CLEANBRIDGE

Private Equity Investment in the Global Clean Economy

2023

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About the research

The **CleanBridge Private Equity Investment in the Global Clean Economy** report provides an insight into Global Private Equity Investment in the global clean economy. The findings of the report are based on primary and secondary research conducted by CleanBridge and its research partner Alchemy Research and Analytics.

The report provides an overview of the global private equity investment market focusing on global and regional trends around capital raising, investment activity, exit markets, and available dry powder for further investment. It also explores the role of private equity investment in the global clean economy and analyses the trends in private investment in renewable energy over the years.

Major private equity GPs who have invested in renewable energy, or the broader clean economy have been profiled in the later part of the report. Data on the private equity industry has been sourced from established industry sources such as Preqin, Bain & Company, Bloomberg NEF and others. Information on private equity GPs has been primarily sourced from Pitchbook and the companies' corporate materials. This has been supplemented by news articles and reports from industry associations, trade journals and national statistical agencies.

The report is an outcome of a collaboration between CleanBridge and its research partner Alchemy Research and Analytics and was completed between February and April 2023.

We would like to thank the following executives for their contribution in preparing the report:

CleanBridge
- L. Warren Pimm, Partner & Sr. Managing Director
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Introduction

Globally, private equity investment in the global clean economy has continued to grow at significant pace, given a combination of increasing allocations to private equity by large asset owners generally, growing policy commitments by global governments towards net zero emissions economies by 2050, and an increasing focus on environmental, social, and governance features by all investors.

Investment in clean energy, the electrification of the global transportation system, and the built environment, specifically the underlying technologies, supply chains, and operating companies within those sectors, is expanding at a rapid pace. Global investment in clean growth and a clean economy is now mainstream, and no longer a niche area of investment by private equity.

The purpose of **CleanBridge's** **Annual Private Equity Investment in the Global Clean Economy Report** is to provide a high-level view of the demand drivers, opportunities, challenges and outlook prevalent in major markets for private equity investment in clean economy sectors of renewable energy, electric transportation, and the built environment. An understanding of global industry trends and country-specific market factors are critical to success for all potential market entrants.

We hope you will enjoy reading our report on the Global Private Equity Investment the Clean Economy.

L. Warren Pimm, CFA
Partner & Senior Managing Director
CleanBridge

1. EXECUTIVE SUMMARY

Executive Summary

Green Capex will be the dominant driver of global PE investment

- Net Zero targets have emerged as a useful tool to indicate a country, company or asset manager's commitment to climate action, uniquely focused on carbon emissions or equivalents
- Around $6 Tn of annual investment is required in 2020s to meet Net Zero, Clean Water and Infrastructure objectives, up from legacy $3.2 Tn
- China, US and Europe represent more than half of required investment for Net Zero by 2050 pathway, consistent with weighting of overall emissions
- Meeting the Net Zero pathway objectives involves not only the expansion of power plant capacity but also of transmission lines, batteries, charging infrastructure, and carbon capture/sequestration

Challenging fundraising market and concentration into larger funds

- The denominator effect is curbing LPs' appetite for new capital commitments, and GPs, especially the new entrants are finding fundraising more challenging
- A greater share of total fundraising is now likely to take the form of re-ups to existing manager relationships, meaning that GPs are having to dislodge incumbents if they are to secure new LPs
- Increased concentration among larger funds have been observed as investors concentrated their allocations amid a broader pullback in commitments. It reflects investors' move to limit risk in a volatile equity market
- Managers are adapting to the new market environment in several ways. A major theme being GPs building out platforms across private capital, having traditionally focused on private equity only

Challenging near-term outlook for private equity

- After a record-braking 2021, the global private equity market is in an adjustment period, and activity remained significantly weaker in 2022 and will likely to be so in 2023 across deal flow, performance, and fundraising
- The higher cost and lower availability of debt, rapidly declining public market valuations, and macroeconomic uncertainty—stifled growth, activity, and performance in what had been the best-performing private markets asset class for many years running. Geopolitical events, especially the Ukraine war has added to the already powerful inflationary pressures rippling through the global economy
- Despite these challenges, strong growth is forecasted for the global private equity market, with assets under management growing at a 10.2% CAGR from 2021 to reach $7.6 tn in 2027

ESG / sustainable investment goes mainstream

- The evidence supporting a positive correlation between ESG and financial performance continues to mount, resulting in more private markets managers are incorporating considerations for ESG factors into their corporate policies, operating procedures, and investment decisions
- GPs are employing a range of strategies to accelerate and capitalize on the ongoing energy transition, with the most visible strategy being the so-called impact funds, which typically include an explicit ESG agenda as part of their investment strategy
- The power sector was the primary target for sustainable investments in 2022 for the third year running, accounting for just over half of all deal activity. The transportation sector, including investments in EV manufacturing and EV-charging infrastructure, ran a distant second

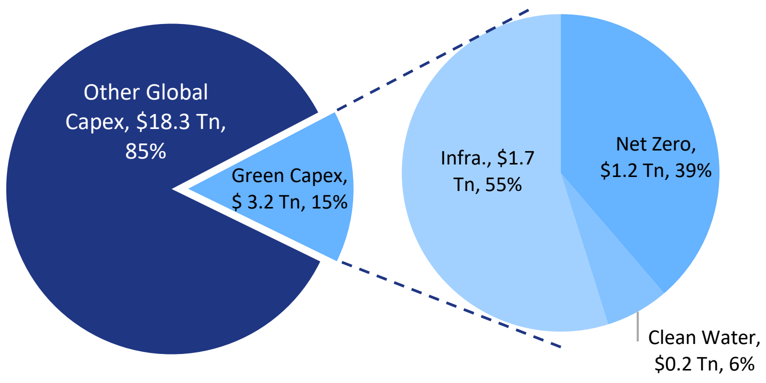
2. OVERVIEW OF GLOBAL PRIVATE EQUITY MARKET

Green Capex Requirement to Meet Sustainable Development Goals

- Estimated **$6 Tn** of annual investment is required through 2020 – 2030 to meet Sustainable Development Goals (SDGs), this is an increase from previous levels of approximately **$3.2 Tn** per annum
- As per Goldman Sachs Research and FactSet, **Half of this** $6 trillion annual investments is needed for decarbonization to be on path for Net Zero by 2050. There is a need for **$1.8 trillion** of annual incremental decarbonization investment in the 2020s and **$1.0 trillion** for infrastructure/water
- The incremental **$2.8 Tn** of annual investment needed each year, though this decade represents approximately **2.7%** of global annual GDP. Currently only one third of this incremental $2.8 Tn annual investment requirement is on track from the private sector
- Geographically **China and the US** should represent the greatest percentage of overall and incremental Net Zero/infrastructure investment needs. In 2019, China emitted around 28% of global CO_2, while the US emitted about 15%
- With continued inflationary pressures, there is a potential upside risk to the $6.0 trillion annually that is required for this decade. At the same time, the potential for greater deployment of solutions could increase the pace of innovation in areas like hydrogen, battery storage and energy efficiency

*Clean water infrastructure includes infrastructure to secure access to clean water and sanitation
Source: Goldman Sachs Global Investment Research

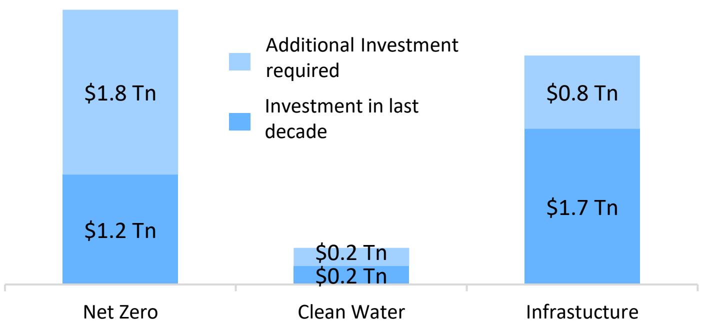
Green Capex toward Net Zero, infrastructure and clean water vs. 2016-19 annual global capital investment



Source: World Bank, IEA, McKinsey, OECD, Goldman Sachs Global Investment Research

Green Capex requirement in the 2020s to support Net Zero, infrastructure and clean water pathways

