PitchBook

Q1 2023

GLOBAL Real Assets Report

Contents

Key takeaways

- Through Q1 2023, six real assets vehicles—all infrastructure funds—closed on just $2.0 billion, the lowest quarterly figure in a decade. This represents a YoY decline of 96.0% from the $50.8 billion raised in Q1 2022.
- The fundraising drop-off in Q1 2023 follows a slowdown that occurred in the second half of 2022. While in H1 2022, the asset class closed on $93.9 billion, in H2 2022, it closed on just $24.9 billion.
- The one-year horizon IRR of real assets overall came in at 18.7% as of the end of Q3 2022, with wide dispersions between the subcategories: Natural resources generated returns of 6.5%, infrastructure notched 15.2%, and oil & gas hit 33.7%.

Real assets horizon IRRs*

	1-year	3-year	5-year	10-year	15-year	20-year
Real assets	18.7%	10.9%	8.6%	7.8%	7.5%	8.2%
Infrastructure	15.2%	11.8%	10.5%	10.5%	9.0%	9.3%
Oil & gas	33.7%	11.7%	6.9%	4.9%	6.2%	7.4%
Other	6.5%	3.6%	2.5%	3.3%	3.4%	3.8%

Source: PitchBook • **Geography:** Global
*As of September 30, 2022

The accompanying Excel file contains additional charts and all underlying data for this report. Download the XLS summary here.

PitchBook Data, Inc.

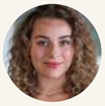
John Gabbert Founder, CEO

Nizar Tarhuni Vice President, Institutional Research and Editorial

Daniel Cook, CFA Head of Quantitative Research

Institutional Research Group

Analysis



Anikka Villegas
Analyst, Fund Strategies & Sustainable Investing
anikka.villegas@pitchbook.com

Juliet Clemens
Analyst, Fund Strategies
juliet.clemens@pitchbook.com

Data

Parker Dean
Associate Quantitative Research Analyst

pbinstitutionalresearch@pitchbook.com

Publishing

Report designed by **Drew Sanders**

Published on June 14, 2023

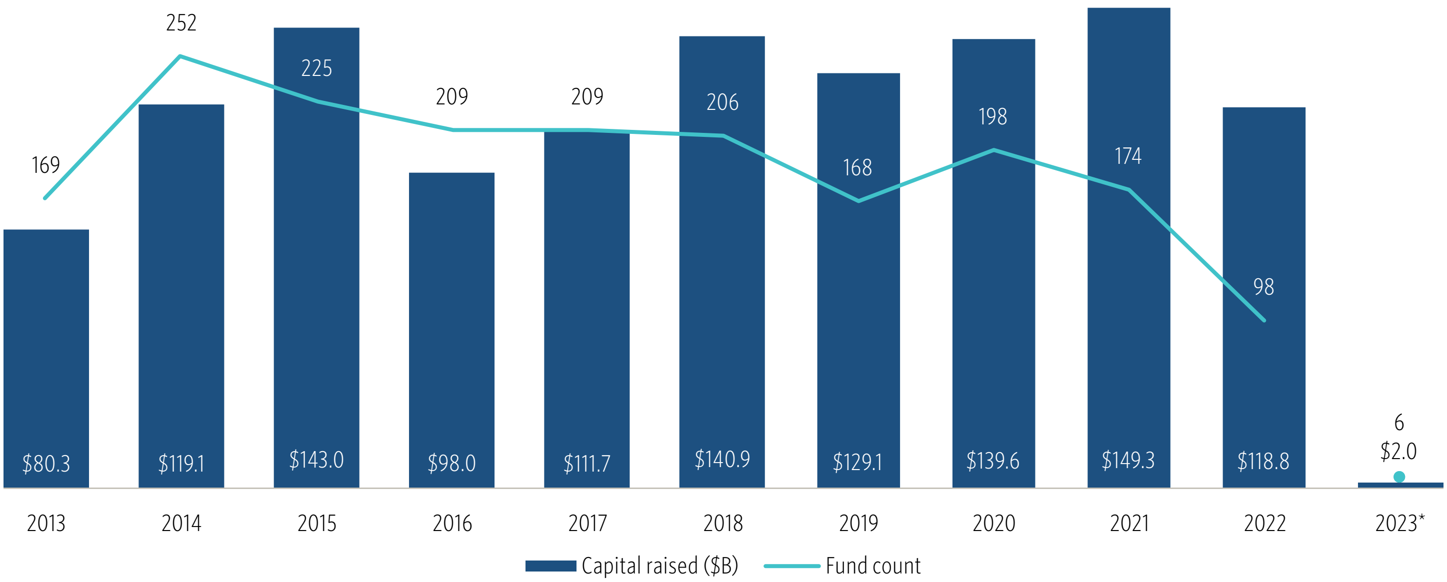
Click here for PitchBook's report methodologies.

Click here for PitchBook's private market glossary.

Note: This report includes real assets debt in the real assets fundraising and performance data, unlike other reports such as the Global Private Market Fundraising Report and the Global Fund Performance Report, in which private debt has its own section. As such, totals may differ from other recent reports.

Overview

Real assets fundraising activity



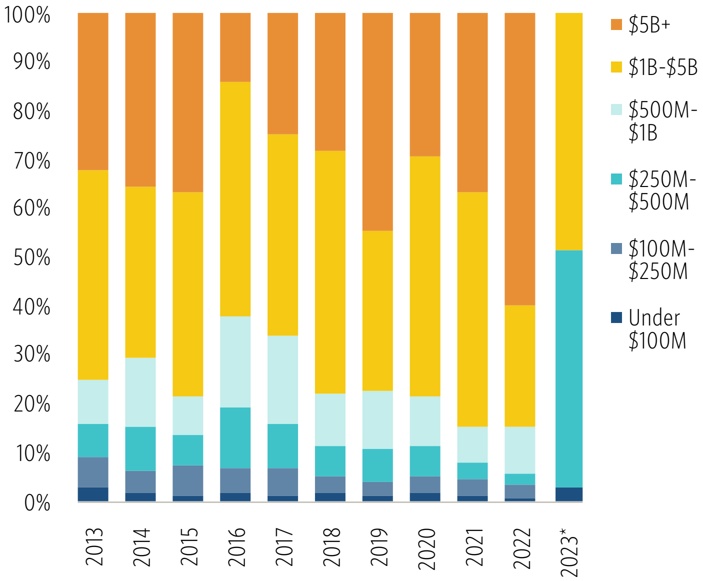
Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Juliet Clemens
Analyst, Fund Strategies

Longtime readers of PitchBook's real assets reports may notice that we have grouped the subcategories of this asset class differently in this iteration than in prior versions. We had previously split real assets out into three groups: infrastructure, oil & gas, and "other," which consisted of agriculture, metals & mining, natural resources, and timber. The shrinking size of natural resources AUM in the world of closed-ended private funds has reduced the need for the separation of the various commodities. Going forward, we will now have dedicated sections for infrastructure and natural resources, which will include oil & gas. The only instance in which we will continue to split out oil & gas from other natural resources will be with regards to performance, as oil & gas returns are vastly different to the returns of other natural resource strategies.

Case in point, through Q1 2023, only six real assets funds were raised—all of them targeting infrastructure investments—closing on a total of $2.0 billion, the lowest quarterly figure in a decade. This represents a QoQ decline of 81.8% as compared with the $11.0 billion raised in Q4 2022, and YoY decline of 96.0% to the $50.8 billion raised in Q1 2022.

Share of real assets capital raised by size bucket



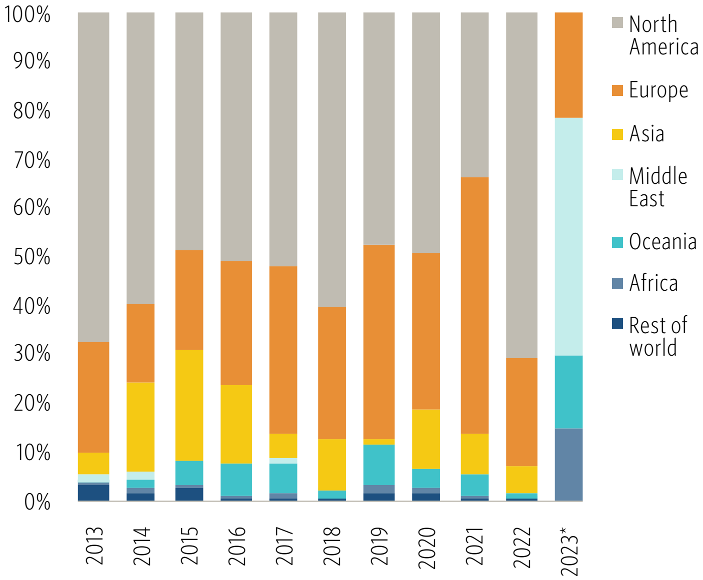
Source: PitchBook • **Geography:** Global
*As of March 31, 2023

The considerable decrease in fundraising in Q1 2023 follows a slowdown that occurred in the second half of 2022. Most of the capital raised in 2022 was raised in the first half of the year. H1 closed on $93.9 billion, aided by the closings of several megafunds, four of which were over $14 billion. In contrast, H2 closed on just $24.9 billion—of the 39 funds to close in H2, only one, Ares Infrastructure Debt Fund V, hit the $5 billion mark. While this disparity may be explained by a lull following several large closings in H1, the speed and extent of the decline is dramatic. As noted in the Q1 2023 Global Fundraising Report, this pullback may be partially due to the denominator effect, the fact that we do not capture fundraising data for evergreen strategies that target real assets, or a combination of both. The largest fund raised in Q1 2023 was the Rakiza Fund, based out of Oman, which closed on $1.0 billion; the smallest fund came in at $60.0 million for the Cardiff Capital Region Innovation Investment Capital Fund, raised out of the United Kingdom. No funds raised this quarter were domiciled in North America.

Though infrastructure fundraising was down in H2 2022, Europe's largest take-private deal involved an infrastructure transaction. This occurred in December 2022, when Atlantia (renamed to Mundys), an Italian motorway and airports group, was bought out by Blackstone Group and Edizione for $51.8 billion. As the cost of capital rises, this deal may offer a peek into the future of infrastructure transactions, wherein it may be more economical to seek take-private opportunities than to dedicate capital toward strategies that build new infrastructure projects from the ground up. There are also several large infrastructure funds in market, including Brookfield Infrastructure Fund V, EQT Infrastructure VI Fund, and KKR Global Infrastructure Investors V, all of which are targeting at least $20 billion, thus suggesting a continued healthy appetite for infrastructure products into 2023, despite the first-quarter slowdown.

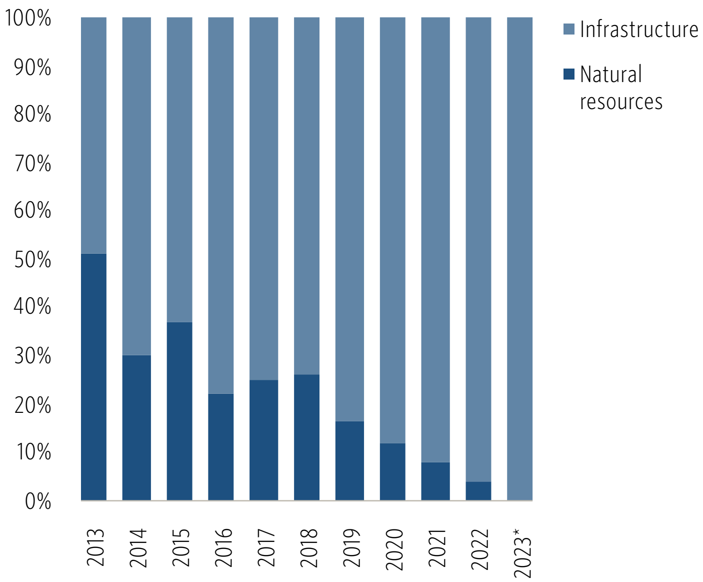
As fund managers increasingly incorporate environmental, social & governance (ESG) considerations when making infrastructure investments, we felt it appropriate to feature Sustainable Infrastructure as the spotlight for this report, based on our Sustainable and Digital Infrastructure in the Private Markets analyst note published in early 2023. Sustainable infrastructure is defined as assets that further progress toward either environmental or social sustainability. This research delves into the growing number of both funds that are dedicated sustainable infrastructure funds and those that target portfolio companies within the sustainable infrastructure space. The spotlight also determines the drivers behind the escalating adoption of these sustainable infrastructure strategies.

