INSIGHTS:
PRIVATE EQUITY
NOVEMBER 2021

iCapital NETWORK

THE DOUBLE BOTTOM LINE: CLIMATE TECH'S INVESTMENT OPPORTUNITY

The climate crisis we collectively face is the defining story of our age and will continue to be a dominant issue for decades to come.

KEY TAKEAWAYS

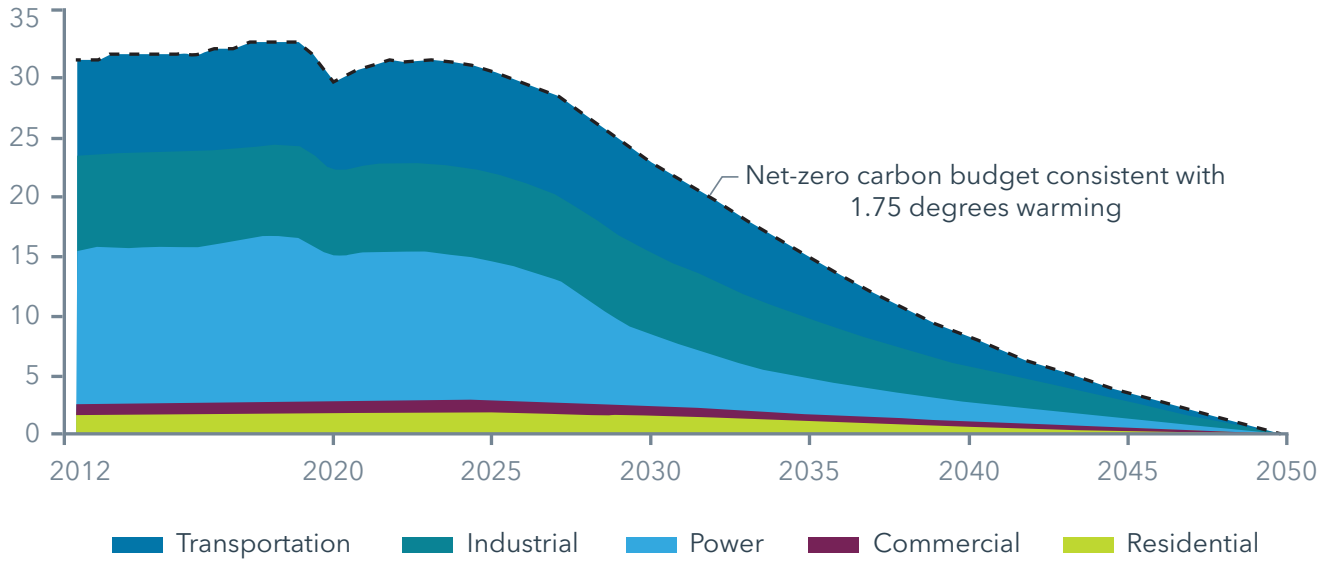
- **Climate change action is likely to be the major growth story of the coming decades. We expect support from individuals, powerful public institutions, prominent corporations, and start-ups to create significant tailwinds for investment in climate tech for many years to come.**
- **Many investors remain skeptical about achieving the double bottom line of market-rate returns and positive social and environmental impact. However, a 2020 analysis by the Global Impact Investing Network found that developed market impact investments generated an average annual gross realized return of 16%.**
- **Private capital is in a leading position to fund climate solutions across the spectrum – from seed-stage innovations to mature technologies. Climate-focused funds have raised well over $100 billion in the last three years. Private companies in the climate tech space outnumber public ones by 13 to 1.**

We are already witnessing the devastating impact of global warming on people's lives and livelihoods – particularly the most vulnerable among us – as rising temperatures trigger increasingly frequent destructive weather events. The Intergovernmental Panel on Climate Change (IPCC) has clearly laid out the importance of keeping global warming "well below" 2°C (3.6°F) above pre-industrial levels to reduce the environmental impact and maintain a livable climate.[1]

Achieving this goal requires an enormous degree of global will and coordination – and time is of the essence. It is estimated that global energy-related emissions must fall 30% from 2019 levels by 2030, decline 75% by 2040, and drop to net-zero by 2050. Road transport emissions must be cut 11% by 2030 and fall to 80% below 2019 levels by 2040 (see Exhibit 1).[2]

Governments took an important step with the Paris Agreement, which looked to lock in place the measures necessary to achieve these ambitious goals. As of July 2021, 191 members of the United Nations Framework Convention on Climate Change (UNFCCC) had ratified the agreement, with only six yet to sign.

