

Climate Tech:

# The Seven Trillion in 10 Years Opportunity

May 2024

**carbon  
equity**

Do good by investing better

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## Introduction

# Why Invest in Climate Change

The world has agreed to combat climate change. Governments are increasingly implementing the required policies and dedicating unprecedented resources to successfully complete this enormous task, exemplified by the latest COP28 UN Climate Change Conference.

This global effort has led to US\$5 trillion in yearly revenues for climate tech in 2020, which is expected to grow to US\$12 trillion in revenue by 2030<sup>1</sup>.

<sup>1</sup> [McKinsey 2022](#); [Roland Berger 2023](#)

# The robust growth in climate tech can be attributed to several fundamental long-term drivers:

- **Declining cost curves driving climate tech cost competitiveness:** Mature climate technologies such as solar power, batteries and heat pumps are proving that costs decrease as technologies scale. The cost of solar power declined by 89% over the last decade and is now cheaper than fossil fuel power in most parts of the world. The majority of climate technologies exhibit the potential to do the same.
- **Geopolitical competition driven by energy security:** Increased focus on energy and technology independence have motivated governments to develop strong policies supporting local renewable power generation and accelerated electrification. Policies like the USA's Inflation Reduction Act (IRA) are creating a strong financial incentive for domestic production of climate technologies, accelerating their deployment.
- **Clear corporate demand signals:** Corporations have been investing heavily in climate technologies. Some climate technologies create direct operational cost reductions or energy resiliency. Corporations are also increasingly motivated to future-proof themselves by developing green products and capturing the benefits of favorable supply/demand balance over the next decades that will result in attractive price premiums on products such as green steel.
- **Institutional investors' commitments to net zero:** 675+ institutional investors, together representing over US\$80 trillion in assets under management, have committed to net zero. Institutional investors are reducing exposure to high carbon industries, with 56% of institutional investors planning to increase their transition allocations in the next 1-3 years.
- **Individuals choosing sustainability in their jobs and consumer behaviors:** 71% of workers consider a company's environmental practices before applying for jobs. 90% of millennials are willing to pay a 10% green premium.





## These drivers have shifted the climate tech private markets from a niche to mainstream.

Climate tech private market investment volume reached US\$196 billion in 2022 (with annual growth of 40% between 2019–2022).<sup>2</sup> Over the last decade, the number of funds, deals and total funding has seen steady growth, which we expect to continue. The investable landscape has expanded tremendously with it, producing a thriving pipeline of established, proven managers. Climate tech investments made between 2015 and 2021 on average have returned 0.9x DPI, 2.0x TVPI and 19.5% IRR as of Sept–23 (all gross, i.e. before fees and expenses).<sup>3</sup>

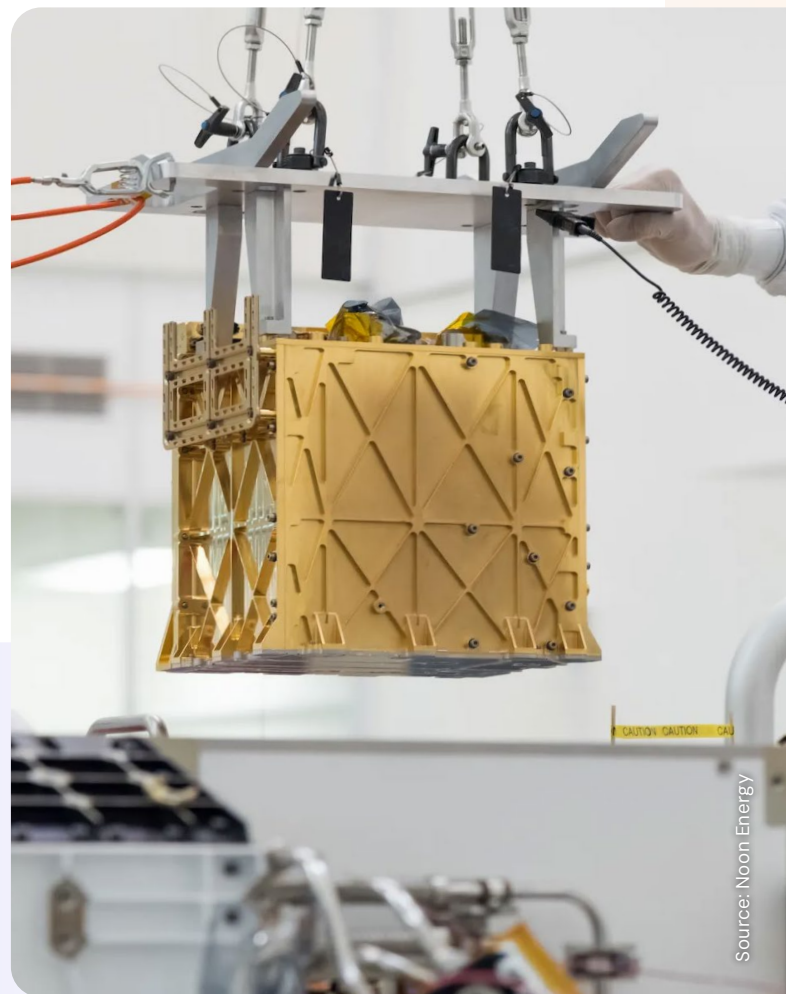
### **Climate tech private equity (PE) has been resilient, despite the current macroeconomic environment, and is poised to grow in the coming years.**

In 2022, investments in climate technology increased, defying the headwinds that affected most capital markets, including the considerable geopolitical and macroeconomic headwinds that roiled global markets. In 2023, total investments in climate tech have come down somewhat, though deal count remained stable, mostly driven by smaller rounds, and presumably lower valuations. The decline has been smaller than in general venture capital.

### **Climate tech is becoming a mainstream investing opportunity.**

As valuations have moderated to reasonable levels, the opportunities for capital growth are clearer than ever. This inflection point reflects both the urgency of investing in solutions to combat climate change and the substantial economic potential these investments hold. Aside from the importance of tackling the biggest societal challenge on earth, climate tech represents a resilient market that holds long-term growth potential.

The convergence of these drivers and shifts marks a unique moment for investing in climate solutions, where a compelling economic opportunity meets the critical task of solving climate change. Let's dive into it together in the rest of this whitepaper.



Source: Noon Energy

<sup>2</sup> [McKinsey 2023](#)

<sup>3</sup> [Cambridge Associates](#)

# About Carbon Equity

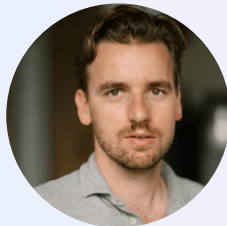
Carbon Equity is an investing platform that enables investors to access breakthrough climate tech companies by investing in leading climate private equity funds. We leverage an industry-leading climate impact due diligence process and robust general due diligence to identify leading climate venture capital and private equity funds. Our investment team actively tracks more than 450 climate funds, of which already 16 have made it through our rigorous selection process. We currently manage over €200 million in assets from an international base of more than 700 investors, including family offices, institutional investors, entrepreneurs and HNWIs.

## About the Authors



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### **Bas van Beijeren**

*Investment Director*, is a seasoned investment professional specialized in fund selection. Prior to joining Carbon Equity, Bas was part of the investment team at AlInvest. He has 9 years of investment experience.



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*Head of Professional Solutions*, has a wealth of experience in private equity. Prior to joining Carbon Equity, Rikkert worked at, among others, Aqua-Spark, Zamo Capital, Avedon, VEP, and AlInvest over a period of 26 years. At Carbon Equity, he heads the professional solutions department, which advises institutional investors and UHNWIs.

## A refresher in Climate Science

Human-caused emissions of greenhouse gases (GHG<sup>4</sup>) are the primary drivers of climate change. These emissions stay within the Earth's atmosphere, creating a greenhouse effect that traps heat. The resulting increase in global temperatures leads to changes in weather patterns, rising sea levels, and more extreme weather events like droughts, heatwaves and storms.

