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Private Infrastructure: 2025 Outlook

JANUARY 2025

Key takeaways

- In 2024, infrastructure debt represented a record 24% of overall private placement activity within investment grade (IG) of \$150bn and a record 16% of capital markets activity among broader global issuance of \$566bn (up 42% YoY overall and 100% YoY within capital markets).
- Transaction volumes in 2024 globally were up 16% YoY to \$1.16tn, near the record high set in 2022 of \$1.25tn with North America continuing to be the largest market followed by Europe.
- Infrastructure debt funds represent only 15% of overall infrastructure AUM, which is expected to present unique opportunities for dedicated credit managers given approximately \$400bn of infrastructure equity dry powder remains available into 2025.
- We believe pent-up demand for M&A, massive public infrastructure funding deficits and high levels of dry powder in private equity point towards a record level of activity in 2025 for both private infrastructure equity and debt investors.

We are primarily focused on the following key themes:

1. Surging demand for artificial intelligence (AI) driving growth in data centers and power supply
2. Higher focus in regional energy security affecting upstream and midstream subsectors as well as broader infrastructure supply chains; and
3. Continuance of the energy transition despite policy uncertainty, across renewables as well as more mature energy storage and renewable fuel technologies.

Sector outlook summary

KEY: ↑ Increasing ↔ Neutral ↓ Decreasing ● 100% ◐ 75% ◑ 50% ◒ 25%

	Sector	2024 global volume	2025 expected deal velocity	2025 expected relative value
	Energy	\$241bn		↑
	Power	\$410bn		↔
	Digital	\$238bn		↑
	Transport	\$180bn		↔
	Social	\$88bn		↔

2024 observations and 2025 outlook

- 2024 was a robust year in private infrastructure with \$1.16tn in global activity driven largely by energy and power, but increasingly in digital as well as transport.
- Investment Grade (IG) private placement debt reached record levels at \$150bn in the U.S. alone, of which infrastructure represented a record 24% share.
- Attractive High Yield (HY) opportunities expanded for institutional investors with issuers seeking an increasing amount of debt refinancings and recapitalizations.
- Total global infrastructure debt volumes reached \$566bn with an 85/15 split across bank loans and capital markets investment (up from a 90/10 split in 2023).
- Infrastructure debt maintained a strong premium to public comparables while offering IG spreads of +200-250 bps, +300-350 bps for BB issuances, and +400-650 bps in low BB and single B transactions.
- Infrastructure equity investment continued to see high volumes of approximately \$600bn on global transaction volumes.
- Infrastructure equity deal flow was largest in core and core-plus strategies, while fundraising was most successful in opportunistic strategies – showing investor appetite for different types of risk-return profiles across the asset class.

Private credit and direct lending will expand further in infrastructure

- We believe that the broader growth market trends of private credit is just beginning for infrastructure as an asset class.
- As deal flow increases in 2025 across IG, HY and equity opportunities, we expect clients to have increased capital allocation appetite with growing activity.
- Principal Asset Management has a dedicated Private Infrastructure investment team to capture both these current trends as well as long-term opportunities, successfully deploying \$1.1bn in 2024.

Private infrastructure deal flow to pick up in 2025

- We expect M&A volumes to increase due to pent-up demand and increased monetization of assets despite an uncertain rate environment.
- Dry powder remains steady going into 2025 at around \$400bn, showing that the market remains poised for higher deal flow.
- Government deficits continue to widen the “infrastructure gap” globally.
- Megatrends across AI, digitalization, energy security, electrification and energy transition present an interesting mix of opportunities in an increasingly complex deal environment.

Principal Private Infrastructure Key Contacts

MANSI PATEL

Senior Managing Director & Group Head
patel.mansi@principal.com

JEFFREY MATHEWS

Managing Director & Head of Origination
mathews.jeffrey@principal.com

ANDERS AMUNDSON

Investment Director
amundson.anders@principal.com

NICK BEAUREGARD

Investment Director
beauregard.nick@principal.com

Infrastructure megatrends to follow

#1 Surging demand for AI driving growth in data centers and power supply

Data center transaction volume surged in 2024 to over \$140bn globally, up 126% from 2023.