Share of real assets capital raised by region



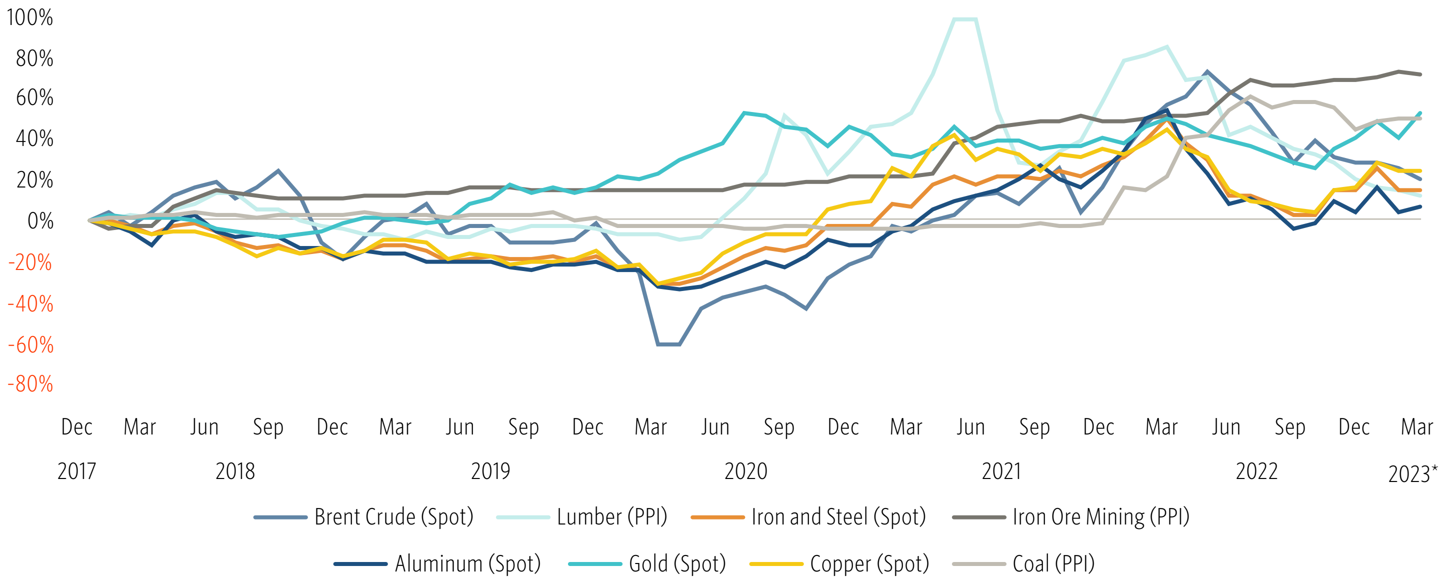
Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Share of real assets capital raised by type (consolidated)



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Price changes for select commodities (rebased to 2017)

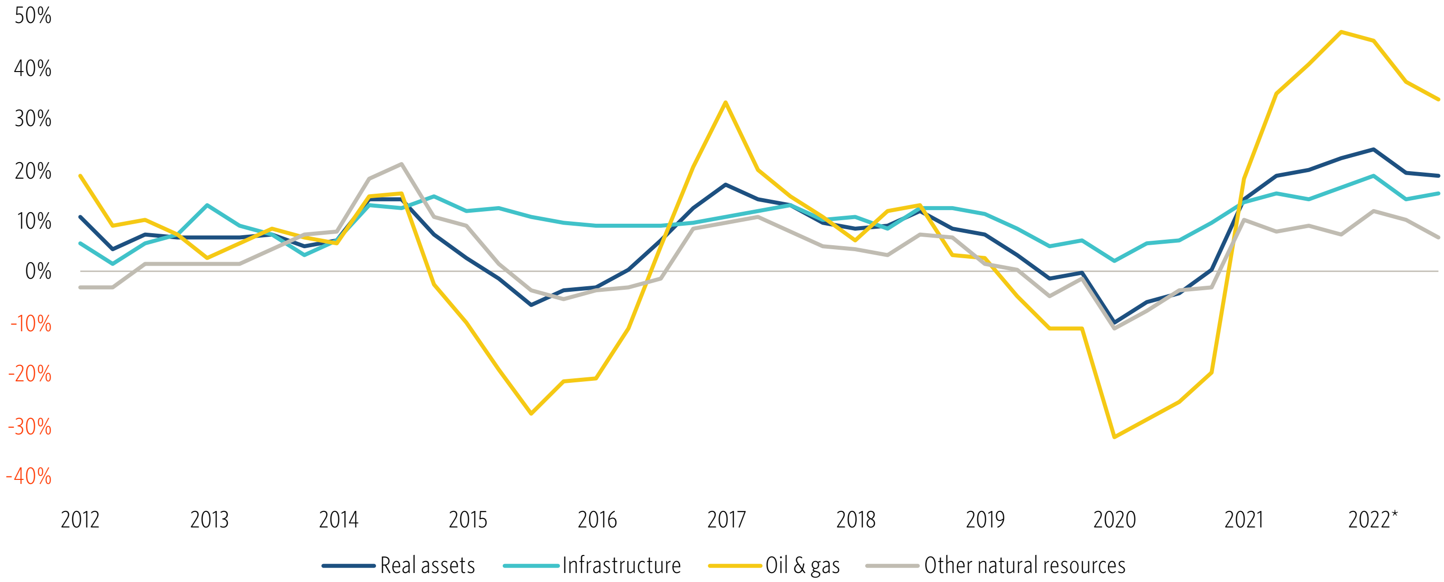


Sources: S&P and FRED • **Geography:** Global
*As of March 31, 2023

In contrast to infrastructure funds, private funds investing in natural resources raised only $4.4 billion of the 2022 fundraising total and no capital in Q1 2023. Natural resource funds made up 26.0% of fundraising totals as recently as 2018, but funds targeting these strategies have been declining ever since. Though commodities generally saw positive price movements through 2022, peak-to-trough dispersions illustrate the unpredictability of those returns. For instance, at its highest, the West Texas Intermediate (WTI) spot price for crude oil hit $114.8 per barrel in June 2022; by March 2023, it hit a low of $73.3 per barrel.[1] Copper's spot price reached a high of $10,230.9 per metric ton in March 2022 before tumbling to $7,544.8 per metric ton in July 2022. In March 2023, the price had recovered some ground to reach $8,856.3 per metric ton.[2] Because of previous boom-and-bust cycles in commodities, there has been wariness on the part of investors to allocate capital toward private natural resource strategies.

1: "Spot Crude Oil Price: West Texas Intermediate (WTI)," FRED, May 2023.
2: "Global Price of Copper," FRED, April 2023.

Real assets rolling one-year IRR by strategy



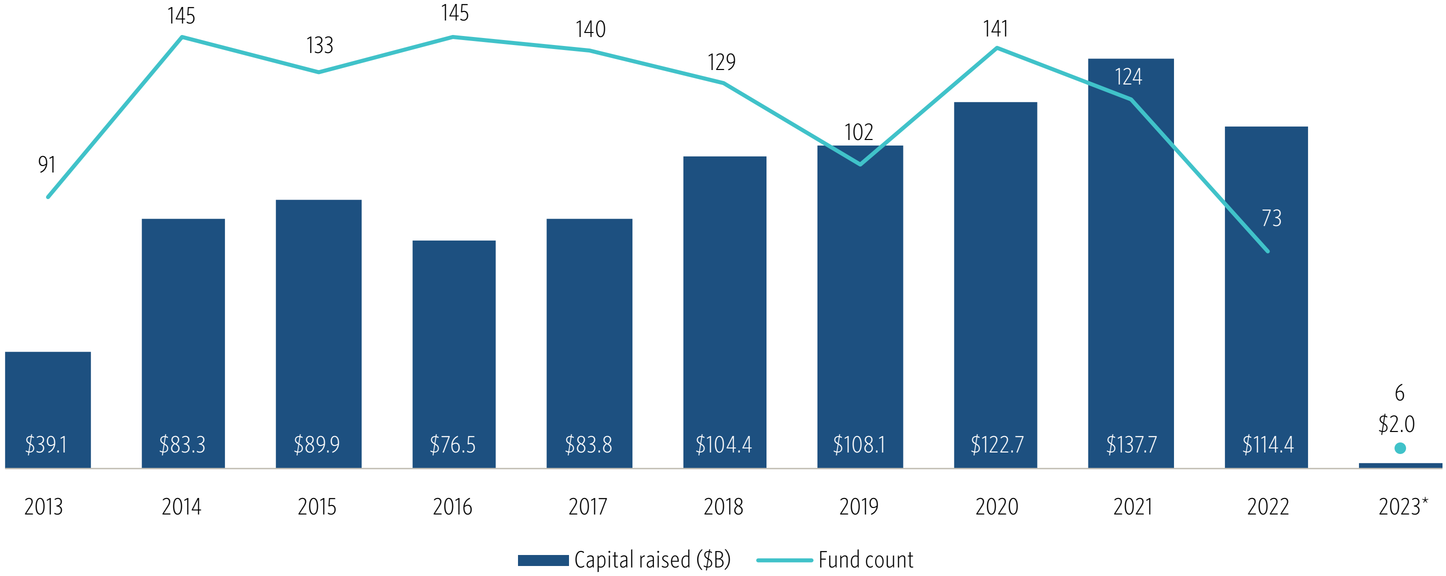
Source: PitchBook • **Geography:** Global
*As of September 30, 2022

The one-year horizon IRR of real assets overall came in at 18.7% at the end of Q3 2022, with wide dispersions between the different constituent groups. For natural resources (excluding oil & gas, as mentioned), the figure was at 6.5%, followed by infrastructure, which notched 15.2%. The outperformer was oil & gas, which had a one-year horizon IRR of 33.7% at the end of Q3 2022. However, despite its outperformance, private oil & gas funds have seen waning investments as a growing number of investors and funds become concerned with following ESG frameworks. For instance, Blackstone's private equity arm stopped making oil & gas investments in 2017 and has since begun targeting portfolio companies in the renewable energy sector.[3] As an increasing number of fund managers turns to investments in renewable energy, critical metals will be in high demand; according to the International Energy Agency, electric cars generally require six times the mineral inputs of internal combustion engine vehicles, and onshore wind plants require nine times more mineral resources than gas-fired plants.[4] As demand for and investments into these materials increase, we may soon see a future in which the performance of natural resources excluding oil & gas will reflect these pricing advantages.

3: "Blackstone Swears Off Oil-Patch Investing as Private Equity's Retreat Widens," Bloomberg, Dawn Lim and Sabrina Willmer, February 22, 2022.
4: "The Role of Critical Metals in Clean Energy Transitions," International Energy Agency, 2021.