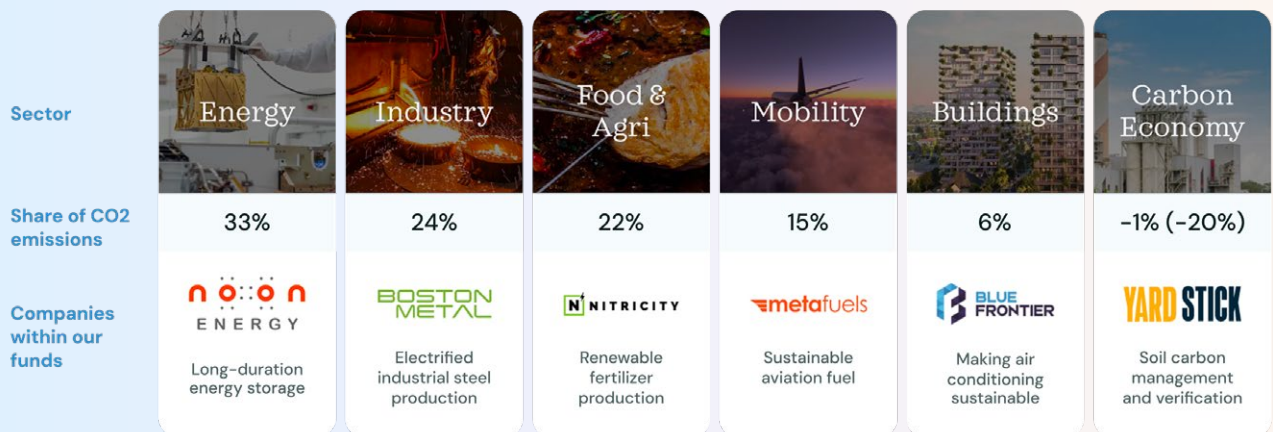
In 2015, at the COP21, 175 parties committed "to hold the increase in the global average temperature to well below 2°C" and preferably 1.5°C. The framework also required each country to set GHG emissions targets and develop the policies necessary to achieve them. Since then, nearly 3000 corporates have also set independently verified net zero targets.<sup>5</sup>

How much global warming are we currently on track for? Only considering the impact of implemented policies, the United Nations predicts the earth will warm 2.9° C by 2050.<sup>6</sup> When factoring in the expected technological advancements and the ongoing decline in renewable energy costs, McKinsey expects a rise of 2.3° C by 2050. If we assume all countries will achieve their net zero targets, global warming will end at 1.6° C.<sup>7</sup>

## What it will take to get to net zero

The vast majority of emissions are generated by five sectors. Energy Production (electricity as well as fuel production) accounts for 33% of global GHG emissions. Industry, which includes the manufacturing of concrete, steel and other materials, creates 24% of emissions. Mobility, including travel and freight, causes 15%. Buildings (with the emissions from material manufacturing counted in the industry), burn gas to heat and cook, and use about one third of all electricity. Finally, our food and agriculture system creates 22% of emissions, primarily from cattle, food waste and overapplication of fertilizers.

To get to net zero, all of these sectors have to be decarbonized. Additionally, a new industry will have to be built: Carbon Management. Carbon Management will help us compensate for the 10–20% of all emissions that we cannot avoid in the short term, by capturing CO<sub>2</sub> emissions from industrial processes with carbon capture and storage (CCS) and by removing CO<sub>2</sub> from the atmosphere (direct air capture, or DAC).



4 [IPCC 2021](#)

5 [Science Based Targets 2024](#)

6 [Financial Times 2023](#)

7 [McKinsey 2023](#)

# 1. The 7 Trillion in 10 Years Opportunity

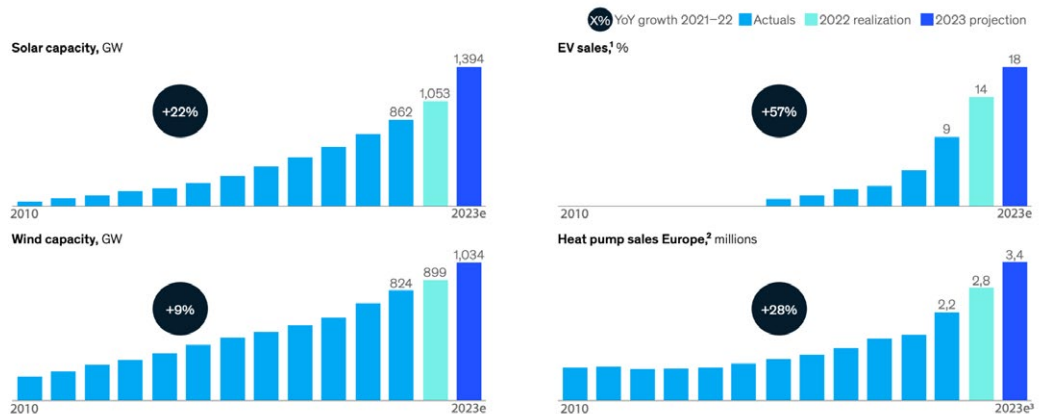
## Key takeaways

- Climate technologies' yearly revenues are expected to grow from €5 trillion in 2020 to €12 trillion in 2030 – an annual compound growth rate of 10%.<sup>8</sup>
- Technologies like solar and wind power, electric vehicles and heat pumps are already showing exponential growth, and many others are expected to follow.

### a. Climate tech is already at US\$5 trillion in global revenue today.

To limit global warming to well below 2° C and maintain our current standard of living, we need to transform large parts of our economy by developing and scaling climate technologies. Climate tech is defined as technologies (both hardware and software), processes, business models and services that are designed to reduce GHG emissions in a specific industry.<sup>9</sup> Today, the global revenue from climate tech is US\$5 trillion, and this is only the beginning.

At revenues of US\$1.23 trillion in 2022,<sup>10</sup> renewable power is the largest climate tech market today, and its growth is still accelerating. In 2023, annual renewable capacity additions increased by almost 50% to nearly 510 gigawatts (GW), the fastest growth rate in the past two decades.<sup>11</sup> The deployment of other climate technologies, such as electric vehicles and heat pumps, has also accelerated significantly in the past decade, often outpacing expectations. Their adoption demonstrates the start of an exponential adoption curve, which is expected to continue.<sup>12</sup>



8 [Roland Berger 2023](#)

9 [Nasdaq 2023](#)

10 [Alternative Energy 2023](#)

11 [IEA 2024](#)

12 [RMI 2023: McKinsey 2023 \(visual\)](#)





Source: Electric Hydrogen

**b. The majority of the climate technologies that we need are already commercially available.**

To get to net zero, we need to scale approximately one hundred climate technologies. These technologies are foundational to all decarbonization pathways, including those published by the IPCC, the IEA and McKinsey.

Of these technologies, more than 50% are already commercially available<sup>13</sup>, including the 10% which are available at large scale and at competitive cost.

The other 40% of necessary climate technologies have been proven in labs, but require further innovation to produce them efficiently and at scale. 5% of required climate tech is still in the concept phase<sup>14</sup>.

For mature technologies, innovation focuses on accelerated deployment; for example, robotics can be developed to facilitate solar PV installations. Less-mature climate technologies require more fundamental technological innovation to improve performance and efficiency, as well as to help bring novel solutions, such as synthetic aviation fuel, small modular nuclear plants, or cultured proteins, to market.