Exhibit 1:
Achieving net-zero by 2050 requires slashing carbon budgets
Energy Emissions & Net Zero Carbon Budget, by Sector (GtCO2)



Source: BloombergNEF, as of July 2021. For illustrative purposes only.

Exhibit 2:
Impact Investing vs. ESG

Though sometimes used interchangeably, impact investing and ESG (Environmental, Social, and Governance) investing are fundamentally different.

ESG investing is a framework that seeks to encourage responsible investing by systematically incorporating ESG factors to help investors identify opportunities and risks that might be material to performance. It is most commonly applied in the public markets.

By contrast, impact investing is a proactive approach that exclusively seeks out companies whose primary products and services are directly tied to a quantifiable positive social or environmental impact, while also generating a market-rate return. It is primarily concentrated in private markets.

More than 130 of the signatory countries – as well as numerous cities and companies – have set or are considering a target of reducing emissions to net zero by mid-century.[3] Many new regulations and incentives have been passed, to the extent that 54% of emissions are now covered by a policy, regulation, or official government position.[4] We expect that number to grow.

Pressure from the private sector is also helping to drive regulatory measures, with many corporations independently setting broad emission-cutting targets. Meanwhile, this past June, investment managers overseeing more than $41 trillion in assets signed a letter urging the adoption of more ambitious emission-reduction targets.[5] This is, of course, not an initiative independent of their business interests. Both institutional and high-net-worth investors are increasingly applying pressure for progressive action on the climate, reflected in a rising emphasis on impact investing (see Exhibit 2).

In the context of this overwhelming support for tackling the climate crisis – from individuals up through governments – we expect significant tailwinds for investments in climate tech for many years to come. The good news for investors is that these investments can help them meet the twin goals of having a positive social and environmental impact and generating market-rate returns – the famous double bottom line.

EXCITING TIME TO INVEST IN CLIMATE TECH

Indeed, we think it is an exciting time to invest in climate tech and see little reason to expect growth to slow in the coming years, particularly in the context of strong sector returns: Nine in 10 impact investors reported that their portfolios either met or exceeded their financial performance expectations.[6] Those same investors, according to a 2020 analysis by the Global Impact Investing Network, have generated an average annual gross realized return of 16% on their developed market impact investments,[7] while the Cambridge Associates PE/VC Impact Investing Index (Developed Markets) benchmark shows pooled returns of 17% over a three-year period.[8]

However, investors should note that there are still few robust private market impact benchmarks available, and strengthening the availability of impact fund performance data remains a challenge.

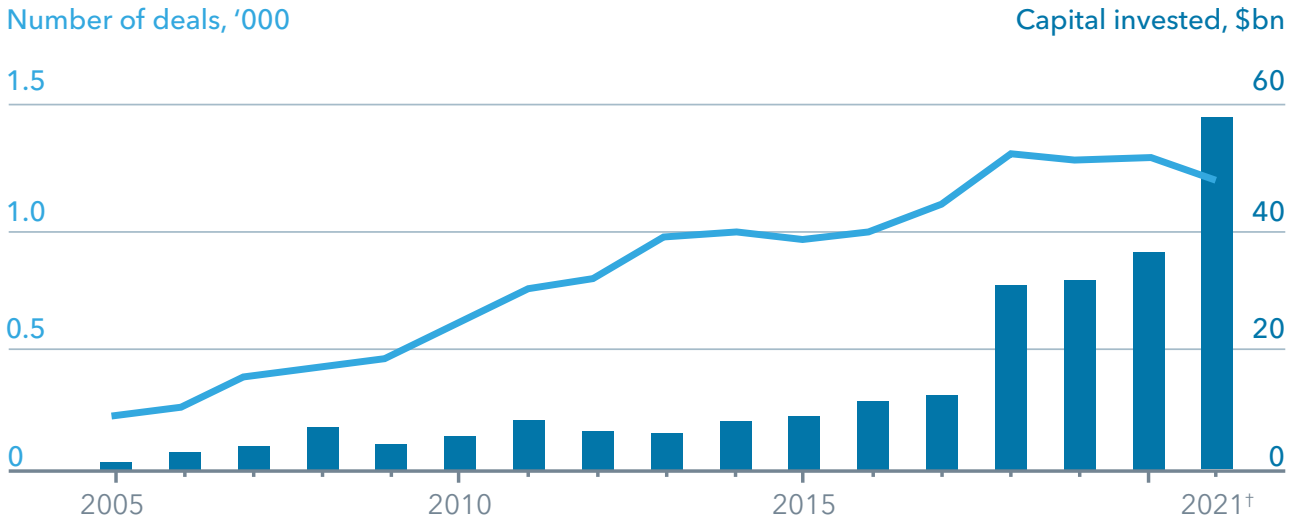
Investors must also be aware of the danger of greenwashing – giving misleading information about how environmentally sound a product, service, or investment is. This has been a significant issue over the last few years, primarily in the public markets. We believe climate tech is easier to verify than other areas of impact investing, due to consensus around readily available emissions metrics.

