

# Investing in Times of Climate Change 2023

Climate transition funds gain traction while the world is off track to limit warming at 1.5°C.

## Morningstar Manager Research

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In this fourth annual edition of *Investing in Times of Climate Change*, we provide an update on the rapidly evolving global landscape of climate funds. Mutual funds with a climate-related mandate represent a wide and growing range of strategies that aim to meet varying investor objectives and preferences, from decarbonizing a portfolio to investing in climate solutions.

### Key Takeaways

- ▶ The menu of options for climate-focused investors across the globe has ballooned in the past five years. We identified more than 1,400 open-end and exchange-traded funds with a climate-related mandate as of June 2023, compared with fewer than 200 in 2018.
- ▶ Assets in these funds have surged 30% in the past 18 months to USD 534 billion, boosted by inflows and product development.
- ▶ Fueled by higher investor interest and regulation, Europe remains the largest and most diverse climate fund market, accounting for 84% of global assets. China and the United States rank second and third, with 8% and 6% market share, respectively.
- ▶ Against a backdrop of high oil and gas prices, falling valuations in renewable energy stocks, and despite the Inflation Reduction Act, assets in U.S. climate funds have grown by only 4% in the past 18 months to USD 31.7 billion.
- ▶ European investors favor climate transition funds; they account for almost half of all climate fund assets in Europe. While other regions are warming up to these strategies, Climate Solutions and Clean Energy/Tech funds continue to dominate the landscape outside of Europe.
- ▶ Product development in climate funds has slowed down this year in line with the broader fund market.
- ▶ Funds offering exposure to climate solutions also exhibit high carbon intensity. These funds tend to invest in transitioning companies that operate in high-emitting sectors, such as utilities, energy, and industrials, and that are developing solutions to help reduce their own emissions and those of others.
- ▶ None of the most common companies in climate funds are aligned to 1.5° Celsius. The most popular stocks in broad market climate portfolios are more misaligned than those in portfolios that target climate solutions, with average Implied Temperature Rises of 3.3°C versus 2.4°C. This can be explained by the high and difficult-to-manage carbon emissions coming from the supply chain and/or customers (Scope 3 upstream and downstream) of top companies in broad market portfolios.

## Introduction

In this fourth annual edition of *Investing in Times of Climate Change*, we provide an update on the rapidly evolving global landscape of climate funds as of June 2023. A lot has happened since the [previous edition](#). Russia's invasion of Ukraine in February 2022 has had profound implications for the world's climate agenda. In the short term, it has increased the use of the dirtiest fossil fuels and put mid- and long-term emission reduction targets in jeopardy. But the conflict has also increased the urgency for countries to diversify their energy sources and accelerate the transition toward renewable energy.

Governments around the world have responded by introducing large incentive packages aimed at boosting investments in clean technologies and accelerating the transition to a low-carbon world. Examples include the Inflation Reduction Act<sup>1</sup> in the United States, REPowerEU<sup>2</sup> in the European Union, and Japan's Green Transformation program,<sup>3</sup> just to name a few.

And progress has been made. More investments are now flowing into renewable energy than fossil fuels.<sup>4</sup> For every USD 1 spent on fossil fuels, USD 1.7 is spent on clean energy, according to the International Energy Agency. Demand for electric cars is booming, with sales expected to leap by more than one-third this year after a record-breaking 2022. The percentage of electric vehicles in total car sales increased to 14% last year, from less than 3% before the coronavirus pandemic.<sup>5</sup> Global sales of heat pumps have seen double-digit growth since 2021.

Despite all these positive developments, the world remains off-track to meet the 1.5°C warming level set down under the Paris accord as the ideal limit to avoid irreversible impacts on natural systems. The world has already warmed by at least 1.1°C since preindustrial times. According to Morningstar Sustainalytics,<sup>6</sup> 87% of the 5,000+ largest public companies globally are on a pathway of at least 2.1°C. Last year, the [UN synthesis report](#) of government commitments stated that current pledges would lead to a 2.5°C world.

What does this mean for investors? Investors are increasingly aware of the risks associated with climate change. Some investments will be disadvantaged in the transition to a low-carbon economy because of changes in regulation, technology, and consumer behavior, among other factors. If mitigation efforts don't accelerate as temperatures keep rising, investments will face higher physical risks, which refer to the vulnerability of a company's supply chain, operations, and assets because of the increasing frequency of extreme weather events such as flooding or hurricanes.

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1 [The Inflation Reduction Act](#), or IRA, was signed into law by President Biden in August 2022. The Act aims to spur investment in green technology in the United States by devoting USD 370 billion in subsidies through grants, loans, and tax credits to public and private entities. Clean electricity and transmission command the biggest slice, followed by clean transportation, including electric-vehicle incentives.

2 [REPowerEU](#) was launched in May 2022 to help the EU save energy, produce clean energy, and diversify its energy supplies through the mobilization of close to EUR 300 billion in grants and loans.

3 Japan's Green Transformation Act, published in February 2023, aims to unlock more than USD1 trillion of investment in low carbon infrastructure over the next decade to accelerate decarbonization in the country.

4 [World Energy Investment 2023](#).

5 [World Energy Investment 2023](#).

6 Morningstar Sustainalytics Research. 2023. "[Morningstar Low Carbon Transition Rating Methodology](#)."

At the same time, more investors are seeking to capitalize on opportunities and invest in companies that develop innovative solutions to mitigate climate change or adapt to it, such as clean energy, EVs, carbon capture and storage, and flood defenses.

Alongside key initiatives like investment stewardship,<sup>7</sup> asset managers are responding to investors' demand to manage climate-related risks and opportunities by launching new strategies and adjusting existing ones. As of June 2023, we identified more than 1,400 open-end funds and ETFs globally with a climate-related focus. (See how we define this universe in the next section).

In this report, we provide an update on the wide range of climate funds available, which we subdivide into five mutually exclusive categories: Low Carbon, Climate Transition, Green Bond, Climate Solutions, and Clean Energy/Tech. We examine the continued growth in assets, flows, and products in each grouping. We analyze these funds through the lens of Morningstar Sustainalytics' carbon metrics, including involvement in fossil fuels and carbon solutions. We also look at their most common holdings and assess their level of alignment to a 1.5°C world using Sustainalytics' new Low Carbon Transition Rating metrics. Finally, we discuss how each type of climate strategy, given its unique risk/reward characteristics, can fit into an investor's portfolio.

The purpose of this report is to help climate-focused investors navigate the expanding array of strategies available to them.

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<sup>7</sup> Asset managers are increasingly expected to assess and manage climate risks in investments. This can be done through investment stewardship, which includes direct engagement with companies, proposing shareholder resolutions, voting proxies, participating in investor coalitions, and advocating for public policy measures that address climate-related issues. We believe that investment stewardship is key to influencing corporate climate strategies and mitigating risks in investment portfolios, but it is not in the scope of this report. For further research on the topic, read:

[2023 Proxy Season: What to Expect for Climate Resolutions](#)

[2023 Proxy-Voting Season: Volume of Climate Resolutions Stays High](#)

[Proxy-Voting Insights: Voting on Politics](#)

[Proxy-Voting Insights: BlackRock, Vanguard, State Street](#)

### Defining the Universe of Climate Funds

For this report, we have defined the global universe of climate funds as those open-end funds and ETFs that have investment strategies related to the climate change theme.<sup>8</sup>

Morningstar's universe of climate funds is based on intentionality rather than holdings. For example, many sustainable portfolios score well on climate metrics, but if climate issues are not the focus of these funds' investment strategies, they are not included in our universe. To identify intentionality and understand the strategies, we relied on a combination of fund names (a strong indicator of intentionality) and information found in legal filings.

To identify these funds, we used a range of key terms in their names (or index names in the case of passive funds). Key terms include obvious words such as "climate," "carbon," "transition," and "green," but also words related to themes and sectors linked to climate change solutions such as "renewable energy," "electric vehicles," and "batteries." Using natural-language-processing technology to comb Morningstar's comprehensive global fund database, we made efforts to identify as many of these funds as possible. We used this sample to analyze the latest trends in terms of assets, flows, product development, and the climate-related profiles of these portfolios.

In this spirit, we did not include those funds whose sole climate-related mandate is to exclude fossil fuel companies. Globally, a small number of funds are branded ex-fossil fuel (with "ex-fossil fuel" or "fossil fuel-free" in their names), but many more unbranded funds similarly exclude fossil fuels. Fossil fuels have become part of a broader exclusion list for many asset managers, alongside weapons, tobacco, and other controversial activities. Moreover, the scope of fossil fuel exclusions varies greatly, from the limited omission of companies involved in thermal coal extraction and generation to full-scale removal of companies with fossil fuel reserves or any involvement in fossil fuel related activities, including exploration, production, and distribution. Excluding fossil fuels is one way to decarbonize a portfolio, but we elected to exclude ex-fossil fuel funds from this study to ensure a well-defined and cohesive universe of climate funds.

Similarly, we did not include the growing number of funds that seek to maintain a lower carbon intensity relative to their investable universe without providing a specific carbon reduction target. For most of these funds, climate considerations represent only a small part of the investment process.<sup>9</sup> To be included in our climate fund universe, a fund committed to reducing its portfolio's carbon footprint or intensity must target a reduction of at least 30% relative to its reference benchmark.

Finally, we did not include funds that claim using investment stewardship as an approach to mitigate climate risks, unless it is the sole objective of the fund. We acknowledge the crucial role that proxy voting and engagement activities play in better understanding and managing climate risks and

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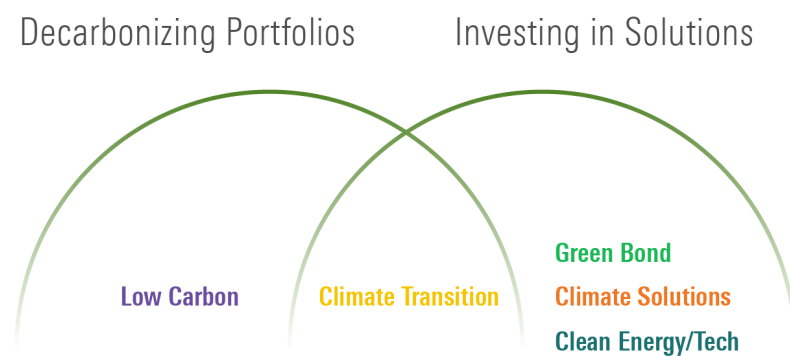
<sup>8</sup> Our list of funds spans all key asset classes, including equity, fixed income, allocation, and alternatives. We have excluded carbon credit (or carbon allowance) funds. The list of funds included in this report is available upon request. For more information, please contact Morningstar Manager Research Services by emailing [ManagerResearchServices@morningstar.com](mailto:ManagerResearchServices@morningstar.com).

<sup>9</sup> We have also excluded funds that use carbon credits to offset the portfolio's carbon footprint.

opportunities in portfolios. But these activities often complement other key objectives and can't be considered the focus of the strategy. We have included only a couple of climate-engagement funds in our universe.

Our universe of climate funds is subdivided into five mutually exclusive groups based on investment objective and policy, diversification, and sector exposure: Low Carbon, Climate Transition, Climate Solutions, Green Bond, and Clean Energy/Tech. Below is a representation of the five groupings, with the role they can play in an investment portfolio, from decarbonizing a portfolio to promoting the climate transition by investing in green solutions.

**Exhibit 1** Climate Strategies and Their Roles in a Portfolio



Source: Morningstar Research.

► **Low Carbon**

Low Carbon funds seek to invest in companies with reduced carbon intensity and/or carbon footprint relative to a reference benchmark. These funds typically market themselves as low-carbon strategies and incorporate quantifiable targets related to carbon emissions reduction. Low Carbon funds tend to offer broad market exposure across all sectors. Examples include strategies such as **Amundi IS Equity Europe Low Carbon** and **TIAA-CREF Social Choice Low Carbon Equity**.

► **Climate Transition**

Climate Transition funds<sup>10</sup> select or tilt toward companies that consider climate change in their business strategy and therefore are better prepared for the transition to a low-carbon economy. Climate Transition funds tend to invest in a mix of companies: those that better align with the transition and those that provide climate solutions. Examples include **Aviva Investors Climate Transition Euro Equity** and **DNCA Invest Beyond Climate**. Also included in this category are passive funds tracking EU Paris-aligned benchmarks, hereafter EU PAB, or EU climate-transition benchmarks, hereafter EU CTB. These benchmarks are designed to account for both risk mitigation and opportunity-seeking while generally replicating the broad market and matching the transition to a climate-resilient economy. An example is **Lyxor Net Zero 2050 S&P Eurozone Climate PAB ETF**. Climate Transition funds share many

<sup>10</sup> Climate Transition funds were renamed from Climate Conscious funds in previous studies.

characteristics with both Low Carbon and Climate Solutions funds. As such, Climate Transition represents somewhat of a hybrid group.

► **Green Bond**

Green Bond funds invest in debt instruments that finance projects facilitating the transition to a green economy. The [Green Bond Principles](#), formulated by the International Capital Market Association, provide high-level categories for eligible green projects. The eligible categories include, but are not limited to, renewable energy, energy efficiency, pollution prevention and control, clean transportation, sustainable water and wastewater, climate change adaptation, eco-efficient and/or circular economy-adapted products, and green buildings. We have also included in this grouping a couple of climate bond funds that have slightly broader mandates, including **LO Funds Global Climate Bond** and **DPAM L Bonds Climate Trends Sustainable**.

► **Climate Solutions**

Climate Solutions funds target companies that are contributing to the transition to a low-carbon economy through their products and services and that will benefit from this transition. For example, **Candriam SRI Equity Climate Action** invests in companies for which climate change solutions are central to their growth story and whose products, processes, technologies, and/or services address climate challenges. **Wellington Climate Strategy** has a similar approach. Included in this category are funds that provide exposure to companies involved in industries and technologies such as hydrogen,<sup>11</sup> nuclear, electric vehicles, batteries, critical raw materials, energy storage, carbon capture and storage, circular economy, and pollution control. Climate Solutions funds differ from Climate Transition funds in that they invest primarily in companies whose goods and services provide solutions for climate change mitigation and adaptation. Their sector exposure is therefore more concentrated.

► **Clean Energy/Tech**

Clean Energy/Tech funds invest in companies that contribute to or facilitate the clean energy transition. This includes renewable energies such as wind, solar, hydro, wave, and geothermal power along with grid infrastructure improvements, transmission, and distribution. Clean Energy/Tech funds are characterized as sector-specific, are typically more concentrated than the first three fund groupings above, and often have a bias toward mid- and small caps. Examples include **First Trust Nasdaq Clean Edge Green Energy Index** and **RobecoSAM Smart Energy**, which invests across renewable energy enablers and producers, “smart-grid” distribution networks, energy-efficient storage and power management technologies, and the electrification of end-use applications.

The list of funds included in this report is available upon request. Please email [ManagerResearchServices@morningstar.com](mailto:ManagerResearchServices@morningstar.com).

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<sup>11</sup> The hydrogen sector is undergoing a transitional stage, but currently, fossil fuels remain the primary source for hydrogen production, with 6% of global natural gas and 2% of global coal going to hydrogen production, according to IEA.

## Global Summary

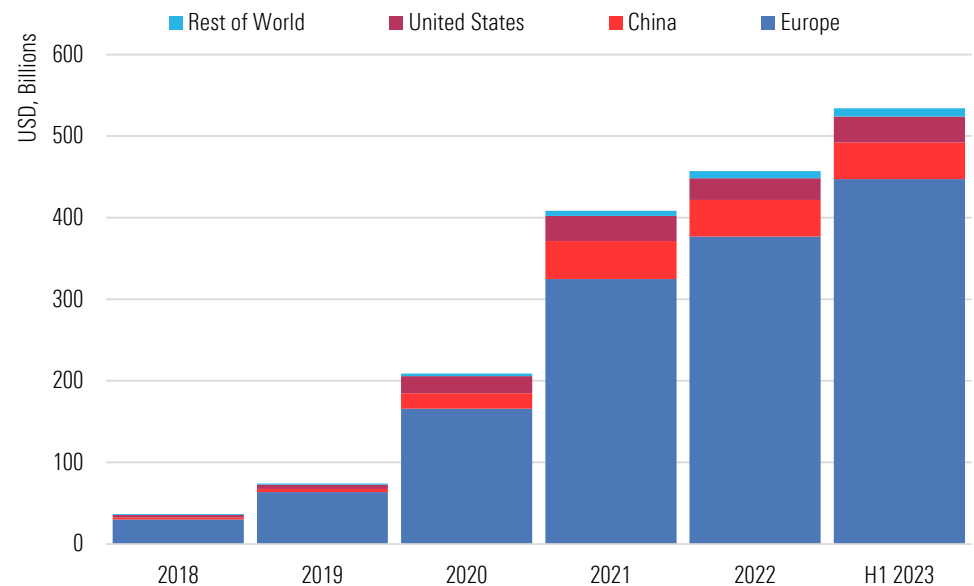
### Assets in Climate Funds Balloon to Over Half a Trillion Dollars

As of June 2023, there were 1,407 climate-related open-end funds and ETFs that fit our definition, with collective assets under management of USD 534 billion worldwide. These represent almost 20% of the global sustainable funds market.<sup>12, 13</sup>

The global universe of funds with a climate-related strategy has surged by 30% in the past 18 months (17% in the past six months), driven by continued inflows and product development. Climate fund assets have grown at a faster clip than the global sustainable funds market and the broader open-end funds and ETF market, which have slid by 5% and 8%, respectively, since December 2021 (expanded by 11% and 13%, respectively, over the past six months).

Money invested in climate funds globally has increased 14-fold in the past five and a half years.

**Exhibit 2** Global Landscape of Climate Funds



Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

### Europe Dominates, China and the US Far Behind

Unsurprisingly given its greater and continued commitment to a climate agenda, Europe remains the largest and most diverse climate funds market, accounting for 84% of global climate fund assets. Assets in European-domiciled funds with a climate-related strategy climbed by 38% over the past 18 months to USD 447 billion. As of June 2023, we identified 870 climate funds in Europe, compared with 223 in China and 117 in the U.S.

<sup>12</sup> Bioy, H. 2023. "Global Sustainable Fund Flows: Q2 2023 in Review." Morningstar. [Global Sustainable Fund Flows: Q2 2023 in Review](#)

<sup>13</sup> The list of funds included in this report is available upon request. For more information, please contact Morningstar Manager Research Services by emailing [ManagerResearchServices@morningstar.com](mailto:ManagerResearchServices@morningstar.com).

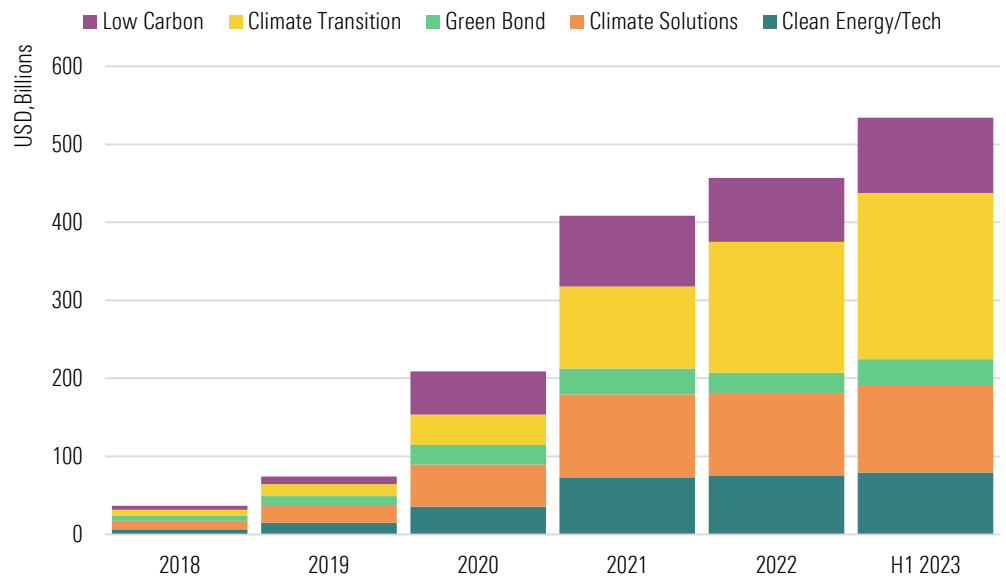
China and the U.S. rank far behind at second and third, with market shares of 8% and 6%, respectively. Despite China's continued commitment to reach peak CO2 emissions by 2030 and carbon neutrality by 2060, assets in climate funds domiciled in the country shrank to USD 44 billion as of June 2023, compared with the historic high of USD 47 billion at the end of 2021. In local currency, however, Chinese climate fund assets rose by 16% over the period. The decline in dollar terms is attributed to the weakening yuan, which mostly reflects China's patchy economic recovery from its zero-Covid policy.