Share of CO2 emissions reductions from technologies needed to reach net zero by 2050, in %

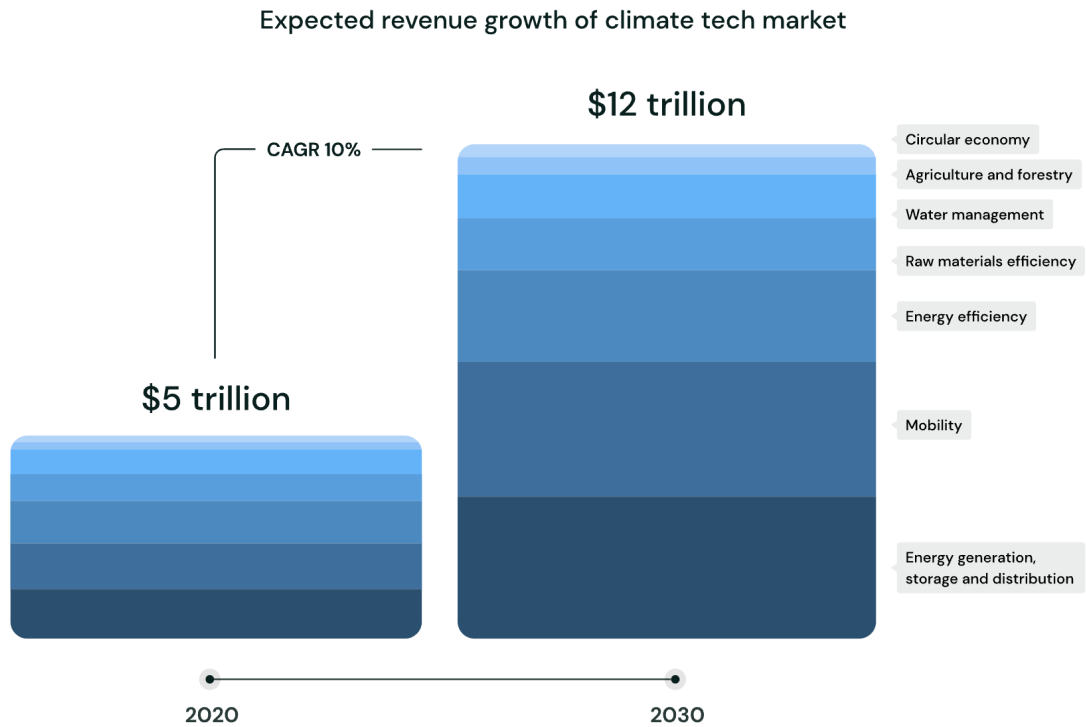


13,14 IEA 2023; McKinsey 2023 (visual)

**c. By 2030, climate tech is expected to reach a market size of US\$12 trillion**

The annual global revenue generated by climate tech is projected to more than double and reach US\$12 trillion in global yearly sales by 2030, equaling a CAGR of >10% p.a.<sup>15</sup> In 2030, renewable energy generation and storage are expected to remain the largest market, followed by sustainable mobility and energy efficiency.

In terms of growth, sustainable mobility, sustainable agriculture, and renewable energy generation and storage are projected to show the strongest annual growth rates. After 2030, the market is expected to grow further, at which point stronger growth is likely to be observed in harder-to-decarbonize sectors such as industrial decarbonization, aviation and shipping.



**A climate tech poised for strong growth: low-carbon hydrogen.**

You may be aware of the strong growth in renewable energy and electric mobility. Another industry that is observing fast growth is green hydrogen. The global green hydrogen market was valued at US\$4.47 billion in 2022 and is expected to grow at a CAGR of 40.6% from 2023 to 2032, reaching US\$134.38 billion by 2032.<sup>16</sup>

Current demand for hydrogen comes from the ammonia, methanol and refining industries. Expected future applications include industrial processes such as steel and cement manufacturing.

Despite hydrogen being less efficient than electricity, hydrogen can reach higher temperatures, and be transformed into fuels that can be stored at greater density than electricity. In such instances, green hydrogen is likely our best alternative to displace fossil fuels.

<sup>15</sup> [McKinsey 2022; Roland Berger 2023](#)

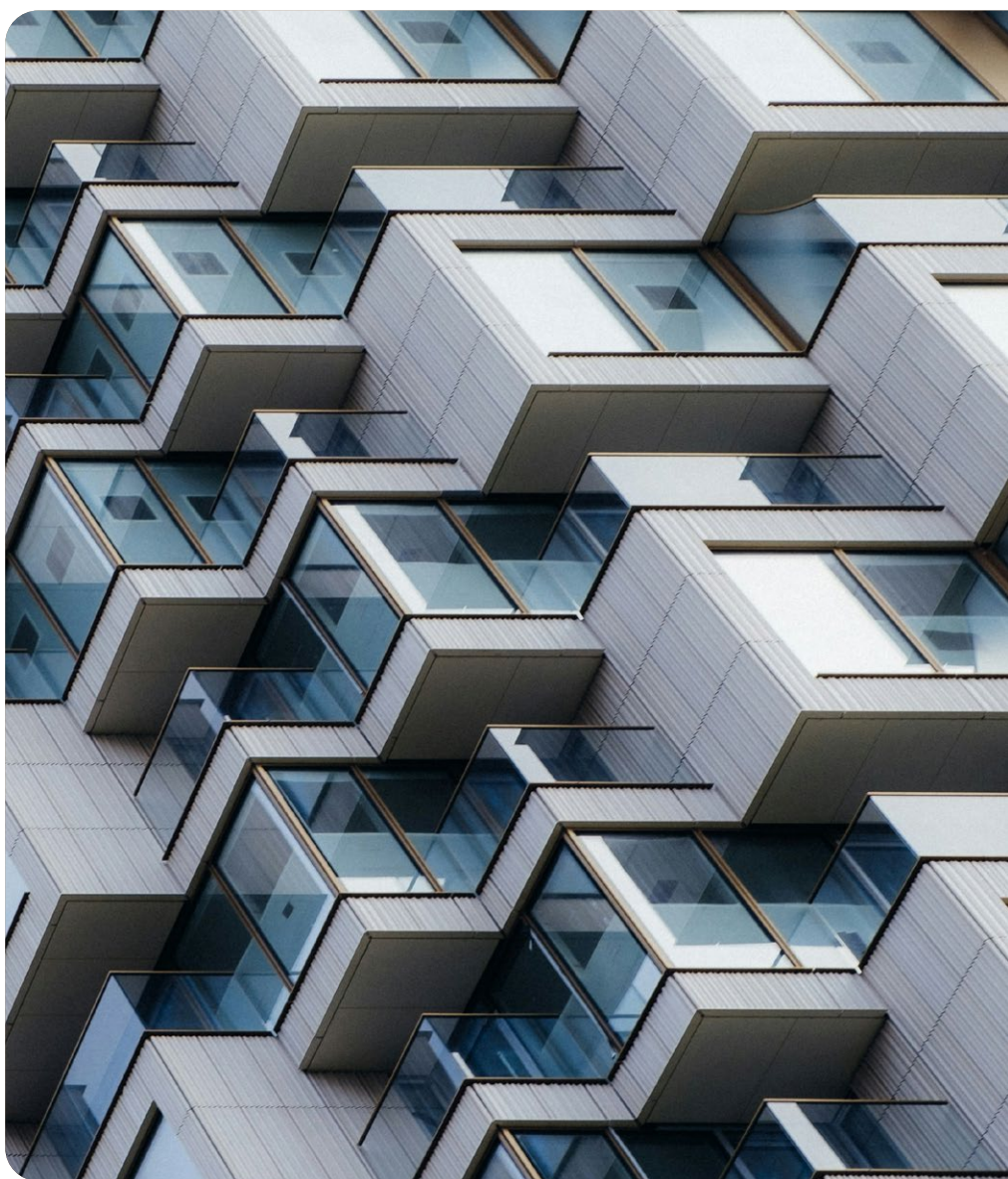
<sup>16</sup> [Precedence Research 2023](#)



#### d. The role of capital markets

Venture capital investments are critical for getting earlier stage technologies to maturity, and for funding new business models that help accelerate the commercial adoption of these technologies. Additionally, vast amounts of growth equity, buy-out and infrastructure investments are necessary to scale mature tech, such as heat pumps, and build out infrastructure like electrical grids or hydrogen pipelines.

