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Contents



# Infrastructure Funds Fuel the Energy Transition

## Fundraising and performance trends in energy transition infrastructure

PitchBook is a Morningstar company providing the most comprehensive, most accurate, and hard-to-find data for professionals doing business in the private markets.

## Key takeaways

- Driven by government net-zero commitments and stakeholder pressure to decarbonize portfolios, commitments to funds engaging in some degree of energy transition infrastructure investment reached a cumulative $892.0 billion from 2014 through H1 2024.
- The performance of private energy transition infrastructure has undergone a transformation over the past decade, with technological development and government subsidies contributing to the creation of a more attractive return profile over that period.
- Specialist funds investing exclusively in energy transition infrastructure have proliferated in recent years, accumulating $235.5 billion in total commitments, as the opportunity set has continued to mature.
- The outlook is good for energy transition infrastructure returns over the next decade, with oncoming headwinds likely to be outweighed by scaling energy demand, government support, low operating costs, and the benefits of improving technology.
- This note contains a market map of the major GPs, public companies, and allocators playing in the energy transition infrastructure space, with the full investor lists accessible to clients via the PitchBook Platform.

## Introduction

In recent years, thought leaders in the infrastructure space have identified three major themes shaping the asset class over the next decade: decarbonization, digitalization, and deglobalization. We previously explored two of the three in 2023 in our Sustainable and Digital Infrastructure in the Private Markets note, examining the growth of those spaces and the dominant influences responsible for bringing more investment dollars to the expanding roster of investors targeting them. Earlier in 2024, we published another report, Infrastructure Investors Capitalize on the Digital Revolution, that provided a focused and more comprehensive update on the digital infrastructure sector. Here, we do the same for energy transition infrastructure, which for purposes of this report, we define to encompass renewable and low-carbon energy assets; electric vehicle (EV) charging infrastructure; carbon capture, utilization, and storage (CCUS) assets; and battery storage assets.[1] We include low-carbon but nonrenewable energy assets such as nuclear and waste-to-energy solutions, as they are considered by many to further the energy transition and reduce fossil fuel reliance.

The transition of the energy system from fossil fuels-based to renewable and low-carbon energy-based—the energy transition, for short—has presented a decadeslong challenge, requiring significant investment from public and private entities alike and yielding mixed, albeit improving, financial results. Despite these issues, institutional investors have increasingly sought exposure to energy transition infrastructure funds, motivated by a push from stakeholders and the prospect of capitalizing on the secular tailwinds they expect will translate to even stronger performance in coming years. In this note, we analyze the key return drivers for the space, record the investment dollars rolling in, and assess its future outlook. We address concerns about its viability and highlight the potential advantages in addition to the obstacles that energy transition funds will experience in coming years. Lastly, we include a detailed landscape of the private fund managers, public companies, and allocators that are putting capital to work building the infrastructure for a sustainable future.

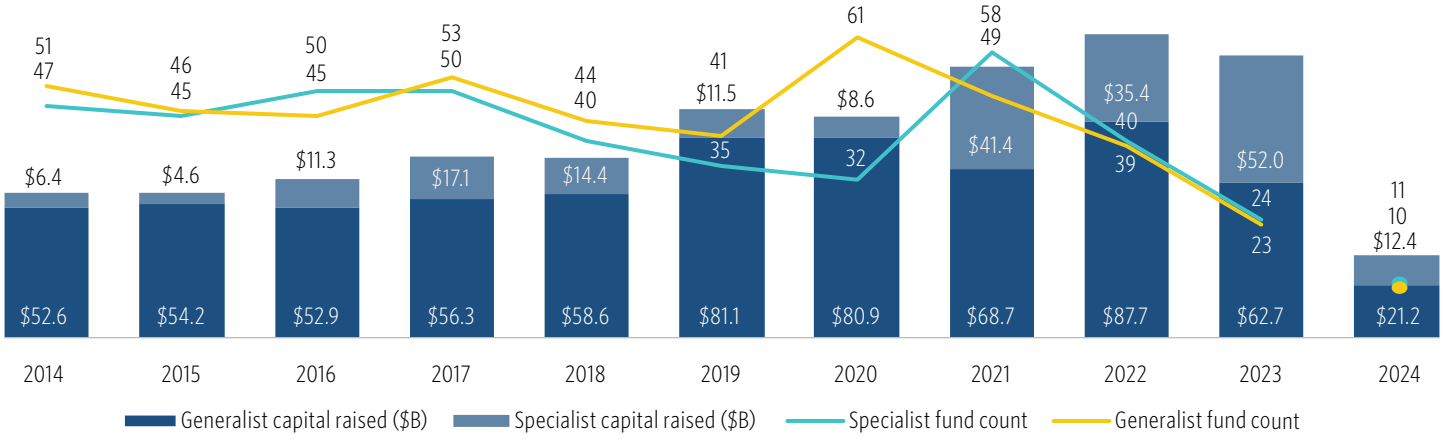
1: More granular detail on what types of assets and funds are included in the dataset can be found in the "Methodology" section of the report.

## The need for energy transition infrastructure

Climate change is widely considered one of the greatest existential threats to mankind. For centuries, human activity has accelerated the process, with fossil fuel usage the foremost contributor to the problem. Energy transition infrastructure is a substantial portion of the solution: Renewable and low-carbon energy, battery storage, and EV charging infrastructure are necessary to prevent further greenhouse gas emissions, and CCUS is one of the few available methods of trapping or removing emissions once created. As the global temperature continues to climb to new heights and the effects of climate change become more severe, governments have increasingly made pledges to achieve net-zero carbon emissions by 2050 and made commitments to invest in the energy transition. This investment can come in the form of government subsidies, such as tax cuts, or of public-private partnerships—both of which create opportunities for infrastructure investors.

At the same time, asset allocators have increasingly sought out funds investing in energy transition infrastructure, due in part to growing stakeholder pressure to decarbonize—or reduce the level of carbon emissions related to—portfolios and incorporate ESG analysis into the investment process. Over the past decade, more pension funds, universities, foundations, and other types of institutional investors have heard from their pension holders, students, beneficiaries, or other contributors that these issues matter to them. For some, it is for ethical reasons, such as a belief that it is one's duty to protect the planet and thus further the transition to net-zero. For others, it is simply good risk management and opportunity analysis, ensuring that the portfolio will not be overly exposed to investments that will suffer from their dependence on an energy source that will be phased out and that the portfolio will have exposure to the energy sources that will benefit from more demand.