Meanwhile, assets in U.S.-domiciled climate funds rose by a modest 4% to USD 32 billion in the past 18 months, against a backdrop of higher energy prices and falling valuations in renewable energy stocks, and despite the Inflation Reduction Act. By contrast, the rest of the world experienced a staggering growth of 60% since December 2021, reaching USD 10 billion in June 2023. Australia and Canada are the largest markets for climate funds outside of the three main markets mentioned here.

**Climate Transition and Climate Solution Strategies Prove Most Popular... But Not Everywhere**

Both Climate Transition and Climate Solutions remain the largest categories as investors look for investment opportunities beyond the renewable energy sector, which has been set back by rising funding costs, materials inflation, and supply chain disruption.

**Exhibit 3** Global Landscape of Climate Funds



Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

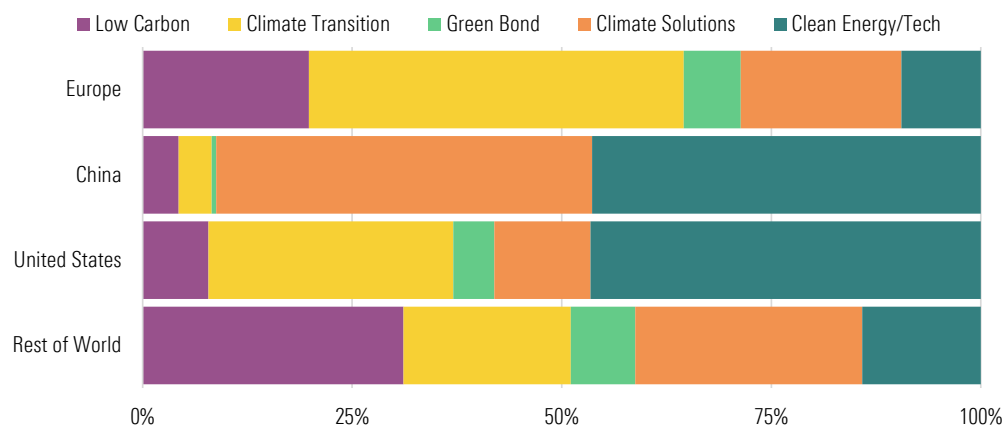
However, a breakdown of assets by climate category reveals significant differences in investor preferences across regions. European investors tend to favor decarbonization strategies and funds focused on both risk and opportunities over those that exclusively offer access to opportunities. This is illustrated by the dominance of Climate Transition funds in the region. These strategies account for 45% of European climate fund assets compared with 19% and 9% for Climate Solutions and Clean Energy/Tech funds, respectively. The growth of Climate Transition strategies in recent years reflects



European investors' increased desire to decarbonize their entire portfolios, starting with the substitution of existing core holdings by strategies that should fare better as the world transitions to a low-carbon economy.

By contrast, Chinese and U.S. investors have a strong preference for strategies focused on climate-related opportunities. Combined, Climate Solutions and Clean Energy/Tech funds account for 31% and 46% of total climate fund assets in China and the U.S., respectively. While Chinese investors have an almost equal liking for the two strategy types, U.S. investors exhibit a clear bias toward Clean Energy/Tech funds, which account for 47% of total U.S. climate fund assets.

**Exhibit 4** Regional Breakdown of Climate Fund Assets by Category



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

### Flows Remain Subdued Because of Market Conditions

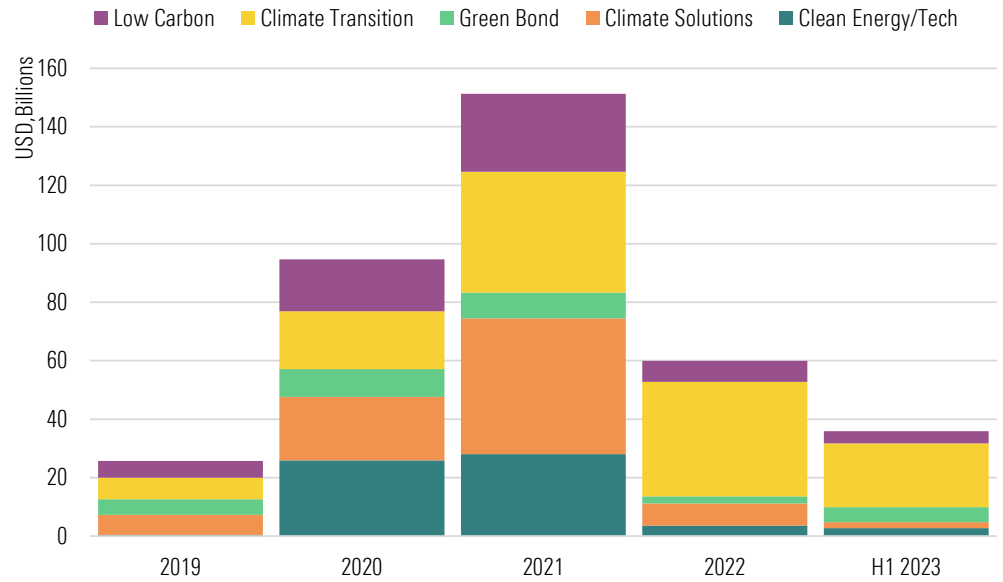
The year 2022 was a troubled one for international capital markets amid growing geopolitical tensions in the wake of Russia's invasion of Ukraine and tightening monetary policy in major economies as they wrestled with inflationary pressures. All of these rattled investors, including those with an interest in climate-related strategies. As a result, while global flows into climate funds remained positive last year, they tumbled to USD 60 billion from more than USD 150 billion a year earlier.

The first six months of 2023 saw a recovery of subscriptions as global climate funds netted almost USD 36 billion. This represents almost 15% growth compared with the second half of 2022, or an 8% organic growth rate.<sup>14</sup> In contrast, the broader open-end fund and ETF market saw a minor pickup of USD 48 billion after registering combined outflows of USD 427 billion over the second half of 2022. The last six-month growth rate was 0.1%. The comparison reflects the undiminished interest from investors in climate-related investments in the face of economic uncertainties.

Climate Transition strategies captured 61% of the flows in the past six months.

<sup>14</sup> Calculated as net flows relative to total assets at the start of a period.

**Exhibit 5** Flows Into Global Climate Funds

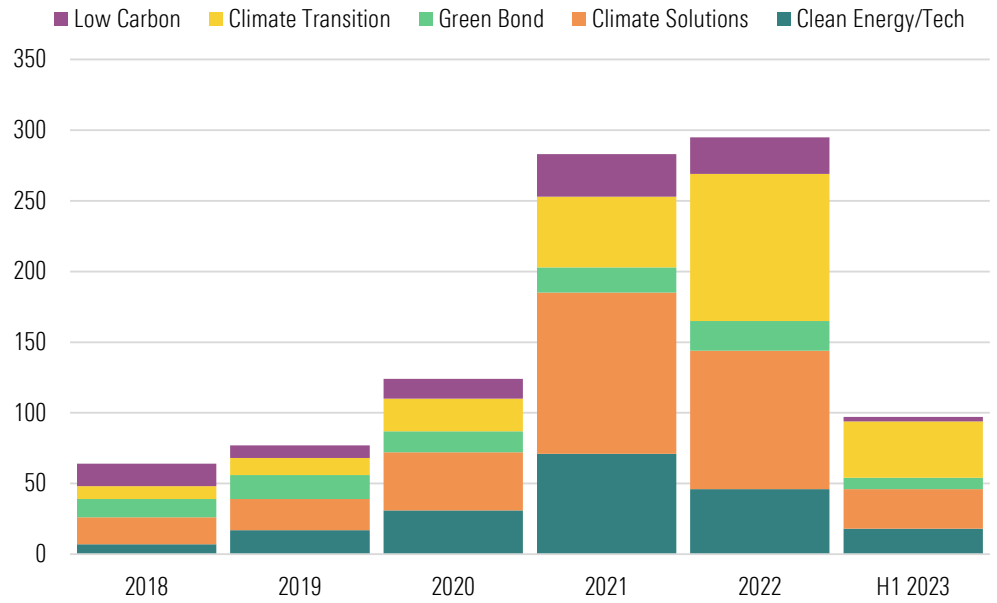


Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

**Product Development Was High in 2022 But Has Slowed Down in Line With the Broader Market**  
 Driven by investor demand as well as asset managers’ net zero commitments,<sup>15</sup> 2022 saw a record number of new climate strategies of all types hitting the shelves (295). But numbers in the first half of this year paint a different picture, with new climate fund launches sliding to 97, a 31% decline from the second half of the previous year. This slowdown, however, is in line with the trend observed in the broader market and can be largely attributed to the uncertain economic outlook. Climate Transition funds accounted for more than 40% of the new offerings, followed by Climate Solutions (29%).

<sup>15</sup> The Net Zero Asset Managers initiative

**Exhibit 6** Launches of Global Climate Funds

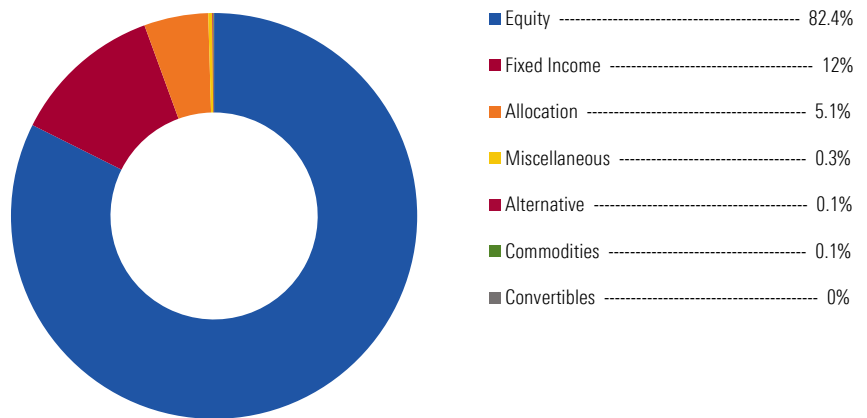


Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

**Equities Are Overwhelmingly Represented**

As is customary with sustainable funds, equity strategies dominate the climate funds universe, representing more than 82% of climate-offering assets as of June 2023, while fixed-income and allocation products account for only 12% and 5%, respectively. Other asset classes are hardly represented in our universe.

**Exhibit 7** Asset Class Breakdown of Global Climate Funds (By Assets)



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Out of the 974 equity funds, more than one fifth (205) offer global exposure, with a majority (125) focused on large-cap companies. Out of the 235 fixed-income strategies, about half (113) provide global exposure.

**Europe**

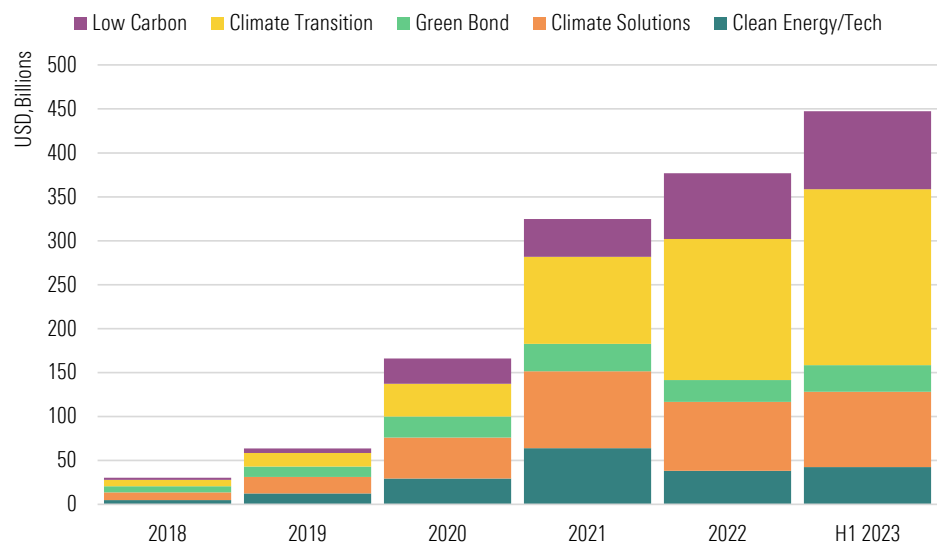
**High Investor Interest and Regulation Fuel Asset Growth**

In 2019, the [European Green Deal](#) was created to transform Europe into the world's first climate-neutral continent through a series of policy initiatives and legislative acts.<sup>16</sup> A key element of climate neutrality involves directing public and private capital toward sustainable business. Europe has since bolstered its dominance of the global sustainable and climate fund market. In the past 18 months alone, Europe's share of the climate fund landscape has increased to 84% from 79%.

As of June 2023, European-domiciled funds with a climate-related mandate held USD 447 billion of assets and represented 877 out of the 1,407 funds identified globally. Despite mounting recession risk, assets in European climate funds grew by 19% so far this year, regaining momentum from 2022, a year plagued by soaring energy prices in the wake of Russia's invasion of Ukraine and by rising interest rates as central banks sought to contain inflation.

The most significant growth over the past 18 months was observed among Climate Transition and Low Carbon funds, as assets in both groups doubled. The Climate Transition category now houses almost half (45%) of European climate fund assets, taking a meaningful lead over Low Carbon (20%) and Climate Solutions funds (19%).

**Exhibit 8** Assets in European Climate Funds



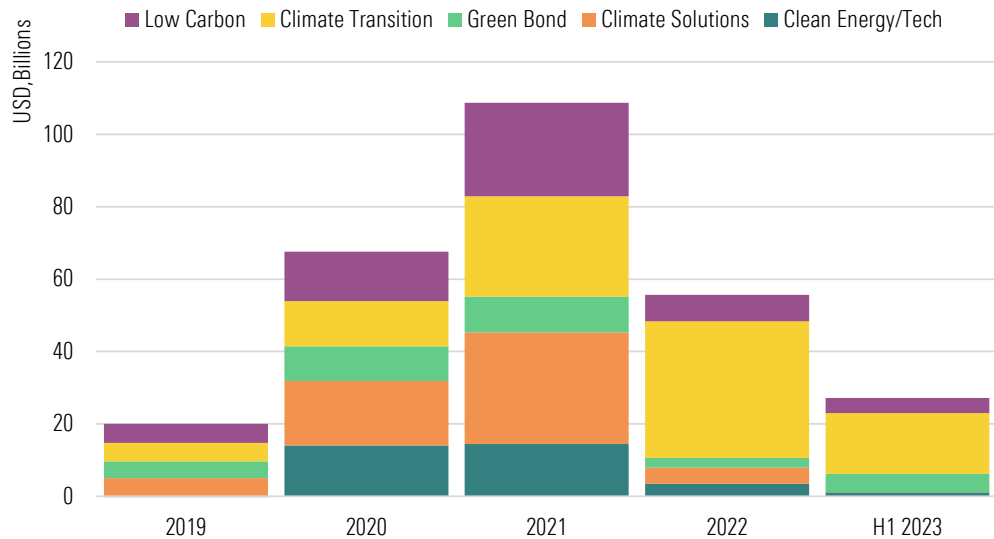
Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

<sup>16</sup> Legislative acts such as the [EU Taxonomy](#), the [Sustainable Finance Disclosure Regulation](#), and the [Corporate Sustainability Reporting Directive](#) prove the reliability and usefulness of sustainability information to investors. The EU taxonomy provides clear criteria for economic activities to qualify as "sustainable," the SFDR sets out how financial market participants have to disclose sustainability information, and the CSRD aims to enhance the breadth, depth, and uniformity of the EU's ESG and sustainability reporting ecosystem.

### Climate Transition Funds Attracted Most of the New Money

The recovery of asset growth this year compared with 2022 was mostly driven by the continued inflows into Climate Transition funds and to a lesser extent Green Bond funds.

**Exhibit 9** Flows into European Climate Funds

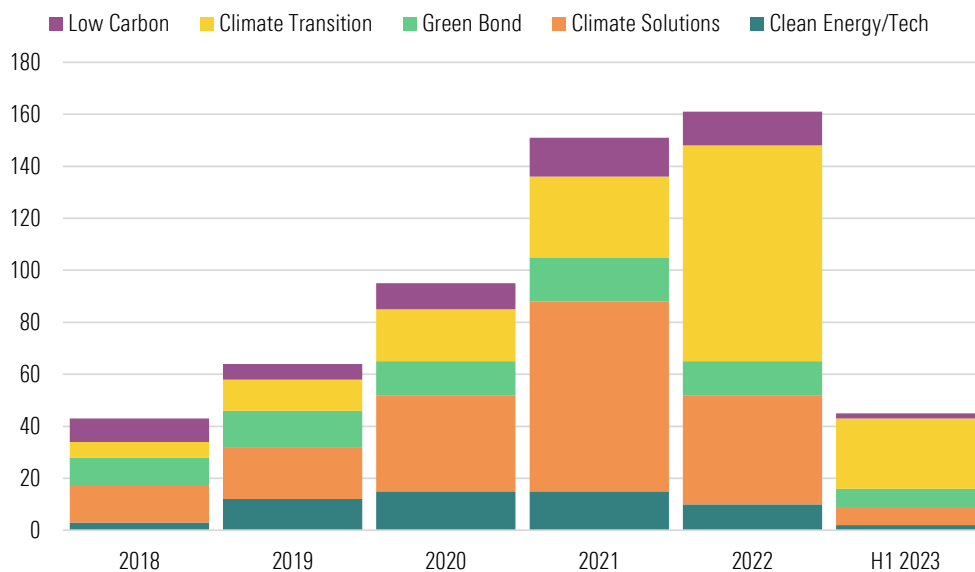


Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

During the first half of 2023, flows into European climate funds amounted to USD 36 billion, a modest increase compared with USD 31 billion over the second half of 2022.

### A Slowdown in Product Development Activity

In line with the broader fund universe, European climate funds experienced a slowdown in product development, with the number of newly launched climate funds reaching a historical low of 55 in the first six months of this year compared with 91 over the same period last year.

**Exhibit 10** Number of European Climate Fund Launches

Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

Climate Transition strategies represented almost half of the new launches, followed by Climate Solutions funds (18%) and Green Bond funds (15%).