Annual CAPEX Investment Target $6 Tn

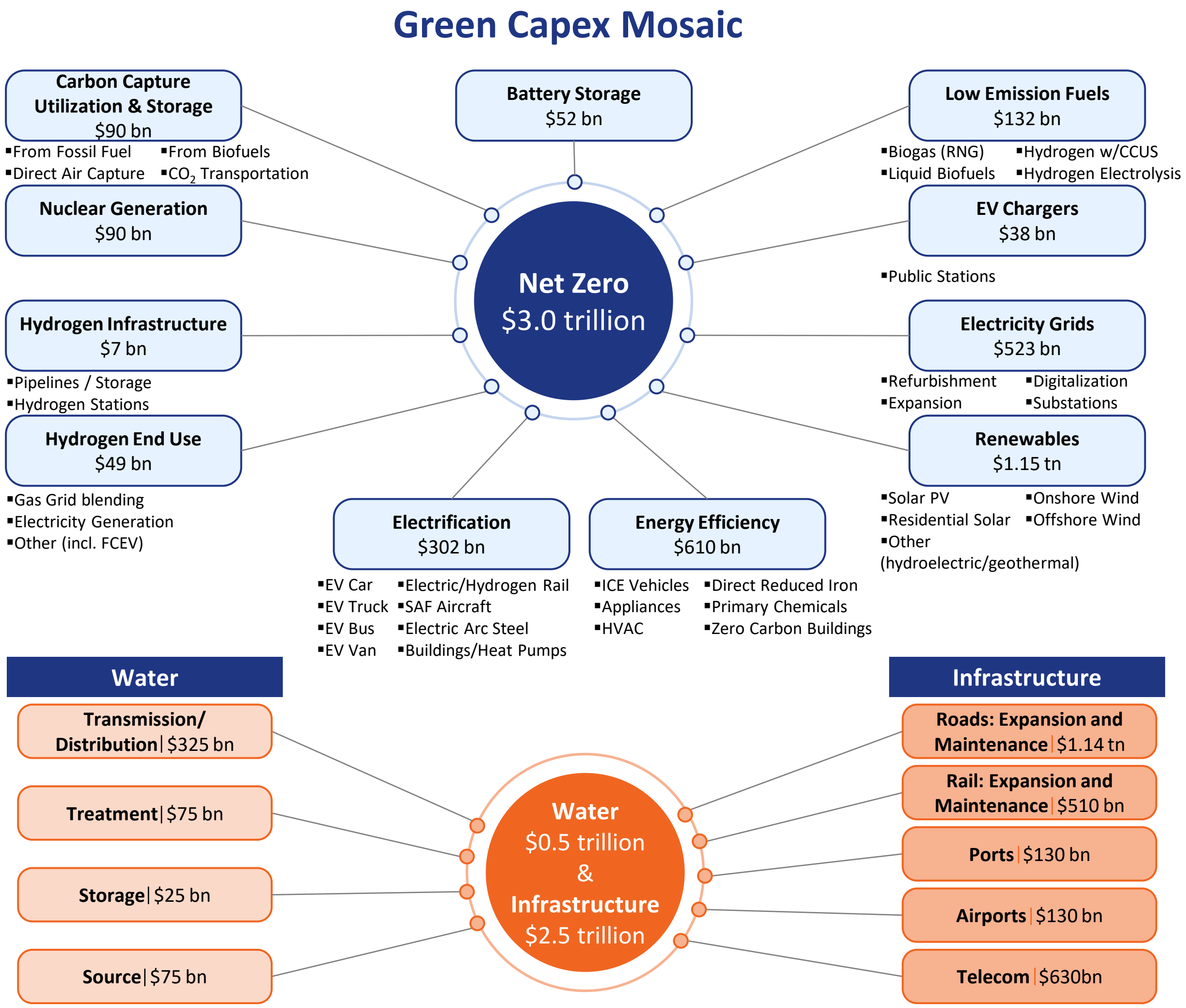


Source: World Bank, IEA, McKinsey, OECD, Goldman Sachs Global Investment Research

Annual Capital Investment in Global Energy Transition

- It is estimated (GS 2022) that *annual capital investment of **c.$6 trillion** is needed each year* between now and 2030, in order to be on a pathway to Net Zero by 2050

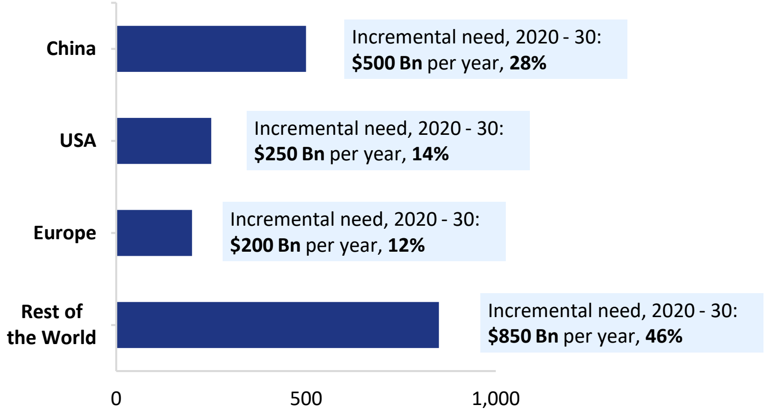
- Need for *capital investment of **c.$1.15 trillion** in renewables alone* – **4x more** than c$0.3 trillion invested in renewables globally in 2020



Source: Goldman Sachs Global Investment Research

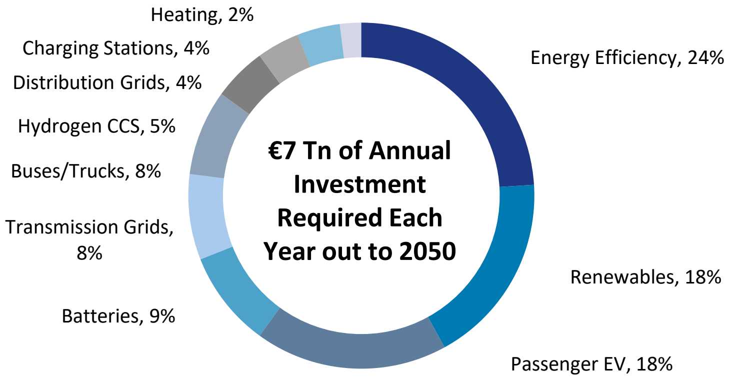
Capex Requirement by Region & Sector

Incremental annual investment through the 2020s, needed to meet the Net Zero by 2050 pathway ($ Bn)



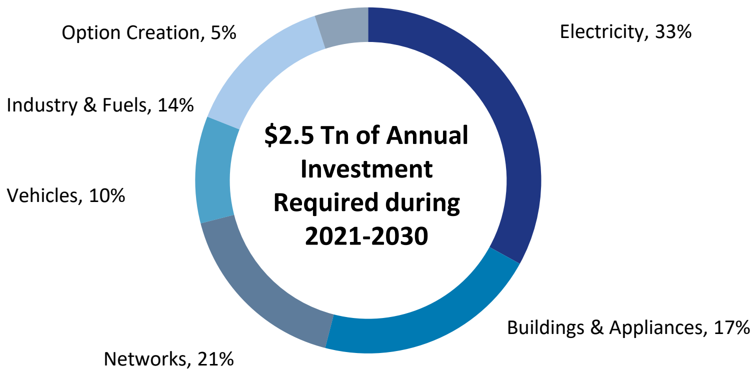
Source: Princeton University, EU Commission, IEA, Goldman Sachs Global Investment Research

EU Net Zero costs by investment category by 2050



Source: Goldman Sachs Global Investment Research, Princeton University, European Commission

US Net Zero costs by investment category during 2021-2030



Source: Princeton University, EU Commission, IEA, Goldman Sachs Global Investment Research

- China, US & Europe represent more than half of the required investment for the Net Zero by 2050 pathway, consistent with a weighting of overall emissions. Meeting Net Zero objectives will likely require capex of about $11 Tn in the EU by 2050 and $16 Tn in China by 2060 (as China is pursuing a Net Zero Path by 2060, which means spending will be less in the 2020s than what would have been required to reach Net Zero by 2050)
- In the US, a combination of demand efficiency and increased deployment of additional clean generation capacity is needed to accomplish the goal set by President Biden to reduce US greenhouse gas emissions 50%-52% by 2030 vs. 2005 levels
- Meeting the Net Zero pathway objectives involves not only the expansion of power plant capacity but also of transmission lines, batteries, charging infrastructure, and carbon capture/sequestration, supported by an investment-friendly policy framework ahead of aggressive capex increases

Global Private Equity Key Facts

3,185

Global private equity funds in market as of September 2022, targeting $1.2tn in capital

19.2%

Median net IRR return of global private equity funds with a 2009–2019 vintage

2.6%

Forecast decline in global private equity fundraising in 2023 following a 21.5% expected fall in 2022

$7.6tn

Forecast for private equity assets under management (AUM) by December 2027

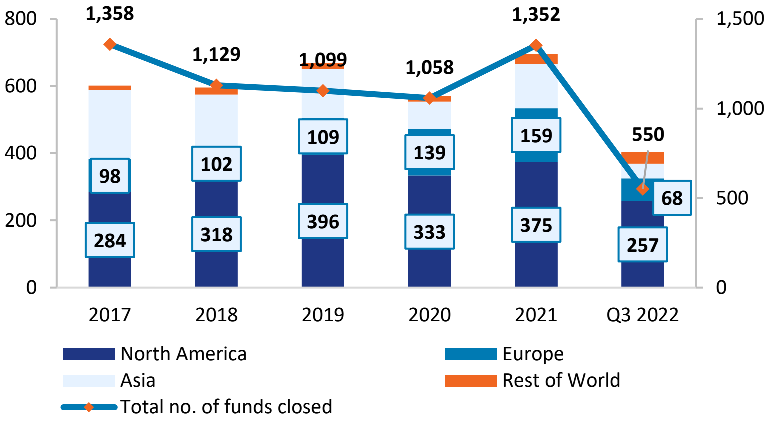
5.17ppts

Expected decline in the annualized performance of global buyout strategies for 2021 – 2027F, compared with the high growth period of 2018 – 2021

Source: Preqin Global Report 2023: Private Equity

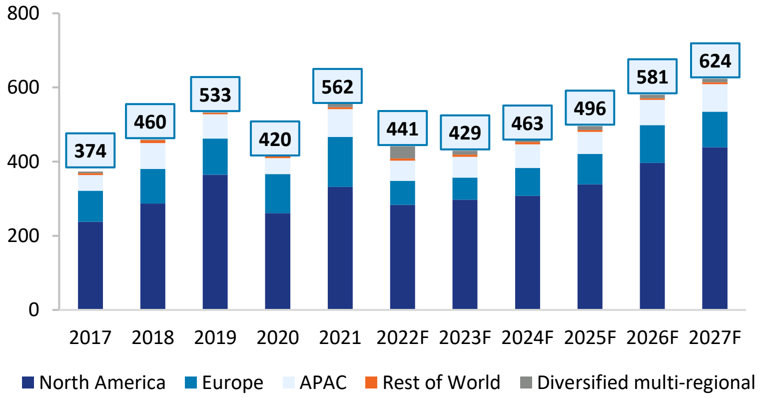
Global Private Equity Fundraising

Aggregate capital raised by private equity funds closed by primary geographic focus, 2017 - Q3 2022, $ billion



Source: Preqin Global Report 2023: Private Equity

Private equity historic and forecast fundraising by region, 2017 - 2027F $ billion

