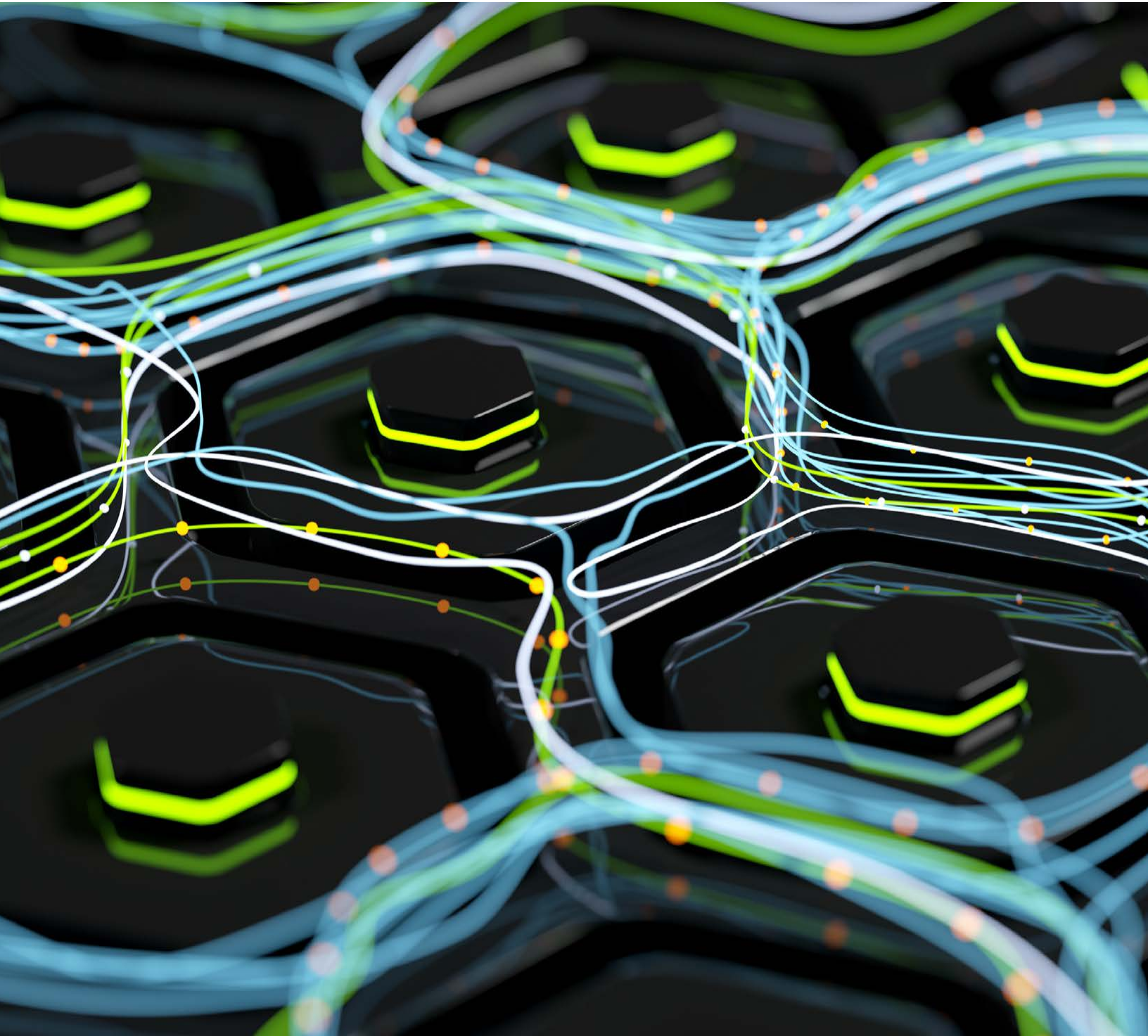




Houlihan Lokey

Valuation Challenges of Early-Stage Energy Transition and Infrastructure Technology Companies