Infrastructure

Infrastructure fundraising activity



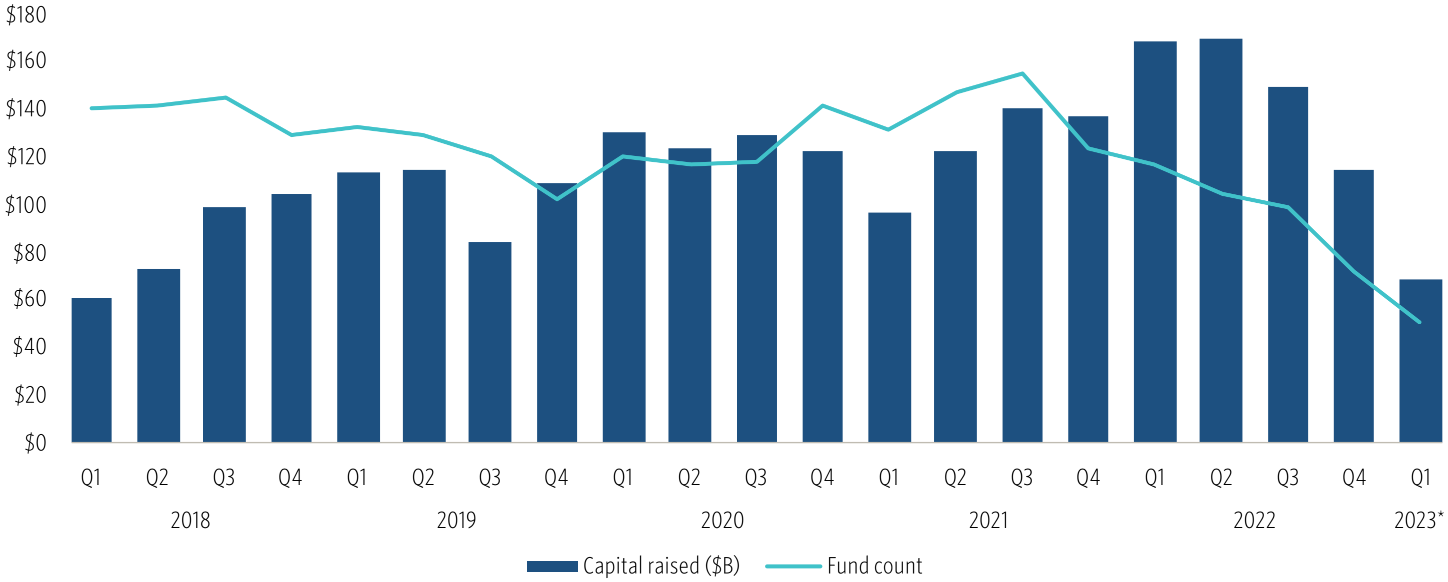
Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Anikka Villegas
Analyst, Fund Strategies & Sustainable Investing

Victim to the inhospitable fundraising environment of the past few quarters, infrastructure fundraising activity continued to soften at the end of 2022 before falling off in the first quarter of 2023. With 16 funds totaling a cumulative $10.8 billion in commitments closed in Q4 2022, it became apparent that high interest rates, the denominator effect, and lower distributions from existing funds were beginning to take their toll on the ability of the asset class to attract capital. However, 2022 fundraising totals were still above the average of the past decade, with $114.4 billion and 73 funds closed. Then, in Q1 2023, just six vehicles and $2.0 billion were raised, reinforcing the speculation that the year was likely to experience a considerable slowdown in fundraising.

This is driven in part by uncharacteristically small fund sizes among those raised. After just two funds above $1 billion closed in Q4 2022, only one $1 billion fund closed in Q1 2023. Even more surprising is the fact that no other funds were raised in the next-smallest size bucket, of $500 million to $1 billion, with half of the vehicles that closed in Q1 2023 in the $250 million to $500 million range. The asset class has traditionally raised large funds, which are often necessary to complete capital-intensive infrastructure projects. With an average of five closed annually in the $5 billion-plus bucket and 24 in the $1 billion to $5 billion bucket from 2018 to 2022, 2023's numbers are a clear divergence from the norm. This is likely due in part to the locations in which the funds were raised and will invest, with half of the funds raised in and investing in emerging markets.

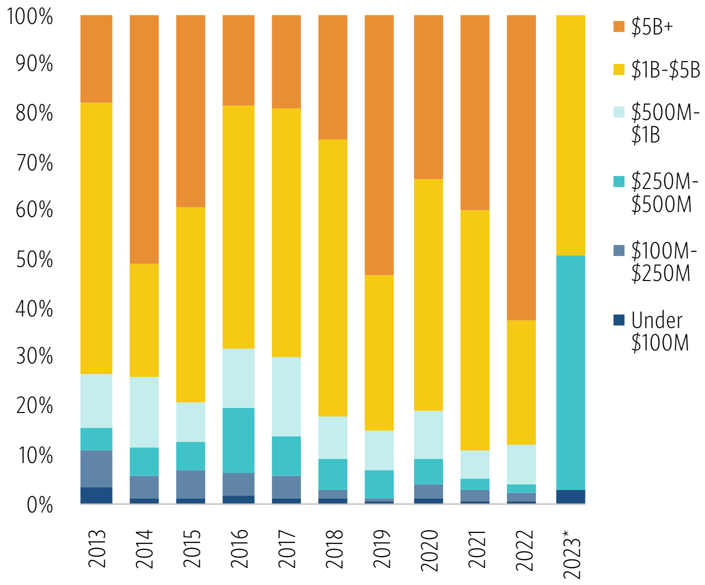
Rolling four-quarter infrastructure fundraising activity



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Geographically, North America dominated infrastructure fundraising in 2022, comprising 70.5% of the capital raised that year. Yet, in Q1 2023, there were no funds raised that were domiciled in North America. Instead, two were domiciled in the Middle East, two in Europe, and one each in Africa and Oceania. Given that the attractive government spending environment in the United States, which has previously been thought to be stimulating infrastructure fundraising in the region, carried into in 2023, its total lack of fundraising in Q1 is noteworthy. Similarly, in Europe, infrastructure fundraising has slowed despite the need for renewable energy infrastructure, which was underlined by the energy crisis, not having been met.[5] This information supports the perception that the other macroeconomic dynamics at play are overshadowing the draw of opportunities that previously enticed LPs to commit capital. Inspecting the regions that started 2023 on track to raise the same number or more funds than they have in recent years, Africa and Oceania are experiencing fairly normal fundraising levels. However, the Middle East, after not raising any funds for the past three years and only one in 2019, saw two vehicles close

Share of infrastructure capital raised by size bucket



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

5: "The EU Unveils Plans to Boost Its Shift to Green Energy: Here's What You Need to Know About the Global Energy Transition This Week," World Economic Forum, Roberto Bocca, March 20, 2023.

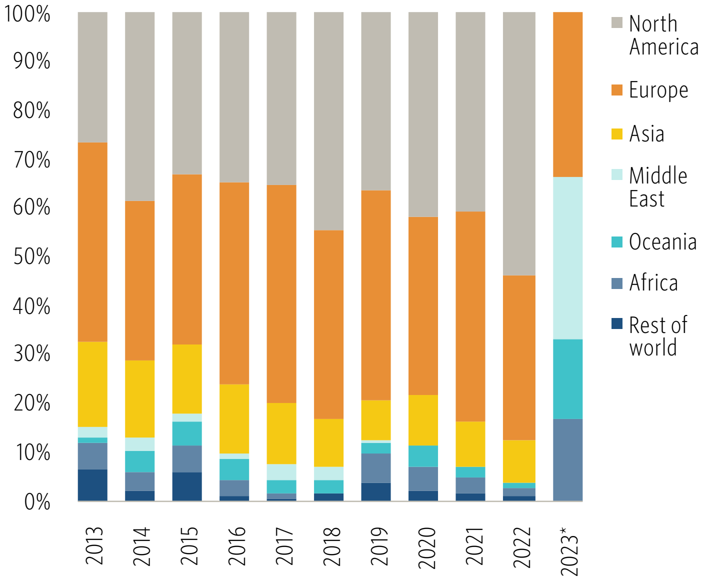
in Q1 2023. The first, Rakiza Fund, was the largest raised in the quarter. It invests in regulated utilities, energy from waste, telecom, transport & logistics, and social infrastructure in Oman and Saudi Arabia.[6] The second, the Saudi Infrastructure Fund, raised by Musharaka Capital, also invests in Saudi Arabian infrastructure.

Looking at the types of infrastructure funds that were raised since our last report, seven of the 16 funds closed in Q4 2022 were opportunistic, three were core, three were generalist, two were debt, and one was greenfield. In Q1 2023, four of the six funds closed were opportunistic, and the other two were core. Core infrastructure fundraising numbers are also likely understated, as the data does not account for the large sums of capital in evergreen fund structures, which are more popular among core strategies.[7] It is interesting to see core funds persist among the vehicles that were able to close under the current conditions, as higher interest rates can increase the opportunity cost of allocating capital, making income-like returns similar to the rate of return of government securities less appealing. However, lower-duration asset classes are relatively more appealing than higher-duration asset classes in a rising interest rate environment. For this reason, more eyes have turned to direct lending, as it is allowing investors to take on less risk while achieving comparable returns to equity investments.

Of note, the largest infrastructure fund closed in the past two quarters was the $5.0 billion Ares Infrastructure Debt Fund V, which will make subordinated investments across the digital, utilities, renewables, energy, and transportation sectors.[8] The second-largest, Clean H2 Infra Fund, at $2.0 billion, was an opportunistic Impact vehicle raised as a joint venture between Ardian and FiveT Hydrogen.[9] The fund invests in large-scale clean hydrogen infrastructure projects across the globe and is one of many infrastructure funds we have seen raised in recent years with a sustainable focus. For more on the forces driving private fund investment in sustainable infrastructure, read on to the report's Spotlight, in which we assess why it has increased over the past 15 years.

Another prominent sector focus that carried into Q1 2023 is investment in digital infrastructure. One of the six funds raised during the quarter was Convergence Partners Digital Infrastructure Fund, another Impact fund, which invests in fiber, wireless, data centers, towers, 5G, cloud, Internet of Things, AI, financial technology (fintech), and network virtualization in sub-Saharan Africa.[10] This follows Q4 2022, in which two dedicated digital infrastructure funds closed, Grain Spectrum Holdings IV and IPI Europe AIF I,[11, 12] as well as one other, Macquarie European Infrastructure Fund 7, which will invest in digital infrastructure, among other sectors.[13] Digital infrastructure fundraising has been increasing rapidly over the last 15 years, as discussed in our recent analyst note. This trend is expected to continue, as tailwinds such as the digitization of the economy, increased needs around data due to technological developments such as AI & machine learning (AI & ML), and less polarized and more widespread political and regulatory support endure. In terms of recent public digital infrastructure performance, the FTSE Nareit Data Centers index climbed throughout 2021, then fell through Q3 2022, before bouncing back up above pre-pandemic numbers in 2023. As of March, it remains above 2017 levels.