Nevertheless, there is no single, centralized way to measure the positive environmental impact of these investments, so the onus falls on investors to scrutinize the data presented by asset managers to ensure that a positive contribution is truly being made.

PRIVATE MARKETS' ADVANTAGE IN ACCESSING CLIMATE TECH INVESTMENTS

The climate tech growth story will demand and drive significant innovation. New problems call for new solutions, and we are still in the early stage of an innovation cycle aimed at solving this critical problem.

Exhibit 3:
Private capital is flowing into climate tech investments
U.S. Investment in Climate Tech



Date from Cleantech Group's i3 database, includes enabling technologies that serve more than the climate-tech sector Forecast.
Source: The Economist. Cleantech Group, PitchBook and Silicon Valley Bank. For illustrative purposes only.

As such, private capital is likely to play a leading role in supplying the funding necessary to develop climate solutions, with venture capital (VC) and private equity (PE) funds particularly well positioned to provide support for (and benefit from the upside of) these early climate tech innovators. Deal activity in climate tech reached record levels in the first half of 2021, with VC and PE funds pouring nearly $60 billion into climate-related investments in the United States alone (see Exhibit 3).[9]

Numerous climate-focused funds have been launched across different private asset classes, considerably expanding the investment opportunity set, which ranges from VC funds focused on early-stage technological innovation to private growth capital investing in more mature climate-oriented businesses.

Private capital has already assumed the role of dominant funding provider for the innovation economy. This is not just because of the significant financial firepower it wields, but also because a sustainable ecosystem has been built over the last two decades in which companies in newly maturing growth sectors can remain private and thrive. Indeed, the bigger picture is that fully accessing the tech unicorns, decacorns, or even hectocorns of the future may increasingly require investing in private funds.

Many of the emerging leaders in climate tech received private capital funding at some point in their life cycle, and the notable ones include Tesla in Mobility and Transport, Beyond Meat in Alternative Proteins, First Solar in Renewable Energy, and Nest in Energy Efficiency. These successes are likely to help generate and maintain investor interest.

THIS TIME IT'S DIFFERENT

It is important to point out that climate tech investment is not a new story. In the early 2000s, cleantech was one of the most active areas for VC. According to data compiled by Cambridge Associates, venture investment in the sector totaled $19 billion from 2005 – 2009, approximately $4 billion a year.[10] This is a substantial figure given that it only includes VC funds, which tend to write smaller equity checks; $1 billion-plus VC funds were an anomaly rather than the norm, and unicorns did not yet exist.

However, investment activity slowed considerably after the Global Financial Crisis (GFC) as returns came in below expectations and investors started to write off cleantech. This underperformance was largely due to weak market adoption in the aftermath of the GFC as corporations and consumers grappled with the immediate financial challenges of the worst economic slowdown since the Great Depression. Longer-term climate issues took a back seat.

Several cleantech companies faced capital shortfalls and had to scale down their operations or went bankrupt, such as Solyndra, a solar power company that filed for bankruptcy in 2011 under pressure from heavily subsidized Chinese rivals. Many investors grew concerned that doing good and generating acceptable investment returns were incompatible goals. Even in today's environment where climate technology companies have performed well – including numerous successful exits resulting in the strong performance metrics highlighted previously – there remains deep skepticism about whether the sector can deliver a double bottom line.

We think this skepticism is now misplaced, for three key reasons:

1. **Regulation –** Policymakers around the world are putting together more coherent and aligned policies. The United States and China – the two largest producers of greenhouse emissions – have both formalized commitments to reach carbon-neutral status by 2050 and 2060, respectively. Regulatory support provides certainty and impetus to the private sector and entrepreneurs.