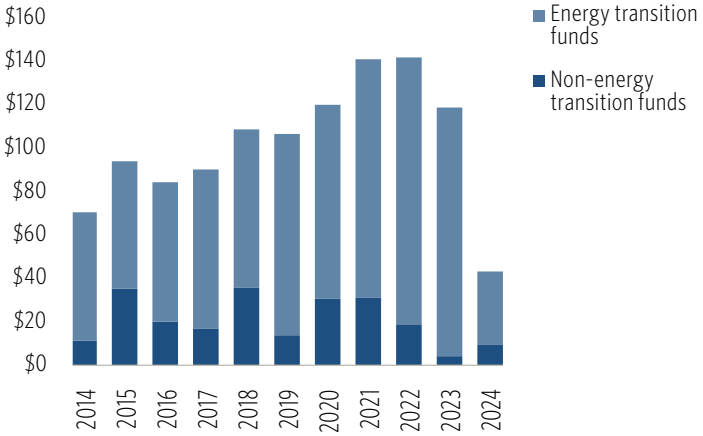
### Energy transition infrastructure fundraising activity




Source: PitchBook • Geography: Global • As of June 30, 2024

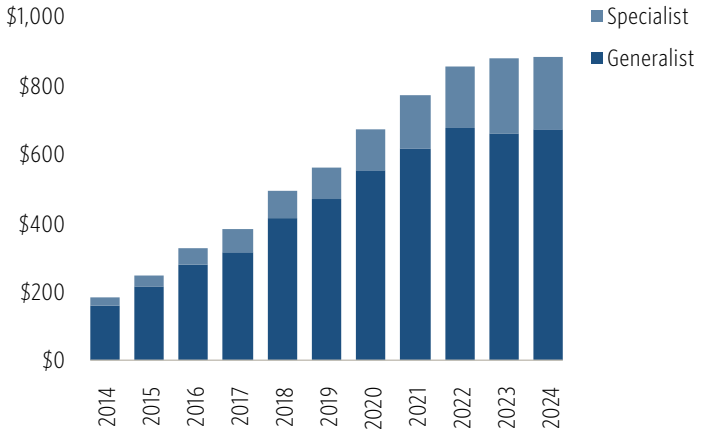
*Note: Definitions of "generalist" and "specialist" and the methodology for this and subsequent charts can be found in the "Methodology" section.*

### Capital raised ($B) by infrastructure funds with and without energy transition investment




Source: PitchBook • Geography: Global • As of June 30, 2024

### Energy transition infrastructure AUM ($B)

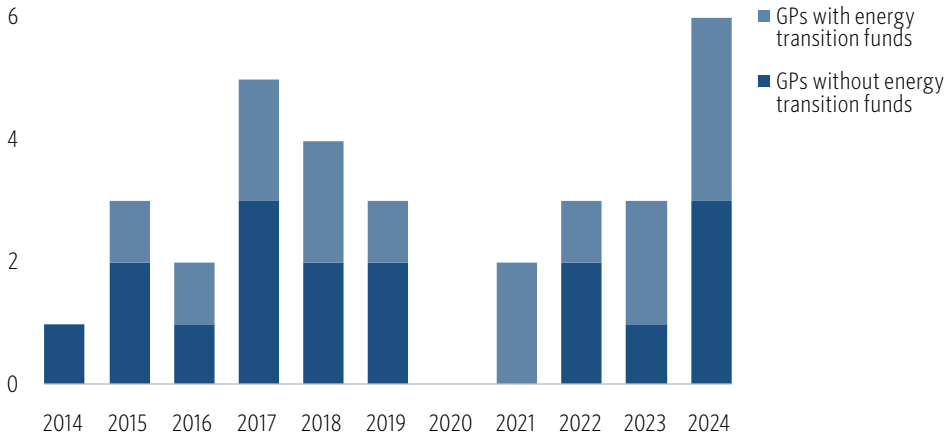



Source: PitchBook • Geography: Global • As of March 31, 2024

As a result of increased government focus on the energy transition and heightened allocator interest, private investment in energy transition infrastructure has grown, while fundraising for other real assets investment products has fallen. Case in point, from 2014 through the first half of 2024, 894 private infrastructure vehicles closed that engaged in at least some energy transition investment, garnering $892.0 billion in cumulative commitments and accounting for nearly 80% of capital raised by infrastructure funds.[2] There are two styles of investment in energy transition infrastructure: specialist funds, which invest exclusively in energy transition assets,[3] and generalist funds, which invest in energy transition assets alongside other infrastructure sectors, such as digital or transportation infrastructure. Over the past 15 years, the proportion of generalist funds that invest in oil & gas infrastructure alongside energy transition infrastructure has dwindled as fund managers work to meet the demands of allocators attempting to satisfy their stakeholders. It is not asset owner interests alone, though, that motivated this shift. Approximately half of the infrastructure GPs acquired by another asset manager from 2014 onward have been managers of energy transition funds, accounting for 79.6% of deal value.

2: It is important to underscore that $676.9 billion of the $892.0 billion was raised by generalist funds that invest in energy transition infrastructure among other infrastructure sectors, so not all the capital raised by those funds has been or will be used for energy transition infrastructure dealmaking.
3: There are some exceptions to this rule. We include funds that almost exclusively invest in energy transition infrastructure in this category, as occasionally GPs will opportunistically target an asset outside of a fund's investment theme if they believe it represents an outsized opportunity.

## Acquisitions of infrastructure GPs with and without energy transition funds

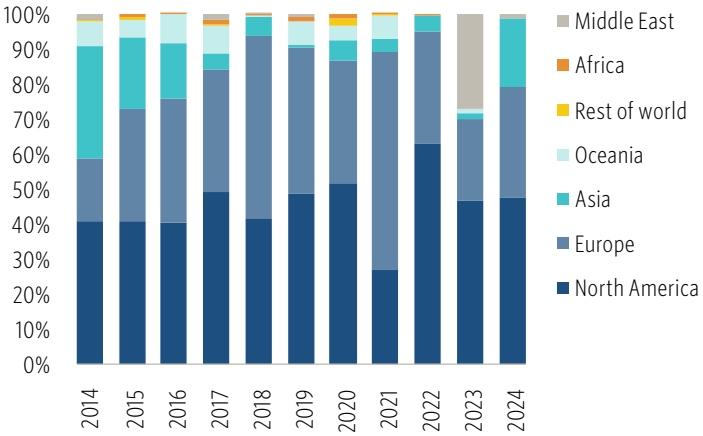



Source: PitchBook • Geography: Global • As of June 30, 2024
*Note: In this context, "acquisitions of infrastructure GPs" refers to infrastructure fund managers being acquired by other asset managers rather than infrastructure fund managers acquiring assets.*

Geographically, North America and Europe have made up a relatively even split of energy transition funds raised over the past decade. However, when looking at the subset of specialist funds alone, it is clear that there has been a more dynamic regional distribution over the past 15 years. From 2009 to 2018, European funds accounted for around 60% of specialist capital raised each year on average, but from 2019 through H1 2024, that average decreased to 35.3% as North American fundraising picked up. Europe has generally been the first mover on decarbonization and sustainability-related investment trends, such as ESG, with North America trailing behind. However, because the US is home to so many of the major players in private capital, it began to dominate fundraising as more investors adopted or formalized ESG and other sustainability-related practices. While most specialist funds have been raised out of more developed countries in North America and the European Union (EU), it is also worth noting that these funds can and often do invest internationally. Much of that investment happens in established markets, but the Global South has also been a focal point of renewable and overall energy demand over the past decade due to rapid economic development and relatively limited fossil fuel reserves.[4] Some fund managers with a higher risk tolerance have looked to capitalize on that demand and help bridge the funding gap in the region, although established market investment is more common.