Introduction

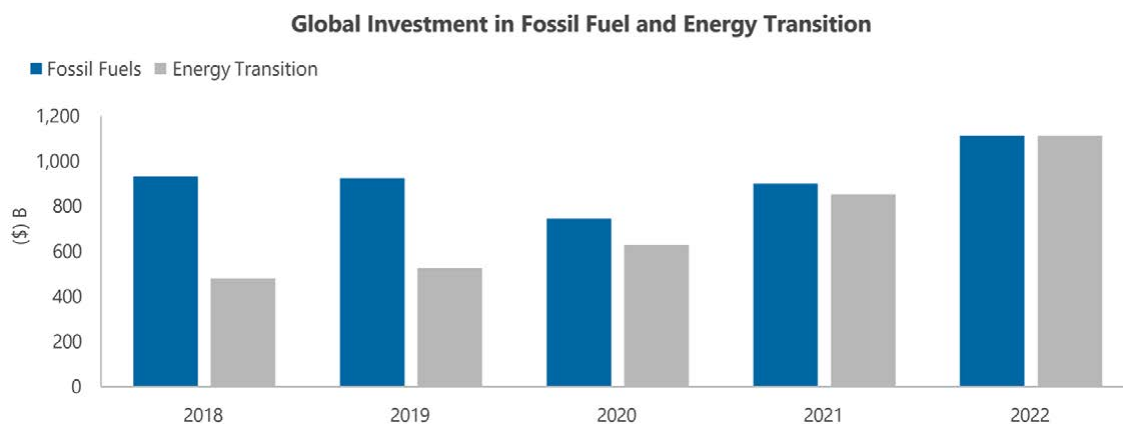
Investment from traditional energy and infrastructure investors in early-stage entities (ESEs) within the energy transition and infrastructure technology space has surged since 2020. Net-zero commitments have fueled investment in this space, as there is a substantial gap in the technology and clean energy sources today, and those needed to achieve the goal of net-zero commitments. Net-zero commitments refer to balancing the amount of greenhouse gas that is produced and the amount that is removed from the atmosphere. Achieving the goal set by the United Nations will likely require a substantial change in existing processes in concert with large-scale deployment[s] in technology across industries. As a result, we have observed traditional infrastructure investors shifting their focus from mature and stable cash flow businesses toward ESEs. This growth has brought forth the need for greater transparency and understanding of valuations in the space, given the nuanced nature of these investments and recent volatility in public markets. In response to increased inquiries from our clients, Houlihan Lokey aims to address certain valuation best practices for investments in ESEs within the energy transition and infrastructure technology sector in this paper. The objectives of this paper are as follows:

1. Explore the current landscape of investment in the energy transition and infrastructure technology sector.
2. Review key trends that are expected to impact the sector.
3. Discuss methodologies and unique considerations for valuing ESEs.

Market Backdrop: Evolution of Investing in ESEs Within Energy Transition

The global markets have witnessed a growing wave of investment directed toward energy transition as funds strive to enhance returns while fulfilling environmental, social, and governance (ESG) initiatives. Energy transition entails the shift from reliance on fossil fuels, such as coal, oil, and natural gas, toward sustainable and low-carbon alternatives. As depicted in Exhibit 1 below, global investment in energy transition has been steadily increasing over the past few years and reached parity with investment in fossil fuels in 2022.

Exhibit 1⁽¹⁾



In recent years, the scope of energy transition has expanded beyond renewable energy to encompass decarbonization, emissions reduction, grid infrastructure, energy storage, EV charging, battery technology, circular economies, and other emerging technologies and innovations. As a result, many companies operating in the space are ESEs pioneering new markets and developing emerging technologies. This has attracted an influx of capital into the venture capital (VC) and growth equity (GE) markets as funds seek investment opportunities specifically in energy transition ESEs.

Key Trends in InfraTech

According to PitchBook, opportunistic infrastructure funds raised \$105.4 million from 2020 to 2022 compared to \$31.1 million from 2017 to 2019. While traditional VC investors continue to participate, nontraditional investors such as corporations, private equity firms, infrastructure funds, hedge funds, mutual funds, sovereign wealth funds, and family offices are also contributing to this capital expansion. VC and GE investments in energy transition technologies have become crucial for both countries and corporations pursuing net-zero targets. According to UN estimates, annual clean energy investment will need to more than triple to \$4 trillion by 2030 to achieve the net-zero target by 2050 outlined in the Biden administration’s plan and the Paris Accord.

⁽²⁾ Alongside favorable government policies, there has been a broader societal push toward decarbonization, driving a surge in investments within the energy transition sector.