Over the last decade, private market investments in climate technologies have increased rapidly to approximately US\$200 billion in 2023. Meanwhile, global finance for climate action (including public finance and investments from corporates and households) exceeded US\$1.2 trillion in 2023.<sup>17</sup> Still, to get to net zero, an additional US\$4 trillion of annual spending and investments need to shift from fossil fuels and other high carbon industries to climate technologies.



17 [Climate Policy Initiative 2023](#)



# 2. Climate Tech's Durable Global Drivers

## Key Takeaways

- Certain key climate technologies such as renewable power and electric vehicles are already at, or about to reach, price parity with incumbent tech. About 80% of all climate technologies have a clear pathway towards cost parity.
- Geopolitical events and the aim of achieving energy security have driven an increasing amount of governmental support for climate technology across the globe.
- Corporations, institutional investors, and individuals are showing increased engagement in selecting sustainable solutions, versus only reducing their carbon exposure.

## Five key drivers are propelling climate tech forward:

### a. Declining cost curves driving climate tech cost competitiveness

Today, certain key climate technologies such as renewable power and electric vehicles are already at, or about to reach, price parity with incumbent tech. Institutes like McKinsey believe that the majority of climate technologies have the potential to become cheaper than incumbent technologies.

Factoring in further government policies (such as mandatory offtake requirements, subsidies and carbon taxes), about 80% of all climate technologies have a clear pathway towards cost parity.<sup>18</sup>

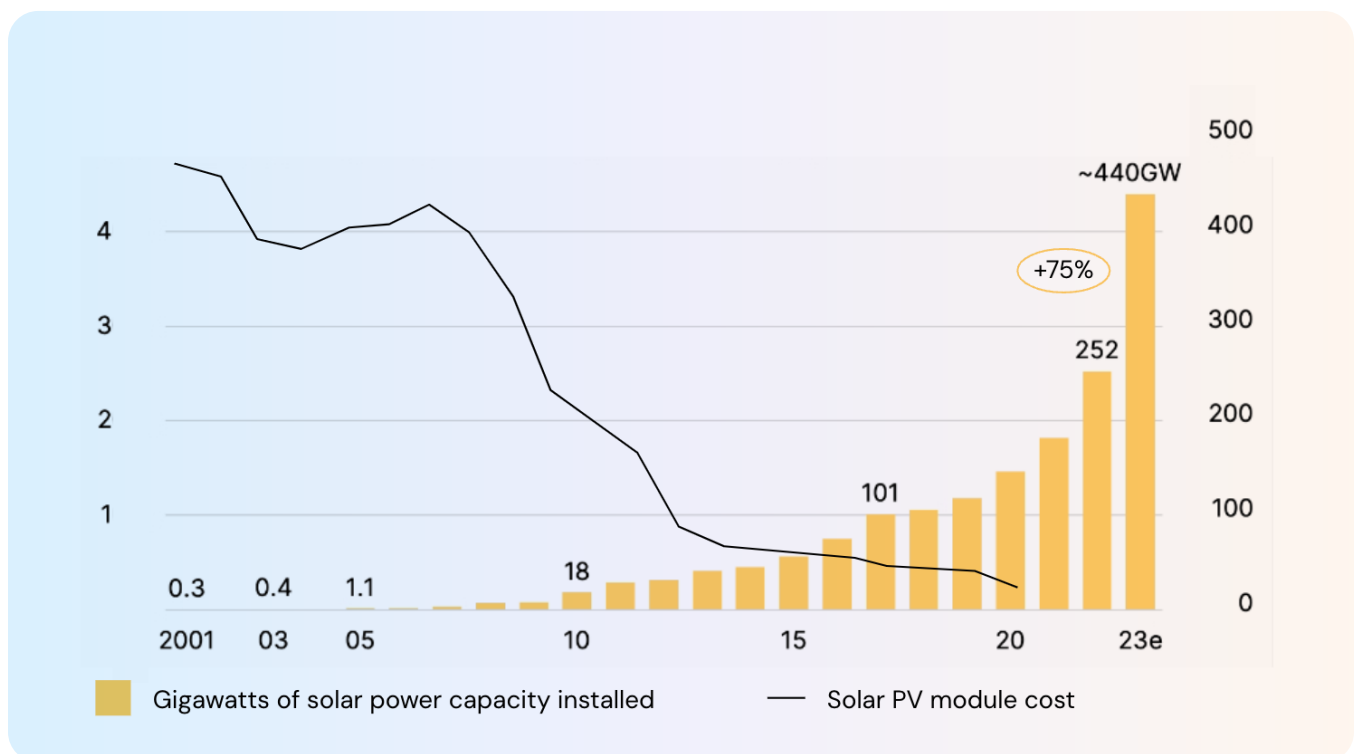
Mature climate technologies are already proving that, as they scale, costs go down. Prices fall due to the economies of scale as well as accelerated learning curves.

<sup>18</sup> McKinsey 2020. Comment: for the remaining 20% (the so-called hard-to-abate industries – primarily aviation, shipping, cement, and steel), for which no technological pathway to cost parity exists today, it is expected that extensive government policy will be required to fully decarbonize them, or that it might even be cheaper and more feasible to do this with carbon removal activities elsewhere.

As the production volumes of a technology go up, learning with regards to technological design, production, and other processes accelerates. As technologies scale, this powers their S-curved adoption path.<sup>19</sup> This development has been observed time and time again, and is described in Wright’s Law, which states that tech becomes cheaper at a consistent rate as the cumulative production of that technology increases.<sup>20</sup>

Solar, wind, and batteries have been following this typical path for the adoption of new technologies.

And now we’re seeing that as these technologies reach their socio-economic tipping point (where they are widely available and their attractiveness and affordability are at parity with incumbent tech), learning continues, leading to further cost declines and technological improvements, pushing their attractiveness past incumbent tech and leading to further accelerated adoption.<sup>21</sup> An example: as the total installed solar capacity quadrupled to nearly 1,200 GW over the last ten years, the cost of solar panels has decreased by 90%, declining past the cost of any kind of fossil-fuel-based electricity.<sup>22</sup>



**Case from our funds: 1KOMMA5° accelerates solar adoption**

1KOMMA5° provides a comprehensive solution for building- and home-owners to accelerate the adoption of carbon-neutral energy solutions. Through their platform, homeowners can purchase and arrange the installation of rooftop

solar, energy storage, heat pumps, and EV charging, as well as manage the energy generation and usage from these products. This solution enables the acceleration of climate technology adoption by making the purchase and installation process easier while driving down installation costs.

19 [RMI 2023](#)

20 [Our World in Data 2023](#)

21 [Systemiq 2023](#), Ember, BloombergNEF, Nat Bullard & Canary Media (visual)

22 [Canary Media 2023](#)

## **b. Geopolitical competition triggered by energy security**

Following the invasion of Ukraine by Russia in February of 2022, and the subsequent collapse in Russian energy exports, many analysts feared that climate issues would slip down the agenda; yet the opposite turned out to be true. To manage energy security, energy independence became one of the highest priorities for the European Union, which doubled down on boosting efficiency and increased its renewable energy targets as well as financial support. These policy incentives, together with higher and more variable fossil fuel prices, led to a 47% increase in solar capacity, a 37% surge in heat pump sales and a 31% uptick in electric vehicle sales in 2022.<sup>23</sup> Bloomberg estimates that the invasion of Ukraine will indirectly result in a much sharper decline in demand for fossil fuels by 2035.<sup>24</sup>

Fueled by the aim of achieving energy security, the last two years have seen an increasing amount of governmental support for climate technology across the globe. Governments use a range of different instruments to incentivize climate tech deployment: targets and bans (e.g. mandatory sustainable aviation fuel (SAF) blending in the EU starting in 2025<sup>25</sup>), subsidies and tax credits (e.g. the US Inflation Reduction Act,<sup>26</sup> a stimulus package for climate technologies that may land north of US\$1 trillion in total funding<sup>27</sup>), carbon taxes (e.g. EU ETS, increasing and currently at 80 euro/ton, applying to both local and imported goods), and banning incumbent tech (e.g. EU ban on internal combustion engine (ICE) car sales from 2035 and gas boilers from 2040).