2. **Market Adoption –** The improved clarity from policymakers is boosting market adoption, with the private sector leading the charge this time. Many large multinational corporations have made climate an important part of their corporate strategy and are willing to sign up for new technologies and services much earlier in their life cycle.

   Take, for example, Climeworks, which has developed a carbon dioxide capturing technology. Coca-Cola buys the carbon dioxide it needs for its beverages from Climeworks, even though the cost of this new technology is higher than traditional sources.[11]

3. **Declining Cost Curve –** The cost of bringing products to market has continued to decline, which has helped improve market adoption. For example, the cost of an Impossible Burger at Burger King is only $1 to $2 more than the original burger, and with time, the price is expected to reach parity with, or fall below, a traditional burger patty.

   Producing the Impossible Burger reportedly requires 96% less land and 87% less fresh water, while generating 89% fewer greenhouse gas (GHG) emissions.[12] On the energy production side, the cost of solar and wind power continues to decline, and more than half of newly added renewable power generation in 2020 was cheaper than fossil fuel options.[13]

PRIVATE CAPITAL'S DIVERSE CLIMATE TECH EXPOSURE

Climate tech opportunities are broadly divided into solutions that focus on mitigating climate change and reducing GHG emissions – often referred to as decarbonization, which we focus on later in this paper – and climate adaptation solutions.

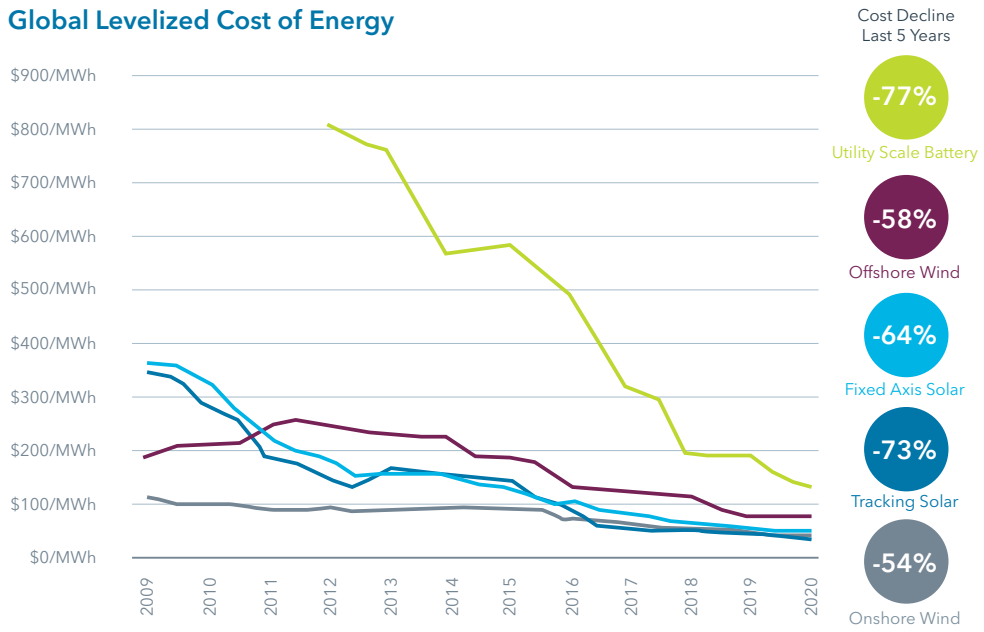
Products and services addressing adaptation help society build resilience to the current and expected effects of climate change.

For example, several agricultural technology (AgTech) companies are focused on breeding heat-resilient crops in the face of record temperatures – July 2021 was the Earth's hottest month on record – and heightened drought risk.[14]

These opportunities span the risk-return spectrum. More mature opportunities, such as those in solar and wind energy, are largely based on driving incremental improvements that can increase efficiencies and reduce costs, which have already fallen sharply over the last decade (see Exhibit 4).[15]

Less mature opportunities are often at the cutting edge of innovation, with companies seeking scientific and engineering breakthroughs that could have a meaningful effect in the battle against climate change. While the latter, concentrated in VC investments, have more transformative potential and offer greater upside, investors should be aware of their heightened risk.

Exhibit 4:
The cost of renewable energy production has been cut sharply
Global levelized cost of energy, 2009 – 2020



Source: Silicon Valley Bank, The Future of Climate Tech, 2021. For illustrative purposes only.