Traditional energy and infrastructure funds are also mobilizing resources to finance renewable energy projects, energy efficiency measures, and sustainable infrastructure development. Meeting net-zero targets not only requires increased investment but also requires allocating capital across various industries and subsectors, including those related to the development and deployment of innovative technologies as shown in Exhibit 2.

Exhibit 2⁽³⁾

- | | | | | | |
|----|---|--|-----|--|--|
| 1. |  | RETIRE coal plants. | 6. |  | INCREASE public transportation, biking, and walking. |
| 2. |  | INVEST in clean energy and efficiency. | 7. |  | DECARBONIZE aviation and shipping. |
| 3. |  | RETROFIT and DECARBONIZE buildings. | 8. |  | HALT deforestation and RESTORE degraded lands. |
| 4. |  | DECARBONIZE cement, steel, and plastics. | 9. |  | REDUCE food loss and waste and IMPROVE agricultural practices. |
| 5. |  | SHIFT to electric vehicles. | 10. |  | EAT more plants and less meat. |

The companies that support the technological initiatives around infrastructure and energy transition are sometimes referred to as infrastructure technology companies, also known as infratech. InfraTech has evolved into a recognized asset class, attracting the attention of numerous traditional infrastructure investors who have expanded their investment scope to include this new sector. Typically, infratech investments involve early-stage businesses, which may present higher risks and smaller deal values. As infratech companies mature, traditional infrastructure funds aim to either: (i) transfer these assets to their flagship infrastructure funds, (ii) sell them to other infrastructure funds, (iii) sell to other energy or infrastructure companies, or (iv) take them public.

Rob Kupchak, Head of Infrastructure and Energy at Macquarie Capital Americas, recently noted, “InfraTech represents a significant opportunity to address challenges and drive rapid advancements in the infrastructure sector, yielding far-reaching effects.”⁽⁴⁾ He emphasized that companies actively embracing technological innovation in the infrastructure landscape can achieve substantial improvements in efficiency, effectiveness, and safety. This underscores the transformative role of technological advancements in shaping the infrastructure industry.

In recent years, several key players in the infrastructure sector have established dedicated infratech funds or allocated capital to infratech within their flagship funds, recognizing the significant return potential of such investments. Exhibit 3 offers examples of traditional infrastructure investors that have invested in infratech over the past year, providing evidence of the growing interest in this sector.

Sources: United Nations, World Resources Institute, Macquarie, PitchBook.

⁽²⁾ United Nations article titled: “Renewable energy – powering a safer future.”

⁽³⁾ World Research Institute article titled: “10 Big Findings from the 2023 IPCC Report on Climate Change,” March 2023.

⁽⁴⁾ Macquarie article titled: “InfraTech: the transformative catalyst.”



Exhibit 3⁽⁵⁾

Selected Early-Stage Infrastructure Investments

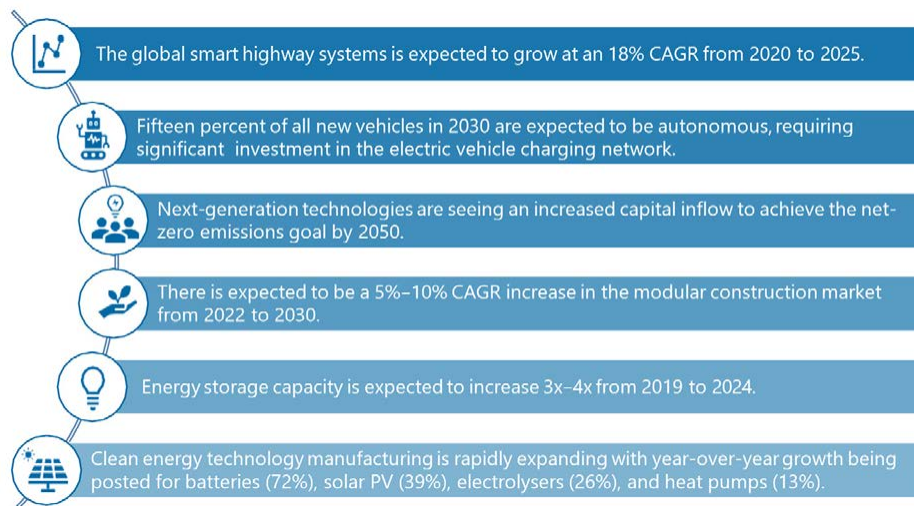
Investor	Portfolio Company	Invested Round	Capital Raised	Close Date	Company Description
NGP Energy Capital	Orennia	Series B	\$25 million	7/11/2023	Developer of a commercial analytics and insights platform intended to inform investment decisions in renewable energy.
UVC Partners	ChargeX	Series B	\$12.5 million	7/5/2023	Developer of an electric vehicle charging system specifically designed for underground parking garages and employee parking lots.
CDP Capital	Energy Dome	Series B	\$43.8 million	4/27/2023	Developer of an energy storage technology designed to fight climate change using carbon dioxide (CO2) to accelerate the transition to renewable energy.
I Squared Capital	PreAct Technologies	Series B	\$20 million	4/25/2023	Developer of a pre-collision automotive safety technology designed to reduce fatalities and injuries from automotive crashes.
NextEra Energy	Modern Electron	Series B2	\$32.8 million	3/28/2023	Developer of thermionic conversion technology that transforms heat from boilers and furnaces into power.
Blackstone Energy Partners	Xspansiv	Later-Stage Growth	\$525 million	1/1/2023	Spot exchange for ESG-inclusive commodities, including carbon, renewable energy certificates, and digital natural gas.