The Inflation Reduction Act (IRA), in particular, has been a game-changer in the US. While the incentive program was announced at US\$369 billion, no cap has been put on total funding, and research institutes estimate total financial support to land at US\$1.2 trillion by 2032, representing the largest regulatory package in climate tech history. The IRA tax credits subsidize key climate technologies such as sustainable aviation fuel, green hydrogen and electric vehicles by 40% on average<sup>28</sup>. As these credits depend on local manufacturing, many other geographies were forced to act. Shortly after the IRA was announced, the EU responded with the Green Deal Industrial Plan and Net Zero Industry Act. China, Australia and Japan soon followed with increased climate tech support schemes. This geopolitical competition is further accelerating the climate tech industry.

### **Cases from our funds: Sunfire and Form Energy benefit from government support**

Sunfire, a company that produces electrolyzers to make green hydrogen, was awarded a €169M grant from the EU Important Project of Common European Interest to develop industrial-scale production of its electrolyzers in two factories in Saxony and North Rhine-Westphalia. In the US, Form Energy received US\$290M in asset-based financing from the state of West Virginia due to the IRA, to build the company's first high-volume manufacturing facility to make multi-day energy storage systems.

<sup>23</sup> [Reuters 2023; ACEA 2023](#)

<sup>24</sup> [Bloomberg 2023](#)

<sup>25</sup> [EASA 2023](#)

<sup>26</sup> [US Treasury 2022](#)

<sup>27</sup> [Goldman Sachs 2023](#)

<sup>28</sup> [CTVC 2022](#)



### c. Clear corporate demand signals

Corporations have been heavily investing in climate technologies<sup>29</sup> for several reasons and have been responsible for 60%+ of all climate tech exits so far. Certain climate technologies, such as energy efficiency measures, lead to direct operational cost reductions. Consumer demand for green products has created the ability to charge a green premium. Investing in renewable power as well as localizing other supply chains increases supply security while reducing cost variability. And finally, many corporations are voluntarily setting decarbonization targets to future-proof themselves, get ahead of regulation, remain relevant in their markets and benefit from governmental support packages such as subsidies and tax incentives.

Over the last decade, many corporations have voluntarily set decarbonization targets. Over 400 companies have joined the RE100 Initiative, committing to sourcing 60% of their energy from renewables by 2030.<sup>30</sup> Additionally, over 4300 companies have set Science Based Targets (SBTs) to reduce their greenhouse gas emissions and reach net zero emissions. SBTs provide clear, science-based decarbonization pathways for companies and financial institutions, independently validated by the Science Based Target Initiative (SBTi).<sup>31</sup>

Demand for low-CO<sub>2</sub> – or “green” – products is also increasing because corporations are able to charge a price premium for these products. Companies like car manufacturers have set ambitious decarbonization targets. Because the cost of adding green components such as green steel is small relative to the overall cost stack for expensive products such as cars, the additional cost of green components is outweighed by their marketing value. Today, the green premium on low-carbon steel is reported at

€200–300 per ton – a 20–30% premium.<sup>32, 33</sup> As the increase in demand for low-CO<sub>2</sub> steel is expected to continue to outpace supply, this premium is expected to remain until 2030.<sup>34</sup>

Corporate commitments to net zero are driving the climate tech industry not only through revenues today, but also through their purchasing commitments. Corporations are increasingly sourcing their green electricity through long-term power purchase agreements (PPAs) with renewable energy developers. The PPA market in 2023 has seen record-breaking growth, with 7.8 GW of renewable capacity secured<sup>35</sup>. This growth is driven by a desire for price security, as PPAs can reduce corporate energy costs by 5–10% over contract lifetimes. But they also facilitate funding for new green projects as the offtake is locked in.<sup>36</sup> For less mature climate tech, binding offtake agreements are facilitating the financing of new plants.

### Case from the industry: H2 Green Steel has locked in its green premium

H2 Green Steel, a company producing low-carbon steel using hydrogen, has received offtake agreements from Mercedes-Benz, Cargill, Scania and Zahnradfabrik Friedrichshafen for steel produced at H2 Green Steel’s Boden plant, which will begin commercial operations in 2025.<sup>37</sup> If the market is pushing incumbent companies to transition to green steel, it is better to be an early mover and benefit from government support, instead of losing competitive positioning.

29 [CIVIC 2023](#)

30 [RE100 2023](#)

31 [SBTi 2023](#)

32 [Fastmarkets 2023](#)

33 [FocusEconomics 2023](#)

34 [McKinsey 2022](#)

35 [Resource Platform 2023](#)

36 [Financial Times 2023](#)

37 [Hydrogen Insight 2023](#)



Source: H2 Green Steel

#### **d. Institutional investors' commitments to net zero**

Over the last decade, institutional investors have increasingly committed to net zero. Recently, they are focused more on what impact they can have on the transition and are emphasizing funding solutions versus only reducing their carbon exposure.

In 2021, the Glasgow Financial Alliance for Net Zero (GFANZ) was formed during COP26. Today, the 675+ member firms of these alliances represent over US\$80 trillion assets under management – more than 80% of global AUM.<sup>38</sup> All GFANZ members have committed to aligning their investment portfolios with the goals of the Paris Agreement,<sup>39</sup> and to achieve this they are putting pressure on corporations to decarbonize.

Next to focusing on reducing exposure to high carbon industries, institutional investors are increasingly focusing on funding solutions. A recent BlackRock survey showed that 56% of institutional investors plan to increase their transition allocations in the next 1–3 years, with 46% stating that navigating the low-carbon transition is their most important investment priority in that time period.<sup>40</sup>

#### **e. Individuals choosing sustainability in their jobs and consumer behaviors.**

Individuals are also driving climate technology development with their career and consumer choices.

An increasing share of workers are dedicating their talent to mission-aligned companies. A study by Gallup found that 71% of workers consider a company's environmental practices before applying for jobs, and 70% of Gen Z respondents stated that a strong sustainability plan impacts their decision to remain with a company.<sup>41</sup> Jobs in climate tech are also on the rise. On the installation and manufacturing side, U.S. clean energy companies have announced more than 100,000 new jobs since the August passage of the Inflation Reduction Act.<sup>42</sup> Globally, the current 6 million jobs in clean energy manufacturing could more than double to 14 million by 2030.<sup>43</sup> Meanwhile, high interest in a rapidly expanding set of resources is showing climate tech jobs are in high demand.<sup>44</sup>

Consumers are also increasingly considering sustainability in purchasing decisions, with younger consumers willing to pay a green premium for sustainable products. Two out of three consumers consider sustainability when making a purchase, and 90% of millennials are willing to pay a 10% green premium.

#### **Case from our funds: Redwood Materials kick-started by the Tesla Mafia**

A group of former Tesla employees dubbed the 'Tesla Mafia' are founding an increasing set of fast scaling climate technology companies after leaving Tesla. These companies include Northvolt, a lithium-ion battery manufacturer for electric vehicles, Redwood Materials, a manufacturer of critical battery components using recycled batteries, Form Energy, a developer of multi-day energy storage systems, and Monarch Tractor, a developer of smart electric tractors. The first three have already obtained unicorn status.

<sup>38</sup> [BCG 2023](#)

<sup>39</sup> [GFANZ 2024](#)

<sup>40</sup> BlackRock 2023; the survey covered over 200 global institutional investors, together representing US\$8.7 trillion in AUM.