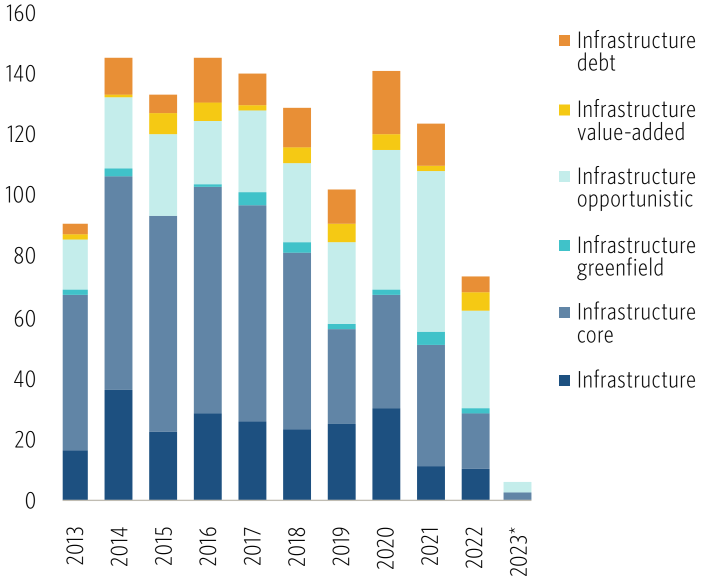
Share of infrastructure fund count by region



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

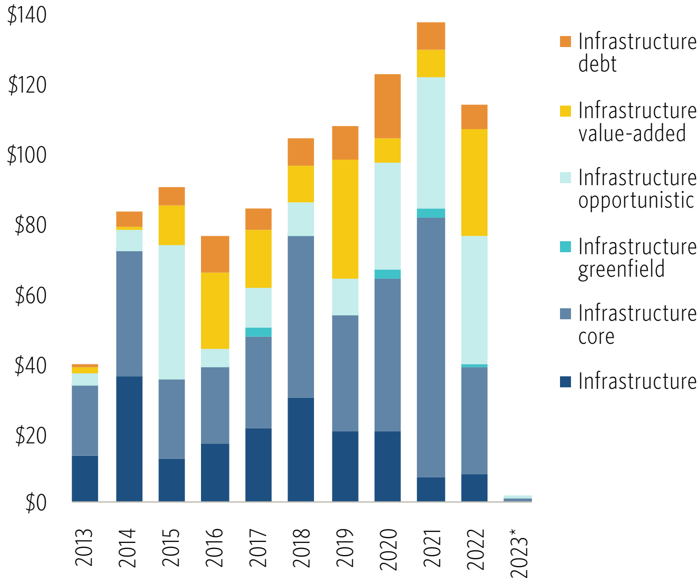
6: "About Rakiza," Oman's Infrastructure Fund, Rakiza, 2023.
7: "Blackstone's Open-Ended Infrastructure Fund Gets Further $2.5Bn," IPE Real Assets, Jon Peterson, April 22, 2022.
8: "Ares Management Raises $5 Billion of Infrastructure Debt Capital," Business Wire, January 11, 2023.
9: "Hy24 Is the World's First Investment Manager Fully Dedicated to Scaling up the Hydrogen Economy," Hy24, n.d., accessed June 1, 2023.
10: "Convergence Partners' Latest Fund to Drive Digital Inclusion in Africa," Convergence Partners, n.d., accessed June 1, 2023.
11: "Grain Management Rounds up $3.75 Billion for Spectrum, Telecom Investments," RCR Wireless News, Kelly Hill, April 6, 2021.
12: "We Aim to Deliver the Strategic Capital to Keep the World Connected," IPI, n.d., accessed June 1. 2023.
13: "Macquarie Launches Seventh European Infrastructure Fund," Institutional Investing in Infrastructure, Kali Persall, January 18, 2022.

Infrastructure fund count by type



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Infrastructure capital raised ($B) by type



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

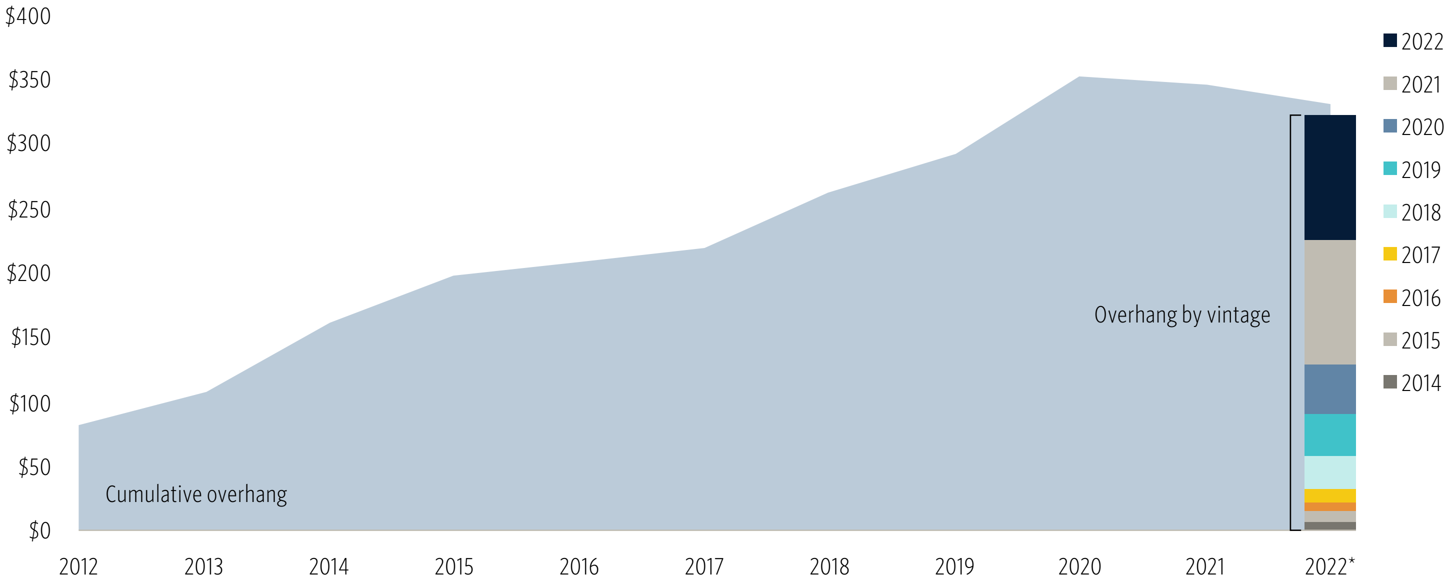
Top infrastructure funds to close in 2023*

Fund	Investor	Fund size ($M)	Close date (2023)	Fund type	Location
Rakiza Fund	Rakiza	$1,000.0	March 21	Infrastructure core	Muscat, Oman
Nykredit Infrastructure Fund 3	Nykredit	$378.0	February 16	Infrastructure opportunistic	Copenhagen, Denmark
FP RE Infrastructure Opportunities Fund	For Purpose Investment Partners	$310.0	January 17	Infrastructure opportunistic	Paddington, Australia
Convergence Partners Digital Infrastructure Fund	Convergence Partners (Africa)	$296.0	January 31	Infrastructure core	Johannesburg, South Africa
Cardiff Capital Region Innovation Investment Capital Fund	Cardiff Capital Region	$60.0	March 6	Infrastructure opportunistic	Hengoed, UK
Saudi Infrastructure Fund	Musharaka Capital	N/A	March 16	Infrastructure opportunistic	Al Khobar, Saudi Arabia

Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Despite dwindling fundraising activity over the past few quarters, infrastructure dry powder remained high as of September 2022, at $330.0 billion, down from 2020's all-time high of $351.6 billion. While it has slowly been declining, it has been dropping by only approximately $15 billion increments each year. It may continue to wane more rapidly in coming quarters, given the current fundraising environment, but with a few infrastructure vehicles targeting over $20 billion fundraising in 2023, it likely will not drop off. At present, fund managers' hesitancy to deploy capital given the uncertain market environment of 2022 may be contributing to keeping the numbers aloft. Inflation began to ease in early 2023, but recessionary fears remained—and intensified—for many. We often consider take-private activity when evaluating dry powder numbers, as the size of those deals puts large sums of the capital raised by infrastructure's typically massive funds to work in one fell swoop. In 2022, there were several take-privates in the infrastructure space, particularly coming out of Europe, as discussed in our 2022 Annual European PE breakdown and previous Real Assets Report. A couple more took place in early 2023. Swedish PE firm EQT, through its Active Core Infrastructure Fund, and PSP Investments agreed to take private Radius Global Infrastructure, which is an aggregator of digital infrastructure assets, for $3.0 billion.[14] In addition, Brookfield and EIG Consortium entered a binding agreement to take private Origin Energy for $12.0 billion.[15] While they had previously reduced their bid, the new proposal was at an approximately 9% premium to the closing share price at the end of March. This is the latest in many Australian infrastructure take-privates over the past two years.[16]

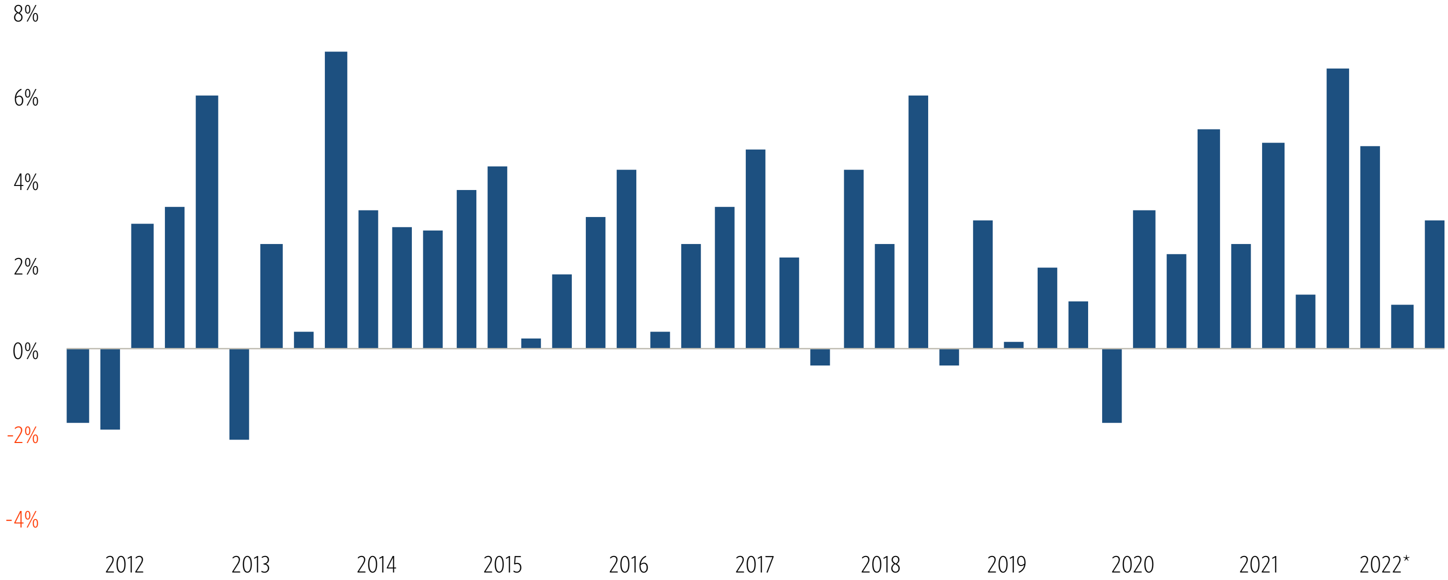
Infrastructure dry powder ($B) by vintage



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

14: "Radius Global Infrastructure to be Acquired by EQT Active Core Infrastructure and PSP Investments for $15.00 per Share in Cash," Business Wire, March 1, 2023.
15: "Brookfield, EIG Near $10.2 Billion Takeover of Origin," Bloomberg, Harry Brumpton, Manuel Baigorri, and David Stringer, March 26, 2023.
16: "A Raid on Public Infrastructure Markets," IPE Real Assets, Florence Chong, October 2022.