According to PitchBook, opportunistic infrastructure funds raised approximately \$36.6 billion from private capital allocators in 2022, surpassing the five-year and 10-year historical averages for this type of fund. This growth is being driven by several key factors:

- Increased Infrastructure Funding in Growth Markets:** Global interest in opportunistic infrastructure investments has driven sponsors to raise infratech-focused funds and increased investment in growth markets through their flagship funds.
- Environmental Initiatives and Green Infrastructure:**⁽⁶⁾ Achievement of net-zero emissions by 2050 necessitates significant investment in energy transition technologies, presenting vast market potential and numerous investment opportunities. Private markets have witnessed a higher influx of energy transition funding compared to public markets due to the substantial upfront cash requirements and long-term investment horizon associated with developing physical assets.
- Emergence of Specialist Subsectors:** Various specialist subsectors, such as smart energy management, smart parking garages, space infrastructure, and other opportunistic areas, have emerged within the infratech landscape.
- Increasing Importance of Digital Infrastructure:** Digital infrastructure, including fiber, wireless towers, and data centers, has gained prominence. In 2021 and 2022, transactions involving data centers alone amounted to a combined \$79 billion, with notable deals such as the \$15 billion CyrusOne data center acquisition in 2021.

Additionally, the growth in the infratech sector is supported by a number of global macroeconomic tailwinds, summarized below in Exhibit 4.

Exhibit 4^(7,8,9)



(5) PitchBook data.
 (6) United Nations article titled: "Renewable energy – powering a safer future."
 (7) McKinsey & Company article titled: "Infrastructure investing will never be the same," August 2022.
 (8) Market Research Future report titled: "Modular Construction Market Research Report...," May 2023.
 (9) International Energy Agency article titled: "Global Energy Transitions Stocktake."



Valuing investments in the dynamic and fast-moving infratech sector presents unique challenges. The sector's rapid technological advancements and market developments require investors to possess deep specialization in order to accurately shape and communicate a credible vision of how the industry and sector dynamics will evolve over time. Therefore, it is crucial to consider the following factors when valuing infratech investments:

- 1. Strong Interest in the Space:** Despite economic uncertainty, the infratech/energy transition sector continues to attract significant fundraising. These investments have proven to offer moderate and consistent returns, even in volatile, inflationary, and recessionary environments. In 2022, commitments to opportunistic and value-added funds surpassed their five-year and 10-year averages. Notably, nine out of the top 15 infrastructure funds that closed in 2022 focused on opportunistic and value-added investments. As a result, there is a substantial amount of capital waiting to be deployed, contributing to relatively stable or increasing valuations over time.
- 2. Resilience of Private Market Investments:** Private infratech investments have demonstrated greater valuation resilience compared to the public markets during periods of economic instability. Transactions in the sector indicate that not all private infratech investments have experienced the same level of valuation correction as their public market counterparts. These investments are typically underwritten with a 3x-10x MOIC depending on the stage of investment, implying IRRs in the range of 25% to 45% over 3-10 year hold periods. Even investments that underperform their underwriting projections but experience growth may warrant a flat or increased valuation. Exhibit 5 shows a step up in valuation and illustrates valuation resilience for a number of infratech-related companies.