- Average deal size increased to \$821mm (up 89% from 2023).
- Big Tech corporates, including Microsoft, Meta, Amazon and Alphabet, collectively increased their capex on AI to \$282bn overall, an increase of 62% compared to 2023.
- The International Data Corporation (IDC) projects \$337bn of total spending in AI-related capex in 2025 and over \$1tn by 2030.

With average deal size expected to get larger, we anticipate an increasing gap between large-cap and middle market data center deal flow.

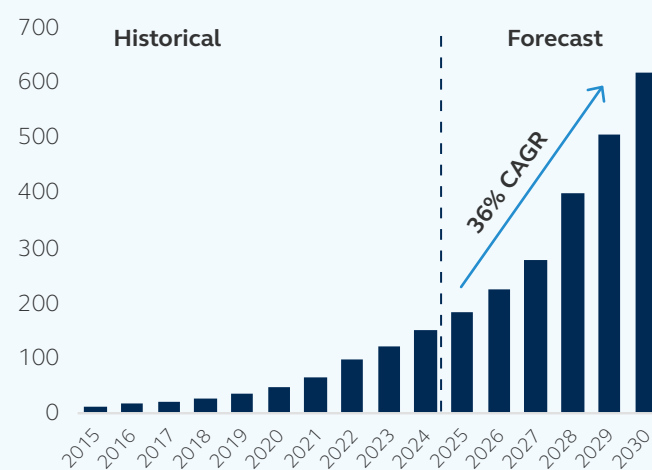
- The middle market deal flow will present increasingly bespoke club-style investment opportunities while the large-cap market will require collaboration across all capital markets.

Data centers have become one of the largest consumers of electricity by sector (competing with other macro themes including electrification and energy transition).

- In 2023, U.S. data centers consumed approximately 147 terawatt-hours (TWh) of electricity, accounting for about 3% of domestic total power usage.
- Projections indicate that by 2030, this consumption could rise ~3x, representing nearly 12% of the total U.S. electricity demand.

Data volume (by year)

(Zettabytes)



Source: Statista, November 2024

The U.S. Department of Energy (DOE) estimates that 47 Gigawatts (GW) of generation capacity will need to be added in the U.S. to accommodate AI infrastructure by 2030, requiring \$50 billion in additional investment.

- Power transmission is a key bottleneck to delivering centralized power for AI infrastructure, presenting additional infrastructure investment opportunities for investors.
- Behind-the-meter (BTM) power (i.e., gas-fired) is a shorter-term solution to meet demand, as well as renewable power paired with storage.
- New cooling technologies that improve energy efficiency will also be critical to mitigate some of the increased load from data centers optimized for AI-specific workloads.
- Small nuclear reactors (SMRs) are a “holy grail” technology that would potentially be a permanent BTM solution, but the commercialization of this technology is likely 5-10 years away.
- Long-term solutions will likely involve enhancing overall generation mix and the expansion of transmission networks for more reliable, centralized power supply.

Financing and private investment will be key to fund this next-generation infrastructure.

- Infrastructure private equity and strategic joint-ventures will play a large role in new development.
- Developers of all sizes will require off-balance sheet financing vehicles and project finance debt solutions provided by private credit investors.

The role for private markets (equity and credit) is massive, and will be paired with capital investment from public markets into Utilities and Big Tech.

#2 Focus on regional energy security, including the onshoring of infrastructure supply chains

Global policy shifts, including expected Trump Administration policies and pressure from geopolitical conflicts, highlight the need for regional energy security.

Over the last two years, total volume of investment into midstream infrastructure (including liquefied natural gas (LNG), pipelines and storage), have decreased 19% and 17%, respectively – we anticipate this trend to reverse.

One key area between U.S. and Europe mutual energy security is the export-import of LNG and storage infrastructure.

- In 2024, YoY LNG transaction volumes fell 58% to \$21bn, but deal flow increased 40%.
- Deal volume in storage facilities surged 403% to \$19.1bn across 49 transactions (up 133% by deal count), returning to levels similar to previous years.

Average midstream investment over the last 5 years has been \$130bn globally vs. 2024 volumes of \$99bn – we expect 2025 to be close to the \$130bn annual trend and will require financing from long-term private capital.

In the U.S., LNG exports continue to increase with 88.3 bcm reported for YE2023, and the current policy includes increasing the Strategic Petroleum Reserve (SPR) by 400 million barrels.