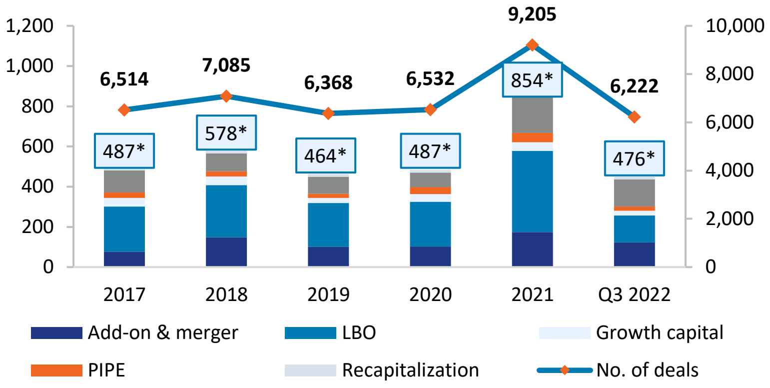


Source: Preqin Global Report 2023: Private Equity

- Like all other asset classes, fund-raising activity for private equity has also experienced a significant drop last year. PE funds raised ~$405 billion through the end of the third quarter of 2022, representing a 41.8% decrease from the full-year 2021 total, attributable to the dwindling appetite of LPs to take on new investments
- While North America-focused funds held up relatively well at 31.3% below the previous year's level, APAC recorded the steepest drop measured by both amount and percentage (-66.9%), driven by notable risk aversion towards China-focused funds
- Fundraising drop is steepest in China-focused funds. A structural slowdown in China's residential property market and ongoing lockdown measures have weighed on activity. The sharp decline in China-focused fundraising started in Q4 2021, where less than $5 bn was closed compared with the $21 bn quarterly average
- A particularly challenging outlook for private equity fundraising is anticipated as the denominator effect kicks in. The denominator effect, refers to the devaluation of public equity and fixed investments, reducing overall portfolio value and thereby pushing private equity allocations closer to, or sometimes over target. This could curb investor's appetite for fresh allocations
- Slowing performance and downside risks emerging within private equity are expected to slow the pace of fundraising considerably
- Following a 34% jump in global private equity fundraising to $562 billion in 2021, a 21.5% decline is expected in 2022 and an additional 2.7% decline in 2023
- Over the remaining period, a modest annual growth in fundraising is anticipated

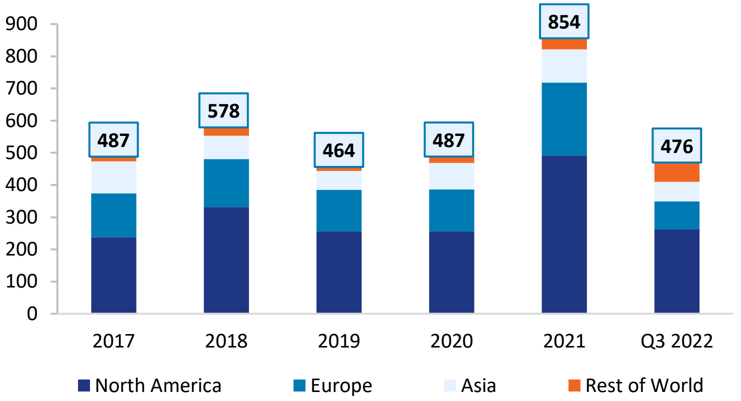
Global Private Equity Backed Deals

Annual aggregate value of private equity-backed deals by investment type, 2017 - Q3 2022 ($ billion)



*Note: Not all types of deals are included in this chart and, therefore would not sum up to the aggregate total of PE-backed deals
Source: Preqin Global Report 2023: Private Equity

Annual aggregate value of private equity-backed deals by region, 2017 - Q3 2022 ($ billion)



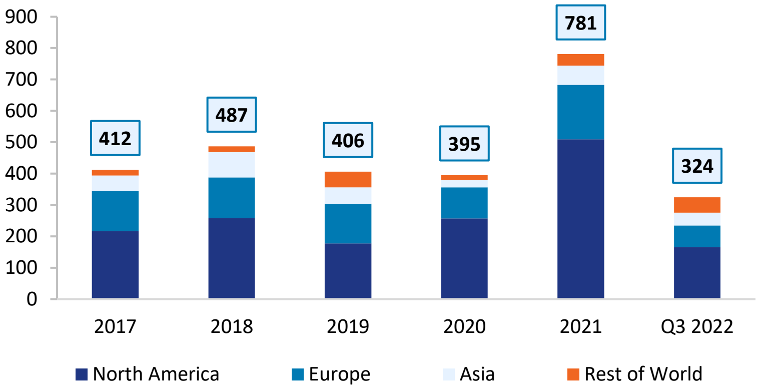
Source: Preqin Global Report 2023: Private Equity

- Every quarter of 2022 has witnessed a decrease in private equity deal activity. As of the end of the third quarter of 2022, total deal activity for global private equity-backed deals is pacing behind 2021 by 44.3% in terms of aggregate deal value and 32.4% in terms of deal volume
- The average deal size has fallen by 17.6% as buyout deals were hit hardest. Deals fell most for buyout strategies in a risk-off market
- Compared to 2021, which set a record with $404.4 billion in total buyout deals, only 33% of this amount has been witnessed in 2022. (as of the end of the third quarter of 2022)
- This suggests a cautious stance towards these deals, which are also generally the largest in ticket size, so they use more leverage. Therefore, they have become more costly amid rising interest rates

- Regionally, private equity-backed deals have fallen the most in Europe up to the third quarter of 2022, where only 38.5% of the 2021 aggregate deal value was recorded, followed by North America, where 53.3% of 2021 aggregate deal value was recorded
- Deal activity has been impacted adversely in Europe by geopolitics. In addition to the war in Ukraine and the anticipated winter energy crisis, the UK and Italy have been struggling with the political turmoil rattling sovereign debt markets
- Total deal value in Asia by the third quarter of 2022 was $61.1bn, 59.3% of 2021. The shortfall came mainly from China and Japan, where PE-backed deals only recorded 51.2% and 24.1% of the 2021 totals, respectively
- The Middle East recorded $12.3bn in the first three quarters, higher than any single year

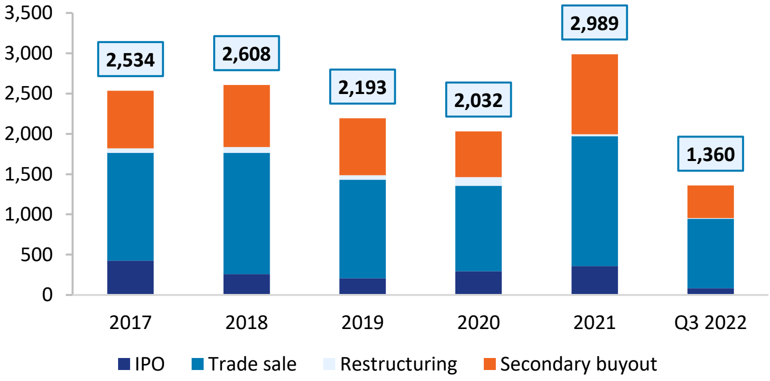
Global Private Equity Backed Exits

Annual value of private equity-backed exits by region, 2017 - Q3 2022 ($ billion)



Source: Preqin Global Report 2023: Private Equity

Annual number of private equity-backed exits by type, 2017 - Q3 2022



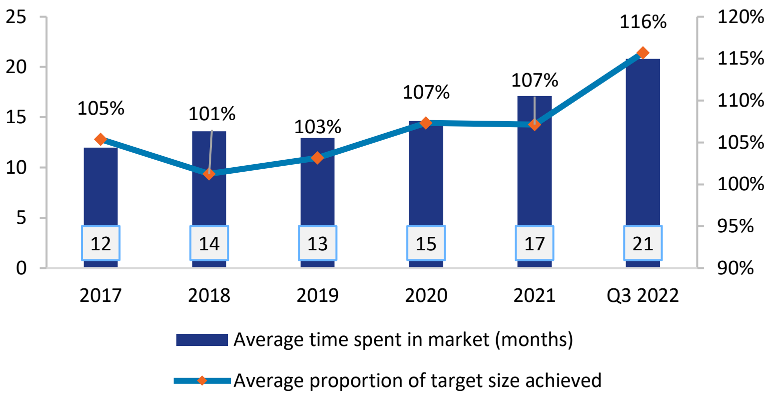
Source: Preqin Global Report 2023: Private Equity

- Weak public equity markets have contributed to a severe downturn in the exit environment. Private equity exits declined by 60% in aggregate value in the first nine months of 2022. Aggregate number of exits also declined by 54.5%. Even on an annualized basis, this is currently below pre-pandemic levels
- North America, mainly the US, was the weakest, declining by 67.2%. Asia exits have fared marginally better, with private equity exits only down by 32.8%
- It is worth noting that the value of PE-backed exits includes the IPOs of China Mobile and China National Overseas Oil Corp on the back of their delisting from the New York Stock Exchange in 2021. By value, Japan exits have decreased significantly from the prior year, but there were a number of trade sales and sales to GPs at undisclosed prices. Lastly, the Middle East had already equaled 2021 by the end of Q3 2022

- With the public equities markets in a risk-off mode, the number of IPO exits has not touched the current low level since 2008
- In the near future, trade sales and secondary buyouts are projected to predominate as the primary exit options for private equity
- Trade sales in 2022 year to date made up 63.5% of the total number of exits, up from 53.9% in 2021. Secondary buyouts, as a proportion of the total, appear to have decreased to 29.9% from 33.3% last year, while activity in this area may eventually build-up
- Some GPs might choose to delay exits and focus on longer-term value creation. Investors are more careful now about the costs of holding onto an investment due to high interest rates

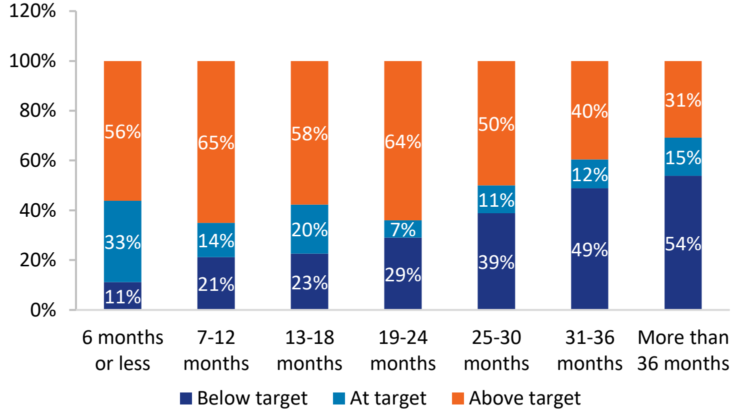
Private Equity Funds – Time Spent in Market

Average time spent in market by funds closed, 2017 - Q3 2022



Source: Preqin Global Report 2023: Private Equity

Private equity fundraising success by time spent in market, funds closed, 2020 - Q3 2022



