

 VIRTUS Data Centres, EMEA

MACQUARIE ASSET MANAGEMENT

Infrastructure: The asset class AI can't replace

AI is the most disruptive force in markets right now. Yet the technology still relies on physical assets to power, connect and support its growth. While infrastructure's physical assets are difficult to replicate, AI can make them more efficient – creating both demand and operational opportunities for investors.

If you only have a minute:



Infrastructure's physical assets – power grids, toll roads, water systems – **cannot be replicated or displaced by AI**, making revenue streams more durable than in many other sectors.



AI adoption across infrastructure assets can deliver **operating expenditure savings** through network optimisation, anomaly detection and process automation.



Demand drivers from AI are strongest for data centres, electricity grids and renewables, while car parks may face longer-term risks.

Why infrastructure holds up: HALOID

In a world where AI is disrupting so much, a natural question is: What actually holds up?

Infrastructure stands out because it has physical assets, provides essential services and generates revenues that are often contractually backed or regulated – making them less tied to market sentiment. The **HALOID** framework, an extension of the more familiar HALO framework, captures this:

HA

Heavy Assets

Infrastructure assets are capital intensive, long-lived and location specific. They are difficult to replicate and often regulated, helping protect and stabilise cash flows.

LO

Low Obsolescence

These assets deliver real-world services with limited substitutes. AI can enhance how infrastructure operates, but it cannot replace the need for power networks, water systems or transport links.

ID

Inelastic Demand

Demand tends to hold up regardless of the broader environment. Revenues are often supported by long-term contracts, regulated frameworks or strong market positions – driving more predictable cash flows.



How AI can add value

HALOID explains why AI is unlikely to displace infrastructure. But here's what it can do – improve how assets are run and potentially drive 5–30% operating cost savings¹ through:

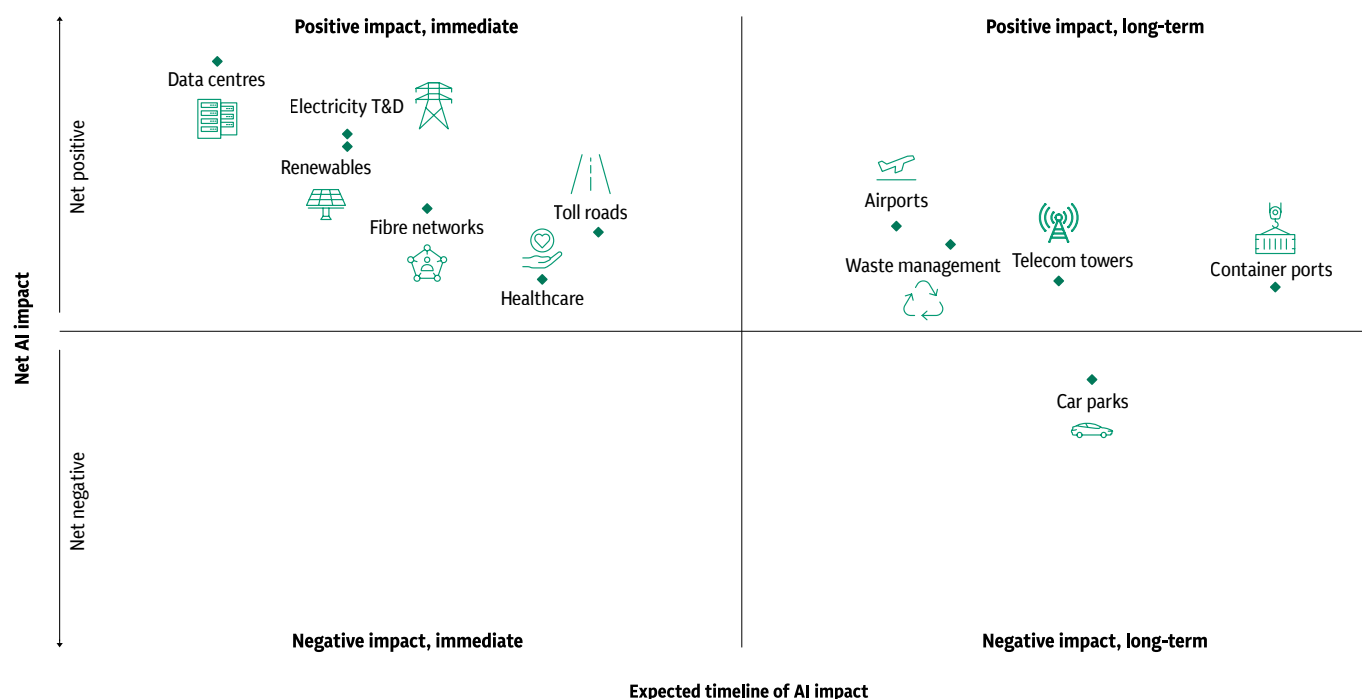
- Predictive maintenance that identifies issues before failure
- Real-time monitoring to reduce outages
- Smarter network and capacity optimisation
- Automation that lowers labour intensity
- Better forecasting and resource allocation

The potential benefits to investors are compelling, with durable contractual income and AI-driven operational efficiencies supporting multiple potential drivers of value creation.