Exhibit 5⁽⁵⁾

Close Date:	Oct. 4, 2022	Close Date:	Mar. 28, 2022	Close Date:	Feb. 14, 2022	Close Date:	Jan. 19, 2022
Prior Round:	Sept. 22, 2021	Prior Round:	June 17, 2020	Prior Round:	Oct. 13, 2020	Prior Round:	Jan. 23, 2019
Company:		Company:		Company:		Company:	
New Round:	Series E	New Round:	Series D	New Round:	Series C	New Round:	Series C1
Deal Size:	\$450 million	Deal Size:	\$150 million	Deal Size:	\$200 million	Deal Size:	\$127.2 million
Post-Money:	\$1.1 billion	Post-Money:	\$1.1 billion	Post-Money:	\$1.4 billion	Post-Money:	\$667.2 million
Step-Up:	1x	Step-Up:	3.1x	Step-Up:	3.6x	Step-Up:	1.1x

Close Date:	May 23, 2023	Close Date:	Apr. 25, 2023	Close Date:	Mar. 28, 2023	Close Date:	Mar. 28, 2023
Prior Round:	Nov. 17, 2021	Prior Round:	Aug. 31, 2021	Prior Round:	Dec. 3, 2021	Prior Round:	July 20, 2021
Company:		Company:		Company:		Company:	
New Round:	Series C	New Round:	Series B	New Round:	Series B2	New Round:	Series A
Deal Size:	\$33.4 million	Deal Size:	\$20 million	Deal Size:	\$32.8 million	Deal Size:	\$28.8 million
Post-Money:	\$233.5 million	Post-Money:	\$90 million	Post-Money:	\$180.8 million	Post-Money:	\$101.8 million
Step-Up:	2.5x	Step-Up:	1.5x	Step-Up:	1.2x	Step-Up:	2.8x

- 3. Unique Nature of InfraTech Companies:** InfraTech companies exhibit significant operational variations, making it challenging to find suitable public comparable companies for performance benchmarking. Many public comparable companies in this space have demonstrated significant volatility in recent years, further complicating the valuation process. Many of these companies went public due to the boom in SPAC IPOs in 2020 and 2021, which led to hundreds of de-SPAC mergers, making them somewhat unsuitable comparables given the dislocation in the SPAC/de-SPAC market.
- 4. Focus on ESG Principles:** Fund managers are increasingly prioritizing investments in companies that embrace ESG principles. They align their investment strategies with their values and are willing to consider ESG interests alongside purely financial returns.

5. **Business Risks Associated With ESEs:** ESEs face several risks. These entities often face uncertainties around the market demand for their services and the technological risk behind the innovation. At times, these entities also face unpredictability regarding future financing. Due to the unconventional nature of these investments, there is also a high degree of political risk involved as there could be a pullback in incentives with a change in political regime.




Once an estimated total company equity value has been determined, it is necessary to consider the rights and preferences of each class of equity. Private valuation methods for allocating total equity include:

1. **Common stock equivalent approach**, which is the typical basis for post-money valuations quoted in news stories.
2. **Waterfall/option pricing approach**, which may incorporate option pricing methodology depending on the complexity of the capital structure.

Understanding the various terms and features attached to each security class in a company's capital structure is essential to security valuation, particularly in the current volatile market environment. Factors such as seniority, liquidation preferences, dividends, ratchets, conversion ratios, and other variables significantly impact the economic features that provide downside protection. The following are key considerations for these two equity value allocation approaches.