- Expected Trump policies include the increase of oil & gas production in Alaska, the withdrawal from the Paris Climate Agreement, easing permitting for new gas-fired power plants and eliminating EV subsidies (among other pro-energy proposals to track).

In Europe, the EU cut Russian gas imports from 40% to less than 10% between 2021 and 2023.

- Further, a massive investment in renewables (including hydrogen) to transition away from gas-fired heat and power is underway – including €300bn from the REPowerEU plan – and we expect this trend to accelerate.

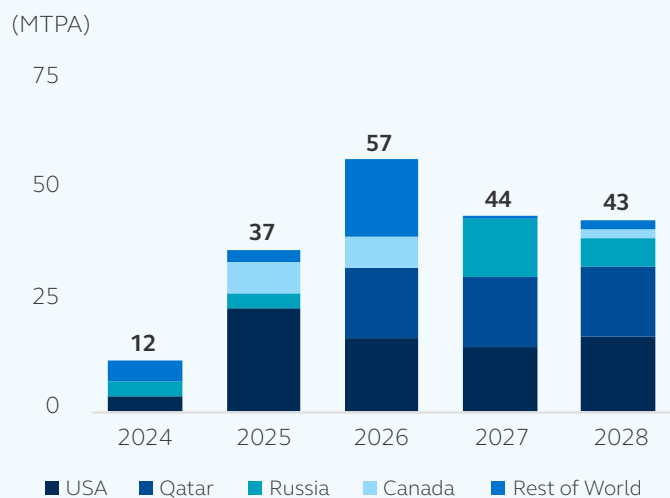
In energy, we expect an uptick in upstream and midstream oil and gas particularly across the U.S. and Europe, but also the onshoring of other infrastructure supply chains.

- Major projects are already underway in the U.S. and Europe including lithium mining and refining, battery and electrical vehicle (EV), and solar panel manufacturing – which have traditionally been dominated abroad.
- Trump's proposed tariff policies should accelerate domestic investment in these supply chains within the U.S. as well as Europe and Asia.

We expect (i) decreasing midstream investment trends to reverse; (ii) consolidation and overall M&A activity in the energy sector to continue and; (iii) the onshoring of supply chains to accelerate.

- Each of these trends individually but also in the combination points to a dynamic environment for private capital opportunities across infrastructure debt and equity.

Global LNG supply additions 2024-2028 (MTPA)



Source: Institute for Energy Economics and Financial Analysis, April 2024.
MTPA - Million tonnes per annum

#3 The energy transition continues despite potential policy headwinds

While policy around broader energy transition is uncertain – particularly in the U.S. – momentum for energy transition is strong and will continue to grow driven by demand.

Key areas of the energy transition – from renewables to electrification – are mature sectors with strong business cases for growth, and other earlier-stage sectors are set to pivot from pilot scale projects to large, commercial scale projects.

- The energy transition has reached a tipping point economically and politically by providing critical job creation, diversification of energy security and competitive prices driven by economies of scale.

The energy wedge in renewables continues to increase when looking over the last 10 years:

- The overall energy mix in the U.S. has seen renewables increase by 2%, natural gas increase by 5% and coal decrease by 6%.
- European energy mix has seen an increase in renewable power by 5% with natural gas flat and coal down 3%.
- Investment in renewables has grown annually to peak in 2024 at \$96bn in the U.S. and \$75bn in Europe.
- Global investment in renewables has been steady over the last 5 years at approximately \$250bn per annum across approximately 1,600 transactions per annum.

Importantly, levelized cost of energy (LCOE) analysis has consistently shown that renewables can be a competitive source for power on a \$/kW basis compared with conventional sources.