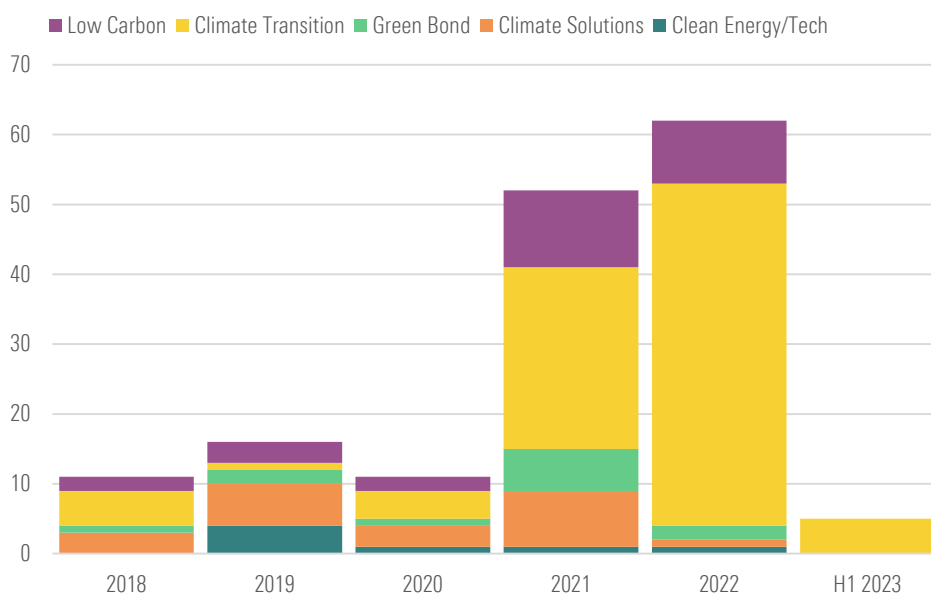
**Goldman Sachs Green Bond** (USD 2.4 billion) topped the largest European climate fund launch so far this year, boosted by the dissipating "greenium" and narrowing the duration gap between existing green bond strategies and conventional non-ESG corporate bond strategies. Along with the criteria articulated in the Green Bond Principles, the fund has in place an ongoing evaluation process to ensure the "green label" attached to an underlying project is aligned with the issuers' overall ESG policy and performance. As with the broader fixed-income universe, green bond investors have been switching to longer-duration exposures this year with the expectation that the current monetary tightening cycle is inching toward the end as inflation is reaching its peak.

Other recent launches include **Amundi MSCI Pacific ESG Climate Net Zero Ambition CTB** (USD 177 million) and **Autofocus Transition Climat Février 2023** (USD 190 million). The latter tracks the S&P France 40 Paris-Aligned Transition ESG 5% Decrement Index. In addition to the minimum standards required for any EU PAB index, the index incorporates factors related to transition risk and climate change opportunities recommended by the Task Force on Climate-related Financial Disclosures.

Another Climate Transition strategy, **Mercer Sustainable Listed Infrastructure CCF** (USD 85 million), seeks to invest in infrastructure companies considered better prepared for the transition to a low-carbon economy. The constituent companies' weightings for this index are adjusted semiannually based on fossil fuel reserves, operational carbon emission intensity, and companies' climate governance activities and forward-looking commitments to carbon emission pathways (aligned to the 2°C scenario of the Paris Agreement).

As with the slower pace of product development, the number of rebranded European climate funds reached a new low this year (five), all of them Climate Transition strategies. Last year saw 62 rebranded climate funds, clustered in the Climate Transition category (49); many of these were passive products converted to PABs or CTBs. Repurposing a traditional strategy or tweaking a sustainable one into a climate-flavored product typically involves reducing the portfolio's allocation to the most carbon-intensive companies and controversial sectors and/or increasing exposure to more climate-friendly securities.

**Exhibit 11** Number of European Rebranded Climate Funds



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

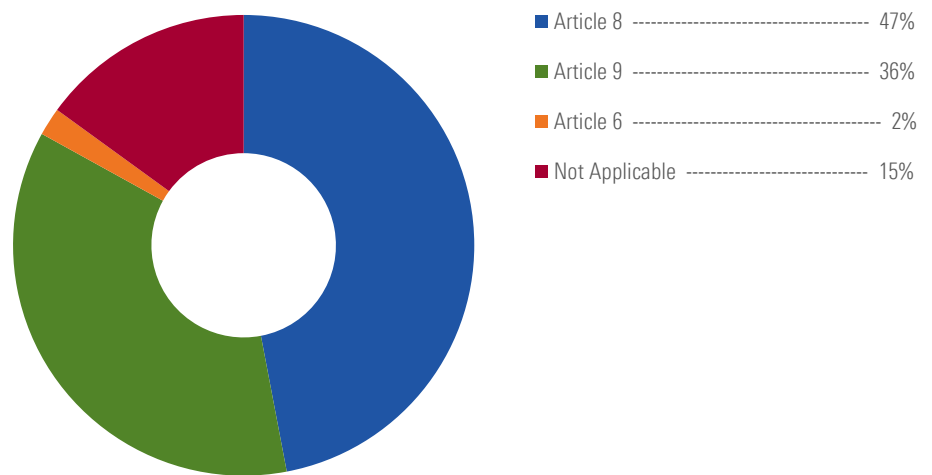
Recent examples of rebranded funds include **Lombard Odier Circular Economy**, which rebranded from **Lombard Odier Natural Capital** to better reflect the fund's renewed focus on four structural trends including circular bio-economy, resource efficiency, outcome-oriented re-economy, and zero waste. Another example is **Amundi Net Zero Ambition Multi Asset**, which is part of five Amundi Net Zero Ambition strategies that experienced a makeover this year. The strategies target carbon intensity reduction objectives in line with those of PABs.

Following the introduction of Sustainable Finance Disclosure Regulation in March 2021, many more funds have committed to lower carbon intensity relative to their benchmarks without specifying the extent of the reduction. As more asset managers commit to net zero by 2050 and start implementing their decarbonization plans, we expect to see more existing funds tweak their investment objectives to include quantified emission reduction targets.

### Article 8 Funds Dominate After the Reclassification Wave

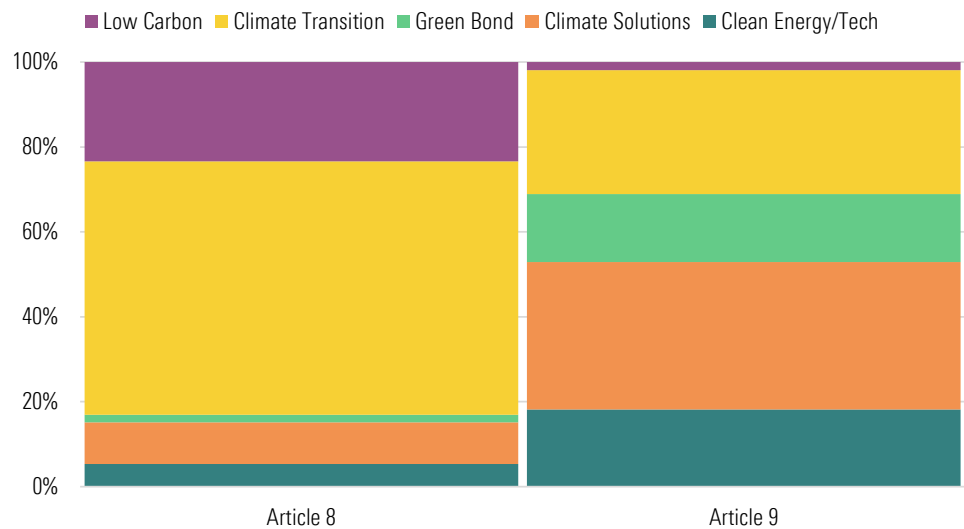
At the end of 2021, Article 9 funds dominated the European climate fund landscape, representing almost two thirds of assets. Following the reclassification wave of Paris-aligned and climate-transition passive funds from Article 9 to Article 8 in late 2022,<sup>17</sup> that market share dropped to about one third (35%, USD 157 billion) as of June 2023, while funds classified as Article 8 funds now account for nearly half of the European climate fund universe (48%, USD 213 billion) compared with 16% and USD 52 billion at the end of 2021.

**Exhibit 12** European Climate Funds Broken Down by SFDR Fund Type



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. "Not Applicable" refers to funds domiciled in Europe that are out of SFDR's scope.

**Exhibit 13** Article 8 and Article 9 Climate Funds



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

<sup>17</sup> For more details, see the latest [SFDR Article 8 and Article 9 Funds in Review](#).



Climate Transition is now the largest climate fund grouping in the Article 8 category, housing 61% of the assets, followed by Low Carbon. The Article 9 category, which encompasses a more diversified range of climate strategies, has Climate Solutions as the dominant grouping (36%), followed by Climate Transition (28%), Clean Energy/Tech (19%), and Green Bond (16%). The larger representation of Climate Solutions and Clean Energy/Tech funds in Article 9 relative to Article 8 is hardly surprising. These "dark green" strategies focus on companies that offer products and services that contribute to the transition to a low-carbon economy.

Yet one may find it surprising to see similar strategies in the Article 9 category feature in the Article 8 category, too. For example, a number of Clean Energy/Tech funds, including **Invesco Global Clean Energy ETF** and **Vontobel Energy Revolution**, have been classified by their managers as Article 8. The former tracks an equally weighted index that invests in companies focused on wind, solar, biofuels, hydro, and other renewable energy sources. It also invests in companies involved in energy conversion, storage, conservation, and efficiency. The latter targets companies that operate in the future resources sector that includes the main themes of alternative energy (for example, wind and solar energy, biofuels) and resource scarcity (such as raw materials, product innovation, clean water, forestry, agriculture, and so on).

Similarly, a few Green Bond funds, including **Amundi Emerging Markets Green Bond** and **Generali SRI Euro Green Bond**, feature in the Article 8 grouping, while the majority are classified as Article 9.

In [previous research](#), we discussed the different interpretations of SFDR made by asset managers, which have resulted in not only a wide range of investment products classified as Article 8 or Article 9 but also similar strategies featuring in both categories. We see this playing out very clearly here. In some cases, a lack of data can prevent managers from classifying funds as Article 9.

### A Mix of Climate Strategies At the Top

Below we list the top 10 European climate funds.

**Exhibit 14** Largest European Climate Funds

<b>Name</b>	<b>Climate Category</b>	<b>AUM (USD, Bil)</b>
ACS Climate Transition World Equity Fund	Climate Transition	12.8
iShares MSCI USA ESG Enhanced ETF	Climate Transition	12.2
Nordea 1 - Global Climate and Environment Fund	Climate Solutions	10.8
Blackrock ACS World ESG Equity Tracker Fund	Low Carbon	10.2
Pictet - Global Environmental Opportunities	Climate Solutions	8.4
Handelsbanken Global Index Criteria	Climate Transition	8.0
iShares Environment & Low Carbon Tilt Real Estate Index Fund (UK)	Low Carbon	7.9
Blackrock ACS World Low Carbon Equity Tracker Fund	Low Carbon	7.5
BlackRock Sustainable Energy Fund	Clean Energy/Tech	7.3
Amundi MSCI USA SRI PAB	Climate Transition	6.3

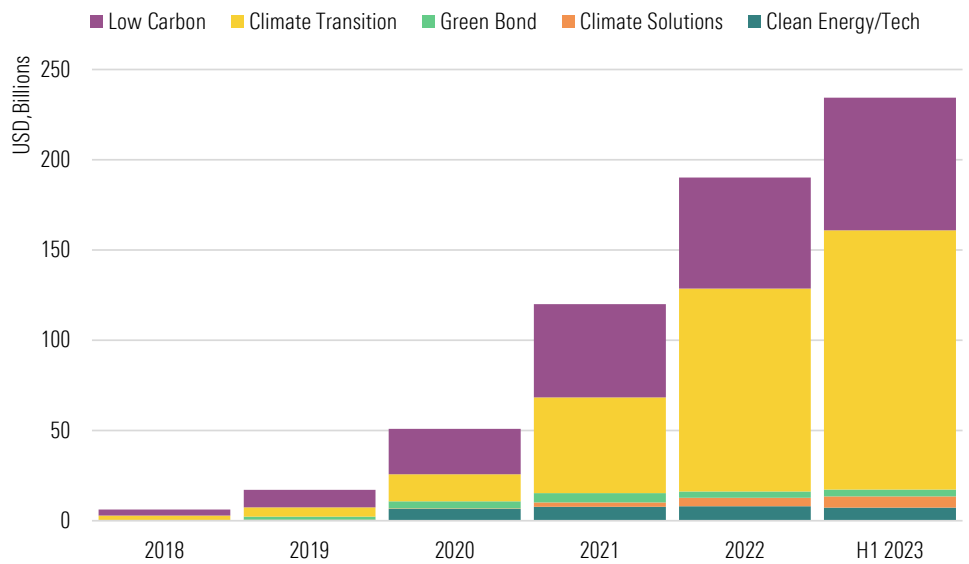
Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Of these 10 European largest climate funds in June 2023, we see two newcomers: **iShares Environment & Low Carbon Tilt Real Estate Index Fund (UK)** and **Amundi MSCI USA SRI PAB**. The former tracks the FTSE EPRA Nareit Developed Green Low Carbon Target Index, where weights of constituents are tilted toward REITs or property developers featuring green building certification, efficient energy usage, and low carbon emissions. Tracking the MSCI USA SRI Filtered PAB Index, the latter switched to track a PAB. Passive funds take over more than half of the top 10 list.

**The EU Climate Benchmark Regulation Boosts Appetite for Passive Climate Transition Strategies**

The increased demand for strategies that incorporate climate factors combined with the continued innovation in indexing are evidenced by the exponential growth of climate-themed index funds and ETFs. Assets totaled USD 234 billion in June 2023, expanding by 24% from 2022 and almost doubling the 2021 number of USD 120 billion.

**Exhibit 15** Assets in European Passive Climate Funds



Source: Morningstar Direct. Morningstar Research. Data as of June 2021.

The rapid growth of Climate Transition strategies to USD 147 billion in mid-2023 has been boosted by both new product creation and the transformation of existing ESG and non-ESG strategies.

The proliferation of passive Climate Transition funds commenced following the launch of the [EU Paris-aligned benchmarks and climate-transition benchmarks](#) in 2021. The two types of benchmarks were designed to consider both climate risk mitigation and investment opportunity-seeking and to be in line with the transition to a climate-resilient economy while ensuring a yearly decarbonization target of at least 7%, in line with the decarbonization trajectory of the IPCC's 1.5°C scenario.<sup>18</sup> EU PABs must have a

<sup>18</sup> The main objectives of the new climate benchmarks are to 1) allow a significant level of comparability of climate benchmarks methodologies while leaving benchmarks' administrators with an important level of flexibility in designing their methodologies; 2) provide investors with an appropriate tool that is aligned with their investment strategy; 3) increase transparency on investors' impact, specifically with regard to climate change and the energy transition; and 4) disincentivize greenwashing.

carbon footprint (including Scope 3 emissions) 50% below that of the investable universe. For EU CTBs, the carbon footprint only must be at least 30% lower. EU PABs also employ additional activity exclusions on high-emitting fossil fuels and electricity producers, which EU CTBs do not have.

As of June 2023, we identified as many as 134 passive funds tracking an EU climate benchmark.

### **Regulatory Update**

In January 2022, as part of SFDR, products distributed in the EU started disclosing [taxonomy alignment](#) (climate mitigation and adaptation) while corporates started disclosing taxonomy-eligible activities.

At the same time, the UK Financial Conduct Authorities required that FCA-regulated asset managers and asset owners (including life insurers and pension providers) and premium and standard listed companies start [reporting](#) how they take climate-related risks and opportunities into consideration using the TCFD framework.

In January 2023, the [Commission Implementing Regulation \(EU\) 2022/2453](#) came into force, requiring banks to disclose ESG risks, including those related to climate change physical risks and transition risks.

In June, asset managers were required to publish entity-level SFDR PAI statements including climate metrics, while July marked [the adoption of the European Sustainability Reporting Standards, or ESRS](#), to implement the recently adopted Corporate Sustainability Reporting Directive. This includes among other things, a dedicated climate standard.

## **China**

### **Economic Challenges Weigh on Climate Funds**

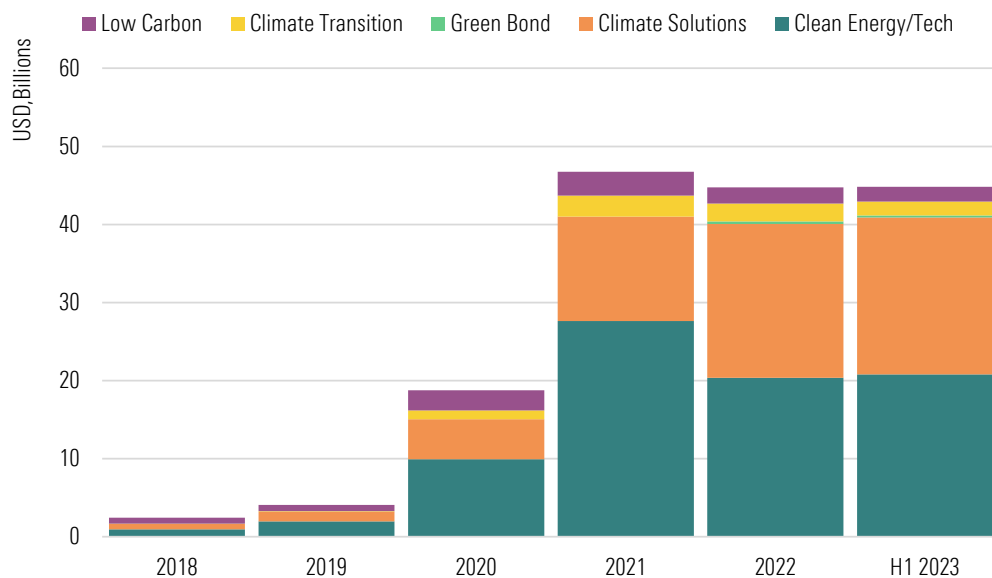
Overtaking the United States in 2021, China has established itself as the second-largest market of climate funds behind Europe. Despite a range of economic challenges dragging the country's outlook, including rising youth unemployment and deflationary pressure, the central leadership's commitment "to peak carbon dioxide emissions by 2030" and "to achieve carbon neutralization by 2060" remains unshaken.

Under these overarching objectives, numerous fiscal incentives have mushroomed at the provincial and municipal levels, including monetary rewards for companies realizing annual carbon emission reduction targets, subsidies for R&D projects contributing to energy efficiency improvement and carbon neutrality, and reduction of purchase tax of new electric vehicles.

Along with fiscal and administrative incentives, Chinese companies have also benefited from the country's supply chain dominance of renewable energy infrastructure and materials, including photovoltaic panels, wind turbines, and electric vehicle batteries. Unlike their U.S. counterparts, the localization of component and subcomponent manufacturers lends an advantage to minimizing supply chain disruption and transportation costs, which translates to greater manufacturing capacities.

Owing to the Covid-19 outbreaks and lockdown restrictions dampening China's economy, as well as a weakening currency, assets of Chinese-domiciled climate funds slipped from their historic high of USD 47 billion in 2021 to just under USD 45 billion at the end of December 2022, and assets have remained flat so far this year. Assets measured in renminbi witnessed 8% growth over the same period.

**Exhibit 16** Assets in Chinese Climate Funds



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Data includes Hong Kong SAR.