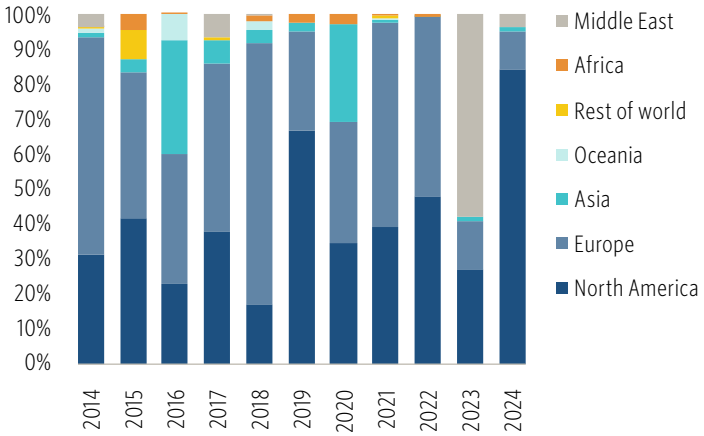
4: "The Opportunity of Servicing Energy Demand in the Global South," World Economic Forum, Marco Arcelli, May 2, 2024.

## Share of energy transition infrastructure capital raised by region



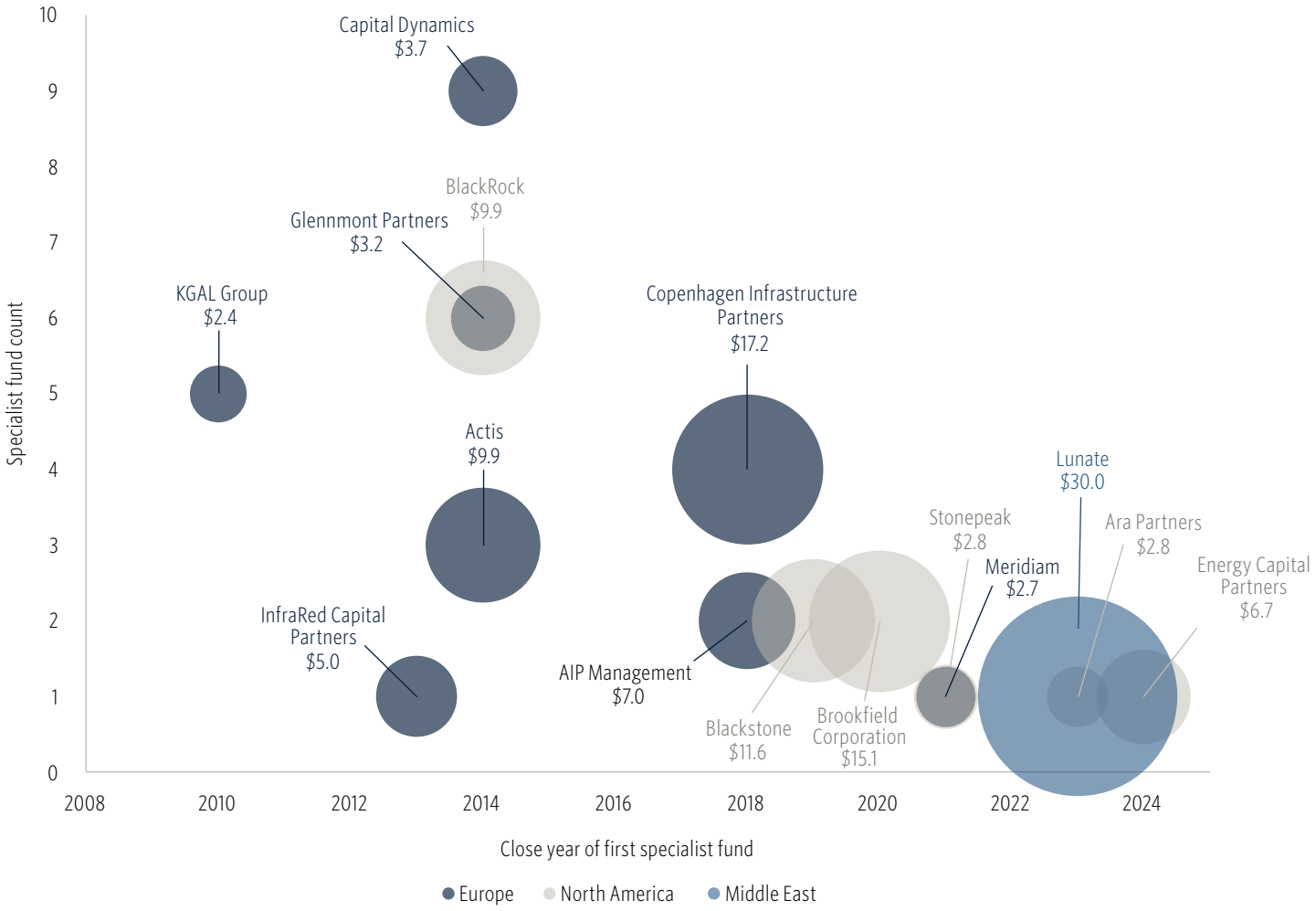

Source: PitchBook • Geography: Global • As of June 30, 2024

## Share of energy transition infrastructure specialist capital raised by region




Source: PitchBook • Geography: Global • As of June 30, 2024

## Top managers by capital raised ($B) since 2009 in energy transition infrastructure specialist funds

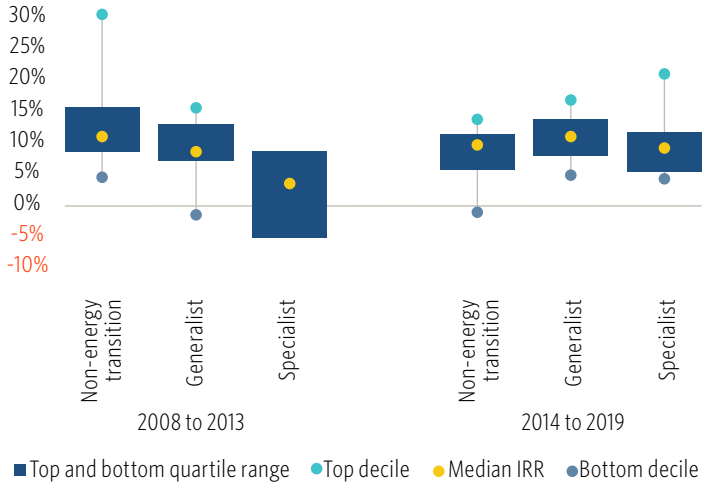



Source: PitchBook • Geography: Global • As of June 30, 2024

## Reversal of fortunes

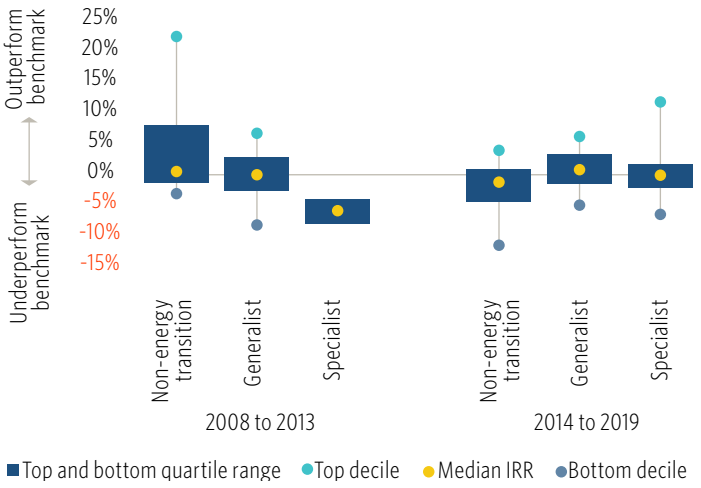
Energy transition infrastructure's fundraising momentum is likely to persist if the sector achieves attractive returns. Historically, performance has been challenged. Leading up to the global financial crisis (GFC), a "green bubble" developed due to speculative investment in renewables. Investors believed that fossil fuel supplies were running out. Crude oil prices climbed to never before seen highs, with some analysts projecting that they would hit $200 per barrel,[5] and renewables were expected to become the cost-effective alternative. However, the GFC caused a pullback in economic activity resulting in a reduction in energy demand, so fossil fuel prices came back down, making renewables relatively more expensive again. Then, with increased usage of techniques such as hydraulic fracking and horizontal drilling as well as the discovery of more fossil fuel reserves in the US, supply was found to no longer be nearing its end, and the anticipated cost advantage for renewables did not materialize until many years later. Further, government spending that had previously supported the renewable energy industry was redirected to help stabilize the economy, putting even more downward pressure on returns.

### Infrastructure fund return dispersion




Source: PitchBook • Geography: North America and Europe • As of March 31, 2024
*Note: Top and bottom decile points for the specialist fund cohort with 2008 to 2013 vintages were excluded from this analysis due to low sample size.*

### Infrastructure fund return dispersion relative to benchmark




Source: PitchBook • Geography: North America and Europe • As of March 31, 2024
*Note: Top and bottom decile points for the specialist fund cohort with 2008 to 2013 vintages were excluded from this analysis due to low sample size.*

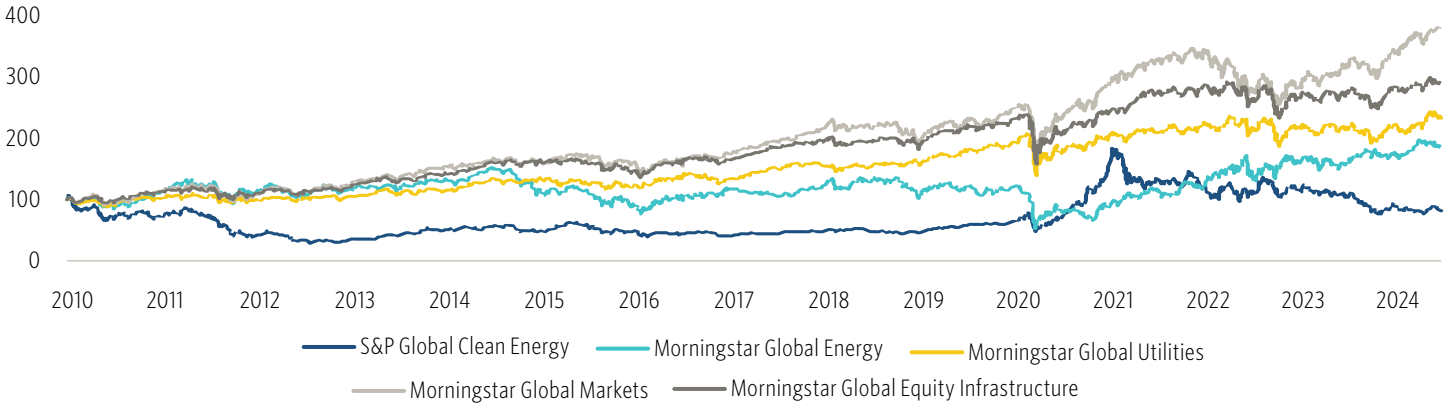