<sup>41</sup> [Gallup 2023](#)

<sup>42</sup> [BNEF 2023](#)

<sup>43</sup> [IEA 2023](#)

<sup>44</sup> [Geekwire 2023](#)

# 3. From niche to mainstream: the climate private market

## Key takeaways

- 16% of all venture capital and growth equity was invested in climate tech in 2023, more than tripling in ten years.
- First movers are showing attractive returns, and many reputable investors are now entering the market.
- Successful exits and large institutional investment in climate PE funds are solidifying the opportunity.

## Introduction

Over the last decade, climate tech has evolved from a niche to a mainstream investment theme within private markets. Number of funds, deals and total funding has seen a steady growth rate that we expect to continue. The investable landscape has expanded tremendously with it, with robust growth in established proven managers investing from their third fund onwards and general platforms raising climate pools.

## Growing climate tech universe

Within the venture capital and private equity space, climate tech has been one of the fastest growing segments. Over the last few years, the space has grown substantially with 16% of all VC and growth equity investments currently going into climate tech,<sup>45</sup> and investment volume in private equity reaching US\$196 billion in 2022 (with annual growth of 40% between 2019–2022). That kind of performance contrasts sharply with the overall private equity deal volume, which declined by roughly 24% from its 2021 levels.<sup>46</sup>

<sup>45</sup> <https://dealroom.co/guides/climate-tech>

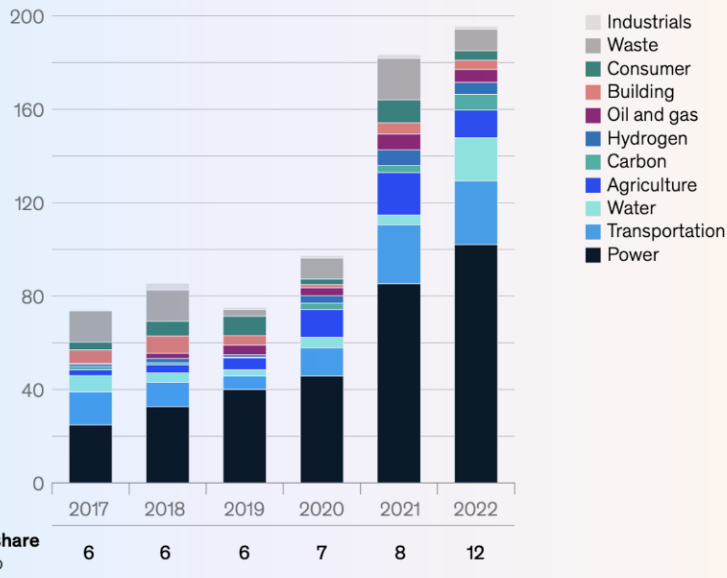
<sup>46</sup> <https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-investing-continuing-breakout-growth-through-uncertain-times>



Exhibit 3

**Climate-related private-market equity investments reached \$196 billion in 2022, a nearly threefold increase from 2019.**

Climate-related private-market equity investments,<sup>1</sup> by sector, \$ billion



<sup>1</sup>Includes equity value of completed buyout/leveraged buyout, growth/expansion, private investment in public equity, add-on, accelerator, angel, seed, early-stage venture capital, later-stage venture capital, grants, and infrastructure investments; includes subsegments: transport, buildings, power, water, agriculture and land use, consumer, oil and gas decarbonization and sustainable fuels, hydrogen, waste, industrial decarbonization, and carbon management.  
<sup>2</sup>Private equity. <sup>3</sup>Venture capital.  
 Source: PitchBook; McKinsey analysis

McKinsey & Company

**Climate private equity funds on the rise**

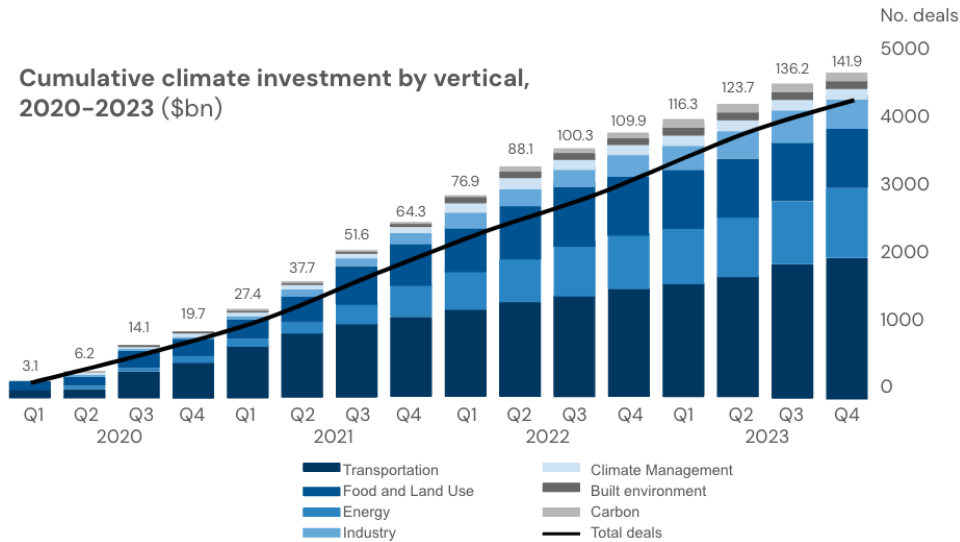
Over the past decade, investments in climate technologies were spearheaded by dedicated firms such as Breakthrough Energy Ventures, Capricorn, and SET Ventures. These pioneering investors played a vital role in laying the foundation for the broader acceptance of climate tech as an investment theme by showing that it’s possible to make attractive returns in this segment. Climate tech investments made between 2015 and 2021 on average have returned 0.9x DPI, 2.0x TVPI and 19.5% IRR as of Sept-23 (all gross, i.e. before fees and expenses).<sup>48</sup>

Over the past five years, the climate tech market has experienced a notable influx of capital from new entrants, as well as traditional VC and PE firms. This shift has seen established players, such as Altor, Ardian, General Atlantic, USV, and TPG, either incorporating climate tech as a key focus area in their existing funds or establishing dedicated pools specifically earmarked for climate tech investments. Furthermore, a surge of new managers, often founded by seasoned VC/PE investors and entrepreneurs, have entered the market.

<sup>47</sup> [McKinsey 2023 \(visual\)](#).

<sup>48</sup> Cambridge Associates 2023. Cambridge Associates LLC (CA) has established a database to monitor the gross company-level returns of clean tech investments made by venture capital and private equity partnerships, Cambridge Associates LLC (CA) screened over 119,200 investments held by the over 9,700 funds in its Private Investments Performance Database to identify clean tech investments. The resulting clean tech sample analysed in this report includes 1,717 investments in 1,076 companies across 692 funds as of June 30, 2023. Cambridge Associates’ definition of clean tech closely resembles what other market parties call climate tech and includes renewable power manufacturing, renewable power development, energy optimization and resource solutions, including advanced materials and technologies and processes that reduce, measure, or control the release of greenhouse gases into the atmosphere.

Cumulative climate investment by vertical, 2020-2023 (\$bn)



# New climate tech investors

## Inclusion of Climate Tech as a Focus Area

Index Ventures, Altor, GIC are among the traditional VC/PE investors that have diversified their portfolios by actively engaging in climate tech investments. Their commitment reflects a growing realization of the sector’s potential for delivering both financial returns and positive environmental impact.

## Establishment of Dedicated Pools

General Atlantic, Goldman Sachs and TPG are notable examples of established firms that have taken a step further by creating dedicated pools of capital exclusively for climate tech investments. This proactive approach signifies a paradigm shift in the perception of climate tech as a lucrative investment opportunity.