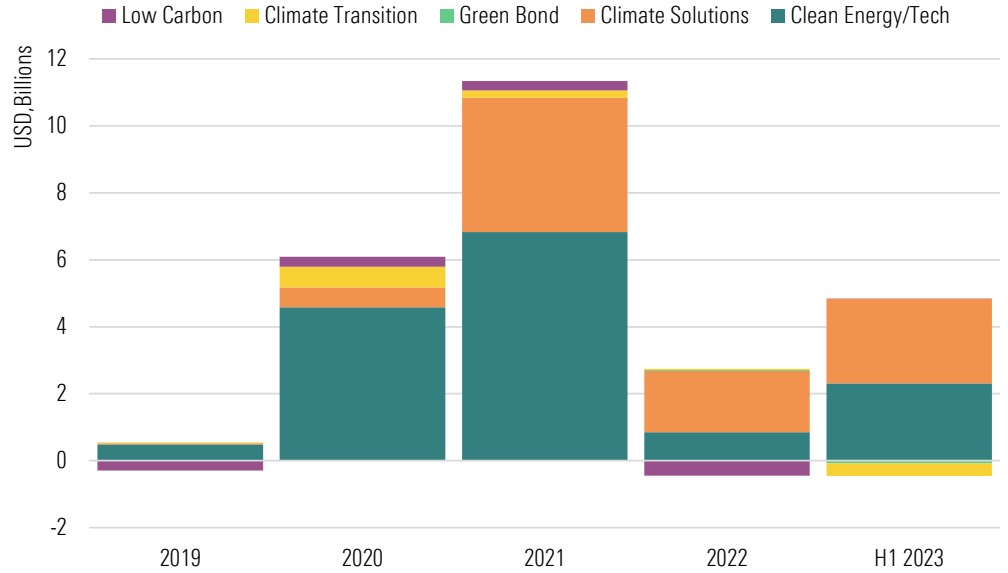
While Chinese Clean Energy/Tech funds towered over other climate strategies in 2021, 2022 saw a stronger presence of Climate Solutions strategies. Assets in the latter expanded by almost 50% to close to USD 20 billion, boosted by the launch of a handful of sizable passive strategies tracking the newly created CSI Shanghai Environment Energy Exchange Carbon Neutral Index. The index consists of 100 mainland-listed large-cap firms involved in decarbonization technology provision and clean energy generation and storage, as well as (although to a much lesser extent) companies in high-carbon emission industries with high emission reduction potential. As of June 2023, assets of Climate Solution funds accounted for almost half of the total assets in Chinese climate funds.

Low Carbon and Climate Transition strategies remained less popular in China, taking up less than 10% of the assets in total assets.

#### **New Subscriptions and Product Launches Decelerate**

Over the first half of 2023, Chinese climate funds netted USD 4.4 billion, a pickup from the major setback in 2022 when flows of the universe slumped to one fifth of the historic high of over USD 11 billion the previous year. Flows into Chinese climate funds tend to exhibit greater volatility, as new subscriptions are often driven by the speculative behavior of local retail investors.

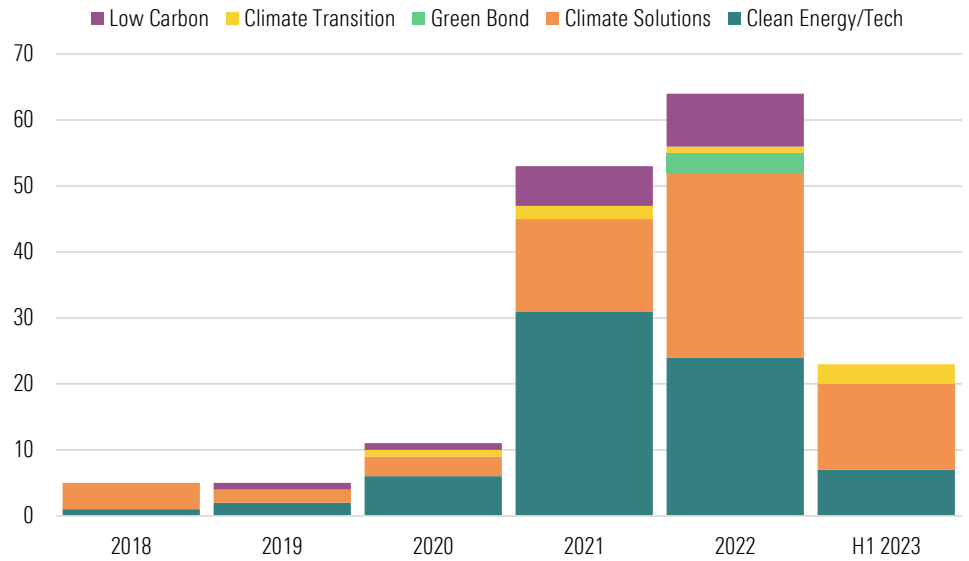
**Exhibit 17** Flows in Chinese Climate Funds



Source: Morningstar Direct, Morningstar Research. Data as of June 2023. Data includes Hong Kong SAR.

In line with the decelerated pace of product development observed in the broader fund universe, new climate fund launches in China plunged in the first half of the year after reaching a record high of 64 last year. Climate Solutions funds (13) continue to dominate the product development activity, followed by Clean Energy/Tech funds (seven).

**Exhibit 18** Launches of Chinese Climate Funds



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Data includes Hong Kong SAR.

Clean energy technologies and materials, electric vehicles, storage technologies, decarbonization technologies, and circular economy feature prominently in new thematic strategies labeled "carbon neutrality" or "deep low carbon." Examples of new thematic funds include **Penghua New Energy Vehicle Mixed Securities Investment** (USD 280 million), **E Fund CSI SSEE Carbon Neutral ETF** (USD 268 million), and **Zhong Ou Carbon Neutral Allocation** (USD 204 million).

The Catalog of Rules for Green Bond Issuances (published April 2021), which contains the most up-to-date definitions of China's green economic activities, has led to the introduction of three Green Bond funds to the Chinese climate fund universe for the first time last year. These are **Yinhua Green Low Carbon Bond**, **Global X Bloomberg MSCI Asia Ex-Japan Green Bond ETF**, and **SWS Green Pure Bond**, although these funds remain small (with an average size of USD 77 million) relative to European peers.

Below we list the top 10 climate funds available to Chinese investors at the end of June 2023.

#### **Exhibit 19** The Largest Chinese Climate Funds

<b>Name</b>	<b>Climate Category</b>	<b>AUM (USD, Bil)</b>
Orient Secs Green Energy Car Alloc	Climate Solutions	2.3
Huatai-PB CSI Photovoltaic Industry ETF	Clean Energy/Tech	2.3
ABC-CA New Energy Theme Hybrid Fund	Clean Energy/Tech	2.1
ChinaAMC New Energy Fund	Clean Energy/Tech	2.0
TianHong CSI Photovoltaic Industry Idx	Clean Energy/Tech	1.9
China Universal New Eneq Car Ind Index LOF	Climate Solutions	1.9
ChinaAMC CSI New En Car Ind ETF	Climate Solutions	1.6
Fullgoal China Secs New Energy Vehicles	Climate Solutions	1.5
Cinda New Energy Ind Stk Fd	Clean Energy/Tech	1.3
E Fund Pro-Environment Alloc	Climate Solutions	1.1

Source: Morningstar Direct, Morningstar Research. Data as of June 2023. Data includes Hong Kong SAR.

The 10 largest Chinese climate funds are equally split into Climate Solutions and Clean Energy/Tech strategies. Four newcomers include **China Universal New Energy Car Industry Index LOF**, **ChinaAMC CSI New Energy Car Industry ETF**, and **E Fund Pro-Environment Allocation**.

#### **Regulatory Update**

This year, the most noticeable regulatory advancement related to China's green and climate finance is a consultation paper issued by the Hong Kong Stock Exchange in April proposing mandatory disclosure of climate-related risks, under which all issuers are required to report climate metrics in accordance with the International Sustainability Standards Board beginning January 2024.<sup>19</sup>

In July, China's National Financial Regulatory Administration issued a draft on easing rules on foreign investment in asset management businesses as part of efforts to attract overseas investors.<sup>20</sup> The NFRA proposes to allow multinationals to directly initiate the establishment of foreign-funded financial companies including asset-management companies. The convergence of disclosure standards and the removal of institutional barriers have the potential to bring forth a shakeup to China's climate fund universe.

### **United States**

#### **Clean Energy/Tech Funds Suffer From Poor Performance**

In stark contrast with Europe, assets in U.S. climate funds increased only slightly (by 4%) over the past 18 months. Assets shrank in 2022 on account of the challenging macro environment of high energy prices in the wake of Russia's invasion of Ukraine and rising interest rates as central banks wrestled with inflationary pressures. In this environment, renewable energy stocks suffered. But strong flows into Climate Transition funds in the first half of 2023 sent assets to a new record of USD 31.7 billion at the end of June.

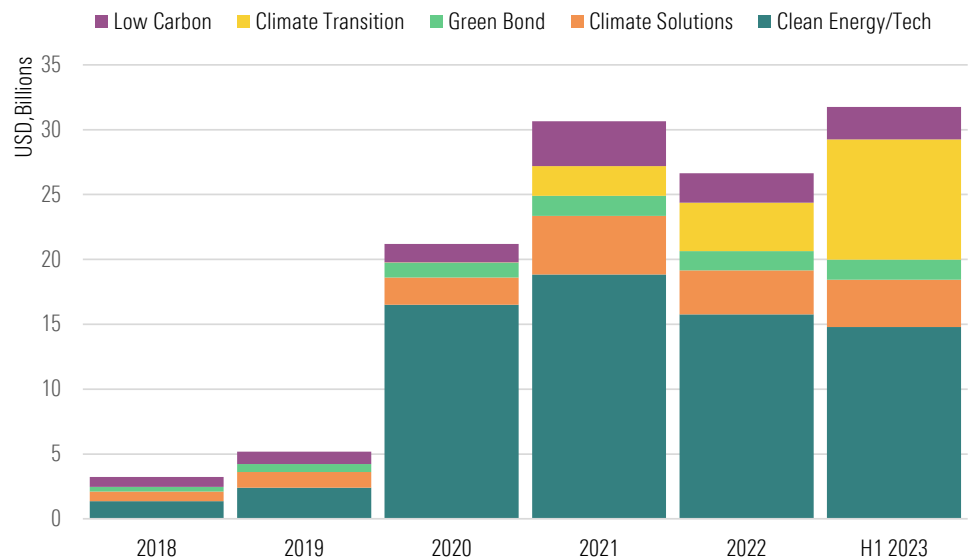
<sup>19</sup> <https://www.hkex.com.hk/-/media/HKEX-Market/News/Market-Consultations/2016-Present/April-2023-Climate-related-Disclosures/Consultation-Paper/cp202304.pdf>

<sup>20</sup> [https://www.gov.cn/zhengce/2021-07/22/content\\_5626671.htm](https://www.gov.cn/zhengce/2021-07/22/content_5626671.htm)

While Clean Energy/Tech funds remain dominant among U.S. climate funds, they have lost assets and other categories have gained ground. As of June 2023, Clean Energy/Tech funds accounted for almost USD 14.8 billion in assets, or 47% of the total, down from a record 78% of market share at the end of 2020. Although these funds have suffered outflows, the decline is mostly attributable to falling valuations. Clean/Energy Tech funds tend to have high exposure to growth stocks, which often suffer in a rising-rate environment.

Meanwhile, assets in Climate Transition funds have grown a whopping 304% over the past 18 months to reach USD 9.3 billion at the end of June. These funds netted USD 5.8 billion in flows over that time.

**Exhibit 20** Assets in U.S. Climate Funds

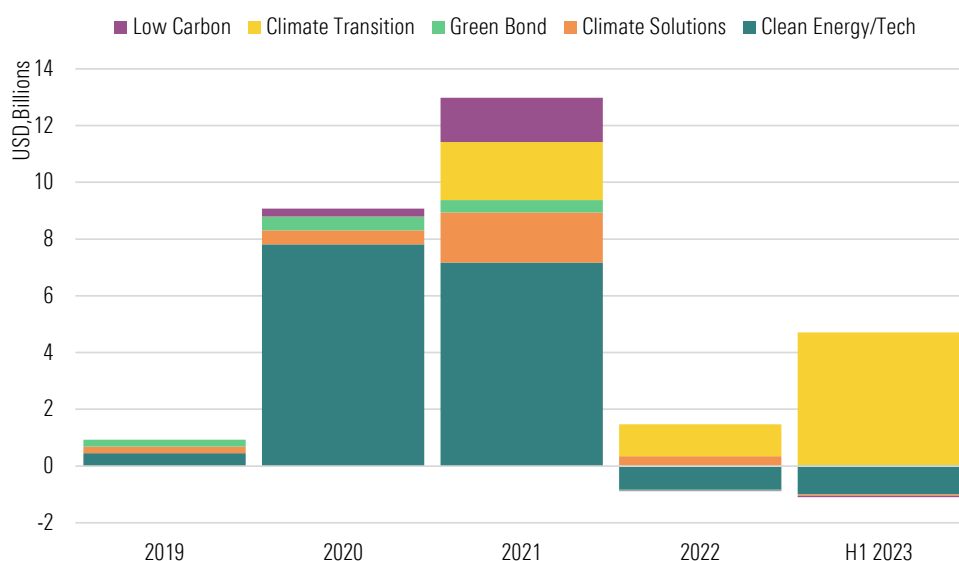


Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

**Climate Transition Funds Attract Most of the Flows**

Except for Climate Transition funds, attracting new money hasn't been easy for U.S. climate funds in the past 18 months. Flows into U.S. climate funds have fallen significantly compared with the segment's record USD 13 billion collection in 2021. Still, flows into climate funds have been more resilient than in the rest of the [U.S. Sustainable Funds Landscape](#), where 2022's annual flows sank to their lowest level in seven years, and sustainable funds shed more than USD 5 billion in the first half of 2023.



**Exhibit 21** Flows Into U.S. Climate Funds

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Climate Transition funds were the clear winners, attracting USD 5.8 billion over the past 18 months and more than offsetting outflows from Clean Energy/Tech funds. Nearly three fourths of this haul went to **Xtrackers MSCI USA Climate Action Equity ETF** and **iShares Climate Conscious & Transition MSCI USA ETF** alone. Both funds track indexes that lean into companies that are well-positioned for the transition to a low-carbon economy or that are actively engaging in the climate transition relative to peers. These processes consider the companies' carbon emissions intensity and emissions reduction targets, among other factors.

Climate Transition funds also topped the chart of flow recipients so far in 2023, but not all funds were so fortunate. Worth highlighting on the withdrawals side is **iShares Global Clean Energy ETF**, the largest fund in our climate fund universe, which suffered more than USD 500 million in outflows so far this year.

**Exhibit 22** U.S. Climate Fund Flows: Leaders and Laggards

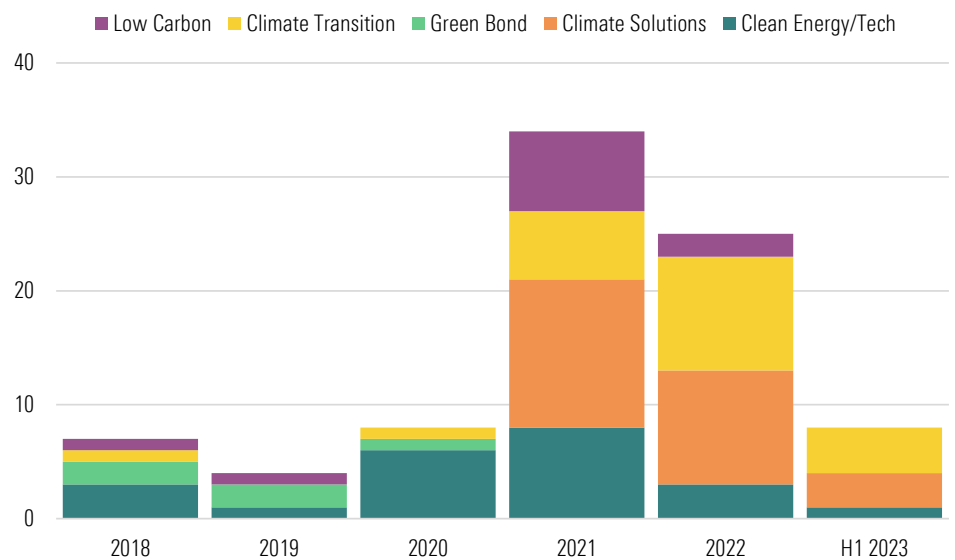
Name	Climate Category	AUM (USD, Bil)	Net Flows YTD (USD, Mil)
iShares Climate Conscious & Transition MSCI USA ETF	Climate Transition	2.24	2,169
Xtrackers MSCI USA Climate Action Equity ETF	Climate Transition	2.21	2,005
iShares Paris-Aligned Climate MSCI USA ETF	Climate Transition	1.54	476
First Trust NASDAQ Clean Edge Smart Grid Infrastructure Index	Clean Energy/Tech	0.91	137
GMO Climate Change	Clean Energy/Tech	1.02	121
iShares MSCI ACWI Low Carbon Target ETF	Low Carbon	0.87	-68
ALPS Clean Energy ETF	Clean Energy/Tech	0.49	-75
First Trust NASDAQ Clean Edge Green Energy Index	Clean Energy/Tech	1.56	-144
Invesco Solar ETF	Clean Energy/Tech	2.08	-250
iShares Global Clean Energy ETF	Clean Energy/Tech	4.24	-516

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

### Product Development Activity Declines

In line with the broader slowdown seen recently in the U.S., product development in climate funds has dropped since the peak in 2021. In 2022, 25 new climate funds came to market, the majority of them Climate Transition or Climate Solutions funds. So far in 2023, only eight new climate strategies launched, roughly one fourth of the total seen in 2021. New sustainable fund launches have also slowed since 2021, so climate strategies still account for more than one fifth of the new strategies launched over the past 18 months.

**Exhibit 23** Launches of U.S. Climate Funds



Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

Nearly half of new climate funds focus on Climate Transition, or those companies that consider climate change in their business strategy and therefore are better prepared for the transition to a low-carbon economy. Many of these funds track EU PABs that are designed to both mitigate climate risks and seek climate-related opportunities, in order to match the transition to a climate-resilient economy. These include **iShares Paris-Aligned Climate MSCI USA ETF**, **Xtrackers Net Zero Pathway Paris Aligned US Equity ETF**, and **SPDR MSCI USA Climate Paris Aligned ETF**.

New Climate Solutions funds include a focus on the infrastructure necessary to support the renewable energy transition. For instance, **Neuberger Berman Carbon Transition & Infrastructure ETF** is an actively managed fund whose portfolio managers invest in companies deriving revenue from the reduction of greenhouse gas emissions as well as infrastructure companies that are focused on renewable energy sources, electrification, and decarbonization solutions. These new launches bring the total number of climate funds in the U.S. to 119 at the end of June.

Below we list the 10 largest U.S. climate funds as of June 2023.

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**Exhibit 24** Largest U.S. Climate Funds

<b>Name</b>	<b>Climate Category</b>	<b>AUM (USD, Bil)</b>
iShares Global Clean Energy ETF	Clean Energy/Tech	4.24
Impax Global Environmental Markets Fund	Climate Solutions	2.43
iShares Climate Conscious & Transition MSCI USA ETF	Climate Transition	2.24
Xtrackers MSCI USA Climate Action Equity ETF	Climate Transition	2.21
Invesco Solar ETF	Clean Energy/Tech	2.08
First Trust NASDAQ® Clean Edge® Green Energy Index Fund	Clean Energy/Tech	1.56
iShares Paris-Aligned Climate MSCI USA ETF	Climate Transition	1.54
BlackRock U.S. Carbon Transition Readiness ETF	Climate Transition	1.53
TIAA-CREF Social Choice Low Carbon Equity Fund	Low Carbon	1.20
GMO Climate Change Fund	Clean Energy/Tech	1.02

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Four of the 10 largest climate funds available to U.S. investors are Climate Transition funds. New to this year's top 10 list are **iShares Climate Conscious & Transition MSCI USA ETF**, **Xtrackers MSCI USA Climate Action Equity ETF**, **iShares Paris-Aligned Climate MSCI USA ETF**, and **GMO Climate Change**. The first two launched in 2023's second quarter but quickly shot up the ranks of the largest U.S. climate funds.