In short, the bubble had burst, and funds raised during this time period suffered the impact. Specialist funds with 2008 to 2013 vintages dramatically underperformed their benchmarks, defined as the median return of the fund's vintage year in its respective geographical region. While the median returns of generalist funds and vehicles not investing in renewables were on par with their benchmarks, generalist funds experienced more significant downside and limited upside given their exposures to renewables, while vehicles not investing in energy transition infrastructure experienced less downside and more dramatic upside. On an absolute basis, non-energy transition funds had the highest median IRR. In public equities, similar performance trends are also present, with the S&P Global Clean Energy Index

5: "Goldman, Once Warning of $200 Oil, Sees $45 in 2009," Reuters, December 12, 2008.

underperforming the Morningstar Global Energy, Global Utilities, Global Equity Infrastructure, and Global Markets Indexes from 2010 to 2020.

However, in recent years, the sector appears to be experiencing a reversal of fortunes, with technological improvements, increased government support, lower operating costs, and growing energy demand turning the tides. The median IRR for specialist funds with 2014 to 2019 vintages reached 9.3%, compared with the median IRR of 3.6% for vehicles with 2008 to 2013 vintages. Among newer vintage funds, specialists show the potential for substantial upside compared with generalists and funds not investing in the space. Specialists' greater return dispersion compared with generalists is not surprising given the effects of diversification on fund returns. However, specialists also experienced less downside than non-energy transition funds, as measured by median, bottom quartile, and bottom decile performance against the funds' respective benchmarks and by bottom decile performance in absolute terms. Generalists have shown the most consistency in returns among newer vintage funds, with the strongest median, top, and bottom quartile returns.

**Returns for select indexes (rebased to 100 in 2010)**




Source: PitchBook • Geography: Global • As of June 30, 2024

Among public equities, the S&P Global Clean Energy Index consistently outperformed the Morningstar Global Energy Index from August 2020 to October 2021 but began a streak of underperformance again in December 2021. Some hold that another green bubble formed and then popped from 2020 to 2023, largely in Europe, which may help explain this underperformance. Due to the European Energy Crisis, fossil fuel prices spiked, driving up conventional energy returns. Clean energy stocks were hit harder by breakdowns in the supply chain, inflation, high interest rates, and price ceilings at renewables auctions.[6] It remains to be seen how these factors will express themselves in private energy transition fund returns. Nonetheless, the industry is largely optimistic about the future of the space, with secular tailwinds expected to push returns up and to the right over the next decade.