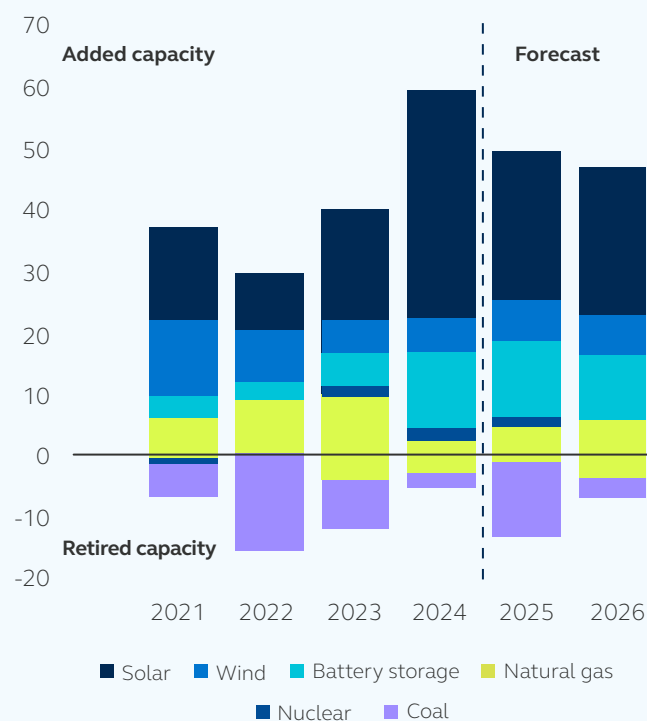
Critically, battery storage has become increasingly viable for solving intermittency issues of renewable power as a baseload source.

- Energy storage investment compound annual growth rate (CAGR) over the last 5 years is 53%, reaching a record \$21.6bn in 2024.
- The development of battery storage and the maturing of long-duration energy storage (LDES) will enable wind and solar to move further into core baseload power supply over time.

Further, distributed generation across commercial and industrial (C&I) and residential platforms as well as other areas such as microgrids continually increase the application and use cases for renewables.

Annual change in U.S. electric power sector capacity by source

(Gigawatts)



Source: U.S. Energy Information Administration, January 2025.

Renewables have been the largest sub-sector in infrastructure for the last 5 years, and we believe this general trend will continue.

- The opportunity for investors to invest in renewables is large and will continue to expand in traditional and growth areas.
- Additionally, opportunities in energy storage and distributed energy resources (DER) will be increasingly available and attractive for debt and equity investors alike.

Sector outlooks



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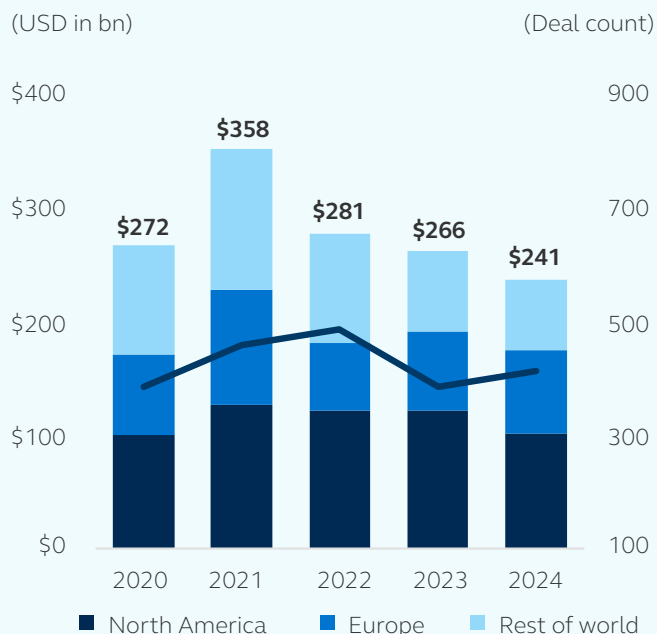


Energy

Sector overview

- Energy is a broad asset class comprising mainly oil & gas infrastructure across upstream, midstream and downstream subsectors. Midstream includes core assets such as LNG, pipelines, and storage assets. Growth areas include carbon capture and sequestration (CCS), renewable fuels, hydrogen and lithium.
- In 2024, energy deal flow reached \$239bn globally across 399 transactions.
- Energy security concerns, exacerbated by geopolitical tensions, have prompted countries to diversify their supply chains and prioritize domestic production.
- Natural gas, viewed as a transitional fuel, remains crucial in many regions.
- The energy sector remains at the center of the global transition toward cleaner and more sustainable economic systems.

Deal volume trends



Source: Infralogic, 31 December 2024

Sector outlook

- We expect the energy sector to have an uptick in deal flow in 2025 as well as provide strong high relative value.
- We expect the declining rate of midstream investment volumes to reverse and approach the \$130bn long term average.
- Regional energy security is expected to be a driving force of growth in the energy sector for 2025 and beyond.
- Countries are likely to strengthen energy security by bolstering regional supply chains and growing upstream and midstream infrastructure in particular.