### Regulatory Update

In March 2022, the U.S. Securities and Exchange Commission proposed a rule to enhance and standardize climate-related disclosures for investors.<sup>21</sup> This rule would require public companies to enhance and standardize the disclosure of climate-related risks and opportunities.<sup>22</sup> Although the rule would only apply to company-level climate-risk disclosures, this data would enable funds to provide greater transparency into their climate-risk management strategies—a win for investors. The public comment period for this proposal closed in the second quarter, and we expect the guidance to be finalized in early 2023.<sup>23</sup> We expect a final version of this rule to be shared by the end of 2023.

### Rest of World

#### A Steady Expansion: Australia, Canada, and South Korea Dominate the Space

Climate funds outside of Europe, the U.S., and China represent a small universe, but their assets expanded steadily over the past 18 months to USD 10.2 billion in June 2023 from the restated USD 3.2 billion in 2021 thanks to continued fund flows and new fund launches.

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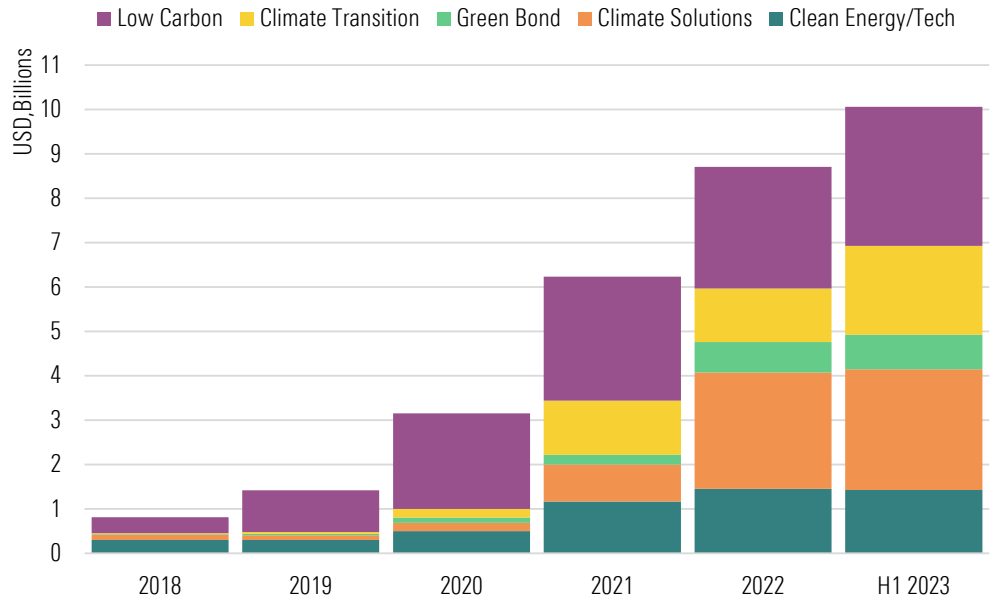
21 U.S. Securities and Exchange Commission. 2023. "SEC Proposes Rules to Enhance and Standardize Climate-Related Disclosures for Investors." <https://www.sec.gov/news/press-release/2022-46>

22 Hale, J. 2022. "The SEC's Proposed Climate-Risk Rule Helps All Investors," Morningstar. <https://www.morningstar.com/articles/1085746/the-secs-proposed-climate-risk-rule-helps-all-investors>

23 Szapiro, A. 2022. "What We Told the SEC About Climate-Related Risk Disclosures," Morningstar. <https://www.morningstar.com/economy/what-we-told-sec-about-climate-related-risk-disclosures>

Climate Solutions funds more than tripled their sizes to USD 2.8 billion from USD 800 million in 2021. Low Carbon continued to be the dominant strategy, taking up 31% of the assets in this universe. Assets in Climate Transition funds grew by 70% to USD 2.2 billion. The most significant growth was found among Green Bond funds: Total assets there almost quadrupled, though their market share remains relatively minor.

**Exhibit 25** Assets in Climate Funds in Rest of World



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

As for the geographical distribution, Australia regained its leadership after overtaking South Korea and Canada in terms of assets, although South Korea remains the largest market in terms of number of climate funds.

**Exhibit 26** Climate Funds in Rest of World

Country	Jun-23		Dec-21		Change in AUM
	Number of Climate Funds	AUM (USD, Mil)	Number of Climate Funds	AUM (USD, Mil)	
Australia	36	2,775	18	2,444	14%
Canada	44	2,615	24	1,849	41%
South Korea	52	1,680	30	1,173	43%
Taiwan	20	1,510	5	179	743%
Japan	21	1,185	8	342	247%
Malaysia	2	104	1	107	-3%
Israel	7	98	7	108	-9%
India	1	83	1	101	-18%
Singapore	3	70	1	6	1096%
Chile	2	18	1	17	10%
New Zealand	2	9	-	-	-
Brazil	4	9	-	-	-
Thailand	1	2	-	-	-
Indonesia	2		-	-	-

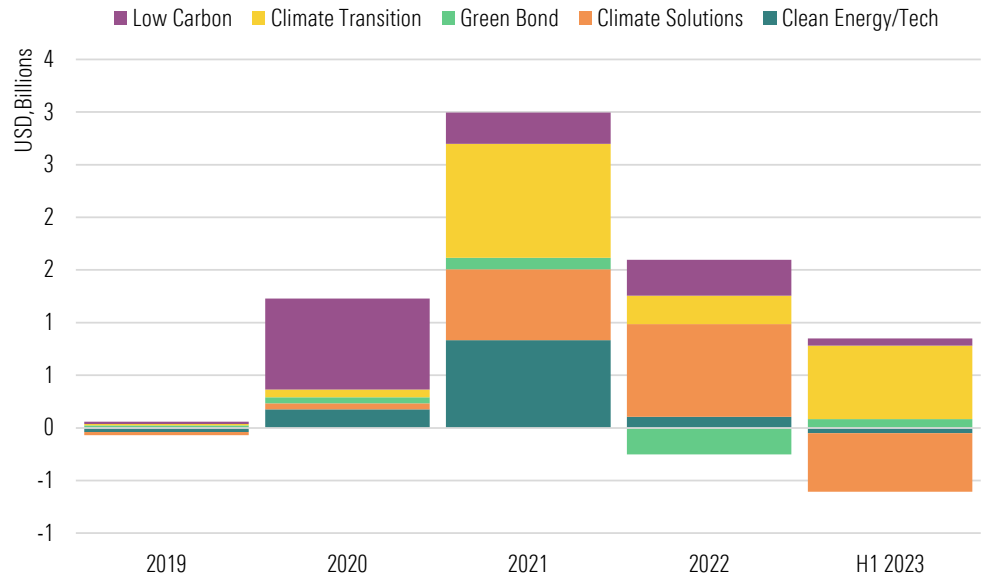
Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Australia, the largest market in the Rest of World group, grew by 13% in assets over the past 18 months, with Low Carbon funds taking up almost two thirds of the assets.

**Transition Funds Gathered the Most Money**

Flows into climate funds in the Rest of World group dropped to USD 240 million in the first half of this year from USD 370 million over the second half of 2022, dragged mostly by the significant outflows from Climate Solutions funds that bled more than USD 550 million over the past six months. This was in striking contrast to last year when the Climate Solution category accounted for almost two thirds of the annual inflow of USD 1.4 billion. Meanwhile, we see a strong comeback for Climate Transition funds in the group, as flows into this category rebounded from last year's USD 270 million—USD 700 million.

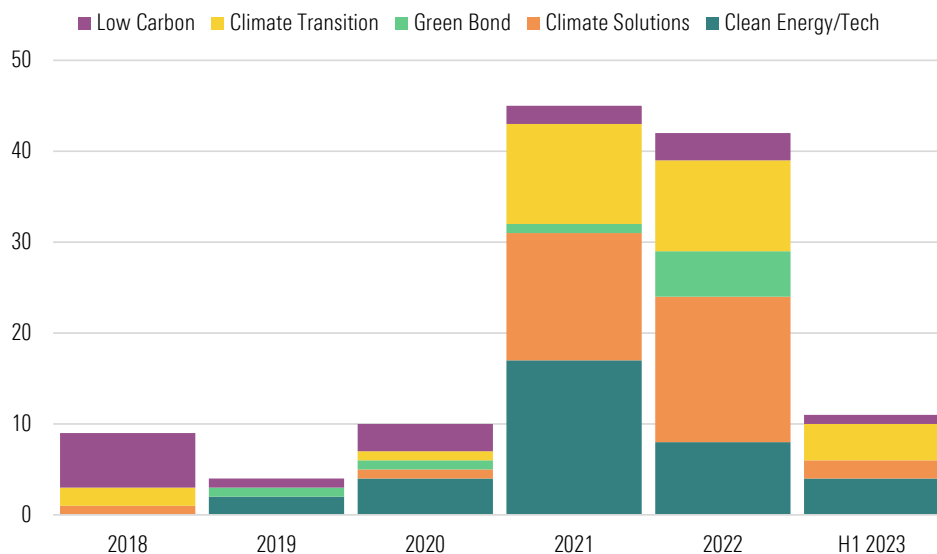
**Exhibit 27** Flows of Climate Funds in Rest of World



Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

**Climate Fund Launches Cool Down**

In contrast to the noticeable asset growth was a cooldown of climate fund launches. The number of newly incepted climate funds in the group fell from 42 for the whole of 2022 to just 11 over the first half of 2023. The largest new fund last year was Taiwan's **Capital Tip Customized Taiwan ESG Low Carbon 50 ETF**, with assets of USD 167 million in June 2023. The passive strategy tracks the Tip Customized Taiwan ESG Low Carbon 50 Index, which first excludes Taiwan-listed companies with below BBB ESG ratings by Taiwan Index Plus and then the top 20% of the remaining firms with the highest carbon intensity.

**Exhibit 28** Launches of Climate Funds in Rest of World

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

Australia hosted 12 of the 38 new climate funds launched last year, but only one of the eight coming to the market so far this year. Canada registered four over the first half of 2023, whereas new launches in Japan and Taiwan were of more significant sizes.

**Exhibit 29** Countries in Rest of World by Number of Climate Fund Launches

Country	Number of Newly Launched Funds	AUM (USD, Mil)
Japan	1	818
Taiwan	2	171
Canada	4	27
South Korea	3	9
Australia	1	8

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

In line with the asset breakdown, the top 10 climate funds in the Rest of World are dominated by Australia-domiciled funds (four), all of which are in the Low Carbon category. With assets of USD 818 million, the newly incepted **iShares MSCI Japan Climate Action ETF** bypassed **Russell Investments Low Carbon Global Shares** to top the list. The former tracks an index that weights companies based on the opportunities and risks associated with the transition to a lower carbon economy. The index is designed to exceed the minimum standards of the EU CTB.

**Exhibit 30** Largest Climate Funds in Rest of World

Name	Climate Category	Domicile	AUM (USD, Mil)
iShares MSCI Japan Climate Action ETF	Climate Transition	Japan	818
Cathay Global Autonomous and Electric Vehicles ETF	Climate Solutions	Taiwan	808
Russell Investments Low Carbon Global Shares Fund	Low Carbon	Australia	611
Russell Invest. Low Carbon Global Shares Fund AUDH	Low Carbon	Australia	559
Fidelity Climate Leadership Fund	Climate Transition	Canada	400
Desjardins SocieTerra Cleantech Fund	Clean Energy/Tech	Canada	340
State Street Climate ESG International Equity Fund	Low Carbon	Australia	243
NH-Amundi Century Enterprise Green Korea Equity	Climate Solutions	South Korea	240
NZAM ETF S&P/JPX Carbon Efficient Index	Low Carbon	Japan	236
SPDR® S&P World ex Australia Carbon Control Fund	Low Carbon	Australia	217

Source: Morningstar Direct. Morningstar Research. Data as of June 2023.

**Regulatory Update**

Earlier this year, both Australia and Japan announced their plans to adopt the [International Sustainability Standards Board disclosure requirements](#)<sup>24</sup> as of 2024. This will aid in the transparency and comparability between companies, particularly with regard to their climate-related progress and net-zero ambitions.

Meanwhile, Canada's Sustainable Finance Action Council [released](#) its [Taxonomy Roadmap Report](#) featuring a Canadian Green and Transition Financial Taxonomy Framework to establish standardized and science-based definitions of [climate-compatible investments](#).

In April, Hong Kong Exchanges and Clearing [proposed](#) new climate-related disclosures aligned with the International Sustainability Standards Board Climate Standard that will become mandatory in 2024 and subject HKEX-listed companies to the most stringent ESG disclosure requirements in the region.

Thailand's Securities and Exchange Commission [issued](#) new voluntary guidelines for asset managers to help them assess, manage, and disclose climate-related risks in order to enhance transparency and mitigate potential greenwashing risks.

<sup>24</sup> FRS' International Sustainability Standards Board published its long-awaited standards on sustainability and climate disclosure. The ISSB climate standard includes the same reporting pillars as the Taskforce on Climate-related Financial Disclosures, (that is, governance, strategy, risk management, and metrics and targets) and requires issuers to disclose material qualitative and quantitative information about climate-related risks and opportunities. Issuers are also expected to report on their transition plans, climate resiliency assessments, and, if material, Scope 1, 2, and 3 emissions based on the Greenhouse Gas Protocol Corporate Standard. Read [what the ISSB standards mean for investors in our blog](#).



### How Do These Funds Stack Up?

In this section, we analyze our list of funds by climate strategy type to ascertain how they compare against one another and whether they deliver what they claim. For example, do Low Carbon funds exhibit lower exposure to high-carbon-emitting companies relative to a broad market index? Do Climate Solution and Clean Energy/Tech funds achieve higher exposure to green solutions?

The next few exhibits compare funds in the five climate strategy groups against the Morningstar Global Target Market Exposure Index,<sup>25</sup> a broad market benchmark that provides exposure to developed and emerging markets. We use the following Morningstar metrics for comparison: Carbon Intensity Scope 1, 2, and 3; Fossil Fuel Percentage of Covered Portfolio Involved; Oil and Gas Production Percentage of Covered Portfolio Involved; Thermal Coal Power Generation Percentage of Covered Portfolio Involved; and Carbon Solutions Percentage of Covered Portfolio Involved. For each, Morningstar leverages Sustainalytics company-level carbon metrics, which it aggregates at the fund level on an asset-weighted basis. In most of these tests, a lower score is optimal; for Carbon Solutions Involvement, a higher percentage is better.

### Carbon Intensity Scope 1, 2, and 3

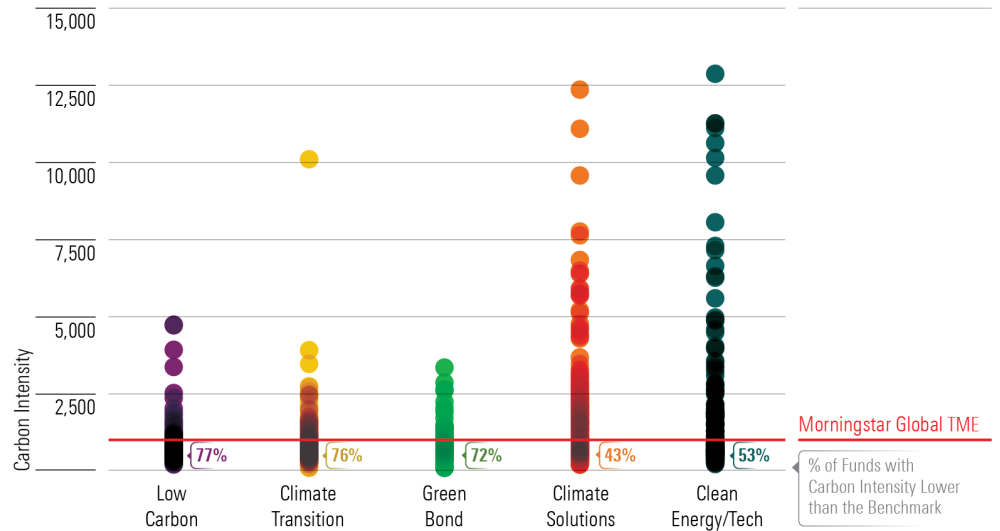
First, we test each fund's level of carbon intensity, which is computed for each portfolio holding as follows: Total Emissions for Scope 1, 2, and 3 (metric tons of CO<sub>2</sub>)/Revenue (USD million) and aggregated at the fund level. A lower score is better.

Each marker in Exhibit 31 represents a fund and its carbon intensity. The callout boxes display the percentage of funds in each climate strategy group that exhibit lower carbon intensity than the Morningstar Global Target Market Exposure Index.

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<sup>25</sup> The Morningstar Global Target Market Exposure Index is a rule-based, float-adjusted, market-cap-weighted index designed to cover 85% of the equity float-adjusted market cap of the global equity markets. For more detail, refer to the Construction Rules for the Morningstar Global Target Market Exposure Index Family, Morningstar Indexes, June 2023. <https://indexes.morningstar.com/docs/rulebook/morningstar-global-target-market-exposure-FS0000DQH7>. As of June 2023, the top three sectors were technology (22.6%), financial services (15.4%), and healthcare (11.9%). Energy stocks represented 4.6% of the index (compared with 5% one year earlier). In terms of regional exposure, North America was the largest exposure (63.5%), followed by Greater Asia (17.6%) and developed Europe (12.5%). Emerging markets overall accounted for only 7.6% of the index.

**Exhibit 31** Carbon Intensity for All Fund Groups Versus Morningstar Global Target Market Exposure Index (tCO<sub>2</sub>/USD Million)



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Based on 1,156 climate funds with available Carbon Intensity Scope 1, 2, and 3 metric, including 152 Low Carbon, 376 Climate Transition, 101 Green Bond, 332 Climate Solutions, and 195 Clean Energy/Tech funds. For Green Bonds, the analysis is carried out at the issuer level, not on the issuance itself.

Of the 1,157 funds covered by the Carbon Intensity Scope 1, 2, and 3 metric, 725 (63%) offer an improvement on the global equity benchmark. As expected, a large majority of these are Low Carbon and Climate Transition funds. By contrast, most of the Climate Solutions funds (57%) and close to half (47%) of the Clean Energy/Tech funds exhibit higher carbon intensity than the benchmark. This reflects the fact that alongside pure-plays in the renewable energy sector like solar photovoltaic system manufacturers SolarEdge Tech and Enphase Energy, which score low on carbon intensity, many Climate Solutions and Clean Energy/Tech portfolios invest in more-diversified companies that operate carbon-intensive businesses. These currently high-emissions companies will be key drivers of the transition to a low-carbon economy.

An example is Schneider Electric, a leading global supplier of electrical and industrial automation equipment. The manufacturing of heavy electrical equipment for power generation and transmission requires large amounts of energy for assembly processes and moving materials along production lines that are increasingly complex, which often lead to high levels of carbon emission. In contrast, Denmark's Ørsted, one of the world's largest renewable energy companies, carries nearly 90% of its energy mix in renewables.<sup>26</sup> Although the electric utilities industry is still very carbon-intensive, Ørsted's carbon footprint has significantly improved in the past several years, following a divestment of its oil and gas assets, a significant reduction in its reliance on coal, and aggressive investment in wind energy.