One of the central reasons for the sector's historical underperformance has been high development costs for energy transition infrastructure assets. Renewable and low-carbon energy assets, which make up the majority of energy transition investments

6: "2023 – The Year the European Renewables Bubble Burst," Forbes, Wood Mackenzie, Rory Mccarthy, January 20, 2024.

among private funds, are exceedingly resource-intensive to build. Materials such as copper and aluminum have seen prices trend upward and hit numerous spikes since the GFC,[7, 8] while prices for rare earth elements (REEs) used in development began to climb post-2020.[9] Inflation, elevated interest rates, and supply chain disruptions have exacerbated the drag that these development costs create on returns,[10] as have trade policies. For instance, willingness to trade with China is a major determinant of access to some inputs, given China's dominance over REE production. High development costs and capex are considered characteristic of renewable energy infrastructure even with the technological improvements that have created efficiencies over the past 15 years.

Execution risks have also factored heavily into energy transition funds' underperformance. For renewables, these risks often relate to intermittency, or the inconsistent production of energy from sources such as solar or wind.[11] This can occur, for example, due to cloud cover over solar assets or low wind conditions around turbines. Intermittency leads to periods of energy oversupply and undersupply, resulting in grid bottlenecks and necessitating large amounts of energy storage, which has traditionally been costly and inefficient. When energy pricing is dynamic, this translates to revenue uncertainty, so much so that projects without corporate power purchase agreements (PPAs) or government partnerships have had trouble accessing debt in the past.[12] For instance, this was the case for the Tellenes Wind Farm built by Norsk Hydro, which was unable to secure funding for approximately six years until Google signed a deal to buy all the electricity generated by the project over a 12-year period in 2016.[13] Even with better data around weather patterns, improving energy storage options, and grid infrastructure updates in some areas, execution risks have only lessened slightly over the past 15 years and are still considerable, particularly for CCUS technologies, which are still fledgling.

Renewables have become less expensive to produce over time due to technological improvements, but ongoing technological development has been a double-edged sword. While it has made new assets more efficient and competitive, it has also forced older assets into premature obsolescence. High levels of competition in the energy industry overall have contributed meaningfully to the performance trends apparent in the data. Not only have renewable and low-carbon energy producers had to compete with others in the same space with better technology, but also against fossil fuels, with a lower cost of production, technologies refined over at least a century, and an established network of supporting infrastructure. Cost has been the principal driver in decision-making around which energy source to use for the majority of governments, corporations, and individuals in the 21st century, so it is unsurprising that renewables had trouble gaining an edge over conventional energy. Even still, private funds investing in fossil fuels are no stranger to the challenges of competing in a commoditized asset class and have had difficulty achieving robust returns themselves.[14] However, as the most accessible fossil fuel reserves have been depleted and extractors have had to expend more capital in production, renewables have increasingly been able to compete—a trend that is expected to intensify further in coming years.

7: "Global Price of Copper," Federal Reserve Bank of St. Louis, October 9, 2024.
8: "Global Price of Aluminum," Federal Reserve Bank of St. Louis, October 9, 2024.
9: "Historical Strategic Metals Price Movements (2012 – 2024)," Strategic Metals Invest, n.d., accessed October 17, 2024.
10: "Clean Energy Is the Future. So Why Have Investors Struggled?" Morningstar, Valerio Baselli, April 18, 2024.
11: "Renewable Energy Has Hidden Costs," The Economist, September 21, 2023.
12: "Why the Renewables Market Does Not Work," Financial Times, Lee Harris, March 29, 2024.
13: "Taking Renewables to Market: Prospects for the After-Subsidy Energy Transition," Wiley, Antipode, Brett Christophers, May 19, 2022.
14: For more details, read our Q1 2024 Real Assets PitchBook Benchmarks.

Subsidies and other kinds of government spending have also had a mixed influence on energy transition infrastructure returns over the past 15 years. In particular, the level of support for renewable and low-carbon energy in North America has been inconsistent, whereas fossil fuel subsidies have been more constant and more extensive. With that being said, government policies on energy transition infrastructure have been trending positively in recent years, with more nations—including the US—prioritizing their commitments to reduce carbon emissions and reliance on fossil fuels. However, as demonstrated by the numerous EU member states that reopened fossil fuel-based power plants during the European Energy Crisis beginning in 2021,[15] energy security is paramount, and measures furthering the transition to net-zero will not progress at the expense of it. Regional differences in policy approaches are partially dictated by access both present and projected to conventional energy, with the US and some other fossil fuel-rich countries less reliant on renewable and low-carbon energy infrastructure compared with other nations. As such, there is a greater likelihood of policies supportive of renewable and low-carbon energy being walked back in those countries.

Energy transition infrastructure does have some major advantages that support returns, one of which is low operating costs. Once built, renewables and batteries generally require minimal operational expenditures, usually limited to maintenance and repairs, battery cooling or the cost of energy storage if outsourced, insurance, salaries, and rent, if land is not owned. In contrast, fossil fuel extractors typically have much higher operating costs due to significant labor and equipment-related needs in the extraction process. This is also true—albeit to a lesser extent—of fossil fuel-burning power plants, which must repeatedly outlay capital to acquire the fuels they utilize to generate energy. Low operating costs are part of the reason that research produced in recent years has touted renewable energy as being less expensive than fossil fuels in many scenarios.[16] Furthermore, operating costs are anticipated to continue declining as technological improvements decrease maintenance and repair requirements.

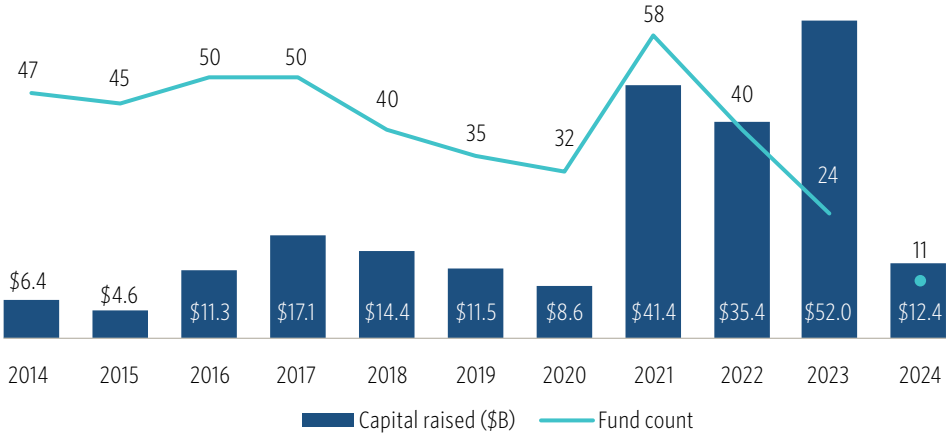
One of the other fundamental forces driving returns upward and fueling investment activity has been robust and mounting energy demand over the past 15 years. Economic development, urbanization, population growth, and digitalization, among other trends, have all contributed to the heightened energy needs that energy transition infrastructure is helping to meet. There is also demand that exists specifically for renewable and low-carbon energy, with many corporations working to meet their own sustainability-related goals or follow through on commitments using mechanisms such as PPAs. It is important to caveat that there are other variables that affect how overall energy demand translates to actual profit margins, with regulation being one. For instance, government-implemented price ceilings, which are common in Europe, can curtail returns.[17] As in every industry, there are many factors at play, but strong and growing demand relative to supply is the most critical. Global energy demand is projected to continue scaling for decades to come, increasing between 11% and 18% by 2050,[18] providing a perennial tailwind for energy transition funds.