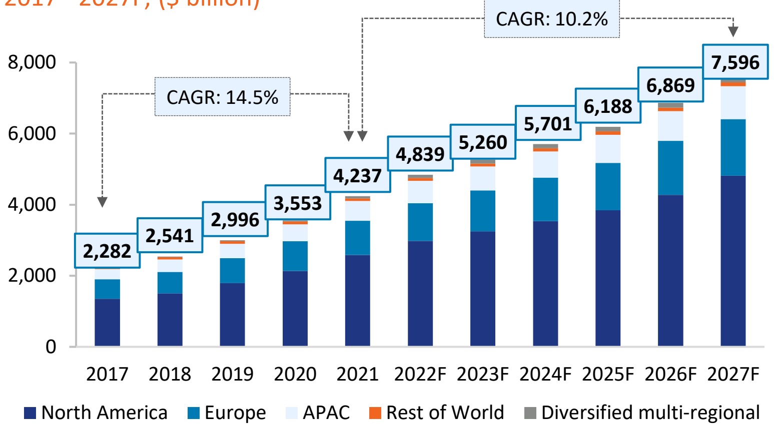
Source: Preqin Global Report 2023: Private Equity

- There were more than 3,185 funds raised in the market as of September 2022, with an aggregate capital target of around $1.2 tn. Both metrics are pushing record highs and therefore paint a picture of highly competitive fundraising
- Amidst supply outpacing demand, competition intensifies for GPs. As a result, funds have been spending more time in the market than ever, averaging 21 months to a final close in 2022, up from 17 months in 2021
- Weak exit environment is anticipated to extend fund holding periods. Some GPs are expected to delay exits to focus on value creation while awaiting more favorable valuations. This would result in slower distributions and longer fund holding periods and is one of the underlying assumptions driving the assets under management growth forecast for private equity

- Evidently, spending more time in the market does not seem to improve the chances of hitting target but, rather, seems to suggest a lower success rate
- It is seen 56% of all funds that have spent 6 months or less in market have surpassed the target while in contrast the similar share for funds spending more than 36 months is 31%
- The combination of weaker LP appetite and a more crowded fundraising scene seems to favor the more established fund managers. Data shows that average fund size for experienced fund managers in 2022 has increased by 46% to $1.1 bn, while fund size for first-time fund managers shrank by 26% to $0.3 bn

Global Private Equity – AUM

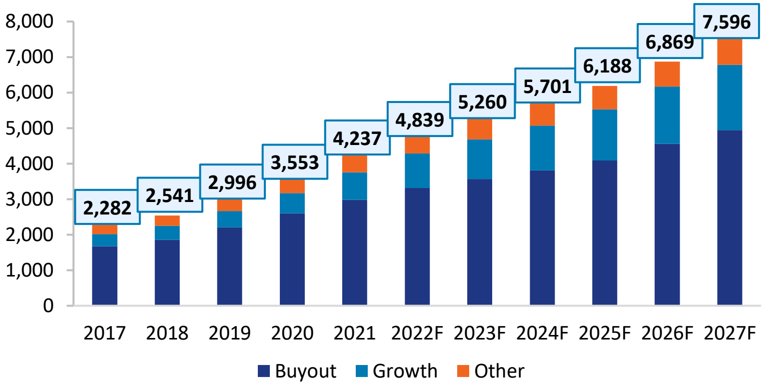
Private equity assets under management by primary region of focus, 2017 - 2027F, ($ billion)



Source: Preqin Global Report 2023: Private Equity

- Amidst the denominator effect adversely affecting LPs' appetite to take on new investments and the fundraising environment becoming challenging for GPs, private equity assets under management (AUM) ascended higher, as it has in every year since the global financial crisis
- Global private equity AUM is expected to reach $7.6 trillion in 2027 from $4.2 trillion in 2021, growing at a CAGR of 10.2%. North America is forecasted to account for the largest share in the global total, equating to 63%

Global private equity assets under management by sub-strategy, 2017 - 2027F, ($ billion)

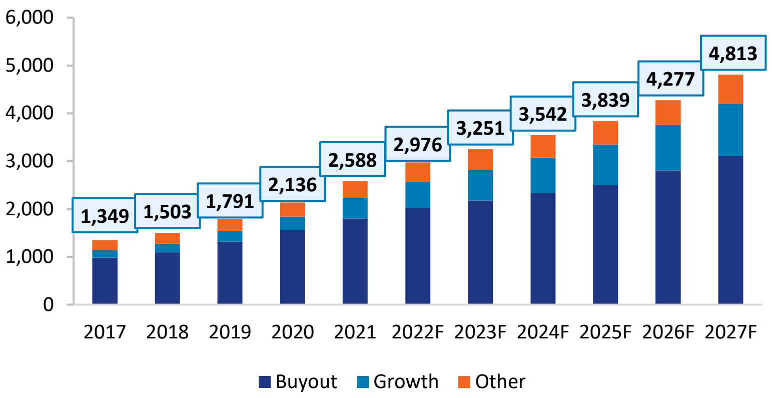


Source: Preqin Global Report 2023: Private Equity

- Within PE, the AUM mix has shifted considerably over time. Buyout accounted for 70.3% of the global total as of 2021, down from 73.2% in 2020
- While in Asia VC accounts for the majority share of the PE AUM, in contrast buyout was the largest strategy in Europe and North America. The rest of the world's AUM was more evenly split between different strategies
- The growth funds are anticipated to experience the greatest increase, with a 15.5% CAGR between 2021 to 2027. Whereas a CAGR of 8.8% is forecasted for buyouts during the period

Global Private Equity – AUM (Regional Focus)

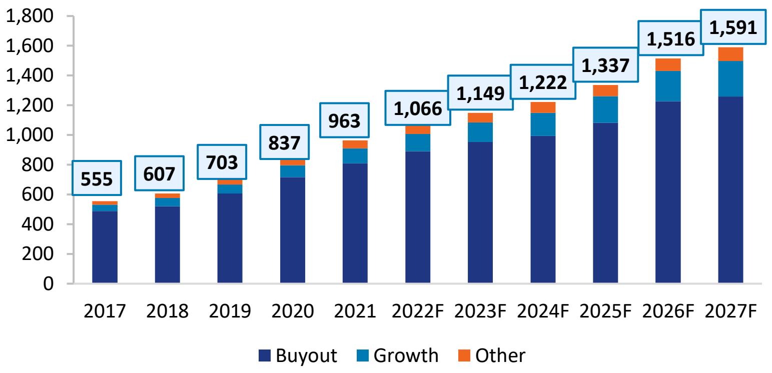
North America-focused private equity assets under management by sub-strategy, 2017 - 2027F ($ billion)



Source: Preqin Global Report 2023: Private Equity

- While the North American private equity market remains the most advanced in the world, private equity AUM still accounts for a mere 7.4% of total equity in the region. This share is forecasted to increase to 7.7% by 2027, assuming that public equity markets maintain their historic growth rate of 9.4% per year
- Overall North American private equity AUM is forecasted to grow at a CAGR of 10.9% from the end of 2021 to the end of 2027. This represents a modest slowdown from 16.2% during the 2015–2021 period
- During 2021-2027, buyout and growth funds are expected to grow at a CAGR of 9.5% and 17.1%, respectively, down from 13.9% and 24.7% in 2015-2021

Europe-focused private equity assets under management by sub-strategy, 2017 - 2027F ($ billion)

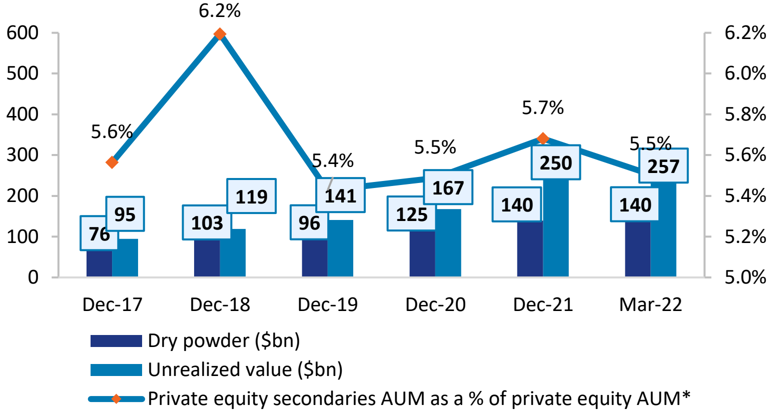


Source: Preqin Global Report 2023: Private Equity

- The Russian invasion of Ukraine has significantly impacted risk assets across Europe. The conflict has left investors grappling with considerable uncertainty, prompting them to demand higher risk premiums across financial markets.
- On top of this, the sanction on Russian natural gas poses significant risks for European industry and households. These factors are expected to weigh on performance, as annualized private equity returns in Europe are forecasted to decline
- Overall European private equity AUM is forecasted to reach $1.6 trillion, growing at a CAGR of 8.7% from the end of 2021 to the end of 2027
- During 2021-2027, buyout and growth funds are expected to grow at a CAGR of 7.6% and 15.7%, respectively, down from 10.7% and 20.5% in 2015-2021

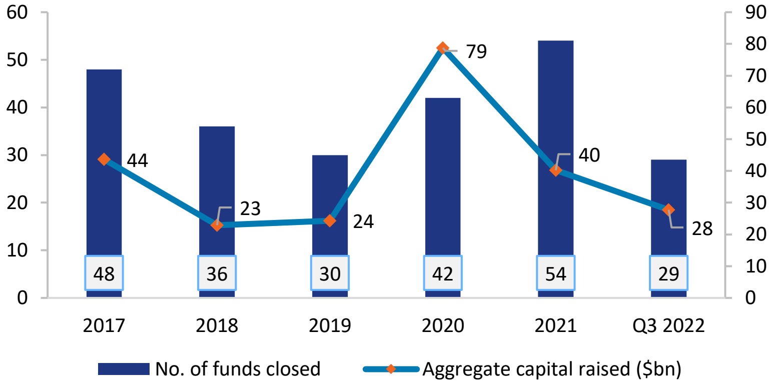
Global Private Equity – Secondaries Market

Private equity secondaries assets under management, 2017 - March 2022 ($ billion)



Note: excluding secondaries AUM
Source: Preqin Global Report 2023: Private Equity

Global private equity secondaries fundraising, 2017 - Q3 2022 ($ billion)