Carbon Intensity Scope 1, 2, and 3 is a normalized metric dependent on both aggregate carbon footprint and revenue. Large-cap equity stocks can often have a lower carbon intensity thanks to their higher

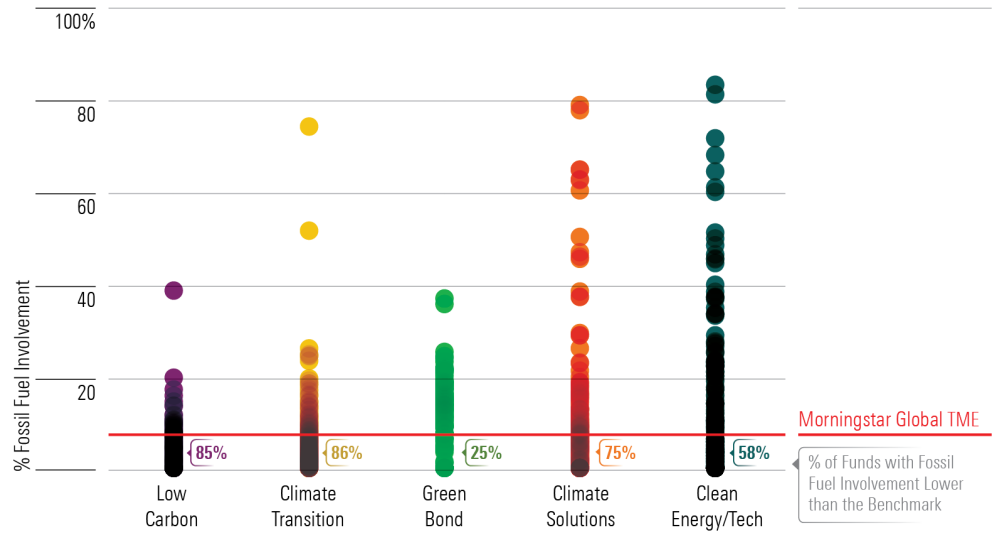
<sup>26</sup> <https://orsted.co.uk/business/sustainable-energy/our-fuel-mix>

revenue and at least lower Scope 1 emissions<sup>27</sup> when compared with the type of industrial companies that would be involved in engineering green energy solutions.

**Fossil Fuel Involvement**

Next, we test the exposure of climate funds to fossil fuel companies. For this, we use the Fossil Fuel Percentage of Covered Portfolio Involved metric. It is defined as a percentage of the covered portfolio that is exposed to corporations that make any revenue (that is, more than 0%) from fossil fuels. Companies involved in fossil fuels may derive revenue from one or more of the following activities: thermal coal extraction, thermal coal power generation, oil and gas production, oil and gas power generation, and oil and gas products and services. A "covered portfolio" represents one with available records of the fossil fuel related business activities highlighted above and provided by Morningstar Sustainalytics. Each marker in Exhibit 32 represents a fund and its exposure to fossil fuels. A lower involvement percentage is optimal.

**Exhibit 32** Percentage of Fossil Fuel Involvement Versus Morningstar Global Target Market Exposure Index



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Based on 1,163 climate funds with available Fossil Fuel Percentage of Covered Portfolio Involved metric, including 152 Low Carbon, 377 Climate Transition, 104 Green Bond, 333 Climate Solutions, and 197 Clean Energy/Tech funds. For Green Bonds, the analysis is carried out at the issuer level, not on the issuance itself.

The overwhelming majority of Low Carbon (85%), Climate Transition (86%), and Climate Solutions (75%) funds have lower fossil fuel involvement than the index average of 11%. However, only 25% of Green Bond funds and 58% of Clean Energy/Tech funds meet this criterion. This is because, as previously mentioned, many of these portfolios invest in utilities companies that have built large renewable energy operations but still operate their legacy fossil fuel businesses.

For example, NextEra Energy, a leading wind farm and solar builder and operator in the U.S., still derives part of its energy mix from fossil fuels (thermal coal and oil and gas) and still builds and operates gas

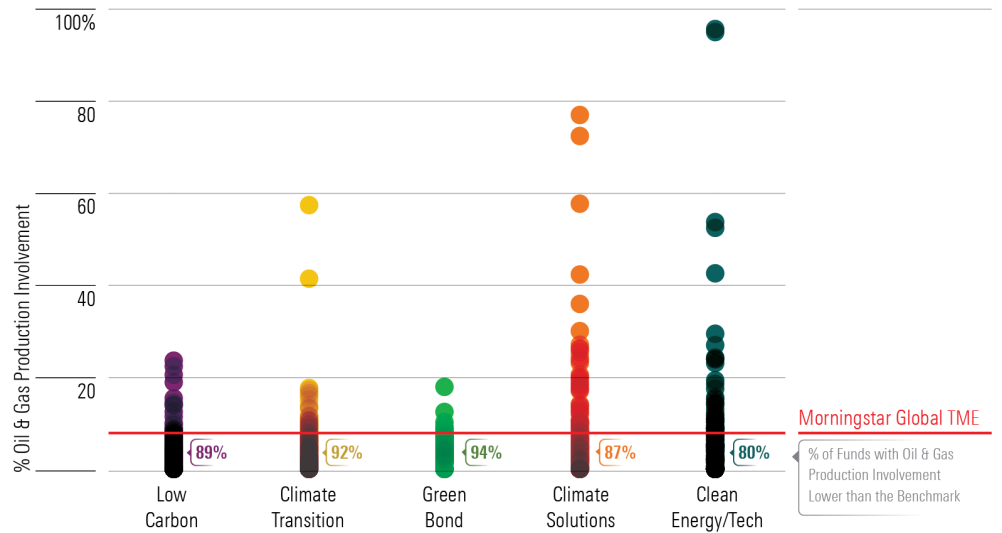
<sup>27</sup> Scope 1 describes direct emissions from owned or controlled resources. Scope 2 describes indirect emissions from purchased electricity. Scope 3 describes all other indirect emissions that occur in a company's value chain, including business travel and procurement.

transmission pipelines. Many companies that issue green bonds are transitioning away from traditional forms of energy.

### Oil and Gas Production Involvement

We now test the exposure of climate-related funds to oil and gas production. The metric used here is Oil and Gas Production Percentage of Covered Portfolio Involved. It is the percentage of the covered portfolio exposed to corporations that make any revenue (that is, more than 0%) from oil and gas production. Involvement in oil and gas production includes involvement in exploration and production, refining, transportation, and storage. Each marker in Exhibit 33 represents a fund and its involvement in oil and gas production. A lower involvement percentage is optimal.

**Exhibit 33** Percentage of Oil and Gas Production Versus Morningstar Global Target Market Exposure Index



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Based on 1,163 climate funds with available Oil and Gas Production Percentage of Covered Portfolio Involved metric, including 152 Low Carbon, 377 Climate Transition, 104 Green Bond, 333 Climate Solutions, and 197 Clean Energy/Tech funds. For Green Bonds, the analysis is carried out at the issuer level, not on the issuance itself.

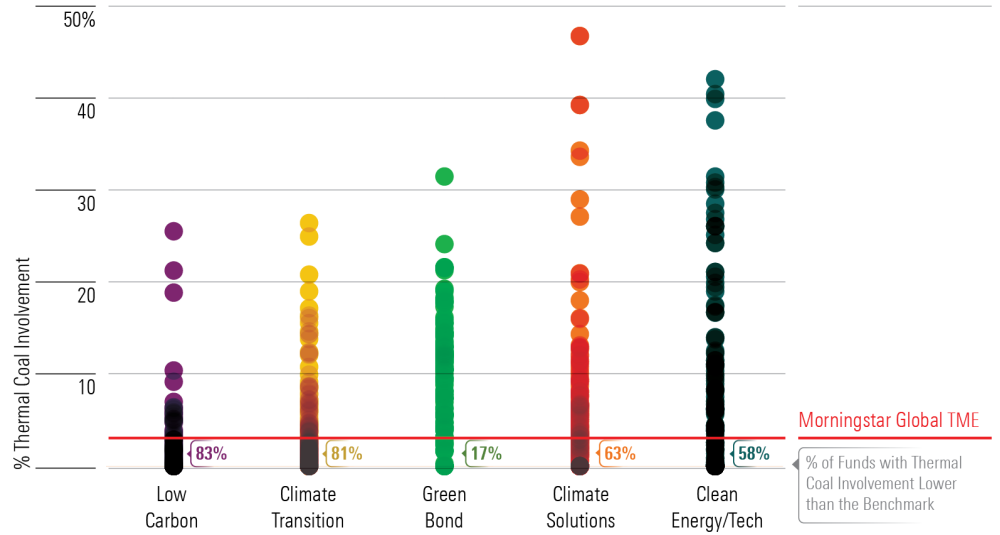
The vast majority (88%) of funds in our list have lower exposure to oil and gas producers than the benchmark, which at the end of June 2023 amounted to 8.6%. We see the most severe outliers in the Climate Solutions and Clean Energy/Tech. For example, **UBS Future Energy Leaders** has more than 42% exposure to oil and gas production. This is driven in part by the fund's focus on companies considered to be central to the energy transition and building the future energy system. These companies are involved in activities such as renewable electricity, advanced biofuels, hydrogen, carbon capture, and grid stability.

### Thermal Coal Power Generation Involvement

Here we test the exposure of our list of funds to one of the most carbon-intensive energy sources. We use the Thermal Coal Power Generation Percentage of Covered Portfolio Involved metric, which represents the percentage of the covered portfolio that is exposed to corporations that make any revenue (that is, more than 0%) from power generation based on thermal coal, including companies that

own or operate coal-fired power plants. Each marker in Exhibit 34 represents a fund and its involvement in thermal coal. In this test, a lower involvement percentage is optimal.

**Exhibit 34** Percentage of Thermal Coal Involvement Versus Morningstar Global Target Market Exposure Index



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Based on 1,163 climate funds with available Thermal Coal Power Generation Percentage of Covered Portfolio Involved metric, including 152 Low Carbon, 377 Climate Transition, 104 Green Bond, 333 Climate Solutions, and 197 Clean Energy/Tech funds. For Green Bonds, the analysis is carried out at the issuer level, not on the issuance itself.

Only 17% of the Green Bond funds with available thermal coal involvement records managed to beat the global equity benchmark. This is unsurprising given the relatively high exposure of these funds to traditional utilities companies that are looking to finance green projects and transition away from their highly intensive coal-fired electricity generation activities.

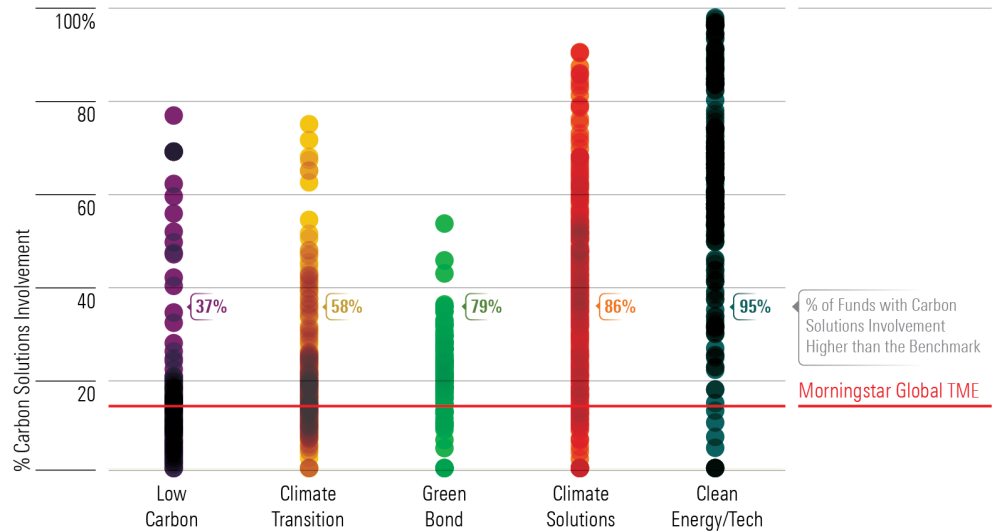
Meanwhile, Low Carbon and Climate Transition funds exhibit much lower levels of thermal coal involvement; more than 80% of these portfolios have less exposure to coal than the Morningstar Global Target Market Exposure Index. Nonetheless, only 63% of Climate Solutions funds and 58% of Clean Energy/Tech funds demonstrated lower exposure than the benchmark.

**Carbon Solutions Involvement**

Here we analyze how much exposure to carbon solutions investors can expect from climate funds. The metric used here is Carbon Solutions Percentage of Covered Portfolio Involved. It is calculated as the percentage of the covered portfolio that is exposed to corporations that make any revenue (that is, more than 0%) from carbon solutions, including renewable energy generation, renewable energy supporting products/services, energy efficiency distribution and management, energy efficiency material, energy efficiency industrial systems and processes, energy efficiency consumer products, green buildings development, green buildings management, green buildings technologies and materials, green transportation vehicles, green transportation technologies, green transportation services, and green transportation infrastructure involvement. A higher percentage is optimal.

Each marker in Exhibit 35 represents a fund and its carbon solutions involvement. In this test, a higher involvement percentage is optimal.

**Exhibit 35** Percentage of Carbon Solutions Involvement Versus Morningstar Global Target Market Exposure Index



Source: Morningstar Direct. Morningstar Research. Data as of June 2023. Based on 1,163 climate funds with available Carbon Solutions Percentage of Covered Portfolio Involved metric, including 152 Low Carbon, 377 Climate Transition, 104 Green Bond, 333 Climate Solutions, and 197 Clean Energy/Tech funds. For Green Bonds, the analysis is carried out at the issuer level, not on the issuance itself.

As expected, the funds offering the highest exposure to carbon solutions are in the Climate Solutions and Clean Energy/tech categories. About 86% and 95% of these portfolios, respectively, exhibit higher exposure than the benchmark, although the level of involvement across offerings varies greatly. EDP Renovaveis SA, a top holding in many of these portfolios, is a renewable energy developer that builds, owns, and operates electricity facilities. This company is almost entirely focused on onshore wind, offshore wind, and solar.

By contrast, only about 37% of Low Carbon funds beat the global market benchmark in terms of carbon solutions exposure. By excluding or reducing exposure to fossil fuel or other carbon-intensive companies, Low Carbon funds may be missing out on exposure to climate solutions, as these companies are increasingly developing products and services that address climate change. Climate Transition funds tend to offer slightly more exposure to green solutions.

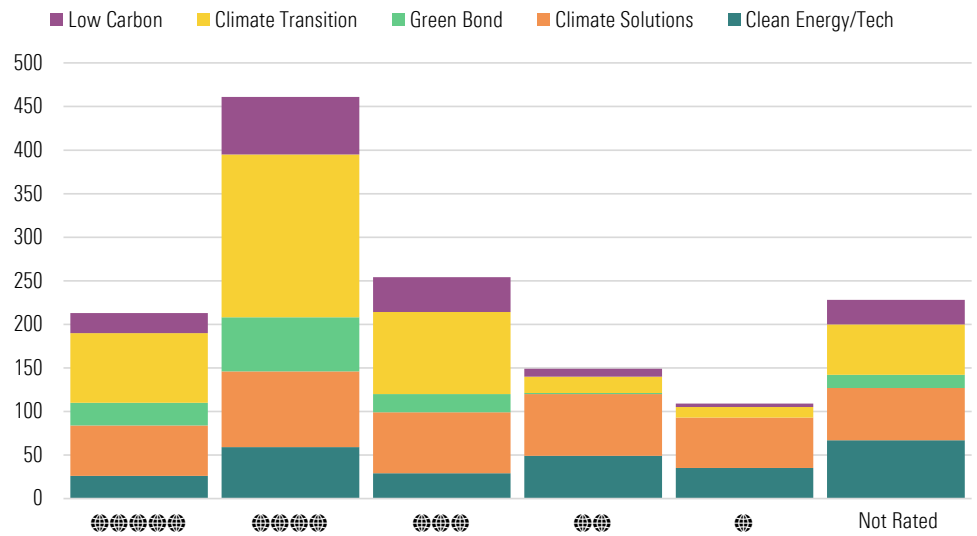
**What About Broader ESG Concerns?**

Although climate metrics are the chief concern for investors in these funds, many will also want to limit exposure to broader ESG risks. In Exhibit 36, we assess the universe of climate funds against the Morningstar Sustainability Rating, commonly referred to as the globe rating. The globes reflect the level of ESG risk present in the portfolio normalized on a peer-relative basis. There is a skew toward Strong ESG risk management in this cohort, with close to 50% of rated funds scoring 4- or 5-globes.<sup>28</sup> However,

<sup>28</sup> A globe rating will be generated if there is ESG risk data available for more than 67% of the portfolio for the trailing 12 months. There are 319 funds in this sample that are not rated owing to lack of coverage.

climate funds in aggregate do not fare as well when compared with the overall sustainable fund universe. About 57% and 65% of sustainable funds in Europe and the U.S., respectively, carry 4- or 5-globe ratings.

**Exhibit 36** Globe Ratings of Climate Funds—Total Universe



Source: Morningstar Direct, Morningstar Research. Data as of June 2023.

Consistent with the findings based on the Carbon Intensity Scope 1, 2, and 3 metric, Climate Solutions and Clean Energy/Tech funds make up the vast majority (83%) of the climate funds with 1- or 2-globe ratings. Very few Low Carbon and Climate Transition funds score poorly on the Morningstar Sustainability Rating (only 7% of rated funds in these two groupings earn either 1- or 2-globes), as these tend to invest in companies with Above Average or Strong ESG risk management.

## What's Inside Climate Funds?

In this section, we look inside climate funds to examine the most commonly held companies in each grouping. In the first subsection, we dive into the Low Carbon Transition Rating for companies from Morningstar Sustainalytics, as well as some underlying metrics, including dominant scope of emissions and management quality. Following this, we compare companies on traditional metrics such as their style, Morningstar rating, and returns.

### Introducing the Low Carbon Transition Rating

The Low Carbon Transition Rating, or LCTR, is a science-based and forward-looking assessment of a company's current alignment to a net-zero pathway that limits global warming to 1.5°C above pre-industrial levels.<sup>29</sup> It is based on the principle that each company is expected to limit its fair share budget of emissions.<sup>30</sup> A company's LCTR is expressed as an Implied Temperature Rise, or ITR, that indicates how close a company is to operating within its net-zero (1.5°C) budget. It also signifies the expected level of global warming if the global economy had the same proportion of emissions misaligned to the net-zero budget of the company.

A company's ITR comprises two assessments: the exposure assessment, which evaluates how the company would be expected to perform if it took no actions to reduce emissions; and the management assessment, which evaluates how prepared the company is to manage its emissions through its governance, policies, programs, and investments. Company management receives a score ranging from Very Weak to Very Strong and is based on indicators such as the use of an internal carbon price, programs to support customers' reduction of energy or water consumption, and management incentives to reduce emissions.<sup>31</sup>

Exhibits 37, 38, 39, and 40 show the ITR scores for the 20 most popular holdings in each of our climate-fund groupings.<sup>32</sup> Looking at the numbers, some investors may be surprised to see that not a single company has an ITR of 1.5° or less, meaning that none are aligned with the Paris Agreement's goal to limit global warming to 1.5°C above preindustrial levels.<sup>33</sup> In fact, out of the 5,800 public companies currently covered under the LCTR, only one is aligned to a 1.5C pathway: healthcare firm Novartis, which can be found in roughly 120 of the 1,000-plus climate-fund portfolios for which we have equity holding data.

29 Morningstar Sustainalytics Research. 2023. "Morningstar Low Carbon Transition Rating Methodology."

<https://connect.sustainalytics.com/hubfs/INV/Climate%20Solutions/Low%20Carbon%20Transition%20Ratings/Sustainalytics%20-%20Low%20Carbon%20Transition%20Rating%20-%20Methodology%20Abstract.pdf>

30 Sustainalytics evaluates each company's "fair-share" budget for greenhouse gas emissions based on the company's business model and where it operates. Some companies face inherently greater exposure to carbon risk by nature of their industry or subindustry, while some types of operations (that is, coal companies) are deemed incompatible with a net-zero scenario.

31 For more details, see Joshi, P. 2023. "A New Tool at the Table: Understanding Low Carbon Transition Risk By Industry and How Companies Are Managing It." Morningstar.