15: "All the European Countries Returning To 'Dirty' Coal as Russia Threatens To Turn Off the Gas Tap," Euro News, Rosie Frost, June 24, 2022.
16: "Renewable Power Generation Costs in 2023," International Renewable Energy Agency, Abu Dhabi, 2024, n.d., accessed October 17, 2024.
17: "2023 – The Year the European Renewables Bubble Burst," Forbes, Wood Mackenzie, Rory Mccarthy, January 20, 2024.
18: "Global Energy Perspective 2024," McKinsey & Company, September 17, 2024.

## Outlook

For investors, the energy transition infrastructure opportunity set is continuing to mature, illustrated by the exponential growth of commitments to specialist funds. Specialists raised an average of $29.8 billion annually from 2019 to 2023, up considerably from an average of $4.1 billion from 2009 to 2013. In total, specialist funds have accumulated $235.5 billion in commitments since 2009. As the energy transition space has become more established, the informational advantage that specialists can gain by focusing all of their resources on one sector has been even more valuable. Technological development in renewable and low-carbon energy, battery storage, EV charging infrastructure, and CCUS is still occurring at a considerable pace, and keeping apprised of these technologies and other developments in the space will be integral to maintaining a competitive edge in coming years.

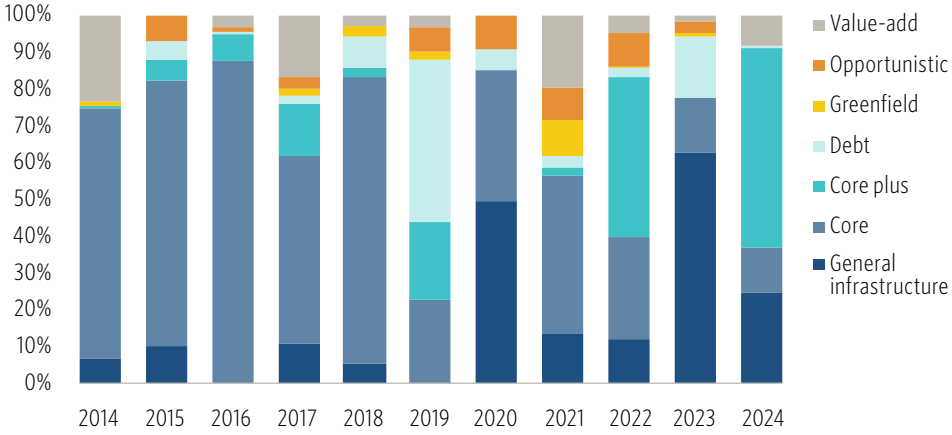
### Energy transition infrastructure specialist fundraising activity




Source: PitchBook • Geography: Global • As of June 30, 2024

The diversification in the types of strategies used by specialist funds also evidences the evolution of the opportunity set. From 2009 to 2018, 70.7% of specialist commitments went to core funds, while among all infrastructure funds, core vehicles raised 35.9% of capital in that period. The portfolios of energy transition specialists with earlier vintages were concentrated even more in renewables, with CCUS, EV charging infrastructure, and battery assets proliferating in infrastructure portfolios later on. The stable, predictable returns of already-built renewable energy assets when government partnerships or PPAs were in place made them a logical fit for core portfolios. However, from 2019 onward, other strategies popularized among specialist funds, with lower-risk, lower-return strategies such as core plus and debt still raising large proportions of capital but opportunistic and value-add funds showing up more significantly in fund counts.

## Share of energy transition infrastructure specialist capital raised by fund type




Source: PitchBook • Geography: Global • As of June 30, 2024

With an expanding opportunity set for energy transition funds in recent years, it follows that a broader spectrum of strategies has been necessary to address it. More funds are investing opportunistically, willing to take on more risk if it means achieving the kind of upside we have seen from recent vintages. For allocators drawn to infrastructure for its inflation-hedging qualities, it is important to keep in mind that strategies involving the ground-up or redevelopment of assets using inputs subject to high commodity prices are less protected in this respect. Furthermore, energy price volatility may also eat away at renewable and low-carbon energy asset's inflation-hedging abilities if government agreements or PPAs precluding this outcome are not in place. Inflation protection is not inherent to all types of infrastructure, so analysis of each asset's fundamentals using this lens is pivotal.

Although energy transition infrastructure has been the focus of this analysis, infrastructure is not the only asset class in which energy transition investment is occurring. VC funds provide different risk and return exposures for investments that fit within this theme but are at an earlier stage of development. Billions are raised each year by venture-backed clean energy tech companies in the intermittent renewable energy, dispatchable energy, clean fuels, and grid infrastructure segments, per our Q2 2024 Clean Energy Report. Clean energy deal activity boomed in 2021, 2022, and 2023, hitting $21.0 billion, $21.1 billion, and $18.0 billion, respectively. These companies are looking to solve the problems that have arisen in the course of the energy transition as well as those that are inherent to it. Technological improvements made by these companies will eventually translate to the infrastructure space, improving the return profile of new assets.

While the outlook for energy transition infrastructure is, by and large, positive, the path forward is not without obstacles. New challenges are likely to arise, and some old ones may become amplified over the next decade. Competition within the energy transition space, for instance, will increase. This will not only result in a more crowded market of energy suppliers but also in more buyers of the materials that are used for development, thus driving up input costs. Some of this

may be counteracted by improved recycling technologies or more investment in raw materials production, but the effects of heightened competition will not be negligible. Climate change's effects on weather patterns and water sources may also create new challenges in coming years, increasing execution risks for hydropower, solar, and wind assets. While insurance can help protect against some physical risks resulting in damage, coverage for these types of events already makes up a significant portion of costs. As such, it may become harder to insure assets without eating away at margins.

Still, over the next decade, energy transition funds will likely benefit from the persistence and intensification of existing tailwinds including growing energy demand, government spending and subsidies, and low operating costs. While mixed influences, such as technological advancement, will continue to create winners and losers, they are likely to have increasingly favorable effects on the space. Energy transition funds will become more competitive with fossil fuels, which will concurrently decrease in competitiveness as extraction costs soar. Technology may also help cut away at renewable and low-carbon energy development costs and reduce intermittency issues, improving the economics of those asset types. New tailwinds will also emerge, namely better supporting infrastructure such as smart grids and smart metering, as will more energy storage options. The energy transition's future is promising, with private capital playing a crucial role, paving the way to a more sustainable world while offering the potential for substantial financial rewards.

