero emissions path is based on the IEA's 2023 World Energy Outlook forecast of carbon capture's role in reaching emissions targets by 2050. 2) The prices for voluntary avoidance credits are annual averages, while the price of removal credits is based on an estimated range.
Source: World Bank, Ecosystem Marketplace, IEA, PitchBook Data, Inc. and SVB analysis.

Exits

A backlog of companies approach an exit, but there are learnings to be had from recent exits.

Unicorn Backlog Builds

Climate tech companies don't get a free pass because they're trying to save the world. Compared to a typical tech company, the path from startup to exit can be more difficult for climate tech founders who are generally further from profitability given the capital-intensive nature of their innovations. The space is still relatively new, so there are few examples of successful exits to draw from, though a new generation of climate tech unicorns is hoping to change that. **Enthusiastic investment during the VC boom nearly tripled the number of global climate tech unicorns, bringing the current number to 97 active unicorns.** This growing backlog of climate tech companies is poised to exit on the public markets, as nearly half of all unicorns are at least 10 years old, often garnering increased pressure from early investors for liquidity.

One barrier for these late-stage companies is the generally poor stock price performance of others who have gone public before them. The median share price for companies that exited in 2020 and 2021 is down more than 80% from their first-day closing price. With this lackluster performance, the 97 still-private climate tech unicorns may be eyeing public markets with apprehension. They are likely also considering options to stay private longer using other forms of financing such as project finance, infrastructure funds or private equity.

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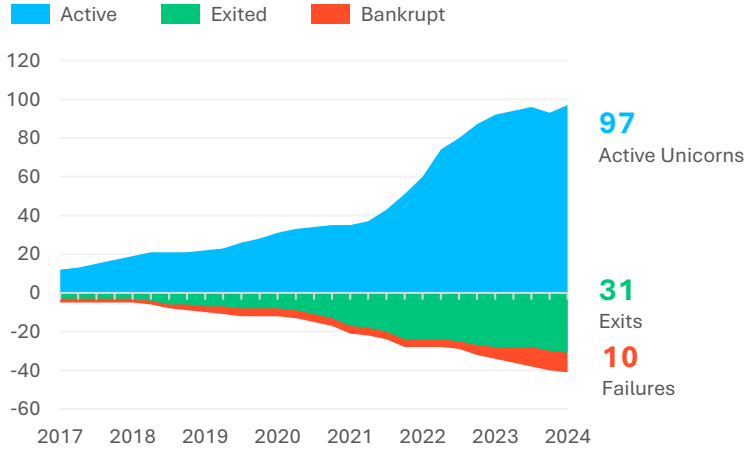
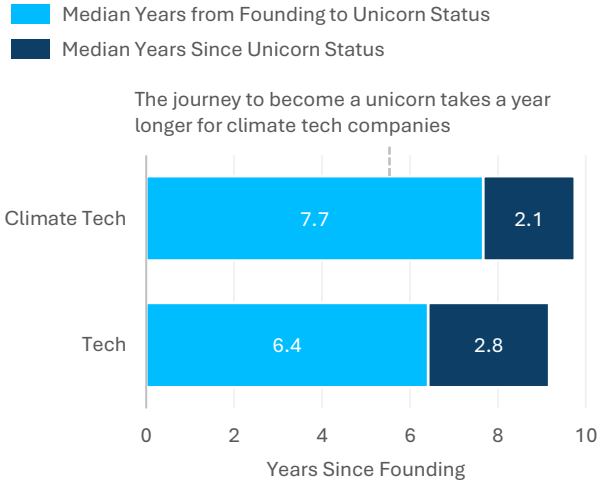
Backlog Swells with Exit-Ready Unicorns