What we're watching

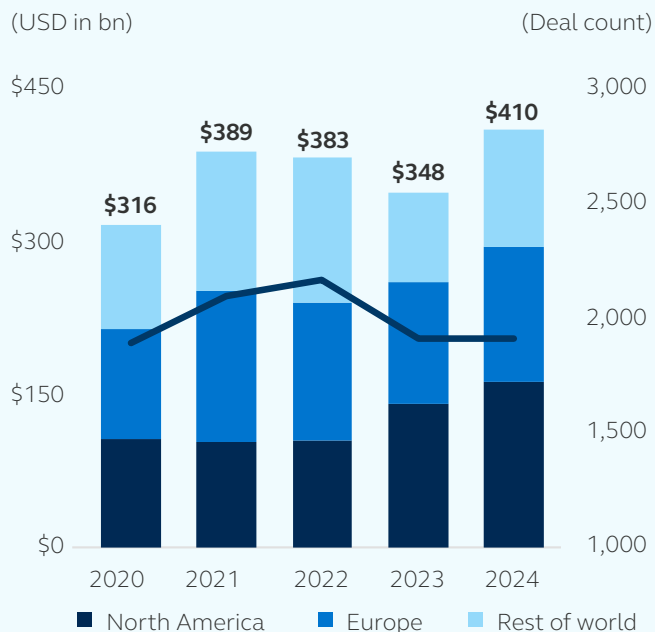
- Increased merger and strategic joint venture activity between oil majors and private equity (or private credit funds)
- Higher asset M&A as large corporates realign core priorities
- Rising global demand for liquefied natural gas driving investment in export terminals and regasification facilities
- Higher production volumes of oil & gas within the U.S. under new Trump Administration policy
- Production policies of Organization of the Petroleum Exporting Countries Plus (OPEC+) affecting global oil prices and supply stability
- Slower but continued progress in newer clean fuels technologies such as renewable natural gas (RNG), hydrogen and sustainable aviation fuel (SAF)



Sector overview

- Power includes thermal and renewable generation, transmission and distribution of electricity. For Principal, thermal power generally includes gas-fired or combined cycle gas turbines (CCGTs) as well as district heating and behind-the-meter assets. Renewable power mainly includes wind, solar, battery storage, hydro and geothermal. Distributed generation and microgrids are a key growth area for core power opportunities.
- In 2024, energy deal flow reached \$405bn globally across over 1,900 transactions.
- Gas-fired capacity remains a primary power source due to its flexibility and reliability, important for both energy security and trends such as AI and digitalization; however, renewables continue to be the fastest growing subsector.
- Traditional centralized power plants (thermal and renewable) are complemented by distributed energy resources such as commercial & industrial (C&I), community and rooftop solar, battery storage, and microgrids.

Deal volume trends



Source: Infralogic, 31 December 2024

Sector outlook

- We expect the power sector to have an uptick in deal flow in 2025 as remain consistent in strong relative value compared to recent years.
- Renewables will continue to dominate new capacity additions along with CCGTs.
- AI, digitalization and electrification trends in transportation and heating will add to demand pressures, potentially outpacing infrastructure readiness.
- Balancing intermittent sources like wind and solar will necessitate investments in energy storage systems, which peaked in 2024 at \$21.6bn.

What we're watching

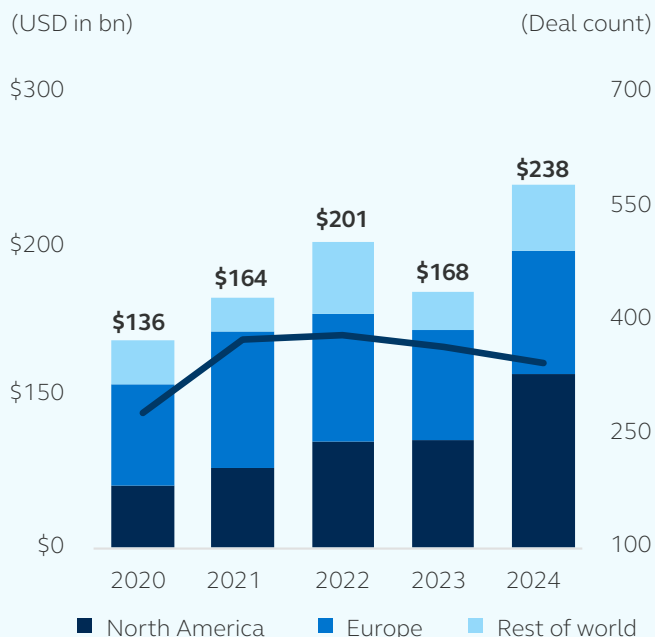
- Resurgence in new-build for gas-fired generation including centralized and behind-the-meter (BTM) facilities
- Higher investment in transmission, including smart grids enhancing grid resilience, and extreme weather preparedness
- Corporate power purchase agreements to continue as a driving force as offtakers for renewable power
- Significant investment in distributed energy resources (DER) including distributed generation, community solar and microgrids
- Significant new installation of battery storage, and the development of LDES technologies
- Faster permitting for transmission projects and grid upgrades under a looser regulatory policy backdrop