# Market map

## Top managers by capital raised since 2014 in energy transition infrastructure funds

| Manager | All energy transition infrastructure fundraising *(specialist)* ($B) | All energy transition infrastructure fund count *(specialist)* | Most recent energy transition fund | Close date | HQ country |
|---|---|---|---|---|---|
| Brookfield | $84.0 *($15.1)* | 9 *(2)* | Brookfield Infrastructure V | December 1, 2023 | Canada |
| Global Infrastructure Partners | $45.0 *(N/A)* | 7 *(N/A)* | Global Infrastructure Partners Emerging Markets | March 5, 2024 | US |
| Macquarie | $43.8 *($2.0)* | 13 *(2)* | Macquarie European Infrastructure 7 | December 1, 2023 | Australia |
| KKR | $37.3 *(N/A)* | 5 *(N/A)* | KKR Asia Pacific Infrastructure Investors II | January 31, 2024 | US |
| EQT | $33.8 *(N/A)* | 3 *(N/A)* | EQT Infrastructure V | October 28, 2021 | Sweden |
| Lunate | $30.0 *($30.0)* | 1 *(1)* | Lunate Capital Climate | December 1, 2023 | United Arab Emirates |
| Stonepeak | $28.1 *($2.8)* | 5 *(1)* | Stonepeak Infrastructure IV | January 31, 2022 | US |
| I Squared Capital | $23.1 *(N/A)* | 4 *(N/A)* | ISQ Growth Markets Infrastructure | March 1, 2024 | US |
| CIP Copenhagen Infrastructure Partners | $22.5 *($17.2)* | 8 *(4)* | CI Green Credit I | October 16, 2023 | Denmark |
| ECP | $18.6 *($6.7)* | 3 *(1)* | Energy Capital Partners V | May 28, 2024 | US |
| Blackstone | $18.1 *($11.6)* | 4 *(2)* | Blackstone Green Private Credit III | August 10, 2023 | US |
| AMP Capital | $15.2 *(N/A)* | 5 *(N/A)* | AMP Capital Global Infrastructure II | December 27, 2019 | Australia |
| Antin Infrastructure Partners | $15.2 *(N/A)* | 4 *(N/A)* | NextGen I | November 30, 2023 | France |
| BlackRock | $15.1 *($9.9)* | 9 *(6)* | BlackRock Global Renewable Power III | April 8, 2021 | US |
| CVC DIF | $15.0 *(N/A)* | 7 *(N/A)* | DIF Infrastructure VII | March 5, 2024 | Netherlands |

Source: PitchBook • Geography: Global • As of June 30, 2024

*Note: Only includes fund managers that have closed an energy transition infrastructure fund from 2019 to H1 2024.*

## Top managers by capital raised since 2014 in energy transition infrastructure specialist funds

| Manager | Energy transition infrastructure specialist fundraising ($B) | Energy transition infrastructure specialist fund count | Most recent energy transition specialist fund | Close date | HQ country |
|---|---|---|---|---|---|
| Lunate | $30.0 | 1 | Lunate Capital Climate | December 1, 2023 | United Arab Emirates |
| CIP Copenhagen Infrastructure Partners | $17.2 | 4 | CI Green Credit I | October 16, 2023 | Denmark |
| Brookfield | $15.1 | 2 | Brookfield Global Transition I | June 22, 2022 | Canada |
| Blackstone | $11.6 | 2 | Blackstone Green Private Credit III | August 10, 2023 | US |
| actis | $9.9 | 3 | Actis Energy 5 | October 11, 2021 | UK |
| BlackRock | $9.9 | 6 | BlackRock Global Renewable Power III | April 8, 2021 | US |
| aip | $7.0 | 2 | AIP Infrastructure II | February 16, 2022 | Denmark |
| ECP | $6.7 | 1 | Energy Capital Partners V | May 28, 2024 | US |
| Capital Dynamics | $3.7 | 9 | Capital Dynamics Clean Energy Infrastructure IX | October 13, 2022 | Switzerland |
| Glennmont Partners from nuveen | $3.2 | 6 | Green Credit II | September 29, 2022 | UK |
| Stonepeak | $2.8 | 1 | Stonepeak Global Renewables I | July 14, 2021 | US |
| Ara Partners | $2.8 | 1 | Ara III | December 13, 2023 | US |
| Meridiam for people and the planet | $2.7 | 1 | Meridiam Sustainable Infrastructure Europe IV | September 16, 2021 | France |
| quinbrook infrastructure PARTNERS | $2.4 | 2 | Quinbrook Renewables Impact | October 2, 2023 | US |
| VISION RIDGE PARTNERS | $2.0 | 2 | Sustainable Asset III | April 1, 2021 | US |

Source: PitchBook • Geography: Global • As of June 30, 2024

*Note: Only includes fund managers that have closed an energy transition infrastructure specialist fund from 2019 to H1 2024.*

## Notable LPs in energy transition funds

| Allocator | Count of all energy transition infrastructure funds committed to since 2014 *(specialist)* | Generalist committed capital ($M) | Specialist committed capital ($M) | Fund most recently committed to | Date | Commitment size ($M) |
|---|---|---|---|---|---|---|
| European Investment Bank | 44 *(20)* | $1,145.0 | $804.3 | Alcazar Energy Partners II | May 21, 2024 | $100.0 |
| CALSTRS | 27 *(6)* | $746.0 | $100.0 | ISQ Growth Markets Infrastructure | March 1, 2024 | N/A |
| Allstate | 26 *(6)* | $159.6 | $23.8 | EnCap Energy Transition II | May 8, 2024 | N/A |
| SBCERS Santa Barbara County Employees' Retirement System | 25 *(3)* | $315.1 | $31.0 | Brookfield Infrastructure V | December 1, 2023 | $15.0 |
| Border to Coast | 25 *(9)* | $1,915.5 | $465.2 | Arcus European Infrastructure 3 | March 18, 2024 | $150.3 |
| | 25 *(6)* | $5,772.4 | $1,797.5 | DIF Core Infrastructure III | March 5, 2024 | $200.0 |
| Industriens Pension | 25 *(8)* | N/A | $50.0 | Arcus European Infrastructure 3 | March 18, 2024 | N/A |
| TRS | 24 *(3)* | $4,129.1 | $375.0 | Energy Capital Partners V | May 28, 2024 | $25.0 |
| gmpf | 24 *(5)* | $1,517.5 | $306.8 | DIF Infrastructure VII | March 5, 2024 | $110.0 |
| | 21 *(3)* | $350.8 | $12.9 | DIF Infrastructure VII | March 5, 2024 | N/A |
| Allstate | 21 *(4)* | N/A | $2.5 | Ember Infrastructure I | June 30, 2022 | N/A |
| BERS Board of Education Retirement System | 21 *(3)* | $820.8 | $37.6 | DIF Infrastructure VII | March 5, 2024 | $45.5 |
| trsnyc | 21 *(3)* | $2,289.2 | $220.6 | DIF Infrastructure VII | March 5, 2024 | $129.3 |
| NYCERS | 21 *(3)* | $1,977.1 | $177.3 | DIF Infrastructure VII | March 5, 2024 | $109.8 |
| ILMARINEN | 21 *(2)* | N/A | N/A | CapMan Nordic Infrastructure II | April 29, 2024 | N/A |