VC funds often rely on several large "winning" deals to generate the vast majority of their returns, with the expectation that many portfolio companies may not return their invested capital.

THE DECARBONIZATION OPPORTUNITY SET

The vast majority of climate tech decarbonization opportunities fall within one of five categories: electricity and power generation, food and agriculture, mobility and transport, heavy industry, and the built environment (which refers to infrastructure created by humans, including homes, buildings, zoning, streets, sidewalks, and open spaces, among others). The broad nature of this opportunity set offers a wide range of potential investments, with today's climate tech companies spanning the risk curve from well-established technologies, such as solar energy to nascent areas such as biofuels.

ELECTRICITY AND POWER GENERATION

Solar and wind technologies have become a key part of today's energy ecosystem, with most new-build renewables now cheaper than coal.[16] However, there remains a significant need to increase adoption, as the burning of fossil fuels to generate electricity is still responsible for 25% of U.S. GHG emissions.[17]

A significant amount of VC and growth equity investment is currently focused on innovations that will spur greater adoption. Smart grid technology, for example, has the potential to make renewable power more consistent by facilitating more effective power transmission and faster restoration after an outage. Innovations in battery storage, meanwhile, should allow energy to be stored at times of peak generation for release when required.

Carbon capture and storage is another focal point. Renewable energy is not necessarily available in all locations, while many industries will require significant innovation and investment over several decades to successfully transition to cleaner fuel. For these entities, such as power plants and construction material producers, technologies that capture and store GHG emissions will be pivotal in supporting their transition to net zero.

The U.S. climate plan earmarks $15 billion for research into both renewable energy and carbon capture and sequestration, and carbon-capture retrofits for large steel, cement, and chemical production facilities. The proposal also expands and reforms the popular Internal Revenue Code Section 45Q tax credit, which encourages carbon capture deployment and permanent storage.

FOOD AND AGRICULTURE

Globally, food systems account for more than one-third of GHG emissions,[18] while in the United States 10% of emissions come from agriculture and land use.[19] Decarbonization efforts across agriculture are expected to drive the value of the AgTech market up to $22.5 billion by 2025, from just $9 billion in 2020.[20]

Numerous innovations have emerged across the value chain. For example, low GHG-farming practices such as vertical farming, in which crops are grown in precisely controlled environments on vertically stacked surfaces, can reduce the use of land, water, and transport. The vertical farming sector is expected to grow six-fold globally from 2018 to 2026 to reach a market value of $12.8 billion.[21] Elsewhere, artificial intelligence (AI) and machine-learning algorithms are helping optimize growing conditions and improve crop yields, supported by advances in seed gene-editing technology.

One of the most visible emerging sectors within food and agriculture is alternative proteins. People are increasingly turning to plant-based meat alternatives to reduce their carbon footprint and encourage land and water conservation. This could significantly reduce GHG emissions, with cattle representing nearly 10% of global emissions.[22]

The most prominent players are Beyond Meat and Impossible Foods, both of which transformed the plant-based meat alternative market by marketing to non-vegetarians and bringing their products into the mainstream. Beyond Meat has indicated its burger generates 90% less GHG emissions than the beef equivalent.[23] It was the first company to sell its products in the meat section of grocery stores, and is currently on the menus of both Dunkin' and McDonald's.

Initially backed by notable VC firms such as Kleiner Perkins, as well as the Gates Foundation, the company went public in 2019 and is currently valued at roughly $7.7 billion.[24] Meanwhile, Impossible Foods' products are available at Burger King and Starbucks. Reports estimate that the company would be valued at around $10 billion if it decides to go public in the coming quarters.[25]

The market opportunity looks significant: The global meat substitutes sector was worth an estimated $21 billion in 2020 and is expected to grow 12% by 2024,[26] which may help limit the rise in carbon emissions as emerging economies consume more meat.