Number of Global VC-Backed Climate Tech Unicorns[1] by Status



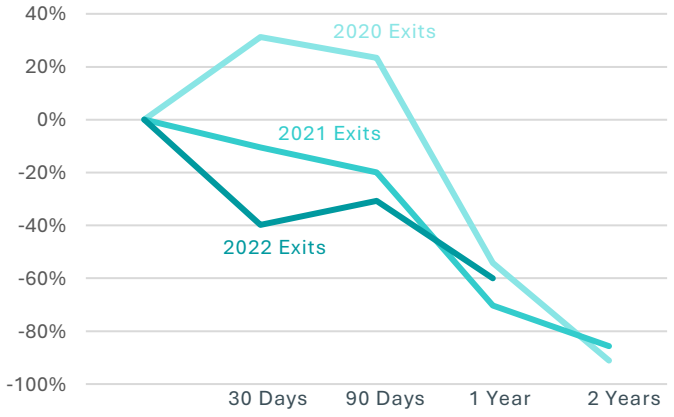
For Climate Tech, a Longer Road to $1B

Median Years from Founding to Unicorn Status



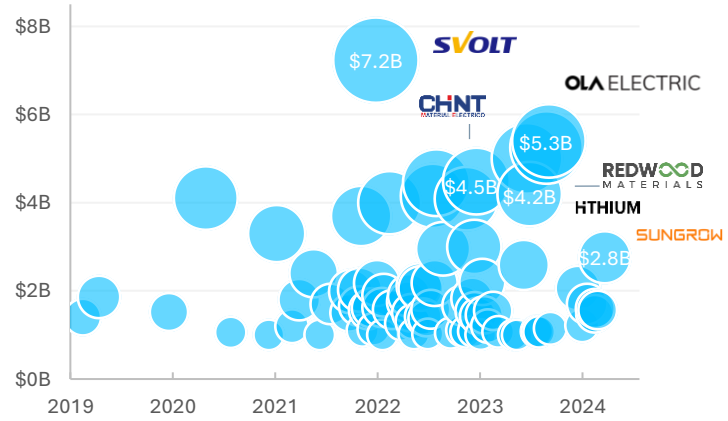
A Cautionary Tale for IPO Hopefuls

Median SPAC and IPO Performance[1] from First Day of Trading for US VC-Backed Climate Tech Exits on Major US Exchanges



Valuations Bubbling Up for Climate Tech

Most Recent Valuation for Active Climate Tech Unicorns[2]



Notes: 1) Change is price from close price of listing. 2) Commonwealth Fusion Systems is not included in the chart, but is likely a unicorn. The company has raised $2B in venture capital but has not disclosed a valuation. Other unicorns not shown due to scale of chart: CGN Wind Energy, GAC Aion, Huadian New Energy Group and Northvolt.

Source: S&P Capital IQ, PitchBook Data, Inc. and SVB analysis.

A Buyer's Market for Climate Tech

Off the highs of 2021 and 2022, M&A deal activity in 2023 left something to be desired. However, a buyer-friendly environment is being cultivated for M&A in 2024. Looking at CVC activity as an exemplification of corporate appetite for climate tech, the top CVCs have been significantly increasing their exposure to the sector over the last four years. Google Ventures, for example, invested in 14 climate tech companies in 2022-23, up from three companies in 2018-19. Other corporates are gearing up for future investment into climate tech. Toyota Ventures recently announced two funds totaling $300M for frontier technology and climate solutions.

Corporates may be salivating at the opportunities on the horizon. Today,1 in 3 climate tech companies will be cash out in the next six months — up from 1 in 5 in 2021. Founders and investors may seek acquisitions if they are unable to access public capital markets or raise sufficient equity at acceptable valuations. **Factors that may affect M&A activity include whether corporates are enthusiastic about the accelerating adoption of emerging technologies and whether companies are available at attractive price points.** Among Dow Jones, S&P 500 and Nasdaq companies, total cash and cash equivalents stand at $4.2T today. With deep corporate pockets, a growing interest in climate tech exposure and technology adoption rates increasing, M&A activity is primed to increase.