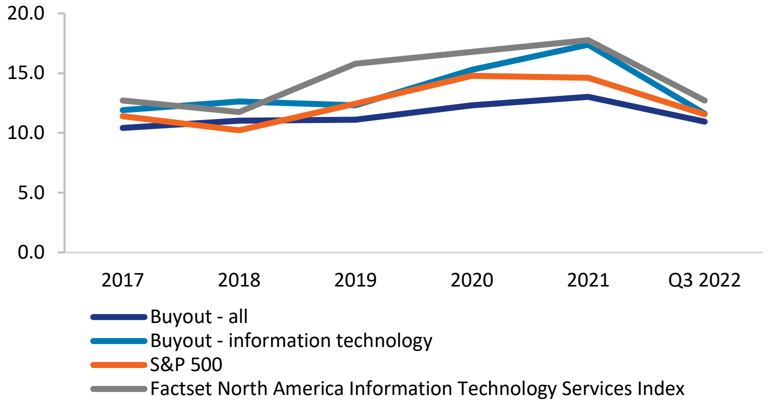
Source: Preqin Global Report 2023: Private Equity

- In the last few years, the PE secondaries market has gained prominence as a liquidity tool. As of the end of 2021, secondaries' AUM accounted for 5.7% of total private equity AUM
- However, as some investors struggle with the denominator effect, more activity in the private equity secondaries market is expected to be witnessed, which may improve secondaries deal flow
- More GPs are likely to utilize continuation fund vehicles to prolong fund lives and facilitate exits into more favorable market conditions in future. As a result, secondaries' share of the total market is expected to increase

- Global private equity secondaries fundraising declined for the second consecutive year, falling to $28 billion in the first nine months of 2022, compared with a peak of $79 billion in 2020, when investors were last anticipating favorable conditions for the strategy
- Stronger LP appetite is anticipated for private equity secondaries strategies going forward as investors seek to take advantage of the supply of fund stakes available in the market from other LPs looking to rebalance portfolios
- There is a relatively muted pipeline of secondaries funds in the market. Currently, 96 funds are tracked that are seeking to raise $78 billion in capital. This will help supplement the $121.4 billion in dry powder in the market as of October 2022. While these funds may be able to close above target, it is evident that more substantial funds will undoubtedly need to enter the market if the projection is to come true in the ensuing years

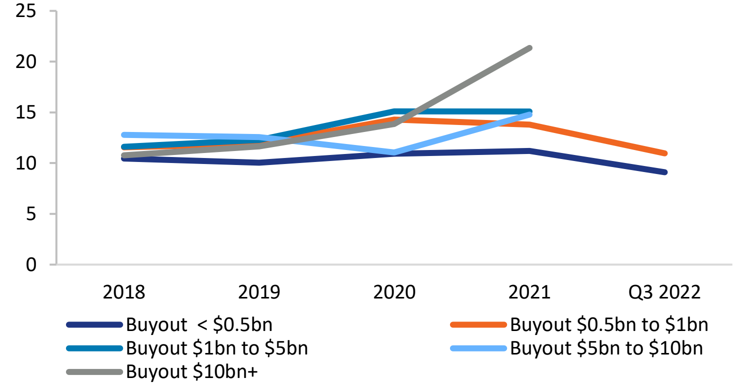
Global Private Equity Performance

Private equity buyout deals entry EV/EBITDA median vs public indices, 2017 – Q3 2022



Note: Except for S&P 500 and FactSet Indices where financial ratios are calculated based on weighted methodologies
Source: Preqin Global Report 2023: Private Equity

Private equity buyout deals entry EV/EBITDA median by size, 2018 – Q3 2022



Note: Data not meeting minimum disclosure threshold is not shown.
Source: Preqin Global Report 2023: Private Equity

- PE was not immune to broader valuation declines, and performance suffered in 2022, albeit less than that of public markets. For the first time in six years, PE was not the highest-performing private markets asset class
- The median entry EV/EBITDA multiples have come down since the end of 2021 and have generally trended in line with public markets indices, declining from 13.0x for all buyout deals in 2021 to 10.9x as of Q3 2022. During this period, the S&P 500 has trended down, from 14.6x EV/EBITDA to 11.6x as of Q3 2022
- The information technology sector makes up the largest portion of PE deals overall, and their fall has been sharpest, peaking at 17.4x in 2021 and coming down to 11.6x as of Q3 2022, while the FactSet North America Information Technology Services Index declined from 17.8x to 12.7x

- Entry EV/EBITDA multiples were generally higher in line with larger targets between 2018 and 2021, a trend that was observed in both sector as well as regional datasets
- Smaller-sized assets tend to be less mature and hence would see a discount to their valuation compared with larger and more mature businesses, while established businesses with a more stable income stream could expect better pricing
- However, as size approaches $5bn, general market conditions have a significant impact on pricing. Since these large deals most likely require financial leverage, positive market sentiment and the availability of low-cost liquidity would drive up valuations
- In a risk-off market, however, investors' appetite for large deals is decreased, resulting in lower valuations

Private Equity Performance (Historic & Forecast)

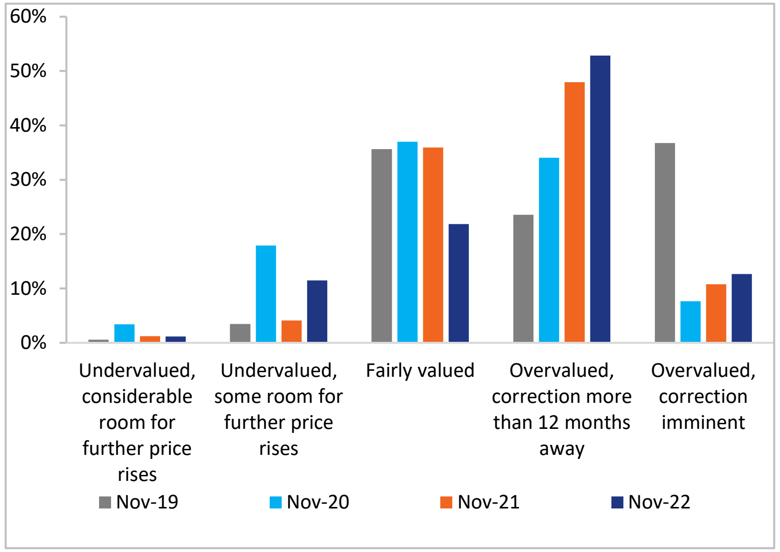
Regional private equity historic and forecast performance by sub-strategy

Performance	CAGR 2015-2021	CAGR 2018-2021	CAGR 2021-2027F
North America - private equity - buyout	16.7%	20.4%	14.5%
North America - private equity - growth	17.4%	22.1%	12.8%
North America - private equity - other	11.3%	14.8%	10.0%
Europe - private equity - buyout	14.9%	17.4%	14.3%
Europe - private equity - growth	15.0%	16.5%	15.0%
Europe - private equity - other	14.2%	17.6%	13.1%
APAC - private equity - buyout	12.2%	16.9%	11.2%
APAC - private equity - growth	13.9%	17.1%	12.6%
APAC - private equity - other	10.5%	12.4%	10.1%
Rest of World - private equity - buyout	19.4%	24.0%	18.0%
Rest of World - private equity - growth	14.5%	19.4%	12.7%
Rest of World - private equity - other	9.2%	9.8%	8.1%
Diversified multi-regional - private equity - buyout	15.0%	18.2%	12.0%
Diversified multi-regional - private equity - growth	6.6%	7.0%	11.5%
Diversified multi-regional - private equity - other	16.7%	23.2%	9.9%

Source: Preqin Global Report 2023: Private Equity

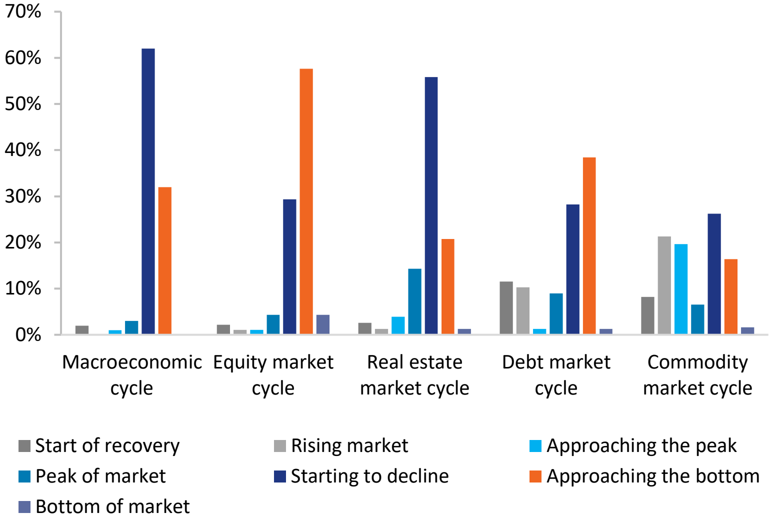
Private Equity – Investors' Views

Private equity investor views on portfolio company/asset pricing



Source: Preqin Global Report 2023: Private Equity

Investor views on where we are in global market cycles

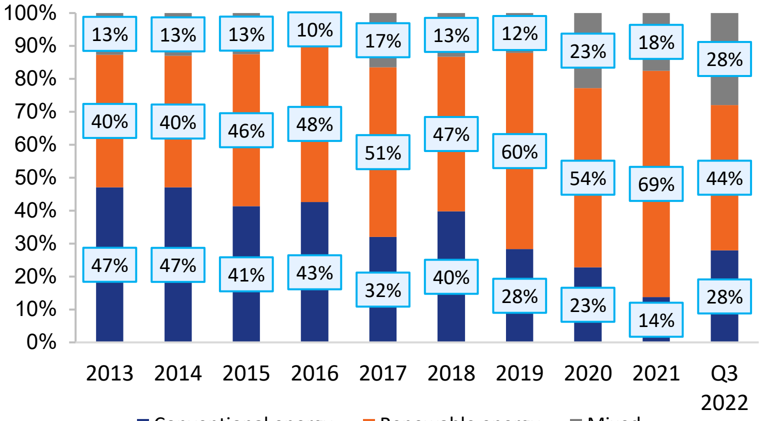


Source: Preqin Global Report 2023: Private Equity

- Near-term private equity performance is under pressure with negative outlook on valuations. While new deals transact at market value, existing investments generally take time to fully reflect changes in market value
- According to the latest survey conducted by Preqin in November, 2022, 65.5% of private equity investors believe that portfolio companies are overvalued and would be subject to corrections either imminently or within 12 months
- 56% of investors responded that the pricing of portfolio companies has moved lower compared with 12 months ago in November 2022. On the contrary only 7.6% would describe the equity market cycle as at the bottom or starting to improve
- Overall investors are expecting more correction in their portfolio assets from now, which makes for a rather bleak outlook for the next few performance reports. At the same time further downside risks to private equity valuations are expected in the near term
- Continued weakness in the exit environment as a result of fewer suitors for assets and reduced market liquidity may cause illiquidity discounts to widen. In addition, addition, a worsening business environment wouldn't support growth premiums at their previous levels