PitchBook Indexes: Infrastructure funds quarterly returns

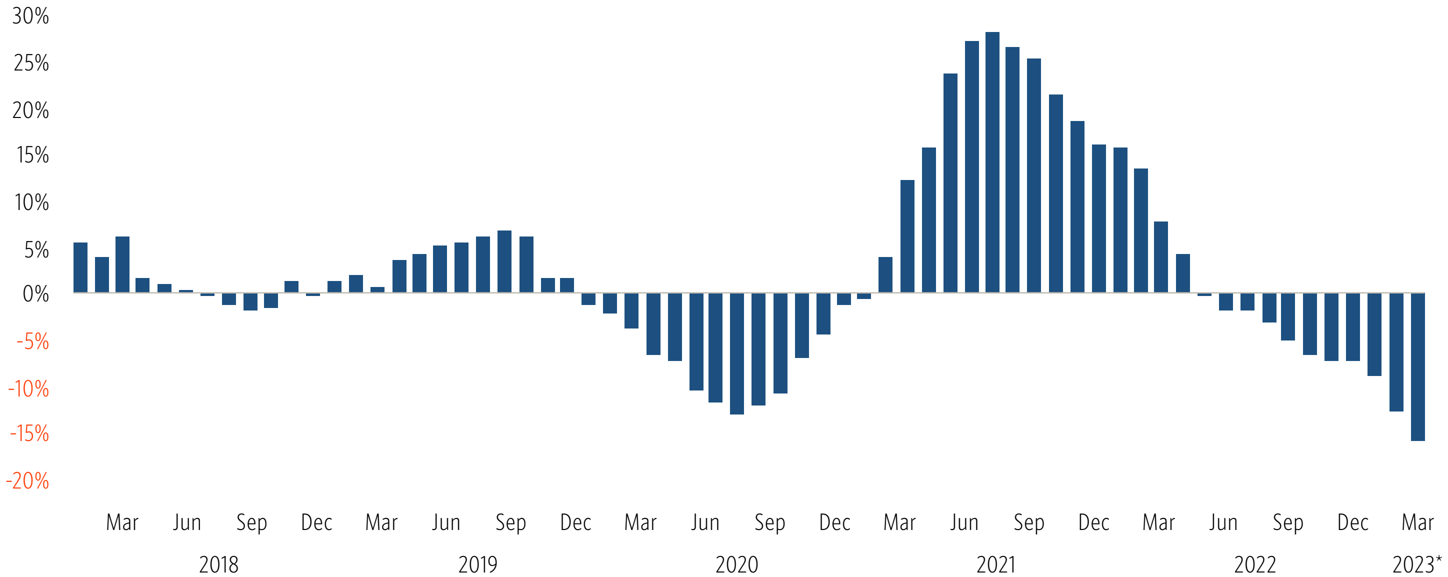


Source: PitchBook • **Geography:** Global
*As of September 30, 2022

In terms of infrastructure fund performance, quarterly returns through Q3 2022 illustrated that the asset class, generally regarded as low-volatility and countercyclical, was living up to its reputation. While all of the other asset classes across private capital experienced quarterly returns that went negative for at least one quarter in 2022, infrastructure did not. In fact, its return increased to 3.1% after Q2's 1.0%, which is the lowest it had been since 2020. With respect to one-year returns, infrastructure had a 15.2% IRR for the one-year period through Q3 2022. This was the seventh straight quarter in which its returns were in the mid-teens, thus illustrating some consistency in infrastructure's ability to weather the storms that rocked other asset classes.
The combination of forces creating upward and downward pressure on returns, including inflation, higher interest rates, and the delayed internalization of the 2022 bear market, seemed to be balancing out in favor of the asset class at the end of 2022. Looking ahead, it's unlikely that infrastructure's performance will break any records in 2023, although it may continue reinforcing the benefits of portfolio diversification using infrastructure funds.

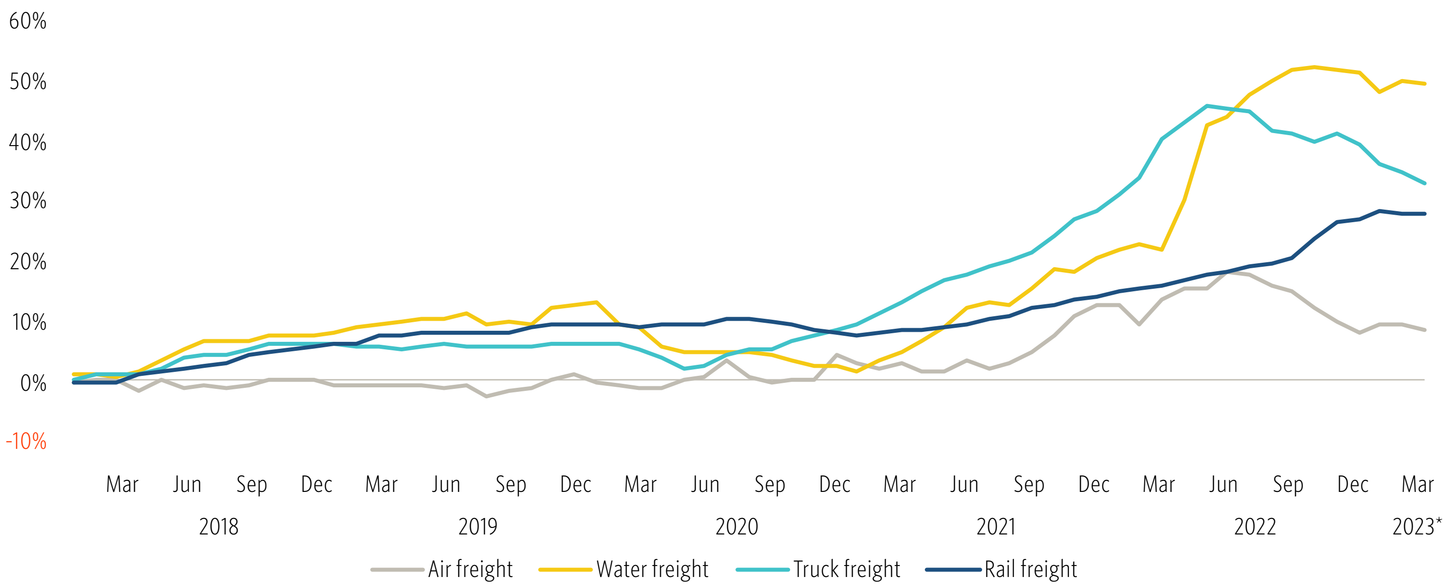
For transport-related infrastructure, returns are likely to be dampened by the shift in consumer spending habits resulting from recessionary fears, affecting ports, railroads, airports, and other logistics-related assets. The YoY change in monthly 20 equipment unit (TEU) volume going through the Port of Los Angeles has been negative since June 2022, with TEU volume hitting a low in February 2023 that rivaled the March 2020 pandemic-induced drop. The producer price index for air, water, truck, and rail freight showed air and truck freight falling from mid-2022 through March 2023, although rail and water freight remained elevated and climbing. In terms of public infrastructure indexes, the FTST Nareit Infrastructure has been trending downward since January 2022, but remains above 2017 levels. Ultimately, the outlook for private infrastructure funds in 2023 is neither outstanding nor grim but may be viewed more positively in light of its relative performance compared to other asset classes.

YoY change in Port of Los Angeles monthly TEU volume



Source: Port of Los Angeles • **Geography:** Global
*As of March 31, 2023

Producer price index for select transportation services

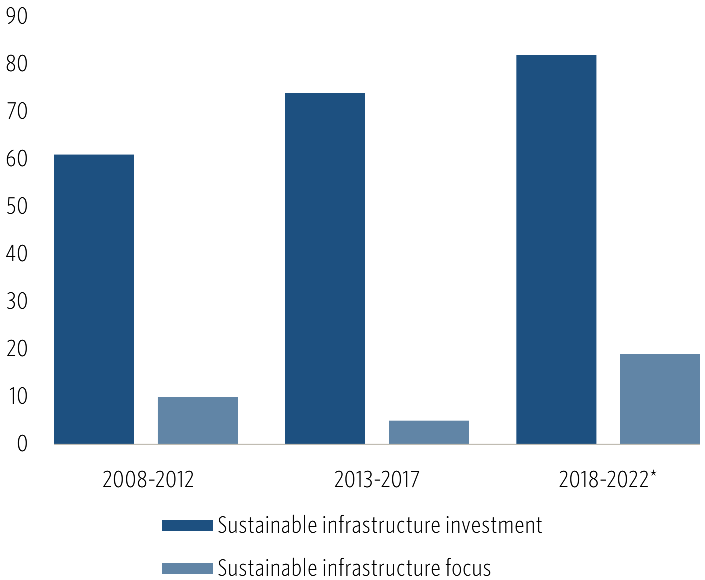


Source: FRED • **Geography:** Global
*As of March 31, 2023

SPOTLIGHT

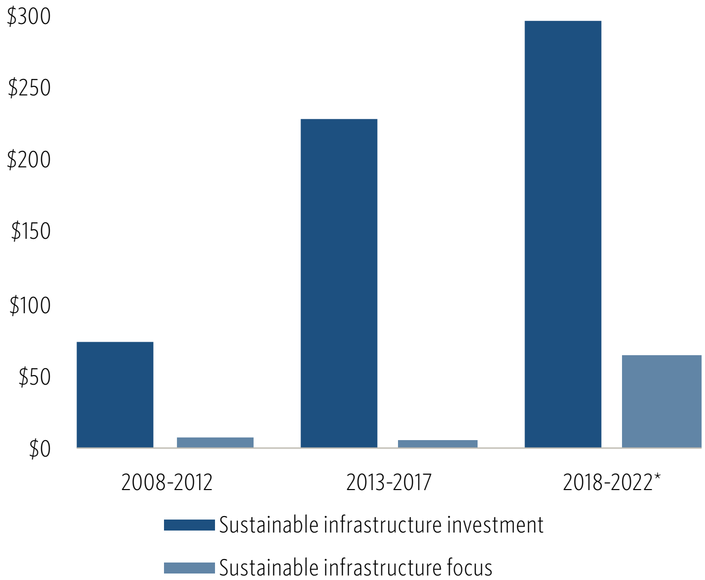
Sustainable infrastructure

Number of top 20 funds raised annually that invest in sustainable infrastructure (divided into five-year brackets)



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Capital raised ($B) by funds in the top 20 raised annually that invest in sustainable infrastructure (divided into five-year brackets)



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Anikka Villegas
Analyst, Fund Strategies & Sustainable Investing

Over the last few years, we have noticed an increase in the number of funds citing sustainable infrastructure as a focus. In early 2023, we published an analyst note identifying the key forces shaping the past, present, and future of these funds, using data to support the assertion that private investment in these areas is growing. We analyzed a dataset of 300 funds, comprised of the top 20 largest infrastructure vehicles raised each year from 2008 to 2022 through Q3. Those funds were evaluated to determine whether they invest in sustainable infrastructure or are dedicated sustainable infrastructure funds.[17, 18] While not representative of the entire infrastructure fund universe, this data offers some quantitative support for claims around the direction of investment. In some graphs, given the sample size, we combine the data into five-year increments in order to smooth the results, which yields more comprehensible insights.

Sustainable infrastructure refers to assets that further progress toward either environmental or social sustainability, although most sustainable infrastructure-focused funds tend toward investment in the environmental side of things. Examples of environmentally sustainable infrastructure investments include renewable energy assets such as solar or wind farms and carbon-capture assets. Examples of socially sustainable infrastructure investments include hospitals increasing access to essential healthcare and schools increasing access to education. Looking at the 20 largest infrastructure funds raised every year going back to 2008, it is evident that the number of top funds investing in sustainable infrastructure has increased over time. While the

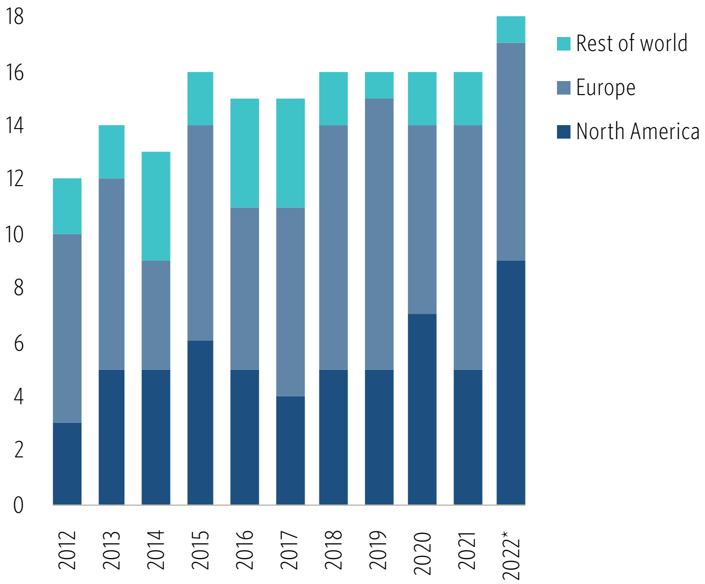
17: For the sake of this research, investing in sustainable infrastructure means the asset manager has communicated that sustainable infrastructure—or the asset types it involves—is an area in which the fund will invest and/or the fund has at least one asset in its portfolio that fits into that category.
18: A dedicated sustainable infrastructure fund is one that the asset manager has communicated that sustainable infrastructure—or the asset types it involves—is the focus of the fund and/or the fund's portfolio is comprised almost exclusively of assets fitting into one of those categories.

numbers have not always increased year to year, combining the data into five-year increments shows a clear escalation in the popularity of sustainable infrastructure.