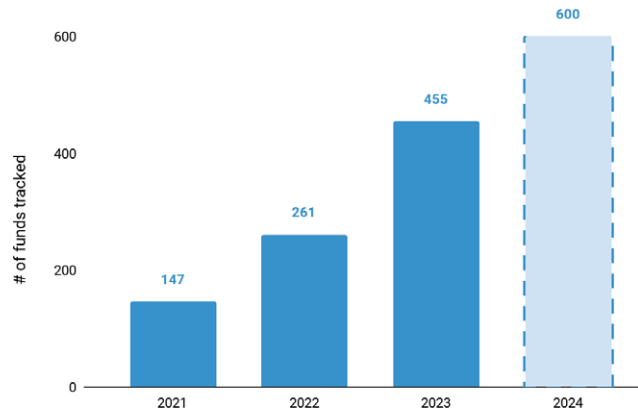
## The rise of new managers

Over the past years, a wave of newly established managers has made a notable entrance into the market. Typically led by experienced investors and/or entrepreneurs, these emerging managers have successfully secured substantial pools of capital. While most investors shy away from first-time managers, these funds have successfully raised their inaugural funds owing to the managers’ strong investment backgrounds and networks. A significant portion of these new players initiated their fundraising efforts between 2020 and 2022, positioning them to either have already secured, or be in the process of securing, their second funds. Their emerging track record makes these new entrants more appealing to a wider range of investors, attracting more capital to the climate tech market.

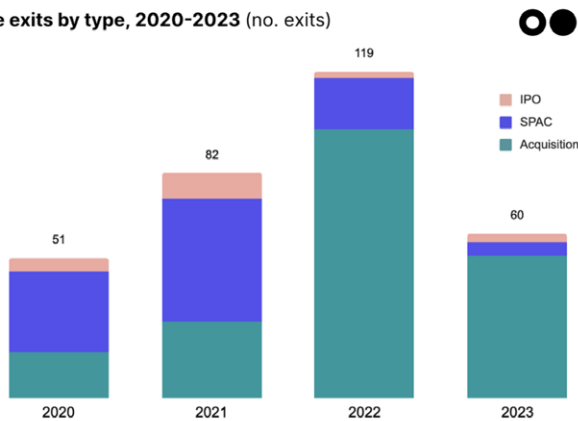
49 CTVC (2023) (visual).

### Carbon Equity tracks all climate GPs

We started tracking the full climate universe in 2021, and have seen our database grow substantially over the past years. We expect this trend to continue, as we see new climate funds surface every week. This is a similar trend the VC/PE market has seen with other themes such as technology, biotech and healthcare funds. Initial success draws more investors and capital to the space.



Climate exits by type, 2020-2023 (no. exits)



### Navigating Climate Tech Exits: A Path to Maturity and Promising Returns

Exits play a pivotal role in demonstrating the climate tech market's maturity and delivering promising realized returns to investors. Climate company exits grew steadily from 2020 to 2022, with a 40–60% increase year-on-year, bolstered by IPO and SPAC activity. The year 2023 presented a challenging exit market, which included the climate market, marked by a notable decline in the number of exits (–50%). While this dip might raise concerns among investors, it emphasizes the need for diversified exit strategies to ensure the resilience and long-term viability of the climate tech sector. Having said that, climate tech has become less dependent on the public market (responsible for >50% of all exits in 2020–2021), with strategic and financial acquirers making a greater proportion of buyers.

### Implications for the Climate Tech Ecosystem

The mainstream adoption of climate tech by a diverse array of new and established investors brings about several implications for the climate tech ecosystem. Most importantly, it attracts new institutional investors to the climate tech space, which is a trend we foresee to continue. Institutional investors typically follow each other, so having large institutional investors such as

Harvard Endowment, Allianz Investment Manager and PGGM starting to deploy into the market is a strong signal. Another important implication of climate tech's broader adoption is the rise of a new exit market for climate tech companies, beyond strategic acquirers and public listings, by large buy-out and infrastructure funds starting to tap into the market.

50 Number of funds tracked: Carbon Equity internal database (visual on the right)

51 Climate exits by type (visual on the left)



# 4. Climate resilience: outperforming the broader market

## Key takeaways

- Valuations in climate tech private equity have come down significantly, although the decline in deal count has been negligible. This represents a significant opportunity for fund managers to invest in companies at cheaper entry valuations
- There are several trends that have the potential to positively influence the climate market over the coming years. These trends include access to non-dilutive financing, the reopening of the stock market, the emergence of mega buyout funds, and the rise of climate infrastructure funds.

## Introduction

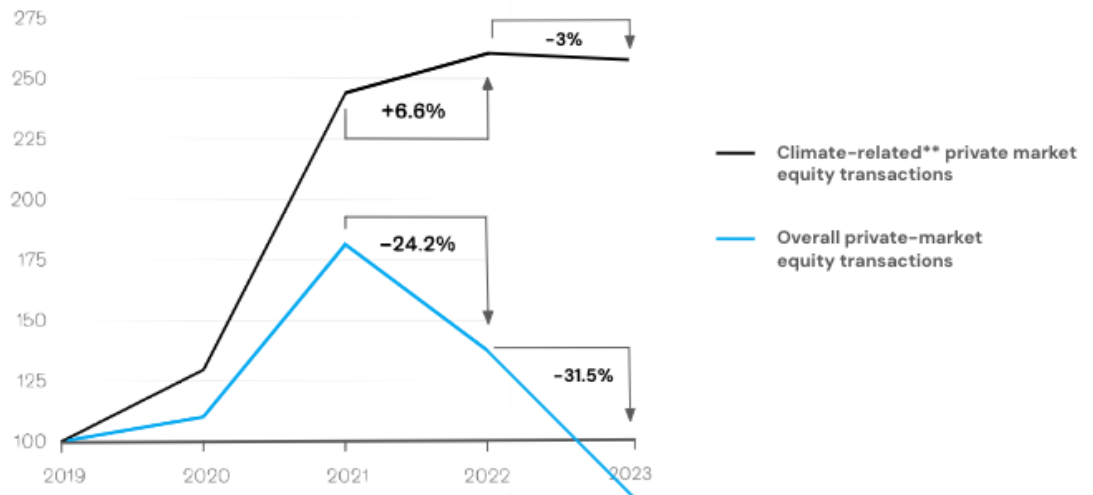
Climate tech has faced a rapidly changing landscape following a period of abundant capital for new technologies. The 11-year-long bull market has come to an end after a prolonged period of low interest rates and inflation. Despite the uncertainty that surrounds the majority of the macroeconomic environment, there are reasons to believe that private markets, and more specifically private market climate funds, are well equipped to outperform.

## Climate investments growth

Following Climate Private Equity's investment volume reaching US\$196B in 2022 (and defying the overall private market slowdown), the tough new macroeconomic conditions in 2023, triggered by higher interest rates, marked an end to the climate market's years-long streak of annual growth. Funding fell by 30% relative to 2022 (versus a 39% decline in the overall venture market), although the decline in deal count was negligible at 3%.<sup>52</sup> We view the number of deal counts as more important than the absolute amount of capital raised. Equity has become scarcer, pushing companies to grow more efficiently.