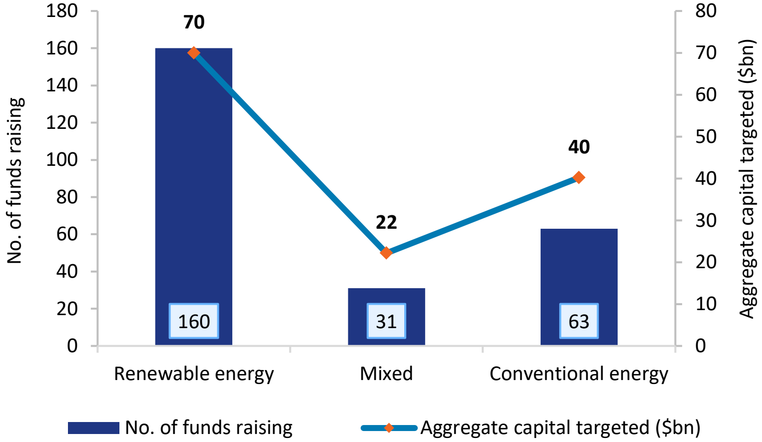
Energy Transition – Key Recent Trends

Unlisted energy funds closed by type



Source: Preqin Global Infrastructure Report - 2023

Unlisted energy funds in market by type, Q3 2022



Source: Preqin Global Infrastructure Report - 2023

ESG commitment in the asset class is on the rise

- Fundraising data on the split between energy funds focused on renewable and conventional sources shows a clear reversion. Since around 2016, renewables-focused fundraising has tended to displace that of conventional energy, with 2021 recording 69% of capital raised for renewables compared with just 14% for conventional energy
- Investors hoping to green their portfolios toward ESG targets have driven much of this medium-term trend. However, Q3 2022 data on this mix reveals a rebound in commitments to conventional energy funds, with the share of fundraising doubling to 28% compared with 2021. This is in response to higher gas and oil prices and the returns they deliver

Volatility drives demand for price stability from corporates

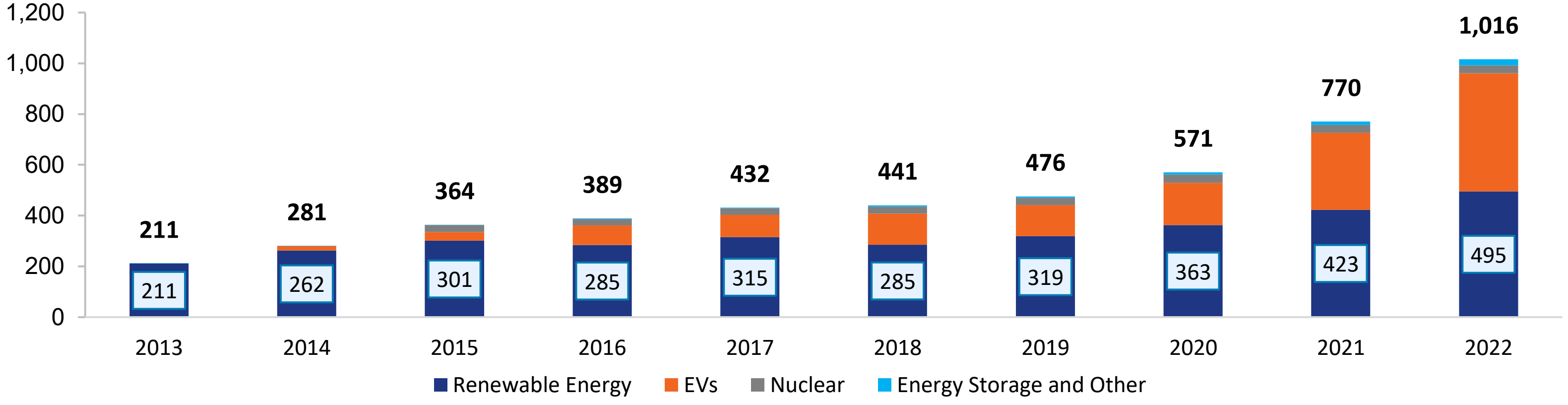
- The volatility in energy prices last year has cemented a longer-term growth trend of corporate power purchase agreements. However, as interest rates and construction costs have risen, challenges have emerged for some developers in meeting these agreements and driving re-negotiations
- Developers securing PPAs may restrict their upside gains. However, it helps ensure greater leverage, hence reducing capital outlays for the fund. In the US, the PPA market is more advanced
- In Europe, the long-term contracted revenue models include auctions or contracted PPAs. Recent years have seen keen interest in auctions, including the UK

Hydrocarbons and renewables are complements, not substitutes

- Although Governments have been effective at scaling up the renewables rollout, hydrocarbons are unlikely to be pushed out as quickly as anticipated. The challenge will be to make the transition away from carbon-intensive sources seamless

Investment in Energy Transition

Global investment in sustainable technologies ($ Bn)

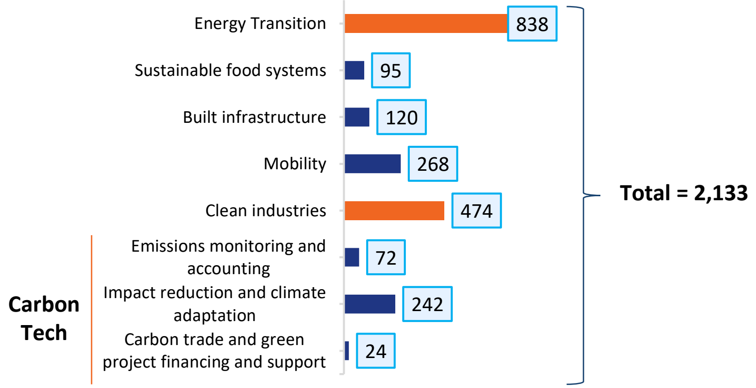


Source: BNEF Energy Transition Investment Trends 2023

- According to BNEF, global investments in the clean energy transition hit $1.1 trillion in 2022, roughly equal to the amount invested in fossil fuel production. This is the first time that annual investment in sustainable technologies surpassed the $1 trillion mark. Although the amount represents a 31% jump from 2021, it's still just a fraction of the requirement to meet net-zero emissions by 2050
- In terms of technology, the majority of the investments in clean energy were driven by solar and wind, reaching $495 billion, a 17% increase from 2021. Electric vehicles come close second with $466 billion of investment, marking a stiff 54% increase over the previous year
- In terms of region, nearly half of all global energy transition investments - $546 billion were in China, followed by European Union and US with $180 billion & $141 billion of investment, respectively
- In 2022, US renewable energy growth slackened due to rising costs and project delays driven by supply chain disruption, trade policy uncertainty, inflation, increasing interest rates, and interconnection delays. But growth will likely accelerate powered by robust demand and the record-breaking raft of clean energy incentives in the Inflation Reduction Act (IRA)
- EU saw a remarkable acceleration in the energy transition, partly because of the energy crisis, with record renewable energy installations and electric vehicle sales. The outlook for low-carbon transition continues to look extremely bright. The EU has reached an agreement on the FiT for 55, RePowerEU and carbon border adjustment mechanism. All these together are setting the scene for faster decarbonization across the bloc

Private Equity Investment in Energy Transition

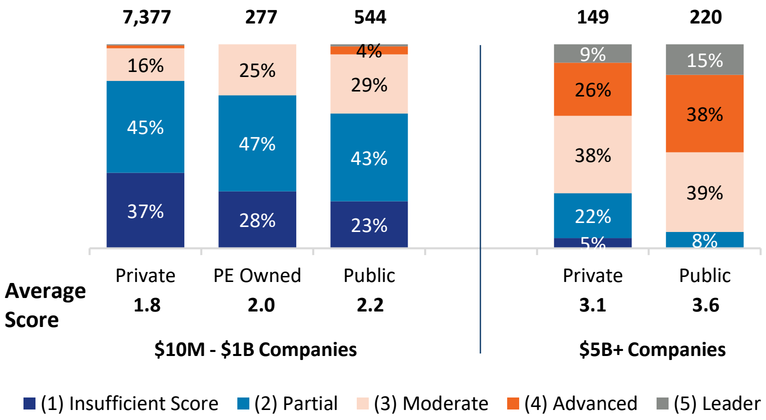
Climate-related target count by sector, 2017 – H2 2022



Note: Represents companies that transacted in a leveraged buyout, add-on, or recap deal between 2017 and H2 2022 with an estimated enterprise value of at least $50 million and less than $750 million at the time of the deal; target count includes companies that are now publicly traded or owned by a strategic buyer

Source: Dealogic; PitchBook; SPS; Bain analysis

Number of companies by EcoVadis carbon maturity score

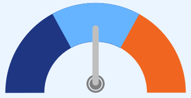
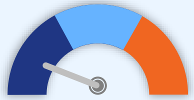
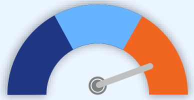
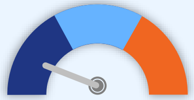
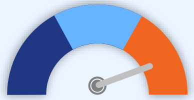
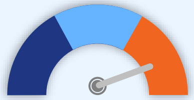
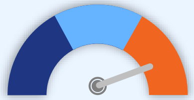
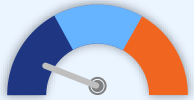
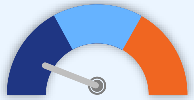


Sources: EcoVadis; Dealogic; S&P Capital IQ; Preqin; Bain analysis

- The energy transition is sprawling across every sector of the economy despite many practical hurdles associated with such a significant global switch. There is deep uncertainty about business models heavily reliant on government subsidies and other factors outside investors' control. Political scenarios are also frequently a disruptive factor
- However, investors are finding the energy transition space increasingly attractive. Between 2017 and the first half of 2022 buyout and growth equity funds had done energy transition-related deals with a total reported value of around $160 billion. Although, the focus of private equity was primarily on the energy transition and clean industries segments, carbon tech is also gaining momentum
- Instead of only increasing broad exposure to the energy transition, funds are investing with a clear strategy based on risk and tactics
- While energy transition is opening new areas for investment, it is also generating new risks and imperatives for PE portfolios. Between the demands of regulators, limited partners, lenders, and customers, demonstrable efforts to decarbonize are increasingly becoming table stakes for PE investment
- Investors and regulators are demanding companies to establish clear emissions-reduction strategies adhering to the standards and reporting protocols established by organizations like the SBTi and CDP. In this regard, the pressure on portfolio companies to transition to net zero constitutes a real risk for GPs
- Private companies have faced less pressure to adopt carbon-reduction strategies than public peers, which is established by the fact that 53% of large public companies achieved top scores for carbon management while the similar number for large private companies is 35%. Also, companies owned by Private Equity score higher than other private companies