Sector overview

- Digital infrastructure continues to expand as a subsector, but generally includes core areas of data centers, fiber optic and cell tower assets. Growth areas include wireless and distributed antenna systems (DAS), as well as various internet of things (IoT) applications. Digital infrastructure intersects with nearly all other infrastructure asset classes due to the digitalization megatrend.
- In 2024, energy deal flow reached \$238bn globally across 343 transactions.
- Digital infrastructure is experiencing exponential growth in 2025, propelled by surging demand for connectivity, cloud computing, and data analytics.
- Operators are increasingly adopting energy-efficient technologies and renewable energy to power their facilities, while surging data center demand requires short-term solutions and gas-fired BTM power supply.

Deal volume trends



Sector outlook

- We expect the digital infrastructure sector to have a massive increase in deal flow in 2025 and beyond given AI trends, as well as provide increasingly attractive relative value.
- Given the increasing average deal size in the space, we expect a bifurcation between middle market and large-cap segments of the market, with the former more accessible to most club-style institutional investors.
- In 2025, digital infrastructure is expected to underpin transformative advances across industries, with Big Data and Utilities combining with government, public markets and private capital to solve the most pressing needs of the modern economy (with power supply being the largest obstacle for growth).

What we're watching

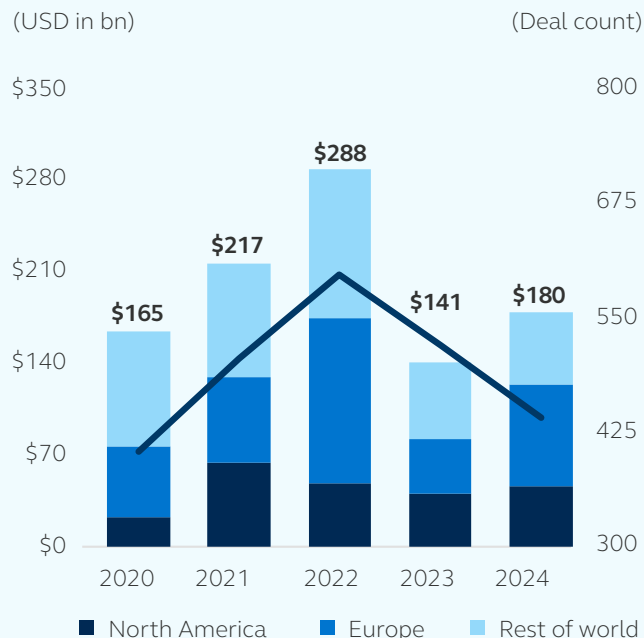
- AI workloads driving massive demand for hyperscale data centers and power supply
- Increased investment in mid-sized enterprise and colocation data centers
- Proliferation of edge computing data centers near urban centers to address latency-sensitive applications, including integration with cloud platforms
- The bifurcation between large-cap and middle market transactions in the data center space
- Green data centers utilizing renewable power, energy storage systems and advanced cooling systems
- Continued investment in fiber networks to support increasing bandwidth demands, particularly in rural and underserved areas

Transport

Sector overview

- Transportation infrastructure is a traditional asset class including surface transportation (roads and rail), marine (seaports and terminals) and air (airports and terminals). Growth areas in transport are in essential service providers, expanding logistics such as cold storage and packaging, as well as EV infrastructure, such as charging networks.
- Transportation infrastructure is essential for both developed and emerging markets and is continually cited as a key problem in the “infrastructure gap” where private capital can help meet demographic needs.
- The integration of multimodal transportation systems is gaining traction to improve connectivity, as well as innovative systems to reduce congestion such as managed lanes.
- In 2024, transportation deal flow reached \$179bn globally across 440 transactions.