The number of top infrastructure funds dedicated to sustainable infrastructure has had a less linear upward trend, with 2013 to 2017 showing a decrease. Yet, in the 2018 to 2022 period, 19.0% of the reviewed funds were dedicated to sustainable infrastructure. Breaking down that data, 2018, 2019, and 2020 had one such fund each, while 2021 and the first three quarters of 2022 saw the numbers jump to seven and nine, respectively. When examining the amount of capital raised by the funds in the top 20 that invest in sustainable infrastructure or are dedicated sustainable infrastructure funds, the same story is told, albeit more dramatically. From 2008 to 2019, the average amount of capital raised by funds in the top 20 dedicated to sustainable infrastructure was $1.8 billion. In 2020, 2021, and the first three quarters of 2022, those numbers increased to $4.9 billion, $28.5 billion, and $25.5 billion, respectively.

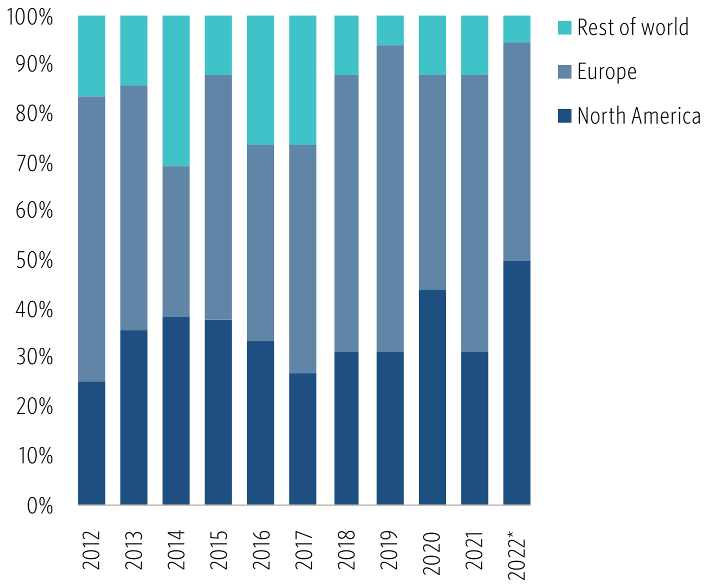
Heightened fundraising of sustainable infrastructure-investing or -dedicated funds has several major causes. For one, not only has the urgency of climate change and the reality of its impacts been increasing, but awareness of it and social movements working to combat its continued exacerbation have as well. These forces have made their impact on elections across the globe, which, in turn, have resulted in significant regulatory shifts and legislation that has made sustainable infrastructure more appealing and mainstream. Second, a shift toward sustainable infrastructure is pragmatic—in countries like the US where infrastructure condition ratings are low (a C- as of 2021), improvements need to be made independent of a push for sustainability.[19] However, it is reasonable to improve upon infrastructure in ways that will be most compatible with future needs, systems, and structures where possible, such as those minimizing carbon emissions, utilizing energy-saving technologies and renewables, or possessing water-efficient features.

Number of top 20 funds raised annually that invest in sustainable infrastructure by region



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Share of the number of top 20 funds raised annually that invest in sustainable infrastructure by region



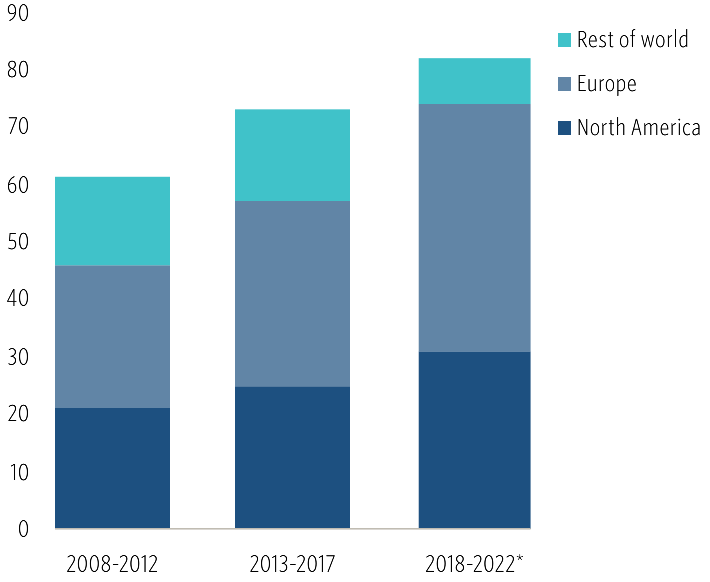
Source: PitchBook • **Geography:** Global
*As of September 30, 2022

19: "America's Infrastructure Scores a C-," 2021 Report Card for American's Infrastructure, n.d., accessed June 1, 2023.

Breaking out the number of the top 20 funds raised each year that invest in sustainable infrastructure by region shows a fairly consistent split between North America and Europe, with Europe typically coming out ahead in its share of funds raised. When divided into five-year increments, the data indicates that while North American sustainable infrastructure-investing funds in the top 20 have increased incrementally over time, European funds have made up a greater share of those raised. Furthermore, the number of funds investing in this area coming out of Europe has been increasing at a faster rate. In the EU, openness to sustainable investing and sustainable infrastructure is more typical and has been more widely accepted for decades. This has manifested in policies—including the European Green Deal, approved in 2020—that systematically work toward climate neutrality through a variety of policy initiatives. More recently, the energy crisis in the EU, catalyzed by the Russia-Ukraine war and resulting energy shocks, has reinforced the need for sustainable infrastructure. However, that factor likely impacts only 2022 fundraising data, if that, given how long it takes to raise and close a fund.

As far as how sustainable infrastructure will continue to shape European infrastructure investing, the EU energy crisis seems to have both reinforced the need for renewables and movement away from fossil fuels while simultaneously causing member states to revert to carbon-intensive energy.[20] It is likely that, while the EU's progress toward carbon reduction goals may slow, investment in sustainable infrastructure will persist, as fossil fuels are used as a short-term crutch, but goals around a transition to low-carbon, renewable energy remain a priority. The sociopolitical tailwinds to sustainable infrastructure investing in the EU are enduring and, as climate change and its impacts become ever-more pressing, intensifying. As more European countries adopt clean energy and work toward an interconnected energy grid, network effects of renewable energy will also make it even more cost-effective and thus accelerate adoption.[21] It is already cheaper to build and operate renewables plants than coal or gas plants.[22]

Number of top 20 funds raised annually that invest in sustainable infrastructure by region (divided into five-year brackets)



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Continued sustainability-related technological developments may also benefit more traditional infrastructure assets. For example, autonomous electric vehicles (EVs) could potentially quadruple the capacity of toll roads, thereby increasing their ability to generate returns.[23] The increased feasibility of and support for sustainable smart cities has also furthered the opportunity to improve infrastructure sustainability and outcomes through technology. Smart cities utilize a wide range of technologically enabled solutions to improve quality of life, efficiency of operations and services, and competitiveness for cities.[24] For example, smart water and waste management, through sensors and other connected technology, enable earlier leakage and pollution detection, just-in-time waste collection, and predictive maintenance planning.[25]

20: "Despite Climate Commitments, the EU Is Going Back to Coal," Le Monde, September 2, 2022.
21: "The European Super Grid: A Solution to the EU's Energy Problems," Eyes on Europe, Tommasco Rucci, January 27, 2022.
22: "Renewable Power Costs Rise, Just not as Much as Fossil Fuels," Bloomberg, David R. Baker, June 30, 2022.
23: "Tailwinds Until 2050: How Net-Zero Is Fueling Infrastructure Investments," Livewire, Shane Hurst, April 27, 2022.
24: "Smart Sustainable Cities," UNECE, n.d., accessed June 1, 2023.
25: "The Future of Smart Cities," Barclays, November 13, 2020.

PitchBook

In the US, the voting-age population, political parties, and private markets alike have been generally slower to prioritize sustainability over the past decade and a half, a fact that has had a repressive influence on the number of funds investing in that space, including in infrastructure. Still, with increasing awareness around climate change and social justice issues, support of infrastructure enabling a transition to a low-carbon economy and access to affordable healthcare and education has increased in recent years, especially among younger generations. This bodes well for investors in the space, as more of the population voting in favor of candidates and laws that fund sustainable infrastructure projects means more opportunities for public-private partnerships and tax incentives. In turn, this results in more—and more attractive—investment opportunities.

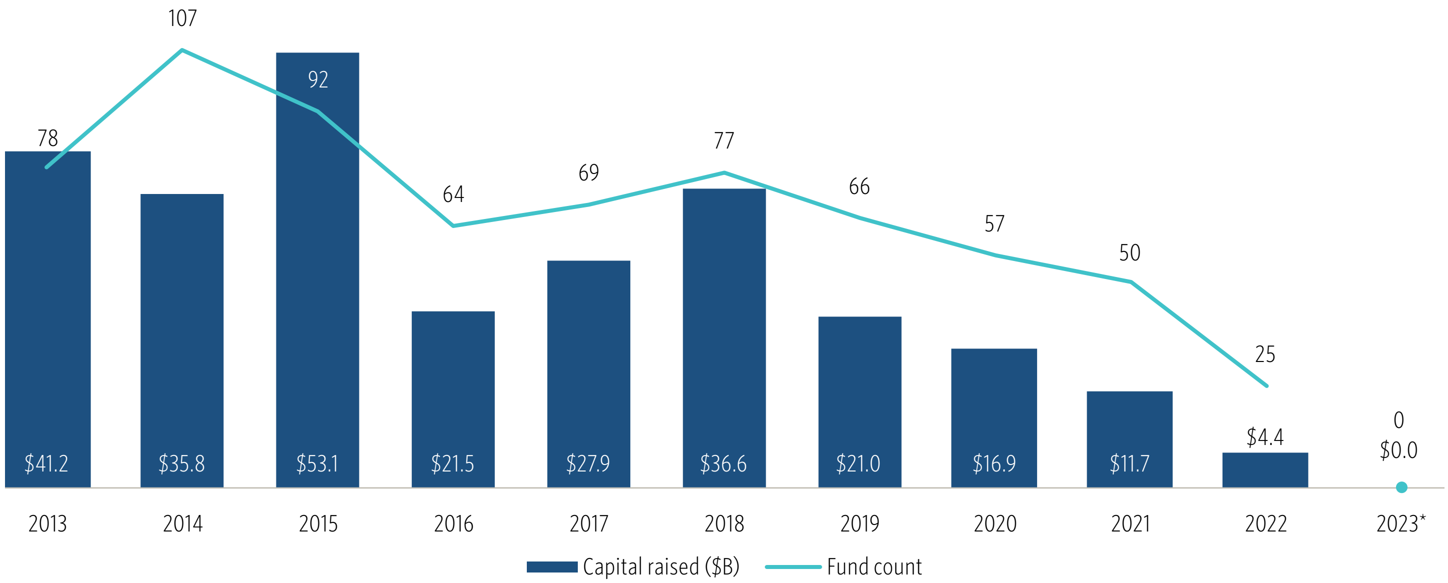
On the regulatory side, both a need for improved infrastructure and a political push toward sustainability had a role to play in the passage of the US Bipartisan Infrastructure Law in 2021 and the Inflation Reduction Act (IRA) in 2022. These pieces of legislation benefit sustainable infrastructure in different ways, with the Infrastructure Law supporting projects related to EV charging infrastructure, electric school buses, modernization and electrification of port and freight infrastructure, and clean energy transmission, among others.[26] The private markets can benefit from public-private partnerships coming out of this law as local and state governments are short-staffed, are facing budgetary constraints, and have long hiring approval processes. The IRA is most impactful on the tax incentive front for renewable infrastructure tied to solar & wind and battery storage.[27] Legislative developments such as these also create a perception that local governments will be more receptive to infrastructure projects and reduce the uncertainty of bureaucratic red tape, thus lessening one barrier faced by investors in the space.