32 With the exception of Green Bond funds, as most of the data we examine here is stock-specific.

33 The balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere. This is in line with the Paris Agreement, which has the goal of "limiting global warming to well below 2°C, preferably to 1.5°C, compared with preindustrial levels."



Below we list the 20 companies most commonly held in Low Carbon funds.

**Exhibit 37** Most Commonly Held Companies in Low Carbon Funds: Climate Metrics

Company	Domicile	Industry	Implied Temperature Rise		Carbon Emission Profile		Management Quality	ESG Risk Rating
			ITR (°C)	Industry % Rank	Key Scope	% Total Emissions		
Alphabet	United States	Software & Services	2.5	14	3	59	Strong	🌐🌐🌐
Henkel & Co	Germany	Household Products	4.0	60	3	99	Strong	🌐🌐🌐🌐
Atlas Copco	Sweden	Machinery	2.3	4	3	53	Strong	🌐🌐🌐
BMW	Germany	Automobiles	3.6	18	3	98	Strong	🌐🌐🌐
Microsoft	United States	Software & Services	2.7	23	3	74	Strong	🌐🌐🌐🌐
ASML Holding NV	Netherlands	Semiconductors	5.5	92	3	98	Strong	🌐🌐🌐🌐🌐
Schneider Electric	France	Electrical Equipment	2.2	25	3	99	Strong	🌐🌐🌐🌐
AXA	France	Insurance	2.2	46	2	66	Average	🌐🌐🌐🌐
Fox	United States	Media	2.1	7	2	73	Weak	🌐🌐🌐🌐
Inditex	Spain	Retailing	5.8	87	3	97	Strong	🌐🌐🌐🌐
Adobe	United States	Software & Services	3.1	32	3	87	Strong	🌐🌐🌐🌐
Redeia Corp	Spain	Utilities	1.9	10	2	55	Strong	🌐🌐🌐🌐
SAP	Germany	Software & Services	2.0	4	3	40	Strong	🌐🌐🌐🌐
L'Oreal	France	Household Products	6.0	94	3	99	Average	🌐🌐🌐🌐
Nokia	Finland	Technology Hardware	4.8	91	3	99	Strong	🌐🌐🌐🌐
Novo Nordisk	Denmark	Pharmaceuticals	2.3	23	3	47	Average	🌐🌐🌐
Munich Re Group	Germany	Insurance	2.2	55	2	47	Average	🌐🌐🌐🌐
Orange	France	Telecom	1.9	14	2	74	Strong	🌐🌐🌐
AstraZeneca	United Kingdom	Pharmaceuticals	4.8	89	3	94	Strong	🌐🌐🌐
Elevance Health	United States	Healthcare	4.1	81	3	92	Average	🌐🌐🌐🌐

Source: Morningstar Direct, Sustainalytics. Data as of August 2023. Emissions data for Scope 3 is subdivided into Upstream and Downstream emissions; these figures have been combined for purposes of display. In the ESG Risk Rating Assessment, 5-globes are equivalent to Negligible ESG Risk, and 1-globe is equivalent to Severe ESG Risk.

Low Carbon funds include some companies that are only moderately misaligned to the 1.5°C goal; at the top of the list are Redeia Corporacion SA, which owns and operates the Spanish electric grid, and Orange SA, which operates the French telecom network. Both companies have ITRs of 1.9°C and Strong management of their emissions, which are predominantly concentrated in Scope 2 (emissions from purchased energy).

On the other end of the spectrum is L'Oréal SA, the largest beauty company in the world. With 94% of its emissions coming from its suppliers,<sup>34</sup> mainly chemicals producers (Scope 3-Upstream), and just Average management of these emissions, L'Oréal's business model comes with an ITR of 6°C (only slightly reducing its projected emissions exposure of 6.5°C). Perhaps surprisingly, L'Oréal receives 4-globes (Low ESG Risk) because carbon emissions are considered less financially material than other issues such as human rights in the supply chain and product governance.

Other severely misaligned companies include ASML (5.5°C), Inditex (5.8°C), Nokia (4.8°C), AstraZeneca (4.8°C), and Elevance Health (4.1°C), which rank among the worst in their respective industries in terms of ITR. ASML ranks 92nd, Inditex 87th, Nokia 91st, AstraZeneca 89th, and Elevance Health 81st, despite

<sup>34</sup> L'Oréal has 99.7% of its total emissions coming from Scope 3, split into Upstream (from suppliers, 94.4%) and Downstream (from the products' use by consumers, 5.3%). These have been combined in Exhibit 37 for purposes of display.

most of them having strong management quality scores. This can be mostly explained by the fact that all these companies started with high projected emissions exposure, from 3.9°C for Elevance Health to 6.6°C for ASML.

Out of the 20 companies listed in the Low Carbon table above, 15 have Scope 3 as the dominant source of emissions. However, ASML also stands out as the lone recipient of 5-globes (Negligible ESG Risk). This is because issues such as carbon emissions, waste, and carbon-intensive operations have little weight on the company's overall risks, compared with issues such as human capital and occupational health and safety. Furthermore, its management of these risks, like its management of its carbon emissions risks, is Strong.

**Exhibit 38** Most Commonly Held Companies in Climate Transition Funds: Climate Metrics

Company	Domicile	Industry	Implied Temperature Rise		Carbon Emission Profile		Management Quality	ESG Risk Rating
			ITR (°C)	Industry % Rank	Key Scope	% Total Emissions		
Alphabet	United States	Software & Services	2.5	14	3	59	Strong	🌐🌐🌐
Schneider Electric	France	Electrical Equipment	2.2	25	3	99	Strong	🌐🌐🌐🌐
Microsoft	United States	Software & Services	2.7	23	3	74	Strong	🌐🌐🌐🌐
ASML Holding NV	Netherlands	Semiconductors	5.5	92	3	98	Strong	🌐🌐🌐🌐🌐
Roche Holding	Switzerland	Pharmaceuticals	6.0	98	3	95	Average	🌐🌐🌐
Henkel & Co	Germany	Household Products	4.0	60	3	99	Strong	🌐🌐🌐🌐
Infineon Tech	Germany	Semiconductors	2.4	30	3	49	Strong	🌐🌐🌐🌐
BMW	Germany	Automobiles	3.6	18	3	98	Strong	🌐🌐🌐
Novo Nordisk	Denmark	Pharmaceuticals	2.3	23	3	47	Average	🌐🌐🌐
Vestas Wind Systems	Denmark	Electrical Equipment	2.5	70	3	99	Average	🌐🌐🌐🌐
NVIDIA	United States	Semiconductors	4.0	76	3	95	Strong	🌐🌐🌐🌐
Atlas Copco	Sweden	Machinery	2.3	4	3	53	Strong	🌐🌐🌐
Autodesk	United States	Software & Services	3.1	33	3	92	Strong	🌐🌐🌐🌐
L'Oreal	France	Household Products	6.0	94	3	99	Average	🌐🌐🌐🌐
SAP	Germany	Software & Services	2.0	4	3	40	Strong	🌐🌐🌐🌐
Mastercard	United States	Software & Services	3.4	42	3	90	Strong	🌐🌐🌐🌐
Adobe	United States	Software & Services	3.1	32	3	87	Strong	🌐🌐🌐🌐
Munich Re Group	Germany	Insurance	2.2	55	2	47	Average	🌐🌐🌐🌐
EDP Renovaveis	Spain	Utilities	2.2	24	2	87	Average	🌐🌐🌐🌐
Visa	United States	Software & Services	3.7	50	3	84	Average	🌐🌐🌐🌐

Source: Morningstar Direct, Sustainalytics. Data as of August 2023. Emissions data for Scope 3 is subdivided into Upstream and Downstream emissions; these figures have been combined for purposes of display. In the ESG Risk Rating Assessment, 5-globes are equivalent to Negligible ESG Risk, and 1-globe is equivalent to Severe ESG Risk.

L'Oréal ranks among the most commonly held companies in Climate Transition funds, too. Surprisingly, Roche Holding AG, a Swiss biopharmaceutical and diagnostic company, joins it as another severely misaligned company with an ITR of 6°C. Roche's severe misalignment to its net-zero pathway is a combination of significant Scope 3-Upstream emission exposure and only Average management of its low-carbon transition issues.

For all but two of the most commonly held stocks in Climate Transition funds, the bulk of emissions come from Scope 3. This underscores the importance of taking a holistic view of a company's management of its full carbon emissions when building a low-carbon-risk portfolio.

**Exhibit 39** Most Commonly Held Companies in Climate Solutions Funds: Climate Metrics

Company	Domicile	Industry	Implied Temperature Rise		Carbon Emission Profile		Management Quality	ESG Risk Rating
			ITR (°C)	Industry % Rank	Key Scope	% Total Emissions		
Contemporary Amperex Tech	China	Electrical Equipment	2.2	18	3	65	Weak	🌐🌐
Schneider Electric	France	Electrical Equipment	2.2	25	3	99	Strong	🌐🌐🌐🌐
BYD	China	Automobiles	4.8	53	3	90	Weak	🌐🌐🌐
Vestas Wind Systems	Denmark	Electrical Equipment	2.5	70	3	99	Average	🌐🌐🌐🌐
SolarEdge Tech	United States	Electrical Equipment	2.0	7	2	57	Average	🌐🌐🌐🌐
Infineon Tech	Germany	Semiconductors	2.4	30	3	49	Strong	🌐🌐🌐🌐
Enphase Energy	United States	Electrical Equipment						🌐🌐🌐
Ørsted	Denmark	Utilities	1.8	6	3	89	Strong	🌐🌐🌐🌐
Xylem	United States	Machinery	3.3	62	3	100	Average	🌐🌐🌐🌐
Waste Management	United States	Commercial Services	3.1	53	1	82	Strong	🌐🌐🌐🌐
First Solar	United States	Semiconductors	2.9	50	3	78	Strong	🌐🌐🌐🌐
Guangzhou Tinci Materials Tech	China	Chemicals	2.3	11	3	61	Weak	🌐🌐
Aptiv	Jersey	Auto Components	2.4	32	3	98	Average	🌐🌐🌐🌐
Samsung	South Korea	Technology Hardware	1.9	7	2	74	Average	🌐🌐🌐
Ganfeng Lithium Group	China	Chemicals	2.3	11	2	29	Weak	🌐🌐🌐
Linde	Ireland	Chemicals	2.4	23	2	36	Strong	
EVE Energy	China	Electrical Equipment	2.5	63	3	81	Weak	🌐🌐
Darling Ingredients	United States	Food Products	2.2	5	1	66	Weak	🌐🌐🌐
EDP Renovaveis	Spain	Utilities	2.2	24	2	87	Average	🌐🌐🌐🌐
Shanghai Putailai New Energy Tech	China	Electrical Equipment	2.4	56	3	80	Weak	🌐🌐

Source: Morningstar Direct. Sustainalytics. Data as of August 2023. Emissions data for Scope 3 is subdivided into Upstream and Downstream emissions; these figures have been combined for purposes of display. In the ESG Risk Rating Assessment, 5-globes are equivalent to Negligible ESG Risk, and 1-globe is equivalent to Severe ESG Risk.

Eight of the 20 stocks commonly held by Climate Solutions funds are new to the chart this year, and five of those are Chinese companies. Contemporary Amperex Technology is the largest electric vehicle battery manufacturer in the world. However, its management of Scope 3-Downstream emissions (from car manufacturers and drivers) is Weak, resulting in significant misalignment with the 1.5°C goal with an ITR of 2.2°C. Similarly, it receives 2-globes (High ESG Risk). Compared with peers in the electrical equipment industry, Contemporary Amperex Tech's management of material ESG issues like business ethics, human capital, and occupational health and safety, is deemed Weak.

Some of the most commonly held names in Climate Solutions funds rank close to the top of their respective industries when it comes to the Low Carbon Transition Rating. For example, Ørsted, a Danish Utilities company, is moderately misaligned to its net-zero pathway. However, its management of carbon emissions and risks related to the transition is Strong, driving an ITR of just 1.8°C.

Darling Ingredients and Waste Management stand out as two companies whose carbon emissions are mostly concentrated in Scope 1, accounting for 67% and 82% of total emissions, respectively. Scope 1

emissions are generally considered the easiest to manage, given that they come from a company's own operations. Even though the firm's management of its emissions is Strong, its ITR is 3.1°C, scoring in the 53rd percentile of the commercial services industry because many of its peers are stronger on these metrics. Nonetheless, Darling Ingredients, which has Weak management programs in place, fares better with an ITR of 2.2°C. Though a small portion of Darling Ingredients' overall business, bioenergy (a form of renewable energy derived from organic materials) accounts for part of the company's revenue, making it a suitable option for some Climate Solutions funds. Waste Management, on the other hand, generates a notable share of its revenue from recycling.

Out of the 19 names listed above, 12 have Scope 3 as their main source of emissions, while for seven companies, Scope 1 or 2 is the dominant scope. For the latter firms, measuring and managing emissions are easier than for the former.

**Exhibit 40** Most Commonly Held Companies in Clean Energy/Tech Funds: Climate Metrics

Company	Domicile	Industry	Implied Temperature Rise		Carbon Emission Profile		Management Quality	ESG Risk Rating
			ITR (°C)	Industry % Rank	Key Scope	% Total Emissions		
SolarEdge Tech	Israel	Electrical Equipment	2.0	7	2	57	Average	🌍🌍🌍🌍
Enphase Energy	United States	Electrical Equipment						🌍🌍🌍
First Solar	United States	Semiconductors	2.9	50	3	78	Strong	🌍🌍🌍🌍
Sunrun	United States	Utilities						🌍🌍🌍
Sungrow Power Supply	China	Electrical Equipment	2.4	59	3	94	Weak	🌍🌍🌍
Plug Power	United States	Electrical Equipment	2.8	84	3	88	Weak	🌍🌍
Vestas Wind Systems	Denmark	Electrical Equipment	2.5	70	3	99	Average	🌍🌍🌍🌍
Array Tech	United States	Semiconductors						🌍🌍🌍🌍
Flat Glass Group	China	Building Products	2.0	3	1	38	Weak	🌍🌍🌍
Contemporary Amperex Tech	China	Electrical Equipment	2.2	18	3	65	Weak	🌍🌍
JA Solar Tech	China	Semiconductors	2.5	31	2	56	Weak	🌍🌍
Orsted	Denmark	Utilities	1.8	6	3	89	Strong	🌍🌍🌍🌍
Sunnova Energy International	United States	Traders & Distributors						🌍🌍🌍🌍
EDP Renovaveis	Spain	Utilities	2.2	24	2	87	Average	🌍🌍🌍🌍
Ormat Tech	United States	Utilities						🌍🌍🌍🌍
LONGi Green Energy Tech	China	Semiconductors	3.6	69	3	88	Weak	🌍🌍
Shoals Tech Group	United States	Electrical Equipment						🌍🌍🌍
Boralex	Canada	Utilities	2.4	35	3	69	Weak	🌍🌍🌍
Canadian Solar	Canada	Semiconductors						🌍🌍
GoodWe Tech	China	Technology Hardware	2.3	29	2	39	Weak	

Source: Morningstar Direct, Sustainalytics. Data as of August 2023. Emissions data for Scope 3 is subdivided into Upstream and Downstream emissions; these figures have been combined for purposes of display. In the ESG Risk Rating Assessment, 5-globes are equivalent to Negligible ESG Risk, and 1-globe is equivalent to Severe ESG Risk.

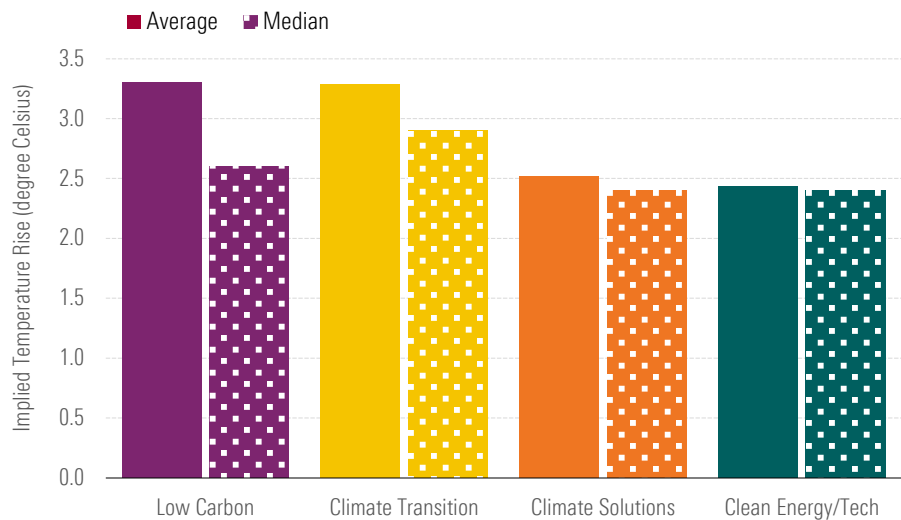
There is less climate-related data available for the stocks most commonly held by Clean Energy/Tech funds because they are predominantly small- and mid-cap companies. As with other ESG data providers, Sustainalytics relies on disclosure, which tends to be less consistent among smaller firms. Hence, we have ITR data for only 13 of the 20 most commonly held stocks. Still, these companies tend to be more aligned with the Paris Agreement's goal of limiting global warming at 1.5°C than the top companies in other climate fund groupings. On average, they carry an ITR of 2.4°C.

Besides Ørsted, the other company with Strong management of its emissions is First Solar, which has instituted a topnotch greenhouse gas performance incentive plan, discloses its emissions data in full, and leads the way with its renewable energy program. These aspects contribute to a Strong management score. First Solar's Strong management holds true for other material ESG issues as well, including human capital, business ethics, and resource use. These factors drive a Low (4-globe) ESG Risk Rating.

**Top Stocks in Low Carbon Funds Are the Least Aligned**

Of the four groupings analyzed here, we found that the 20 most common holdings in Clean Energy/Tech funds are the most aligned, with average and median ITR scores of 2.4°C. Top companies in Low Carbon funds, on the other hand, tend to be the least aligned, with average and median ITR scores of 3.3°C and 2.6°C, respectively. This can be explained by the high and difficult-to-manage carbon emissions coming from the supply chain and/or customers (Scope 3-Upstream and -Downstream) of top companies in broad market (Low Carbon) portfolios.

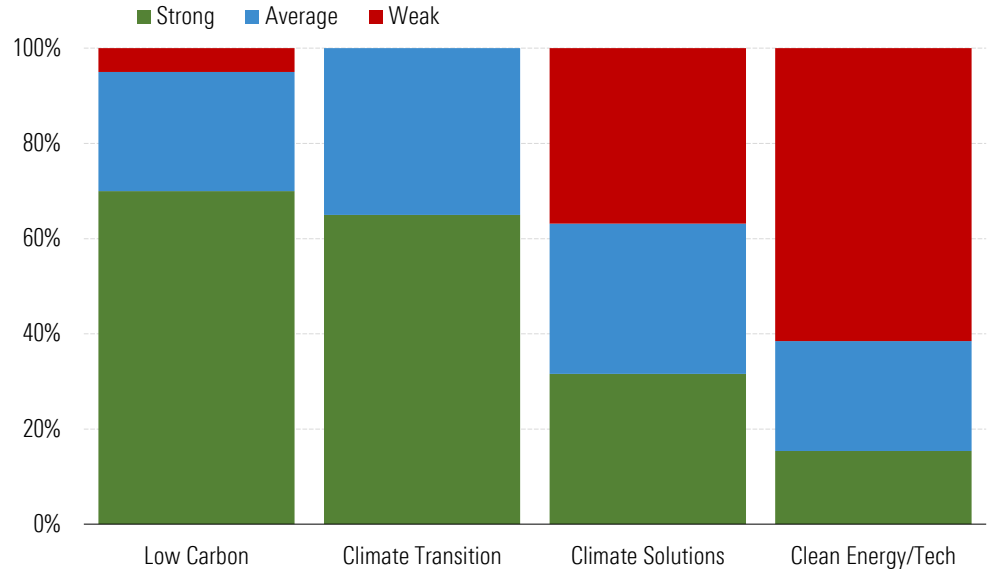
**Exhibit 41** Average and Median ITR of the Top 20 Most Commonly Held Companies in Each Climate Fund Group



Source: Sustainalytics Low Carbon Transition Data. Morningstar Research. Data as of August 2023. The list includes funds launched through June 2023.