Deal volume trends



Source: Infralogic, 31 December 2024

Sector outlook

- We expect the transportation sector to see continued growth in Europe given the continuous need for reinvestment, while U.S. deal activity is expected to remain flat given the accessibility of tax-exempt and municipal bond markets (relative value in the sector should remain steady on a global basis).
- Governments and private stakeholders are expected to increase investments in EV charging networks, green logistics corridors, and smart traffic management systems.
- Funding mechanisms, such as public-private partnerships, will play a critical role in addressing infrastructure deficits and enabling transformative growth in the sector.

What we're watching

- Accelerated deployment of public and private EV charging stations, particularly in Europe, driven by government programs and private company network expansions
- Additional congestion relief projects in the U.S., following the implementation of New York's congestion tolling program
- Investment in climate resilience projects from extreme weather events and floods for existing infrastructure
- Additional deal flow in service businesses tied to major transportation infrastructure assets such as airports
- Automation in long-haul trucking and last-mile delivery
- Potential resurgence of public-private partnerships to address funding gaps in roads and public transportation systems



Social

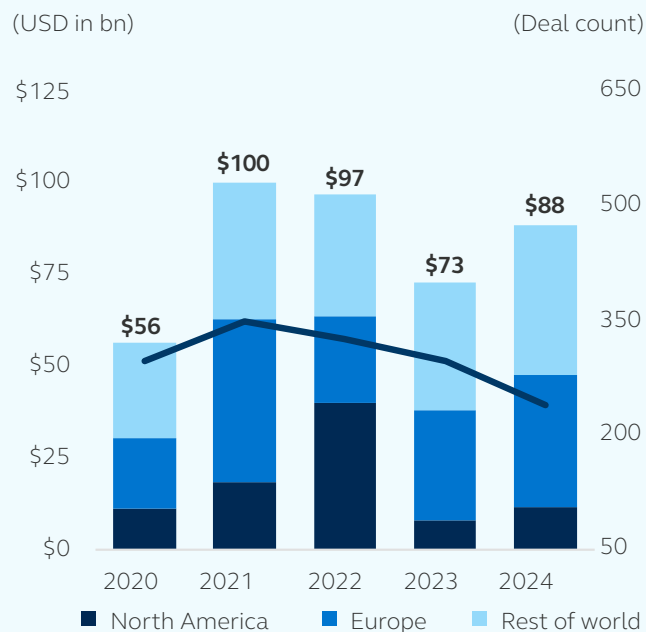
Sector overview

- Social infrastructure is broad and diverse subsector that spans several different types of assets from civic facilities (state education, healthcare and military housing) to stadiums and arenas. Water and wastewater are also often considered social infrastructure.
- Growth areas in social infrastructure depend on the expansion of public-private partnerships.
- Often the biggest driver for social infrastructure deal flow is public-private partnerships or outright privatization (or concession) of civic services.
- In 2024, transportation deal flow reached \$87bn globally across 238 transactions.

Sector outlook

- We expect the social infrastructure sector to continue its typically steady but relatively light deal flow while offering steady relative value to investors.
- Deal flow within social infrastructure has been consistent over recent years and we expect that trend to continue for the foreseeable future.
- Within social infrastructure, we see short-term opportunities in the stadium and arena spaces that present uniquely attractive opportunities.
- Longer-term, we see water and wastewater (and other social-environmental services) to be a major area for private capital investment.

Deal volume trends



Source: Infralogic, 31 December 2024

What we're watching

- Potential for privatization of water utilities across U.S. and Europe (as well as increased investment in water resources)
- Modernization of stadiums and arenas in Europe and U.S. markets
- Aging population driving investment in long-term care facilities and adaptive healthcare designs
- Increase in telemedicine supported by government programs to connect rural broadband and digital health hubs to support private and state health systems
- Climate resiliency projects for hospitals, school, district energy and water infrastructure
- In the U.S., public-private partnerships potentially being a method to increase supply of affordable housing

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