These policies are important to private market investors for reasons beyond their influence on the number of infrastructure opportunities, ability of investors to complete projects, and presence of tax incentives. Overarchingly, they offer a sense of confidence in the permanence and widespread adoption of sustainable technologies and infrastructure for at least the coming decade, if not longer.[28] Elections of the past decade have created uncertainty around the US economy and direction of sustainability-related policy, with the perception of there being dramatic swings from one political extreme to the other.[29] The fact that ESG and sustainable investing have come under fire from those on the far right, with many critics equating clean energy and transportation with ESG, has further called into question whether sustainable investments will be a fixture of private market portfolios. Yet, with legislation passed that will have a decadeslong positive reach, investors have greater assurance in the future of sustainable infrastructure in the US.[30]

26: "Fact Sheet: The Bipartisan Infrastructure Deal Boosts Clean Energy Jobs, Strengthens Resilience, and Advances Environmental Justice," The White House, November 8, 2021.
27: "The Inflation Reduction Act Is Spurring Interest in Clean Energy and Climate-Conscious Investing," Morningstar, Jon Hale, August 12, 2022.
28: "The Inflation Reduction Act Is About to Jumpstart U.S. Climate Policy and Change the World," Time, Justin Worland, August 12, 2022.
29: "How Political Uncertainty Hurts the US Economy: Lessons From Italy," Brookings, Carlo Bastian, December 18, 2020.
30: "Climate, Macro Drivers Create Tailwinds," ClearBridge Investments, December 2022.

Natural resources

Natural resources fundraising activity



Source: PitchBook • **Geography:** Global
*As of March 31, 2023

Juliet Clemens
Analyst, Fund Strategies

In the years leading up to the global financial crisis (GFC), the world was experiencing a commodities supercycle,[31] driven primarily by China's accelerated urbanization, as well as by the real estate boom in the US. Given the high demand in construction and transportation industries to fuel this growth, commodities prices surged throughout this period. For instance, from 2001 to mid-2008, copper prices rose by 700%, while oil prices rose by 800%.[32] However, the GFC caused a swift reversal in commodity pricing. Oil, which had reached a high of $133.90 per barrel at the end of Q2 2008, tumbled down to a low of $41.00 per barrel by Q4 2008.[33] Copper, which had been trading around highs of $3.95 per pound in June 2008 saw prices deteriorate to $1.29 per pound that December.[34] While commodity pricing recovered over the next few quarters—though not to pre-GFC peaks—this global shock left many investors wary of investing in commodities sectors.

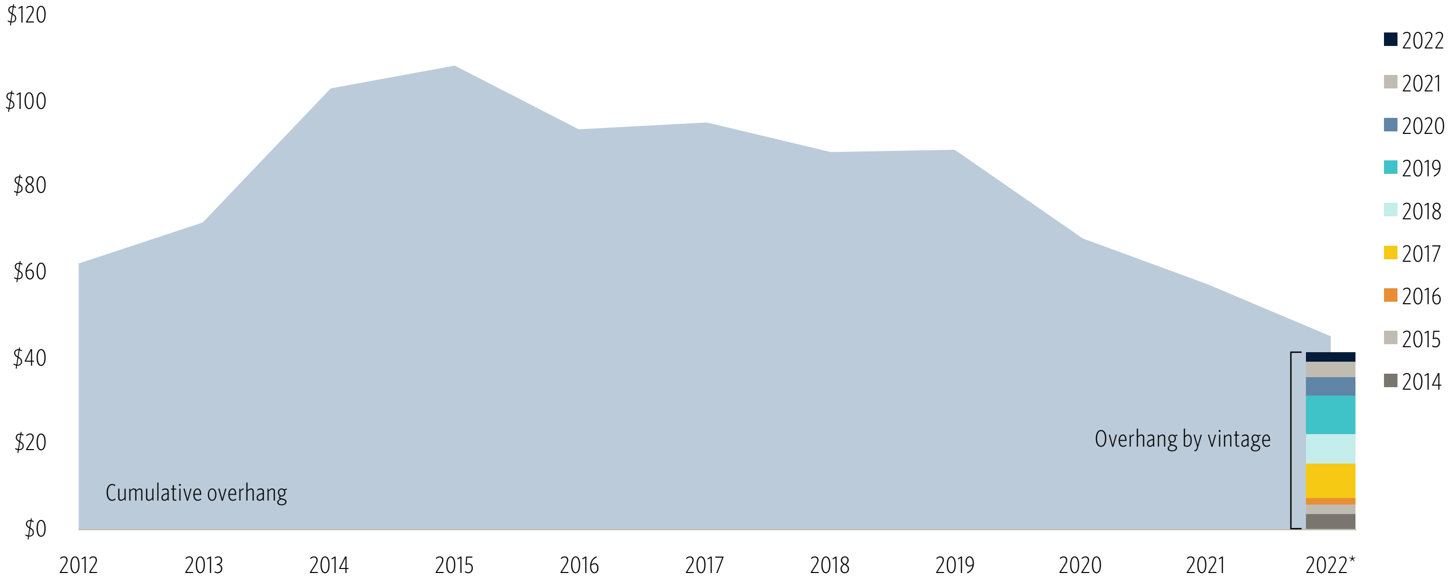
This wariness was further amplified by boom-and-bust cycles that challenged both the oil and mining markets in the years following the GFC. With regards to crude oil, prices underwent a moderate recovery in the handful of quarters after the GFC, reaching around $105 per barrel in Q2 2014.[35] However, prices then tumbled again to less than $40 per barrel in Q4 2015 as booming oil production coincided with both deteriorating demand and rapid increases in shale production,[36] causing oversupply in the market.

Similarly, the metals & mining sector underwent a period of heavy investment into new mines following the GFC. In 2009, $83.2 billion went toward investments in new mines; by 2012, this hit a peak of $144.1 billion.[37] This overinvestment in mining operations caused a glut of supply of materials such as iron ore to flood the markets, which drove down prices and industry profits, eventually causing some midsized mining companies to file for bankruptcy.[38]

31: A commodities supercycle is defined as an extended period in which the price of commodities undergoes sustained increases above or decreases below their long-term trends.
32: "Commodity Prices Tumble," New York Times, Clifford Krauss, October 13, 2008.
33: "Spot Crude Oil Price: West Texas Intermediate (WTI)," FRED, June 1, 2023.
34: "Copper Prices - 45 Year Historical Chart," Macrotrends, n.d., accessed June 1, 2023.
35: "Spot Crude Oil Price: West Texas Intermediate (WTI)," FRED, June 1, 2023.
36: "What Triggered the Oil Price Plunge of 2014-2016 and Why It Failed To Deliver an Economic Impetus in Eight Charts," World Bank Blogs, Marc Stocker, John Baffes, and Dana Vorisek, January 18, 2018.
37: "Supply Crunch Looms in Commodities Markets," Wall Street Journal, Amrith Ramkumar and David Hodari, November 6, 2018.
38: "Miners Spend on Shareholders, not Projects," Wall Street Journal, Rhiannon Hoyle and Scott Patterson, August 8, 2018.

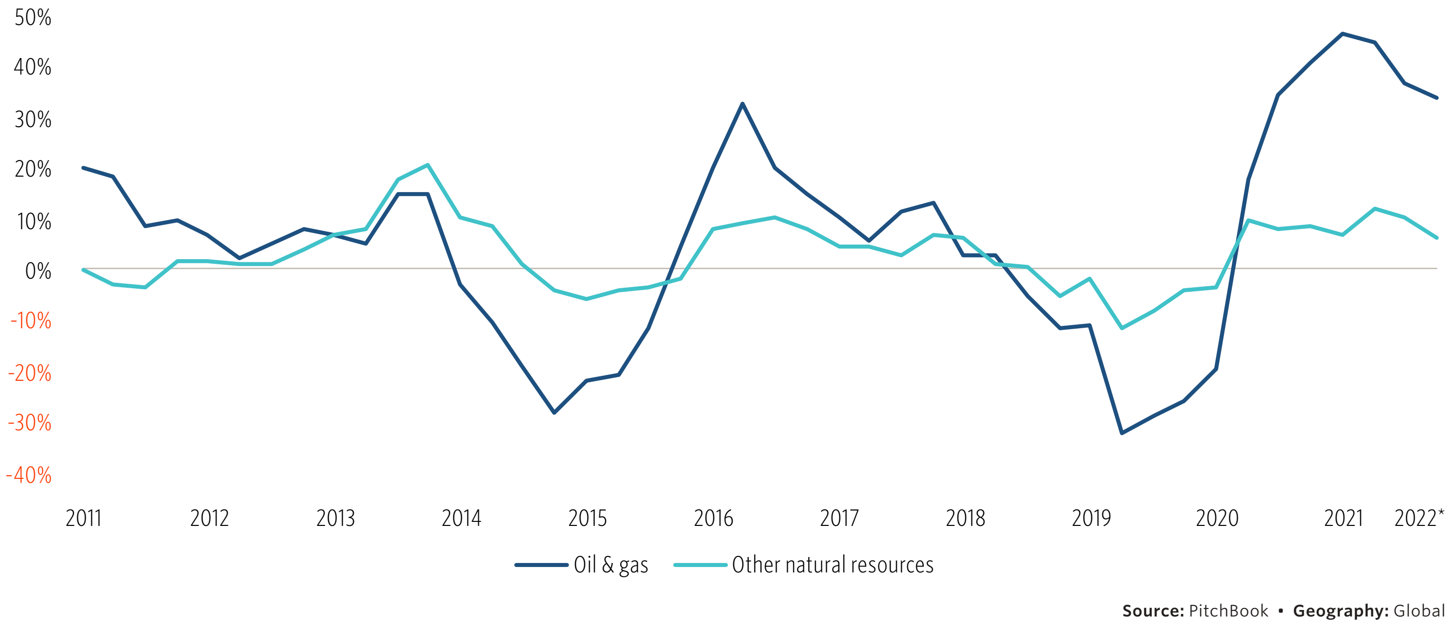
These trends in the past decade have led to chronic historical underinvestment in commodities, particularly in the private markets. Through Q1 2023, no private, closed-ended funds in the natural resource sector closed. This result follows a muted Q4 2022, with five funds closing on a total of $217.6 million. Natural resource fundraising has been on a downward trajectory since raising a peak of $53.1 billion in 2015—between 2016 and 2021, fundraising totals fell within a range of $11.7 billion to $36.6 billion before dropping to just $4.4 billion raised across 25 funds in 2022. Overhang for natural resources came in at $44.9 billion, its lowest figure since dry powder was at $27.7 billion in 2006.