<sup>52</sup> <https://www.ctvc.co/32bn-and-30-drop-as-market-hits-pause-in-2023/?ref=ctvc-by-sightline-climate-newsletter>

Private-market equity deal volume\*, index (100=2019)

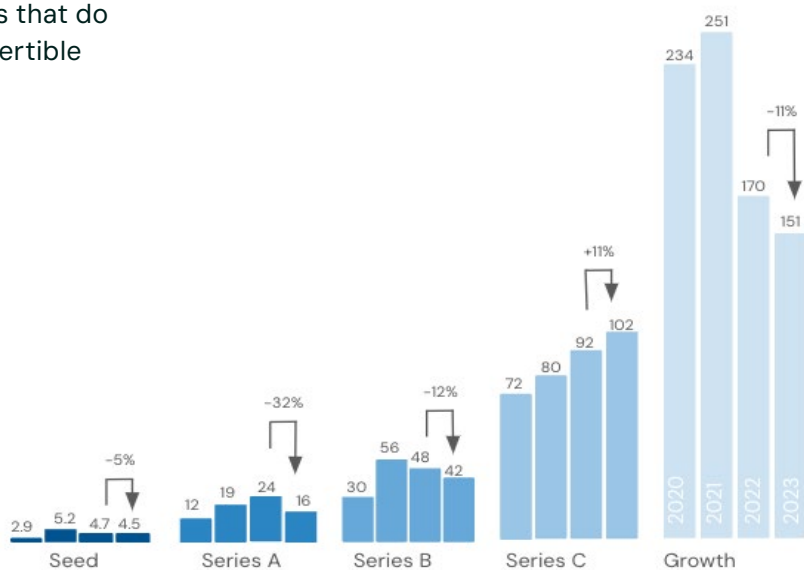


\*Includes completed buyout/leveraged buyout, growth/expansion, private investment in public equity, add-on, accelerator, angel, seed, early-stage venture capital, later-stage venture capital, grants and infrastructure investments.  
 \*\* Includes subsegments: transport, buildings, power, water, agriculture and land use, consumer, oil and gas decarbonization and sustainable fuels, hydrogen, waste, industrial decarbonization, and carbon management  
 Sources: McKinsey & Company, S&P Global, CTVC

### Valuation reset

During the final years of the boom market (2019–2021), valuations were elevated across all asset classes and within the climate tech market. Starting in 2022–2023, there has been a shift in the market. It has become harder to raise capital, both for funds and for the underlying companies. Raising capital takes longer, and it is harder for companies to find a lead investor who is willing to price their round. This has led to an increase in flat rounds (i.e. no valuation appreciation) and internal funding rounds to extend companies’ runways with instruments that do not require a new valuation (e.g. convertible notes or SAFE instruments).

The average round size fell by 28% in 2023, predominantly driven by smaller growth rounds.<sup>54</sup> Especially in certain niches, such as carbon accounting, alternative proteins and vertical farms, we have seen valuations come down significantly. While in many ways this is a tougher market to operate in, it also represents a significant opportunity for fund managers to invest in companies at cheaper entry valuations. This will likely make 2023 and 2024 strong fund vintages to invest in.



Source: Sightline Climate

53 [McKinsey 2023](#), (visual on the top)

54 <https://www.ctvc.co/32bn-and-30-drop-as-market-hits-pause-in-2023/?ref=ctvc-by-sightline-climate-newsletter>

# Anticipating Further Growth: Factors Driving Positive Change



We're currently tracking four trends that have the potential to positively influence the climate market over the coming years.

- 1. Access to non-dilutive financing:** The options for non-dilutive financing have dramatically increased over the past 18 months. Spearheaded by the US after introducing the Inflation Reduction Act and Infrastructure Bill, and followed by the EU Green Deal, climate companies raised substantial amounts of non-dilutive financing (either in the form of subsidies, loans or project finance). The debt market is also gearing up for the wave of climate companies maturing. HSBC recently announced a US\$150 million private debt joint venture with Temasek to support climate companies in Asia.
- 2. Reopening of the Stock Market:** A key factor in the anticipated recovery of the overall PE market is the eventual reopening of the stock market. The resumption of IPO activities will provide a crucial exit route for climate tech ventures and inject renewed confidence into the market.
- 3. Emergence of Mega Buyout Funds:** The climate fund landscape is evolving with the entrance of mega buyout funds into the climate tech arena, such as TPG Rise (currently raising US\$8-10 billion). These funds bring substantial capital and strategic expertise, offering an alternative exit pathway for companies seeking growth and scalability.
- 4. Rise of Climate Infrastructure Funds:** Another noteworthy development is the rise of climate infrastructure funds. These dedicated pools of capital are tailored to the unique needs of certain hardware climate solution companies, such as the role out of long-duration battery storage or hydrogen production. As these funds gain prominence, they contribute to the diversification of exit options.



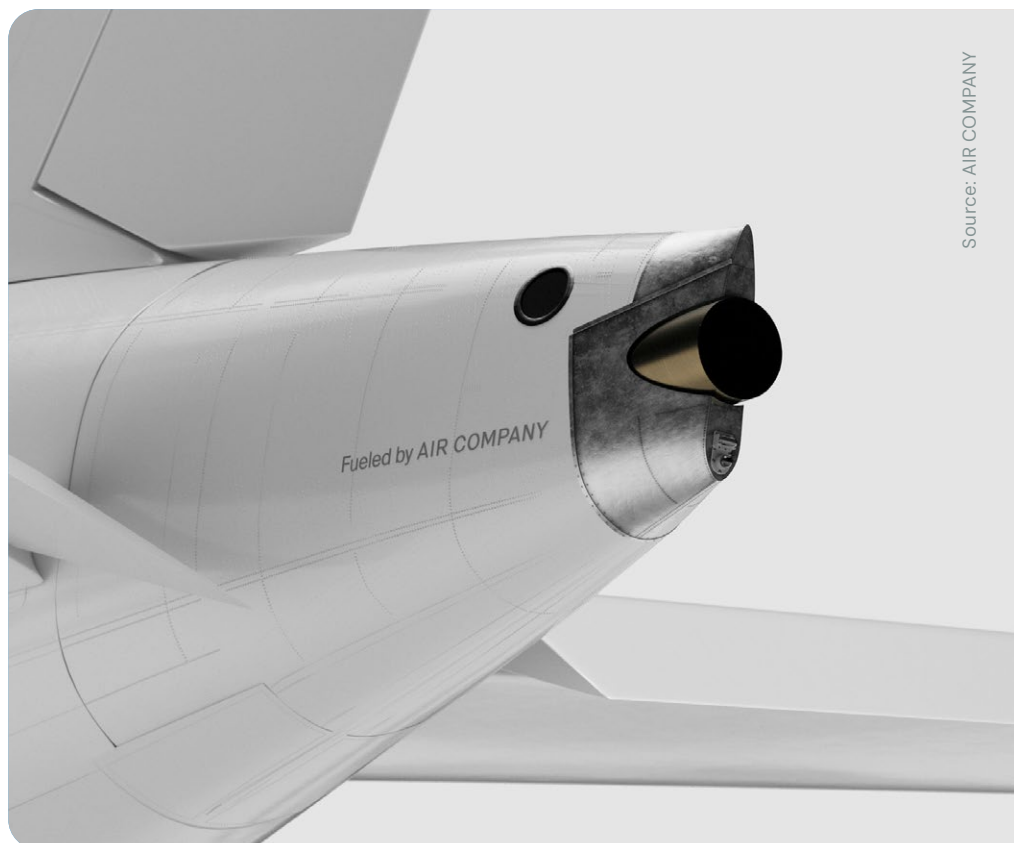
# Conclusion

## Is this the right time to invest in the climate tech category?

The climate tech landscape is rapidly changing, and climate tech is becoming a mainstream investing opportunity. At the same time, valuations have come down from excessive heights, which means the opportunities for growth are now more vivid than ever. This inflection point underscores not solely the urgency of investing in solutions to combat climate change, but also the substantial economic potential these investments hold. Besides fighting the biggest societal challenge on earth, climate tech represents a resilient market that holds growth potential.

The rapid development of climate technologies signals a shift in global markets, and investors with a keen eye for sustainable and profitable investments will find climate tech to be fertile ground. This sector demonstrates favorable fundamentals for robust financial reward and plays a crucial role in driving the global economy toward a more sustainable and decarbonized future.

The climate tech opportunity is an intersection of profitability and responsibility, and it has exhibited the ability to outperform the market, even in times of macroeconomic insecurity. Climate tech is an investment in leading innovations and in the future of our planet.



Source: AIR COMPANY

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