Nonetheless, the most popular holdings of Low Carbon and Climate Transition funds tend to score the best on disclosure, and their management of carbon risks tends to be stronger, compared with the top companies in Climate Solutions and Clean Energy/Tech portfolios. This likely owes in part to the large-cap bias in Low Carbon and Climate Transition funds, which leads to higher disclosure requirements.

**Exhibit 42** Percentage of Commonly Held Companies According to Management Quality



Source: Sustainalytics Low Carbon Transition Data. Morningstar Research. Data as of August 2023. The list includes funds launched through June 2023.

We also found a somewhat positive correlation between emissions management quality and ESG risk rating, which makes sense. A company that manages its overall ESG risk well should also have the right governance, policies, programs, and investments in place that will help it transition better to a low-carbon world.









































All of the stocks with 5-globes (Negligible ESG Risk) attained Strong management scores regarding carbon risks, and all of the stocks with only 2-globes (High ESG Risk) received Weak management scores under the LCTR framework. Of the remaining companies, those with 4-globes (Below Average ESG Risk) were more likely to receive Strong management quality scores.

**Traditional Financial Metrics**

Following our analysis of commonly held companies using climate-focused data, in this subsection we compare companies on traditional metrics. Such metrics include companies' domicile, sector, style, and Morningstar Rating, as well as 2022 and 2023 year-to-date returns. In 2022, a rapid rise in interest rates structurally benefited value styles of investing. However, the first half of 2023 saw more stable market conditions, favoring more growth-oriented funds. This is reflected in the relative recovery of many sustainable funds and, as seen in the exhibits below, the strong performance of stocks commonly held in climate funds.

Below we list the 20 companies most commonly held in Low Carbon funds.









































**Exhibit 43** Most Commonly Held Companies in Low Carbon Funds: Financial Metrics

Company	Domicile	Sector	Equity Style Box	Morningstar Rating	2022 Return (%)	2023 YTD Return (%)
Alphabet	United States	 Communication Services	 Large Growth	★★★★★	-39.1	54.3
Henkel & Co	Germany	 Consumer Defensive	 Large Blend	★★★★★	-12.4	13.5
Atlas Copco	Sweden	 Industrials	 Large Growth	★★	-30.6	12.9
Bayerische Motoren Werke	Germany	 Consumer Cyclical	 Large Value	★★★★★	-7.0	28.9
Microsoft	United States	 Technology	 Large Growth	★★★★	-27.9	37.5
ASML Holding NV	Netherlands	 Technology	 Large Growth	★★★★★	-32.3	23.6
Schneider Electric	France	 Industrials	 Large Blend	★★★★	-27.3	25.8
AXA	France	 Financial Services	 Large Value	★★★★	-1.1	15.1
Fox	United States	 Communication Services	 Mid Value	★★★★★	-16.4	10.5
Industria De Diseno Textil	Spain	 Consumer Cyclical	 Large Growth	★★★★	-15.8	47.2
Adobe	United States	 Technology	 Large Growth	★★★★	-40.7	66.2
Redeiaoracion	Spain	 Utilities	 Mid Value	★★★★★	-15.8	-0.2
SAP	Germany	 Technology	 Large Growth	★★★★	-26.2	38.1
L'Oreal	France	 Consumer Defensive	 Large Growth	★★★★	-23.8	25.5
Nokia	Finland	 Technology	 Large Value	★★★★★	-26.4	-11.5
Novo Nordisk	Denmark	 Healthcare	 Large Growth	★	20.8	39.4
AstraZeneca	United Kingdom	 Healthcare	 Large Growth	★★★★★	17.1	2.3
Elevance Health	United States	 Healthcare	 Large Value	★★★★★	11.8	-13.3
Munich Re Group	Germany	 Financial Services	 Large Blend	★★★★	12.4	23.7
Orange	France	 Communication Services	 Large Value	★★★★★	-0.5	17.9

Source: Morningstar Direct. Data as of August 2023. The list includes funds launched through June 2023. The Morningstar Rating for Stocks represents our opinion of the firm's intrinsic value relative to its market price on a risk-adjusted basis. It rests on three key components, including our analysts' estimate of the stock's fair value; our assessment of the firm's business risk; and the stock's current market price.

Low Carbon funds tend to be well-diversified portfolios with broad sector and stock exposure. All but two of the 20 most represented stocks are large caps, and the median return in this cohort was 23.7% for 2023 to-date (through August), an impressive 8.6 percentage points above the return for the Morningstar Global Target Market Exposure Index, helped by technology stocks. Adobe and Alphabet led the pack with gains of 66% and 54%, respectively.

**Exhibit 44** Most Commonly Held Companies in Climate Transition Funds: Financial Metrics

Company	Domicile	Sector	Equity Style Box	Morningstar Rating	2022	2023 YTD
					Return (%)	Return (%)
Alphabet	United States	 Communication Services		★★★★	-39.1	54.3
Schneider Electric	France	 Industrials		★★★	-27.3	25.8
Microsoft	United States	 Technology		★★★	-27.9	37.5
ASML Holding NV	Netherlands	 Technology		★★★★	-32.3	23.6
Roche Holding	Switzerland	 Healthcare		★★★★★	-23.0	-2.7
Henkel & Co	Germany	 Consumer Defensive		★★★★	-12.4	13.5
Infineon Technologies	Germany	 Technology		★★★★	-34.1	19.2
Bayerische Motoren Werke	Germany	 Consumer Cyclical		★★★★	-7.0	28.9
Novo Nordisk	Denmark	 Healthcare		★	20.8	39.4
Vestas Wind Systems	Denmark	 Industrials		★★★★	-5.0	-20.2
NVIDIA	United States	 Technology		★★★	-50.3	237.8
Atlas Copco	Sweden	 Industrials		★★	-30.6	12.9
Autodesk	United States	 Technology		★★★★	-33.5	18.8
L'Oreal	France	 Consumer Defensive		★★★	-23.8	25.5
SAP	Germany	 Technology		★★★	-26.2	38.1
Mastercard	United States	 Financial Services		★★★	-2.7	19.2
Adobe	United States	 Technology		★★★	-40.7	66.2
Munich Re Group	Germany	 Financial Services		★★★	12.4	23.7
EDP Renovaveis	Spain	 Utilities		★★★★	-11.5	-15.4
Visa	United States	 Financial Services		★★★	-3.4	18.9









































Source: Morningstar Direct. Data as of August 2023. The list includes funds launched through June 2023. The Morningstar Rating for Stocks represents our opinion of the firm's intrinsic value relative to its market price on a risk-adjusted basis. It rests on three key components, including our analysts' estimate of the stock's fair value; our assessment of the firm's business risk; and the stock's current market price.

As seen previously, Climate Transition funds share many characteristics with Low Carbon and Climate Solutions funds. They also share many common holdings with these two groupings. Adobe, Alphabet, ASML Holding, and Microsoft are popular names in Low Carbon portfolios, while Vestas Wind Systems and Infineon Technologies are commonly held by Climate Solutions funds. Notably, Schneider Electric is one of the top common holdings in three of the equity-focused climate-fund groupings: Low Carbon, Climate Transition, and Climate Solutions. Schneider Electric is a leading provider of energy and automation digital solutions to achieve energy efficiency.

All of the most popular stocks in Climate Transition funds are large caps, and seven of 20 are in the tech sector. The median return for these stocks was nearly 24% for the first eight months of 2023, but Nvidia blew away the competition with a jaw-dropping 238% gain during the period. It is also the most volatile among this bucket of stocks: Its 50% loss in 2022 was the worst among this group, but its 125% return in 2021 topped the list. Nvidia designs graphics processing units for the gaming and professional markets, as well as system-on-a-chip units for the mobile computing and automotive markets. Its outperformance so far this year has been propelled by the explosive growth and potential of artificial intelligence.



**Exhibit 45** Most Commonly Held Companies in Climate Solutions Funds: Financial Metrics

Company	Domicile	Sector	Equity Style Box	Morningstar Rating	2022	2023 YTD
					Return (%)	Return (%)
Contemporary Amperex Technology	China	 Industrials		★★★	-38.6	4.3
Schneider Electric	France	 Industrials		★★★	-27.3	25.8
BYD	China	 Consumer Cyclical		★★★	-12.1	-7.0
Vestas Wind Systems	Denmark	 Industrials		★★★★	-5.0	-20.2
SolarEdge Technologies	United States	 Technology		★★★★	1.0	-42.6
Infineon Technologies	Germany	 Technology		★★★★	-34.1	19.2
Enphase Energy	United States	 Technology		★★★	44.8	-52.3
Orsted	Denmark	 Utilities		★★★★★	-28.0	-26.7
Xylem	United States	 Industrials		★★★	-6.8	-5.5
First Solar	United States	 Technology		★★★	71.9	26.3
Waste Management	United States	 Industrials		★★	-4.5	0.8
Guangzhou Tinci Materials Technology	China	 Basic Materials			-29.1	-27.3
Aptiv	Jersey	 Consumer Cyclical		★★★★	-43.5	8.9
Samsung	South Korea	 Technology		★★★★	-15.0	-0.6
Ganfeng Lithium Group	China	 Basic Materials		★★	-37.3	-33.6
EVE Energy	China	 Industrials			-31.7	-46.2
Linde	Ireland	 Basic Materials		★★★	-4.5	19.4
Darling Ingredients	United States	 Consumer Defensive			-9.7	-1.3
EDP Renovaveis	Spain	 Utilities		★★★★	-11.5	-15.4
Shanghai Putailai New Energy Technology	China	 Basic Materials			-40.2	-11.9

Source: Morningstar Direct. Data as of August 2023. The list includes funds launched through June 2023. The Morningstar Rating for Stocks represents our opinion of the firm's intrinsic value relative to its market price on a risk-adjusted basis. It rests on three key components, including our analysts' estimate of the stock's fair value; our assessment of the firm's business risk; and the stock's current market price.

Climate Solutions funds are typically more concentrated at the sector level than any of the previous three groupings, and this is well reflected here. Industrial companies dominate the league table of the 20 most commonly held stocks in Climate Solutions funds. However, additional sectors, including technology, utilities, basic materials, and consumer cyclical, make Climate Solutions funds still more diversified than Clean Energy/Tech funds. Many Climate Solutions portfolios also tend to have a mid-cap and/or growth tilt.<sup>35</sup>









































The median stock in this cohort lost 6.2% so far in 2023. First Solar topped the chart with a 26.3% gain, but Enphase Energy suffered the worst with a 52.3% loss. Both companies focus on solar, but one key differentiating factor is the distribution market in which they operate. Like other U.S. solar manufacturers satisfying the Domestic Content Requirement, First Solar now enjoys lucrative investment tax credits and production tax credits from the Inflation Reduction Act. Enphase Energy competes in selling rooftop solar panels to homeowners, which, because of higher borrowing costs, has seen plummeting demand so far this year.<sup>36</sup> On the other end, First Solar may be the biggest renewable

<sup>35</sup> The notable presence of Chinese stocks among the common holdings by Climate Solution strategies added to the regional, idiosyncratic risks.

<sup>36</sup> Norton, L. 2023. "Why Are Climate Funds In the Dumps?" Morningstar. <https://www.morningstar.com/sustainable-investing/why-are-climate-funds-dumps>

energy winner from the Inflation Reduction Act by selling to utility fields and expanding capacity in the U.S. to take advantage of domestic manufacturing incentives.

**Exhibit 46** Most Commonly Held Companies in Clean Energy/Tech Funds: Financial Metrics

Company	Domicile	Sector	Equity Style Box	2022 2023 YTD		
				Morningstar Rating	Return (%)	Return (%)
Enphase Energy	United States	 Technology		★★★	44.8	-52.3
SolarEdge Technologies	United States	 Technology		★★★★	1.0	-42.6
First Solar	United States	 Technology		★★★	71.9	26.3
Sunrun	United States	 Technology		★★★★	-30.0	-34.9
Sungrow Power Supply	China	 Industrials			-29.6	-14.7
Plug Power	United States	 Industrials		★★★★	-56.2	-31.6
Vestas Wind Systems	Denmark	 Industrials		★★★★	-5.0	-20.2
Array Technologies	United States	 Technology			23.2	28.7
Contemporary Amperex Technology	China	 Industrials		★★★	-38.6	4.3
Flat Glass Group	China	 Industrials			-51.7	2.7
JA Solar Technology	China	 Technology			-16.6	-37.6
Orsted	Denmark	 Utilities		★★★★★	-28.0	-26.7
Sunnova Energy International	United States	 Technology			-35.5	-22.8
EDP Renovaveis	Spain	 Utilities		★★★★	-11.5	-15.4
Ormat Technologies	United States	 Utilities			9.7	-11.8
LONGi Green Energy Technology	China	 Technology		★★★	-36.7	-39.2
Shoals Technologies Group	United States	 Technology		★★★	1.5	-20.2
Boralex	Canada	 Utilities		★★★★	9.4	-16.7
Canadian Solar	Canada	 Technology			-1.3	-9.4
GoodWe Technologies	China	 Technology			-9.5	-42.1

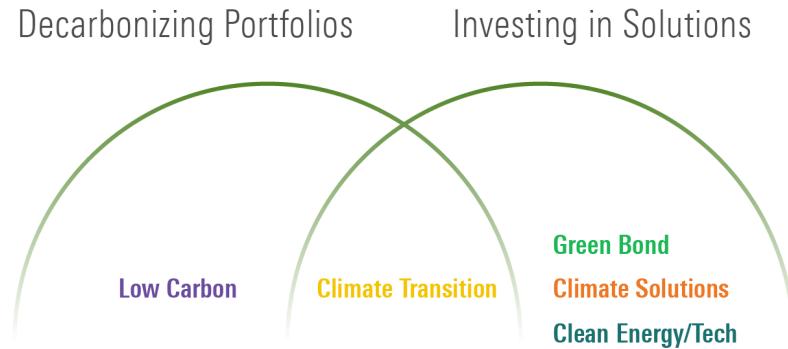
Source: Morningstar Direct. Data as of August 2023. The list includes funds launched through June 2023. The Morningstar Rating for Stocks represents our opinion of the firm's intrinsic value relative to its market price on a risk-adjusted basis. It rests on three key components, including our analysts' estimate of the stock's fair value; our assessment of the firm's business risk; and the stock's current market price.

Clean Energy/Tech funds tend to be concentrated at the sector level, with technology, industrials, and utilities dominating the chart. Small and mid-caps account for more than half of the 20 most commonly held stocks, reflecting the relatively nascent stage of many renewable energy companies. This cohort of stocks was hard-hit, with a median loss of 20.2% so far in 2023. This might be surprising given the massive investment expected from the Inflation Reduction Act in the U.S., but a few factors have played against the sector, including high interest rates, which have raised funding costs; materials inflation; and project delays as people await finalization of the package's details by the government. All this has caused many renewable energy companies to plummet.

### How Climate Funds Fit Into an Investor's Portfolio

The five climate-fund groupings we have identified represent a broad range of approaches globally that aim to meet different investor needs and preferences. The choice of one type over another largely depends on an investor's investment goals, risk appetite, and preferences.

**Exhibit 47** Climate Strategies and Their Roles in a Portfolio



Source: Morningstar Research.

Investors who simply want to protect their portfolios against climate change risks can use Low Carbon funds to "decarbonize" their portfolios. These approaches provide broad and diversified exposure to the market and are therefore suitable as part of a portfolio core allocation. In fact, within an asset allocation, Low Carbon funds can substitute for a lot of core equity exposure. They would, however, be less suitable for investors who want to benefit from the opportunities offered by the climate transition. For that, investors must choose among the remaining types.

Risk-conscious investors looking also to take advantage of this transition can turn toward Climate Transition funds. These typically exhibit low carbon risk like Low Carbon funds, with the added benefit of higher exposure to carbon solutions. These are suitable for investors wanting to strike a balance between mitigating risk and looking to benefit from the green transition. In Europe, funds tracking PABs are more suited for investors who want to benefit from the opportunities offered by the climate transition, while funds tracking CTBs are a better choice for investors who simply want to protect their portfolios against climate change risks while tracking the pace of transition toward a low carbon economy.

Further along the risk-opportunity spectrum, Climate Solutions and Clean Energy/Tech strategies can appeal to investors with a greater risk appetite and who consider climate change as an alpha-generating opportunity. Because of their narrower market exposure and often mid- and small-cap bias, Climate Solutions and Clean Energy/Tech funds represent more-volatile investments. Sharp price fluctuations in the clean energy sector over the past few years are testament to this. Since registering their best annual performance in 2020, with returns of up to more than 200%, Clean Energy/Tech funds have lagged the market.

Climate Solutions and Clean Energy/Tech funds can also come with higher carbon intensity. We have seen this begin to change gradually as the transitioning companies implement their solutions. Given their less-diversified and higher risk profile, Climate Solutions and Clean Energy/Tech funds are more suitable as part of a satellite allocation to complement rather than replace existing core holdings.

Green Bonds may be inherently lower risk, but investors must be sure that the projects sitting within the bonds have positive environmental and/or climate benefits; many green-bond issuers operate in traditional "brown" sectors, including utilities, energy, and industrials. Ideally, in the coming years, we would like to see increased disclosure on Green Bond projects and how they serve to lower the environmental impact of their issuer in a material way. For instance, a distribution company issuing a green bond to electrify its fleet has a greater impact on the issuer than an oil and gas firm issuing a green bond to electrify warehouse operations.

## Conclusion

The menu of options for climate investors globally has expanded considerably in the past year and a half and will continue to expand as asset managers strive to help reorient capital toward more climate-friendly investments, in line with their [net-zero commitment](#). More choices and better information on the carbon characteristics and physical risk exposures of their investments will help investors meet their climate goals.

When choosing a climate product, investors should carefully consider their preferences and carbon-risk appetite. As we have seen, Low Carbon funds provide the greatest shield from carbon risk but will offer little in the way of climate solutions. Conversely, Clean Energy/Tech funds offer high exposure to products and services that address climate change, as expected, but these also currently hold the greatest carbon risk in the bunch. This, however, should not put investors off. The rationale for investing in solutions is not only to profit from their potential success but also to help provide the capital and support to bring those solutions into being. If these companies are able to do so successfully, they will have sidestepped their carbon risk in the process.

It is important that investors do their homework. They should understand the funds' investment objectives and how the portfolios are constructed, ensure they are comfortable with the level of carbon exposure, and, crucially, look at the funds' holdings to avoid any bad surprises. Investors should also bear in mind that some climate change investment strategies can result in narrow and concentrated portfolios, which makes them more suitable as satellite holdings than as core parts of a portfolio. Climate funds also have a relatively short history—most have launched in the past two to three years—making their performance hard to assess.

As more asset managers start implementing their decarbonization plans, we expect to see more new climate funds come to market. We will also see more existing conventional and sustainable funds repurposed into fully fledged climate funds or tweak their investment objectives to include emission reduction targets. As companies are asked to disclose more fulsome and accurate data, we can expect funds with climate-related mandates to become clearer in their missions and more accountable to investors. This report is a snapshot of the current state of play, but we expect this universe will fluctuate. Morningstar will continue to monitor its progress. ■■

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