Private Equity Investment in Energy Transition - Risk Analysis

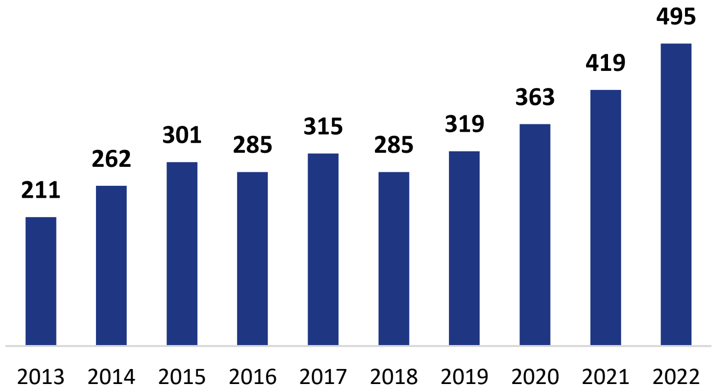
The right investment play depends on a fund's appetite for risk and capital intensity, as well as its value-creation focus

Asset Class				Growth		
	Buyout					
	Infrastructure					
Investment Play	**Grey-to-Green Transformation:** Mature assets shifting operations to reduce emissions	**Green Energy Operators:** Businesses directly focused on cleantech/ sustainability, with proven technology	**Picks & Shovels:** Businesses offering proven products that enable the energy transition	**Technology of the Future:** Big bets on promising technologies with scientific and/ or commercial uncertainty	**Green Service Champions:** Ecosystem of service enablers for green transition (i.e., distributors maintenance)	**Green Digital Enablers:** Enabling software for the green transition (e.g., sustainability monitoring & reporting)
Risk Profile						
Capital/ Asset Intensity						
Core Industrial Focus	Utilities, oil and gas, energy, manufacturing	Utilities, oil and gas, energy	Manufacturing	Manufacturing	Rollup/ M&A, business development	Rapid growth through customer acquisition
Value-creation opportunity	Operational improvements	Operational improvements	Operational improvements	Investments to reach scale	Rollup/M&A; business development	Rapid growth through customer acquisition

Source: Global Private Equity Report 2023 Bain & Company

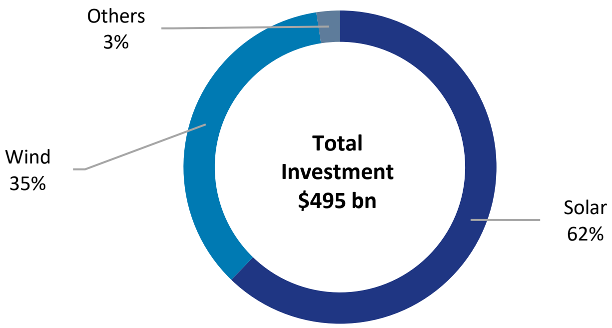
Investment Activity in Renewable Energy

Global investment in renewable energy ($ Bn)



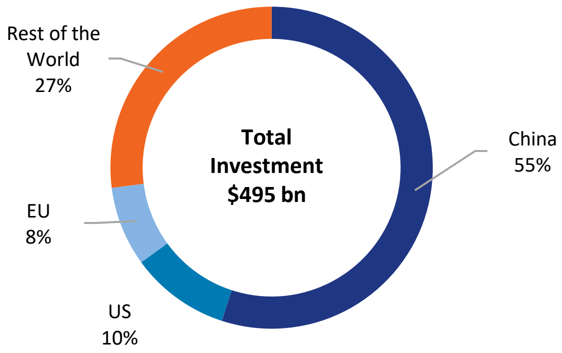
Source: BNEF Energy Transition Investment Trends 2023

Global investment in clean energy by technology (2022)



Source: BNEF Energy Transition Investment Trends 2023

Global Investment in Clean Energy by Region (2022)

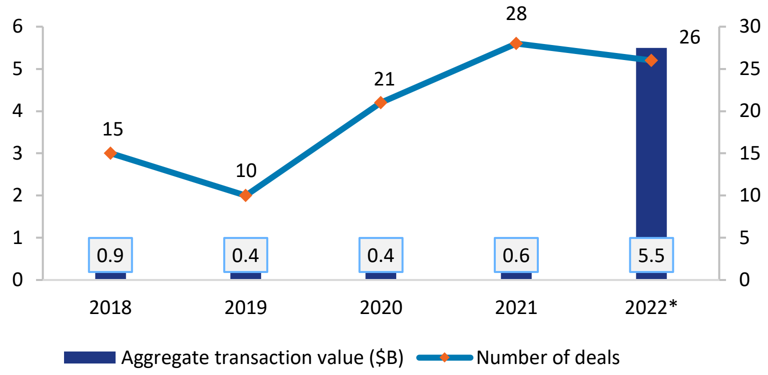


Source: BNEF Energy Transition Investment Trends 2023

- Investment in renewable energy rose to record high in 2022, approaching half a trillion dollars for the first time as per estimates by Bloomberg New Energy Finance
- Majority of the investments was attributed to solar, marking a year on year jump of 36%. Approximately $308 billion was invested into the technology, translating to new capacity of 260GW
- Investment in wind remained stable at $175 billion. There have been multiple instances of procedural delays in terms of securing permission and establishing grid connection for the new wind powerplants in Europe and North America
- China once again has been the leading investor, accounting for 55% of the total investments followed by US with roughly $50 billion and Europe with $39 billion of investment

Private Equity Investment in Renewable Energy

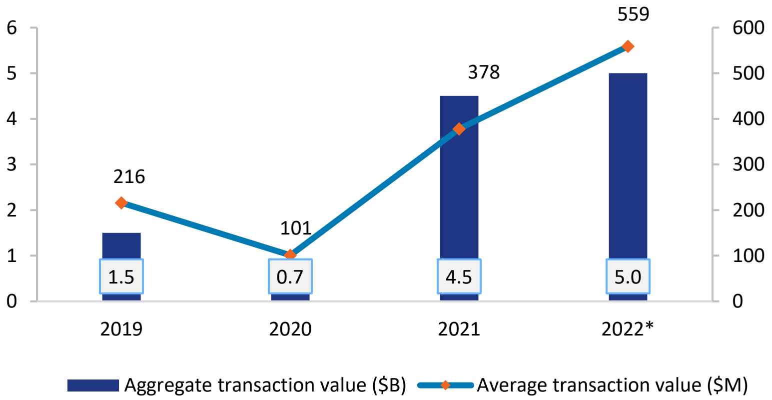
PE and VC backed investments in European renewables



Note: *2022 data as of Sep 26, 2022
Source: S&P Global Market Intelligence

- Private equity and venture capital investment in European renewable energy companies sharply increased in 2022 owing primarily to the energy crisis created by EU's sanction on imported natural gas from Russia. Aggregate deal value for renewable energy companies soared about nine times, to $5.51 billion from $633.9 million, over the whole of 2021
- Among the largest deals announce in 2022 notable is KKR & Co. Inc.'s approximately $2.82 billion buyout of French renewable energy producer Albioma
- Renewable energy will remain a hot sector for investors amid soaring energy prices, although it is not limited to wind and solar power. Cleantech, ranging from battery technology to smart grids are becoming increasingly important in advancing Europe's energy transition

PE and VC backed investments in North American renewables

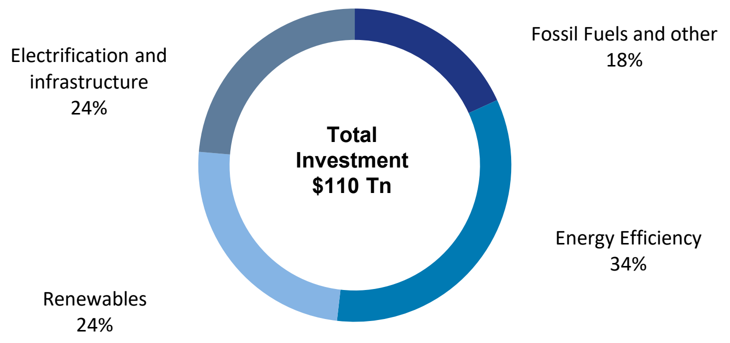


Note: *2022 data as of Aug 23, 2022
Source: S&P Global Market Intelligence

- North America was already seeing an uptick in private equity investment in renewable energy even before the Inflation Reduction Act ("IRA") was passed in August, last year
- In the pre-IRA era ESG goals of investors were the primary force pushing private equity into renewables. The $3 billion equity investment in Invenergy Renewables LLC by Blackstone Inc. and CDPQ helped push the total PE-backed investment in North America's renewable sector to $5 billion in 2022 through August, surpassing the 2021 total of $4.5 billion
- It is projected that IRA could drive over $4.1 trillion in cumulative capital investment in new American energy supply infrastructure over the next decade. The new tax benefits for renewables offered by IRA are not only creating unexpected value for existing investors but also raising the barrier for new investors to enter into the market as the existing ones now want a premium for exit

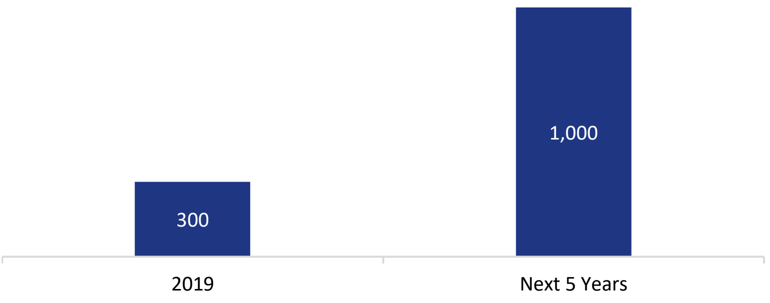
PE / VC Investment Requirement in Clean Technology - Outlook