MOBILITY AND TRANSPORT

Transport is responsible for nearly 30% of U.S. GHG emissions, with the vast majority coming from cars, trucks, and buses.[27] However, while transport emissions rose again in 2019, it was at a slower pace than over the past two decades.[28] This slowdown has been catalyzed by significant innovation in the electric vehicle (EV) space, including in supporting technologies like batteries and related infrastructure, such as charging networks. Spearheaded by Tesla – but supported by the launches of EV or hybrid vehicles by multiple traditional car brands, including GM, Ford, Toyota, and Volkswagen – the EV market opportunity set is vast. By 2026, it is expected to grow nearly five-fold to more than $700 billion.[29]

One company carving a niche for itself in the EV space is Rivian, which in August filed to go public via an IPO at a potential $70 billion to $80 billion valuation.[30]

Existing investors include Amazon's Climate Pledge Fund, Ford Motor Company, and T. Rowe Price. A relatively newer entrant, founded in 2009, the company has differentiated itself by focusing on electric SUVs, pick-up trucks, and vans for both personal and commercial use. In a pivotal moment for Rivian, Amazon – looking to meet its carbon-neutral goals – purchased 100,000 of its electric vans in 2019, which is the largest-ever EV order.

Beyond EVs, there are also tailwinds in areas, such as eco-friendly micro-mobility – for example, e-bikes that run on rechargeable solar-powered batteries – and low-carbon fuels. These fuels, such as biodiesel and bioethanol, could help reduce emissions for long-distance journeys in trucking and aviation, applications for which battery technology is not yet suitable.

INDUSTRY

Heavy industry is responsible for 23% of U.S. GHG emissions, largely via manufacturing processes and the material inputs used, such as chemicals and plastics.[31] Reducing these emissions requires a multi-pronged approach. Carbon capture and sequestration are an obvious first step, as these industries cannot be easily electrified or run on renewables. Decarbonization technologies can also help by making manufacturing more resource efficient. This could involve, for example, using industrial robots to reduce energy consumption or developing low carbon alternatives to traditional inputs.

As an example, Allbirds is an apparel company that has publicly committed to cut its per-unit carbon footprint in half by 2025 by using low carbon materials, such as wool, wood pulp, and plant-based leather in the manufacture of its footwear.

Moving toward a circular economy – one in which resources are used, then reused in a closed loop that does not extract more resources from the Earth – is another key driver of reaching net zero. Multiple industry verticals can make a difference in driving this change, with examples ranging from the simple recycling of plastic packaging to the more complex process of recycling, repairing, and reusing furniture. Swedish home furnishing giant Ikea, for example, is attempting to make its products 100% circular by 2030.

THE BUILT ENVIRONMENT

The buildings in which we live, work, and play are significant contributors to GHG emissions. Real estate represents approximately 15% of global GDP, but the construction and operation of buildings is responsible for nearly 30% of global emissions (13% in the United States).[32] This presents an opportunity for innovations to generate improvements across the real estate value chain.

Innovations could include:

- Using efficient construction methods, such as 3D printing
- Managing buildings via smart sensors and other devices
- Improving the energy efficiency of buildings, including upgrading heating, air conditioning, or lighting systems

A prominent example is Mighty Buildings, which uses 3D-printing technology to build modular homes. This is not only faster than traditional construction techniques, but also produces just a fraction of the construction waste, which translates into significantly lower GHG emissions.

Solutions also extend beyond a single building or development to the creation of smart cities, particularly as 84% of the North American population lives in urban areas.[33] Harnessing new technologies, such as interconnected smart street lighting, waste management, and water and gas metering can help make cities more sustainable and resilient over the long term.

A HUGE CHALLENGE, A HUGE OPPORTUNITY

The scale of the challenge and the opportunity presented by our climate crisis is clear. Climate change mitigation is likely to be a secular growth trend for several decades, as capital is funneled into a diverse array of sectors, with each working to achieve carbon neutrality.

Public market investors can gain some exposure to climate tech stocks at more reasonable valuations than at the start of 2021. Public clean energy valuations, for example, have reset from a 42x forward price-to-earnings ratio on January 8, 2021, to 26.4x as of August 16, even as stellar earnings growth has continued.[34]

However, private companies outnumber public ones by 13 to 1 in the climate tech space, and PE and VC funds have significant firepower to deploy, having raised $111 billion in the 2019 – 2021 vintage years for investment in the sector.[35]

Though private investments demand greater risk tolerance – particularly in the VC space – and greater patience in order to fully reap the benefits, there is now a substantial set of proven, well-respected fund managers that offer climate tech-focused strategies. Taking into account its advantageous positioning for investing in climate tech, private capital makes a compelling case to become the primary method for investors to both support climate action and gain exposure to its financial upside.

END NOTES

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35. Source: Pitchbook, as of August 16, 2021.

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