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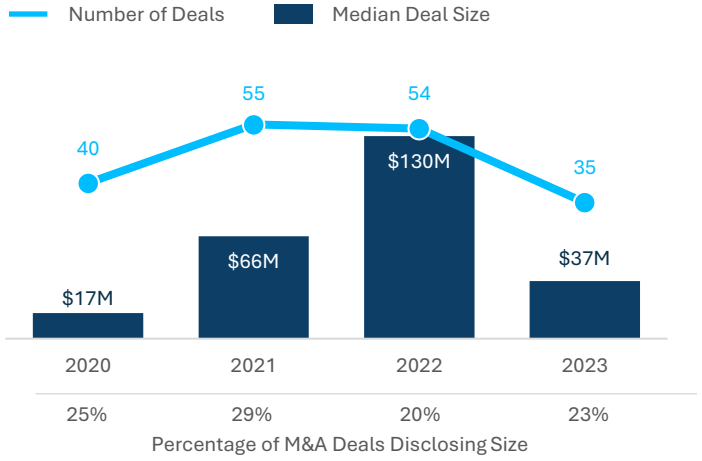
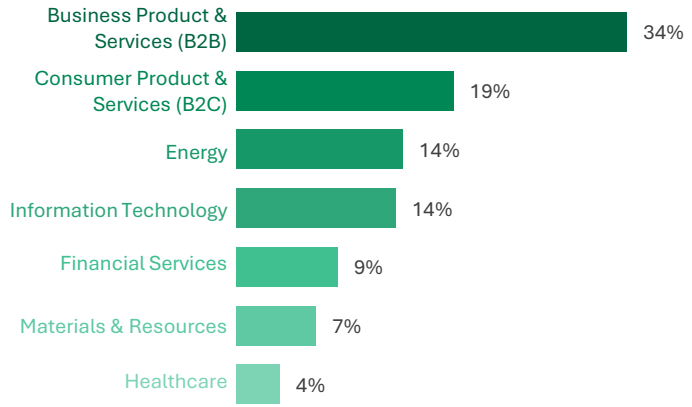
Pumping the Brakes on M&A

US Climate Tech M&A Activity



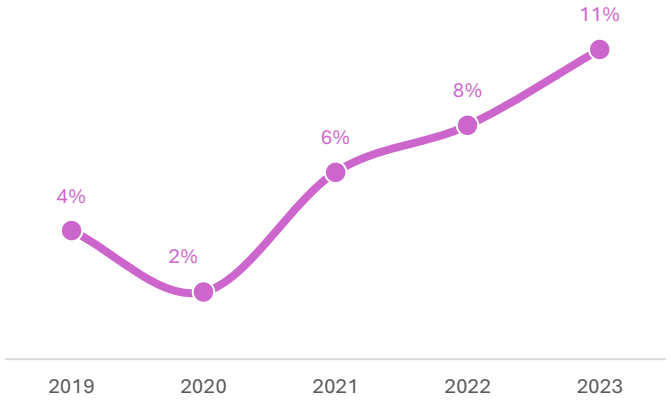
Who Are the Buyers?

Primary Industry for US Climate Tech Acquirers Since 2020



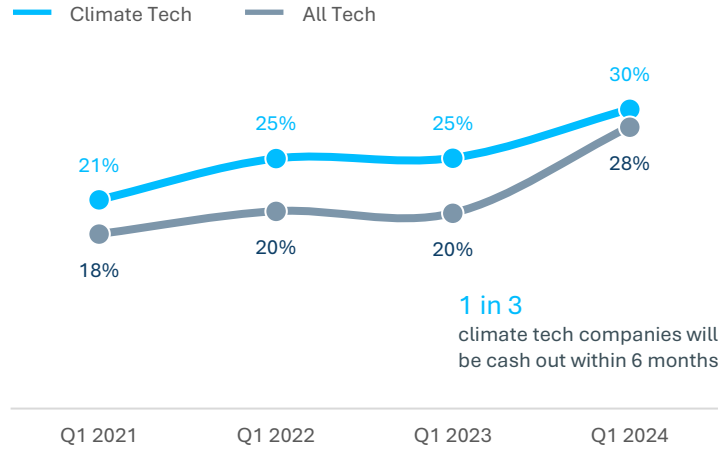
Corporates Hone In on Climate Tech

Top 100 US CVCs: Percent of Deals in Climate Tech[1]



When Cash Runs Low, Some May Sell

Percentage of US VC-Backed Startups with <6 Months Runway



1 in 3
climate tech companies will be cash out within 6 months

Note: 1) Top CVCs as measured by deal count over the last 24 months.
Source: PitchBook Data, Inc., SVB proprietary taxonomy, SVB proprietary data and SVB analysis.

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