Cumulative investment need to meet sustainability goal 2016 - 2050 ($ Tn)



Source: IRENA

Expected annual investment by PE / VC in clean technology ($ Bn)



Source: World Economic Forum

- It is estimated that cumulative investment of $110 Tn will be needed to be invested in energy systems by 2050 to meet the goals of the Paris Agreement
- IRENA expects a massive market worth $90 Tn to be developed across renewable energy, electrification technologies and energy efficiency sub-sectors
- Given the massive amount of capital requirement, private investment is expected to play a major role, roughly estimated to account for three-quarters of overall capital needs, with the remaining 25% being sourced from public sources

- The clean technology industry is seen to reach a stage of maturity, following a decade of failures which saw energy related VCs lose around $12.5 bn
- As clean technology becomes more economically viable, new business models have emerged attracting private investments into the sector. Consequently, annual investment into the sector is expected to grow more than 3x to $1 Tn annually in the next five years from $300 Bn currently
- A combination of factors such as favourable regulatory environment, immense growth potential of specific technologies such as electric mobility and energy storage are catalysing private investment into the clean technology sector

Source: IRENA, World Economic Forum

3. CleanBridge OVERVIEW

CLEANBRIDGE

CleanBridge Overview

CleanBridge provides high quality, independent strategic advisory, capital raising, and M&A services to businesses and their owners across the Americas and Europe

Introduction

- CleanBridge was founded to advise our clients in achieving their objectives for growth and value creation – through acquisition, investment and capital raising transactions
- Via CleanBridge Securities LLC, we are a member of FINRA/ SIPC

Team

- Team of investment banking professionals with diversified backgrounds and extensive transaction experience in investment banking, capital raising, private equity, and corporate finance & operations
- Complemented by a prestigious group of highly experienced Senior Advisors

Leadership

- Directorial and executive leadership positions in the private and public sectors across the Americas and Europe, including with banks and leading financial institutions

Experience

- Deep operating and industry experience, including in power and renewable energy, EV transport, climate finance and sustainable living across Europe and the Americas

Focus

1. **M&A and strategic advisory transactions**, often private, complex or cross-border, across the Americas and Europe
2. **Debt and equity capital raising** for businesses, projects and highly differentiated fund managers
3. **Sector expertise** in infrastructure, power and renewable energy. **$1.6 billion** in M&A advisory across **43 transactions**. **$1.5 billion** in project finance & debt advisory across **25 transactions**

Transactional Track Record

CleanBridge and members of the firm have completed **87** transactions with over **US$5.0 billion** in total transaction value. Our firm has an extensive and successful track record in M&A advisory and capital raising for clean energy and infrastructure

$1.6 billion	$1.5 billion	$1.0 billion	$0.8 billion
M&A and strategic advisory across **43** transactions	Project finance, debt advisory and restructuring across **25** transactions	Capital advisory across **12** transactions	Capital placement transactions across **7** fund transactions

Investment & Merchant Banking (Core Sectors)

We partner and guide industry-leading companies who have unique visions for building successful Sustainable Investment businesses within core infrastructure sectors of energy, water, and transport, alongside the climate finance, and sustainable living sectors

New Energy Infrastructure	▪ CleanBridge's focus on the onshore wind, solar PV, waste-to-energy, and energy storage covers the transition to a low carbon energy system. Across every market globally, climate change policy is being drawn down into government policy, asset owner and investor policy, and ultimately into power companies business strategy. We continue to operate at the central point of capital formation and investment into new energy across each of our core markets in Europe & Americas
Water Infrastructure	▪ Water desalination represents an increasingly important element in the world economy. Desalination plants will continue to become more efficient and membranes will be more fouling resistant. As well, solar powered desalination may provide massive change for the developing nations in providing both drinking water and water for irrigation and agriculture use ▪ Water infrastructure is a highly sought after investment for large infrastructure and strategic investors given its utility like nature and quality long term investment cash flows
Climate Finance	▪ Within the global economy, the commitment to a net-zero 2050 carbon environment is now set across all governments, investors, and sectors. With that commitment comes a material change in finance, and movement to climate based financings (both equity and debt) ▪ We advise governments, financial institutions, and investors on their transition towards financing and investing in a net-zero 2050 future
Sustainable Transportation	▪ The "third leg" of the low carbon economy is the electrification of transportation. Globally governments are applying a similar approach taken to the energy sector in regulating transportation towards being electrified – covering both public and private sector transportation ▪ The challenge and opportunity is a $Tn dollar opportunity over the next 25 years as all forms of transport move to electrification
Sustainable Living	▪ As part of transitioning to a low carbon, net-zero economy over the next 30 years, the world is moving to a more sustainable approach to living in that transition. From developing new agriculture technologies and techniques that will feed an estimated 8.5 billion people by 2030, to innovation in healthcare, fitness, nutrition, and vitality, people are looking to new sustainable ways of supporting a long and vital life ▪ We work to be at the heart of the sustainable living movement in advising and financing some of the best companies supporting the life transition that is underway in the world

Investment & Merchant Banking (Core Services)

CleanBridge is a leading specialist advisor on strategic advisory, capital advisory (equity and debt), mergers, acquisitions, and related strategic matters within sustainable investment markets. Our Strategic Advisory, Capital Advisory, and M&A practice is distinguished by senior banker involvement, deep industry sector expertise and global reach. We are regularly involved in large, complex and industry-defining transactions, often across national borders

Equity & Capital Advisory	▪ Our capital advisory services leverage our expertise on capital structure, capital formation and capital raising. Our professionals work closely to source and advice on corporate finance options, in helping tailor financing strategies to clients' unique situations, with an especially well established track record of finding innovative solutions for challenging market conditions ▪ We advise clients on a broad range of strategic and tactical issues, including capital structure optimization, capital allocation, equity and debt positioning and issuance ▪ We leverage our ecosystem of specialist investment counterparties including large asset owners, sponsors, corporates, and strategics in bringing best execution forward for our mandates
Debt Advisory	▪ Our team of senior bankers advises and negotiates on behalf of clients regarding alternatives for existing debt and the issuance of new debt. We also provide guidance on all aspects of the credit and non-recourse project finance process, including interactions with the ratings agencies, assembly of credit memos, financial modelling, and due diligence support ▪ We retain key relationships with over 20+ global non-recourse project finance banks in ensuring best execution on arranging non-recourse project finance for our clients and their projects ▪ Support project developers in structuring and arranging non recourse debt for their projects, and provide transaction support for greenfield, brownfield, acquisition financing and refinancing
M&A & Strategic Advisory	▪ We evaluate potential targets or merger partners as well as financial and strategic alternatives. We advise on strategy, timing, structure, financing, pricing, and we assist in negotiating and closing transactions. ▪ Complete suite of M&A advisory services including modelling and valuations, transaction services and due-diligence relating to acquisition or divestment of stakes in infrastructure projects
Private Capital Advisory	▪ Our group is a leader in raising capital, and providing capital solutions for private investment funds. Members of our team have been involved in over 50 private capital raising assignments, aggregating more than $20 billion. Our group has built one of the broadest institutional investor coverage networks in the industry and has cultivated relationships with over 150 investing institutions globally. Our practice is consistent with CleanBridge approach of delivering highly experienced, senior-level execution capabilities, with senior professionals managing all aspects of the capital raising process

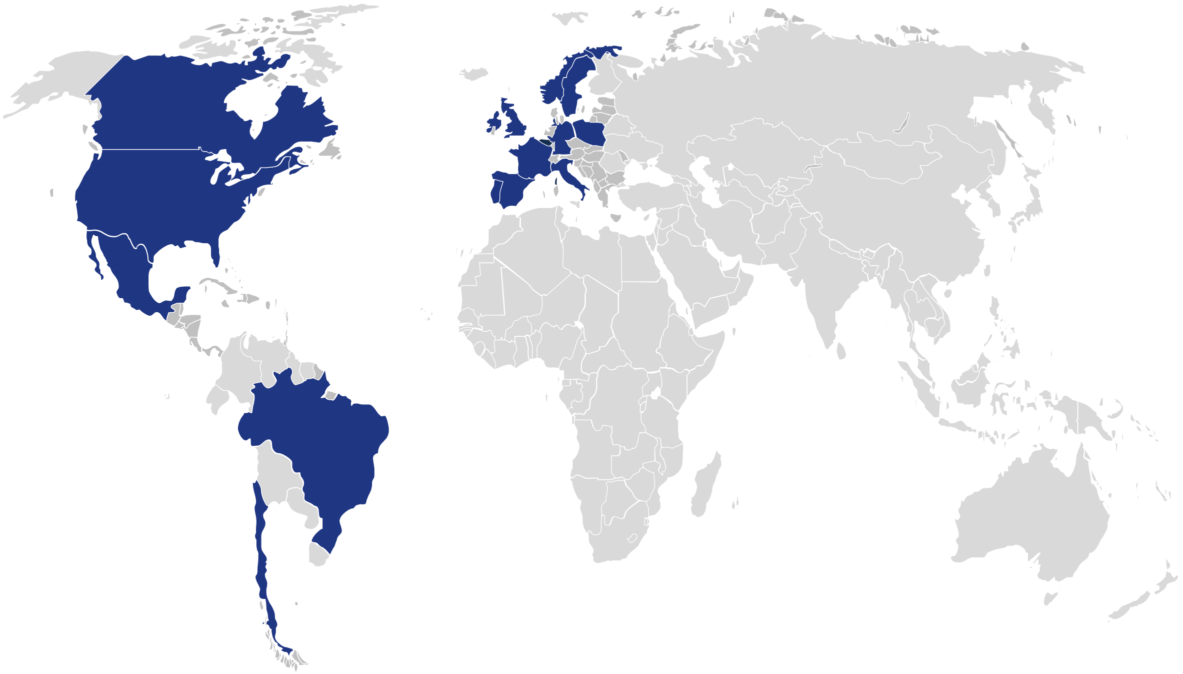
CleanBridge – Key Global Infrastructure Markets

Energy, water, sustainable transportation, climate finance, and sustainable living are global themes, within investment flows covering multiple world markets.

CleanBridge covers key European and Americas markets where its institutional investment clients are active.

The group's sector and product specialization, and "one team" platform with global P&L, global performance compensation pool, and global client and institutional investor coverage, ensures we bring the full resources of our group forward to clients across markets, including:

- Europe
- Americas



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