Exhibit 6



Key Considerations

<p>Income Approach</p> 	<ul style="list-style-type: none"> ■ For a profitable company with predictable and steady cash flows, which is typical of companies with contractual revenues, a discounted cash flow (DCF) analysis may be appropriate. ■ For a development-stage company, a DCF analysis may be appropriate, but it should consider: <ul style="list-style-type: none"> ■ Length of forecast to capture full ramp-up to peak production and sales/deployment/utilization. ■ Cumulative probability of success from the current stage (e.g., product development, prototyping, product market fit) through market acceptance. ■ The discount rate used should reflect the nature of cash flows (i.e., if a probability adjustment has been applied to the cash flows, discount rate should not double-penalize the company). ■ Terminal value typically considers: <ul style="list-style-type: none"> ■ Predictability of long-term revenues. ■ Strategic vs. financial exit, which may impact type of exit valuation utilized (e.g., revenue, earnings, long-term growth rate). ■ It should, however, be noted that the income approach can be challenging for ESEs as it is difficult to accurately forecast future cash flows due to the company's lack of a proven track record of profitability or success.
<p>Market Approach</p> 	<ul style="list-style-type: none"> ■ For a revenue-generating or profitable company, a typical approach is to conduct a guideline public company (GPC) analysis using revenue or earnings multiples. ■ When selecting the capitalization metric, it is important to consider the availability and reliability of comparable metrics for public companies. For example, recurring revenue is a relevant metric for SaaS companies, but it may not be reported by public companies. ■ For a pre-revenue company, multiples typically will not be applicable. Instead, total market capitalization and considering targets of similar risk (e.g., technology and company/product lifecycle stage) may be appropriate alongside benchmarking to both publicly traded pre-revenue companies and targets of disclosed transactions.
<p>Last Round of Financing</p> 	<ul style="list-style-type: none"> ■ In the context of current market volatility, it is important to give consideration to the following factors: <ul style="list-style-type: none"> ■ Length of time since the prior financing round, taking into account any changes in public markets and company-specific risks. ■ Benchmarking the subject company against comparable public companies in terms of product or service offerings, specific subsectors, and other relevant factors. ■ Analysis of recent secondary transactions or any pending investor interest. ■ It is worth noting that valuation shifts in the private markets may follow the direction of the public markets, but not necessarily on a 1:1 basis. Benchmarking can be particularly useful in determining the appropriate adjustment to the valuation of the last financing round.

In recent years, private security valuation at the fund level has become increasingly important to private fund investors seeking transparency around NAV and fees. The Securities and Exchange Commission's (SEC) Division of Examinations has published its examination priorities for 2023 and highlighted the Fair Valuation Rule, which establishes guidelines for the valuation of fund investments, as one of its key priorities. For securities that do not have readily available market quotations, the Fair Valuation Rule requires them to be valued at their fair value, which is determined in good faith by the fund's board of directors, taking into consideration all relevant factors that would impact the value of the security. This assessment is crucial as it ensures that funds are valuing their investments appropriately and transparently. Accurate valuation is essential for providing investors with reliable information about the value of their investments and helps maintain the integrity of the fund and instills confidence in investors that their assets are being valued fairly.



Exhibit 7

	Exit Assumption	Valuation Considerations
Common Stock Equivalent Analysis 	<ul style="list-style-type: none"> Qualified IPO, which assumes all classes of equity typically convert to common. 	<ul style="list-style-type: none"> The common stock equivalent method assumes all equity securities in the capital structure convert into (or are otherwise treated as) a single common share class. In such circumstances, a typical, knowledgeable investor would not likely give significant consideration to the specific rights and privileges of any specific equity security (other than its common stock conversion ratio). Certain classes of preferred securities may have a dilutive impact on other securities (e.g., conversion ratio > 1:1). This valuation approach is more relevant when an IPO scenario is more likely. Given the current slowdown in the IPO market, the weighting toward this exit assumption may be lower than in prior quarters and years.
Option Pricing Analysis 	<ul style="list-style-type: none"> M&A, which assumes contractual rights and preferences of preferred are respected. 	<ul style="list-style-type: none"> Option pricing analysis is a method to allocate a company's total enterprise or equity value to each of its securities based on its contractual rights and liquidation preferences. This valuation approach values equity as call options on the company's value. Various strike prices of the options represent different thresholds at which securities in the capital structure start to participate in or drop out from the value distribution. This approach will often reflect higher security values for senior classes of equity given contractual downside protections such as liquidation preference. Option pricing analysis is typically more relevant when an M&A scenario is more likely. Given the current slowdown in the IPO market, the weighting toward this exit assumption may be higher than in prior quarters and years.