Source: PitchBook • Geography: Global • As of June 30, 2024

*Note: Only includes allocators that have made a commitment to an energy transition infrastructure fund from 2019 to H1 2024. Commitment sizes were captured at a rate of approximately 50% for this dataset.*

## Notable LPs in energy transition specialist funds

| Allocator | Count of energy transition infrastructure specialist funds committed to since 2014 | Capital committed to energy transition infrastructure specialist funds ($M) | Specialist fund most recently committed to | Date | Commitment size ($M) |
|---|---|---|---|---|---|
| European Investment Bank | 20 | $804.3 | Alcazar Energy Partners II | May 21, 2024 | $100.0 |
| Strathclyde Pension Fund | 11 | $561.4 | Quinbrook Renewables Impact | November 30, 2020 | $70.1 |
| Border to Coast | 9 | $465.2 | Ara III | December 13, 2023 | N/A |
| Environment Agency Pension Fund | 8 | $327.1 | Meridiam Sustainable Infrastructure Europe IV | September 16, 2021 | N/A |
| Industriens Pension | 8 | $50.0 | CI Energy Transition I | August 1, 2022 | N/A |
| CALSTRS | 6 | $100.0 | Generate Capital Sustainable Infrastructure | July 19, 2021 | N/A |
| Swedfund | 6 | $30.0 | African Renewable Energy II | December 31, 2021 | N/A |
| | 6 | $1,797.5 | Blackstone Green Private Credit III | August 10, 2023 | $350.0 |
| European Investment Fund | 6 | $349.5 | Impax New Energy Investors IV | May 22, 2024 | N/A |
| Allstate | 6 | $23.8 | EnCap Energy Transition II | May 8, 2024 | N/A |
| FMO Entrepreneurial Development Bank | 6 | $52.6 | Responsibility Asia Climate | November 28, 2023 | N/A |
| SFERS San Francisco Employees' Retirement System | 6 | $247.4 | Sustainable Asset III | April 1, 2021 | $60.0 |
| gmpf | 5 | $306.8 | British Sustainable Infrastructure II | November 9, 2023 | $36.5 |
| DFC U.S. International Development Finance Corporation | 5 | $130.0 | Alcazar Energy Partners II | May 21, 2024 | N/A |
| Portland Investment Counsel Buy. Hold. And Prosper. | 5 | N/A | ARCH Africa Renewable Power | December 31, 2019 | N/A |

Source: PitchBook • Geography: Global • As of June 30, 2024

*Note: Only includes allocators that have made a commitment to a specialist energy transition infrastructure fund from 2019 to H1 2024. Commitment sizes were captured at a rate of approximately 50% for this dataset.*

## Evergreen funds investing in energy transition infrastructure

| Manager | Fund | Fund size ($B) | Fund location |
|---|---|---|---|
| J.P.Morgan Asset Management | JP Morgan Infrastructure Investments | $37.7 | US |
| Blackstone | Blackstone Infrastructure Partners | $33.9 | US |
| KKR | KKR Diversified Core Infrastructure | $9.5 | US |
| ifm investors | IFM Global Infrastructure | $13.4 | US |
| Ullico | Ullico Infrastructure | $9.9 | US |
| ifm investors | IFM Australian Infrastructure | $8.1 | Australia |
| igneo Infrastructure Partners | Global Diversified Infrastructure | $6.5 | Australia |
| GLIL INFRASTRUCTURE | GLIL Infrastructure | $4.3 | UK |
| Stonepeak | Stonepeak Core | $3.1 | US |
| MORRISON&CO | Morrison & Co Infrastructure Partnership | $3.0 | New Zealand |

Source: PitchBook • Geography: Global • As of September 25, 2024

## Public companies in the energy transition infrastructure space

| Manager | Market cap ($B) | Industry/vertical | Type of energy transition infrastructure | HQ country |
|---|---|---|---|---|
| Vestas | $23.4 | Alternative energy equipment | Wind energy | Denmark |
| First Solar | $26.2 | Alternative energy equipment | Solar energy | US |
| ENPHASE | $15.8 | Alternative energy equipment | Solar energy, battery energy storage, EV charging infrastructure | US |
| SUZLON | $13.6 | Alternative energy equipment | Solar energy, wind energy | India |
| Ørsted | $27.7 | Energy production | Solar energy, wind energy hydrogen, battery energy storage | Denmark |
| adani | $39.2 | Energy production | Solar energy, wind energy, hybrid renewable power plants | India |
| | $100.4 | Energy production | Hydropower | China |
| edp Renewables | $17.8 | Energy production | Solar energy, wind energy, hydropower | Portugal |
| Verbund | $28.6 | Electric utilities | Wind energy, hydropower | Austria |
| Iberdrola | $96.6 | Electric utilities | Solar energy, wind energy, hydropower, green hydrogen | Spain |
| CHUBU Electric Power | $9.1 | Electric utilities | Hydroelectric, geothermal, nuclear | Japan |
| conEdison | $35.6 | Multi-utilities | Solar energy, wind energy | US |
| ORMAT | $4.6 | Energy infrastructure | Geothermal | US |

Source: PitchBook • Geography: Global • As of September 24, 2024

## Methodology

For the purposes of this paper, we define energy transition infrastructure funds or energy transition funds as any infrastructure fund that has made an investment in energy transition infrastructure, or which has specified that it targets assets under the energy transition umbrella as part of its mandate. Energy transition infrastructure encompasses renewable and low-carbon energy assets; EV charging infrastructure; CCUS assets; and battery storage assets. Renewable or low-carbon energy assets include those generating power through solar, wind, hydropower, geothermal, bioenergy or waste-to-energy, and nuclear technologies.

The universe of energy transition infrastructure funds contains generalist funds, which invest in energy transition infrastructure alongside other infrastructure sectors, and specialist funds, which exclusively or almost exclusively invest in energy transition infrastructure. We expanded our definition to include funds that almost exclusively invest in energy transition infrastructure, as occasionally GPs will opportunistically target an asset outside of a fund's investment theme if they believe it represents an outsized opportunity.

Unless otherwise specified, the energy transition funds covered by the report are primary, closed-end infrastructure vehicles closed from 2009 through June 30, 2024. A combination of manual tagging and PitchBook database searches was used to arrive at the list of energy transition infrastructure generalists and specialists. Specifically, approximately 430 vehicles including the 20 largest infrastructure funds closed each year from 2009 to H1 2024 were tagged manually and used to validate the keyword search methodology used to create the rest of the dataset.