Natural resources dry powder ($B) by vintage



Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Natural resources rolling one-year horizon IRRs

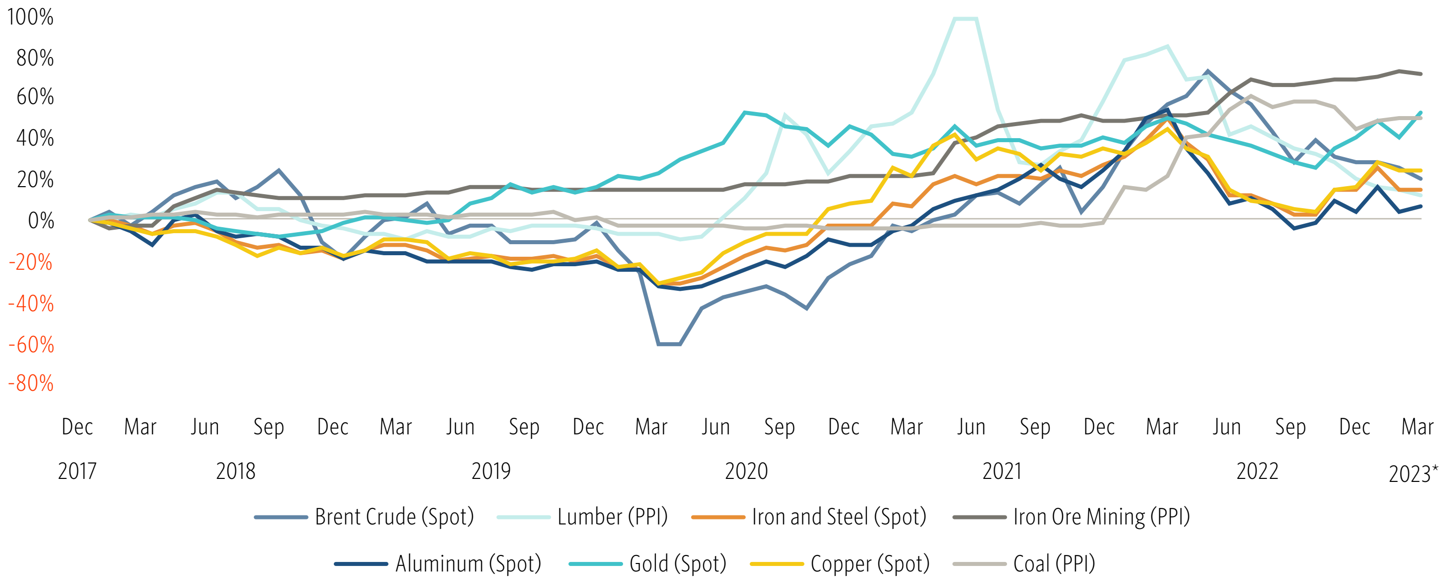


Source: PitchBook • **Geography:** Global
*As of September 30, 2022

Goldman Sachs analysts point out that despite commodities pricing climbing to near-record prices in 2022, investments into expanding the space have been incredibly slow.[39] From Q1 to Q3 2022, oil & gas one-year horizon IRRs hovered between 33.7% and 44.7%, marking oil & gas as the best performer of real assets as a whole. The one-year horizon IRRs for other natural resources were more moderate, but still positive within a range of 6.5% and 11.9%. However, given that 2022 saw the beginning of the Russia-Ukraine war, interest rate hikes, which significantly raised the cost of capital, and fears of a broad recession looming, these factors did not inspire investor confidence in natural resources. Underinvestment has led to a lack of supply of such commodities, and without capital expenditure toward creating more supply capacity, pricing will remain high over an extended period, leading to a supercycle. While it depends on the type of commodity, the world's largest oil fields averaged 5.5 years from the discovery phase to production stage, while mining projects averaged over 16 years.[40, 41]

In the case of metals & mining, governments are acting to try to get more supply online through policy developments. For instance, in mid-March, the European Commission (EC) published its proposal for the Critical Raw Materials Act, which intends to expand the EU's access to diversified, affordable, and secure supplies of critical raw materials.[42] The Russia-Ukraine war highlighted Europe's dependence on imports, and one of the main goals of the act is to spur domestic raw material extraction in countries within the EU. To facilitate this, the EC will aim to reduce the bureaucracy that previously has plagued the permitting process for raw material development. However, companies have faced internal opposition from citizens who oppose mining operations. For instance, companies in both Portugal and Serbia have struggled against protests; in Serbia, protests succeeded in forcing the government to withdraw permits that Rio Tinto had secured for a large lithium mining operation.[43]

Price changes for select commodities (rebased to 2017)



Source: FRED • **Geography:** Global
*As of March 31, 2023

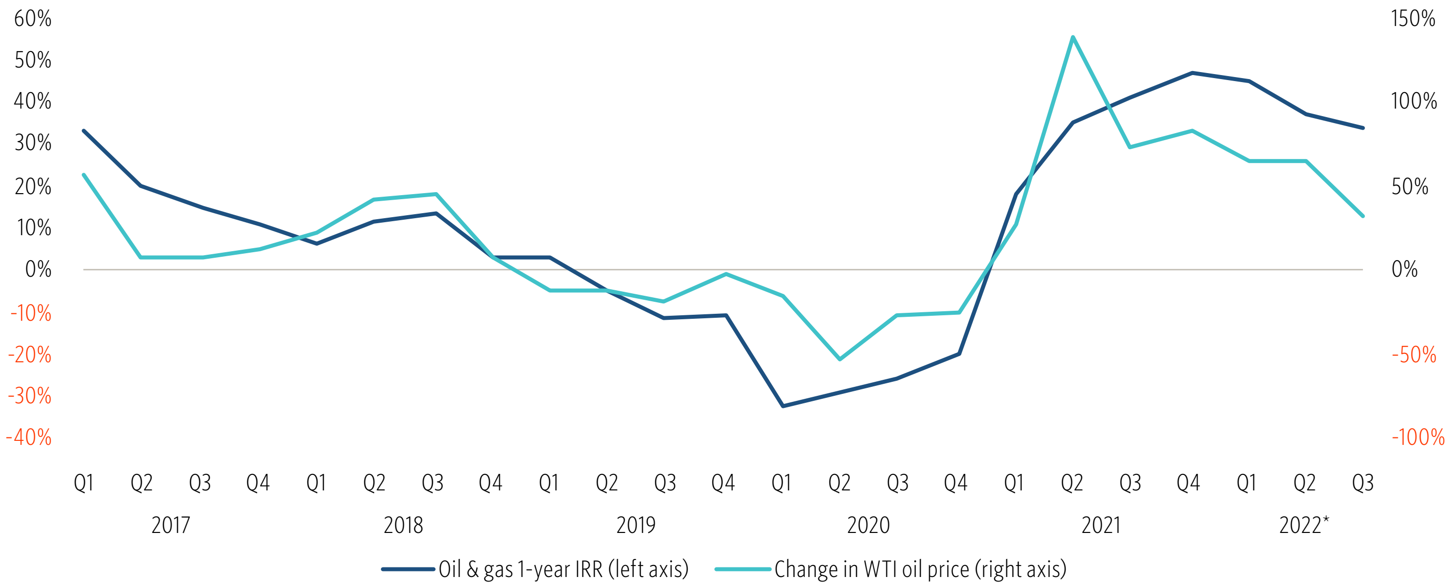
39: "An Underinvested Supercycle," Goldman Sachs, Jeffrey Currie, et al., December 14, 2022.
40: "Investment and Production Dynamics of Conventional Oil and Unconventional Tight Oil: Implications for Oil Markets and Climate Strategies," ScienceDirect, Energy and Climate Change, Henrik Wachtmeister and Mikael Höök, December 2020.
41: "The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions," IEA, March 2022.
42: "Critical Raw Materials: Ensuring Secure and Sustainable Supply Chains for Eu's Green and Digital Future," European Commission, March 16, 2023.
43: "Europe Moves to Revive Mining to Cut Reliance on China," Wall Street Journal, Eric Sylvers, March 18, 2023.

The act also emphasizes strengthening global trade relations with resource-heavy nations. Countries are starting to accelerate the nationalization of resources, particularly among Latin American countries. Latin America is resource-rich and home to over half of the world's supply of lithium, 40% of the world's copper, and 25% of nickel. So far this year, both Chile and Mexico have announced their intentions to nationalize lithium production.[44] In fact, several South American countries—Argentina, Bolivia, Brazil, and Chile—are also discussing the possibility of forming a "lithium OPEC," a bloc that could greatly influence lithium prices globally.[45] As nationalizing natural resources becomes an increasing trend, strong trade relations will become increasingly important.

In the case of oil, European sanctions on importing oil from Russia caused oil prices to spike in 2022, with the expectation that global oil production would be sharply curtailed. However, on the contrary, Russia's oil output rose to 10.8 million barrels per day—a 2% increase from 2021 levels—as it exported oil to countries like Turkey and India.[46] Additionally, China's oil demand fell by 3% as rolling lockdowns rocked the Chinese economy throughout the year. When China ended its lockdown policy in December 2022, there were expectations that demand for oil would surge as the country reopened. However, in April 2023, China's manufacturing activity experienced an unexpected contraction,[47] and the surge in oil demand has yet to materialize as of this writing.

The simultaneous increase in supply from Russia and decrease in demand from China have led oil prices to decline significantly in 2023 as compared to quarterly highs in 2022. The average West Texas Intermediate (WTI) spot price through Q1 2023 came in at $76.10 per barrel, down 19% YoY and 30.0% from the Q2 2022 high of $108.70 per barrel.

Oil & gas rolling one-year IRR and change in WTI oil price



Sources: PitchBook and FRED • **Geography:** Global
*As of March 31, 2023

44: "The Green Revolution Will Stall Without Latin America's Lithium," The Economist, May 2, 2023.
45: "South America Looks at Creating 'Lithium OPEC,'" Mining.com, Cecilia Jamasmie, March 6, 2023.
46: "Russia To Send Most 2023 Oil Exports to Friendly Countries After Output Cut Announcement," S&P Global Commodity Insights, February 13, 2023.
47: "Oil's Sharp Slide Has Surprised Markets. But Some Traders Now See a Bottom for Prices," CNBC, Lee Ying Shan, May 8, 2023.

For most of Q1 2023, WTI measured crude oil prices hovering around $70 to $80 per barrel until mid-March, when fears around bank contagion arose. As institutions like Silicon Valley Bank and Credit Suisse underwent a sudden liquidity crisis, prices dropped to around $65 per barrel.[48] However, this downward pressure on pricing did not last long; by the end of March, prices had moderated back to $73.20 per barrel.[49] Despite OPEC+'s surprise announcement in early Q2 2023 that oil producers would be cutting outputs by 1.16 million barrels per day, which took effect in May, this also has not borne out the intended effect of higher oil prices as of this writing.[50]

Though oil prices have moderated in 2023, the data as of the end of Q3 2022 still shows oil & gas funds outperforming other real asset funds, with one-year horizon IRRs for oil & gas at 33.7% compared to 15.2% for infrastructure. Whether this outperformance will continue, however, remains unknown, as quarterly returns as of Q3 2022 have come in at 2.0%, versus 9.6% one quarter prior. Though we may not see any meaningful increases in private fundraising for the asset class, oil & gas is still proving to be an essential steppingstone toward achieving a fully green, sustainable economy in the public sector.

Price changes for brent crude (rebased to 2017)

Source: S&P • **Geography:** Global
*As of March 31, 2023

48: "Commodity Price Report," TD Economics, Marc Ercalao, May 4, 2023.
49: "Spot Crude Oil Price: West Texas Intermediate (WTI)," FRED, June 1, 2023.
50: "OPEC+ Announces Surprise Oil Output Cuts," Reuters, Maha El Dahan and Ahmed Rasheed, April 2, 2023.

Additional research

Private markets

Global Fund Performance Report as of Q3 2022 (with preliminary Q4 2022 data)

Download the report here

Q1 2023 Private Fundraising Report

Download the report here

Q1 2023 Analyst Note: Sustainable and Digital Infrastructure in the Private Markets

Download the report here

Q1 2023 Global M&A Report

Download the report here

Q1 2023 Analyst Note: What the Future Holds for Private Capital

Download the report here

H2 2022 Global Real Estate Report

Download the report here

More research available at pitchbook.com/news/reports