Houlihan Lokey's Unique Expertise

Houlihan Lokey has a successful track record and robust experience in assisting its clients—including private equity, venture capital, hedge funds, energy and infrastructure funds, sovereign wealth funds, and family offices—with ongoing portfolio valuation work and fund-related transactions. Our unique expertise in the sector enables us to be able to “speak the language” with deal teams and finance professionals at our fund clients (as well as their auditors), alleviating information asymmetries and streamlining the valuation process. Additionally, live insights from our leading M&A practice allow our team to have a pulse on the market and a deeper understanding of private deal dynamics. Exhibit 8 illustrates our energy and infrastructure capabilities across different subsectors.



Exhibit 8

Houlihan Lokey-Dedicated Energy and Infrastructure Subsectors Include:



Power and Renewables



Energy Transition



Oil and Gas

Coverage includes E&P, OFS, Midstream and Refining



Digital Infrastructure



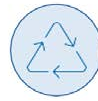
Metals and Mining



Transportation and Logistics



Chemicals



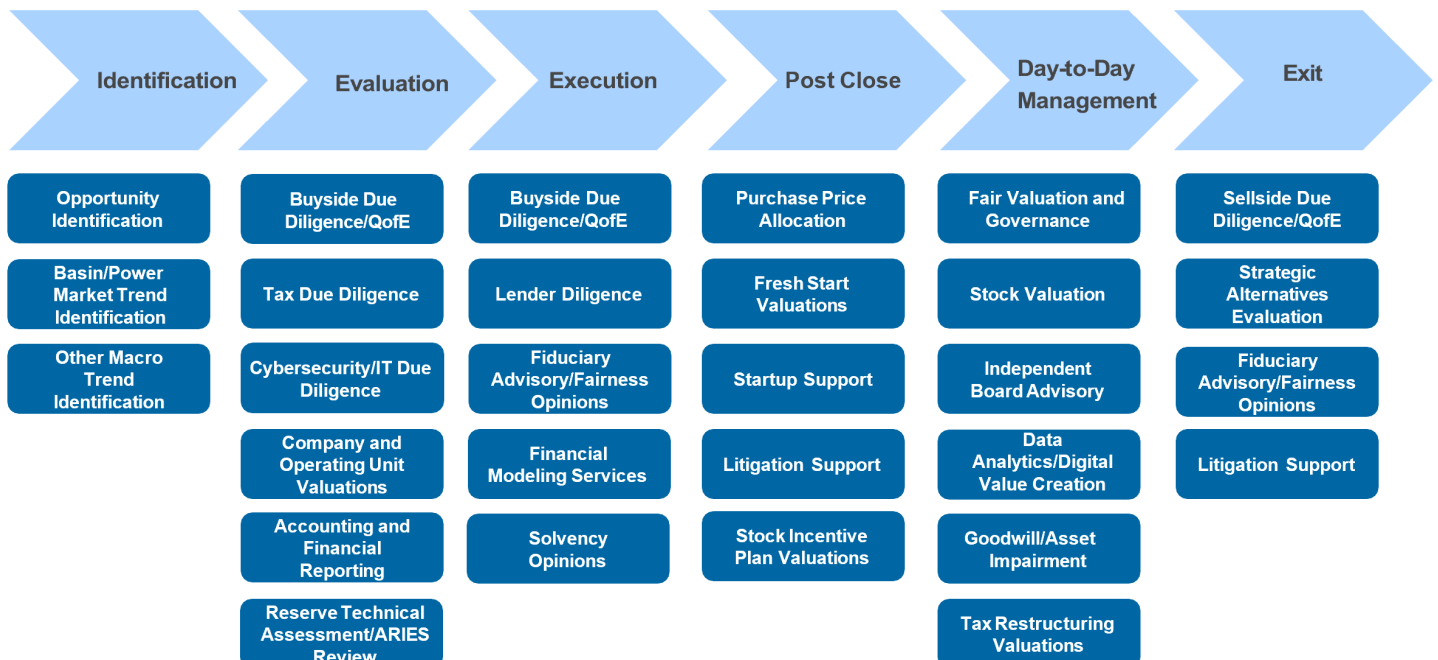
Waste Management, Water, and Sanitation

Related Houlihan Lokey Services

Houlihan Lokey also provides independent financial, tax, and strategic advice throughout the investment lifecycle.

Below is a summary of how we can help at each stage of a fund's investment lifecycle.

Exhibit 9





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To receive further information or to discuss Houlihan Lokey's valuation service offerings, please contact one of our team members listed below.



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