Where AI is creating opportunity, and risks to watch

The impact from AI is not uniform across infrastructure – some sectors are better positioned to benefit over the long term, while others may feel the effects sooner or, not at all (Figure 1).

Expected AI impact by infrastructure sector (Figure 1)



Source: Macquarie Asset Management (May 2026)



Chart takeaway

Most infrastructure sectors stand to benefit from AI. For investors, the question is timing.

1. Macquarie Asset Management (June 2026). Represents a summary across all sectors, calculated based on proprietary research.

1 Digital infrastructure

Sector	AI drivers	Key risks
Digital infrastructure	Strong demand growth across data centres, fibre and towers	Obsolescence risk for AI-oriented data centres; near-term tower build deferral

AI is supporting demand across data centres, fibre networks and telecom towers, as compute-intensive applications require more power, faster data movement and lower-latency connectivity. For data centres, the best locations increasingly come down to reliable power, energy efficiency and connectivity, while fibre networks are needed to move large volumes of data quickly and reliably. Over time, latency-sensitive AI applications may also support denser networks and small cell infrastructure in urban areas.

The key risks are asset specific. AI-focused data centres may become less competitive over time if power and cooling requirements evolve faster than sites can adapt, particularly where there is limited room to scale or weak location advantage. For towers, AI-driven network optimisation may allow mobile operators to get more capacity from existing assets in the near term, potentially delaying the need for new builds.

AI in action

Data Centres	↓	45% unplanned downtime reduction through AI predictive maintenance ²	↓	15-25% operational cost reductions through AI adoption (first year) ³
	↓	32-41% maintenance cost reduction ⁴	↓	76-84% cooling-related downtime reduction ⁴
Fibre networks	↓	30% reduction in total network opex ⁵		
Telecommunication towers	↓	15% reduction in site visits ⁶		

2. DataBank, "AI-Driven Data Centers: Efficiency & Innovation," 2024.

3. Andreja Velimirovic, "AI Impact on Data Centers," phoenixNAP, 2024.

4. Digital Realty, "The Impact of AI on Data Centers".

5. McKinsey & Company, Issue Brief: AI-driven telecom networks (February 2026).

6. Ericsson, "Can AI bring down network energy costs?" (February 2020).

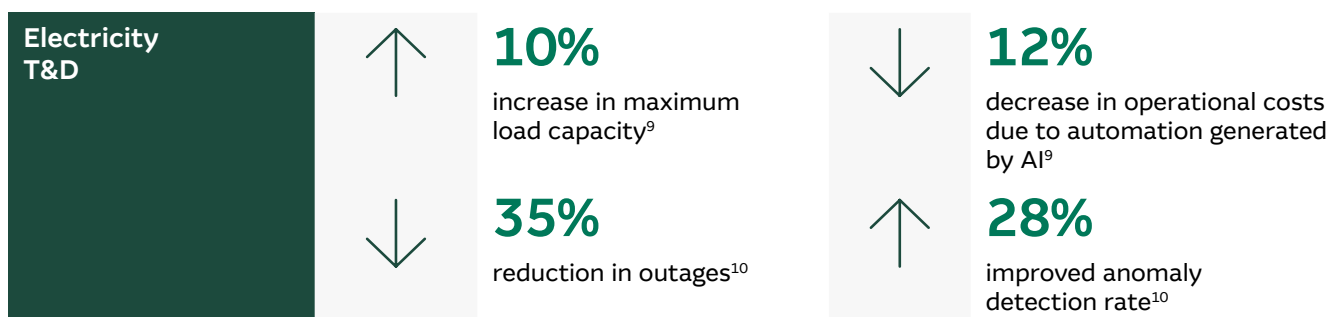
2 Electricity transmission and distribution

Sector	AI drivers	Key risks
Utilities	Electrification and data centre load driving a capex super-cycle; operational efficiency gains	Interconnection and permitting timelines; congestion and affordability pressure

The increasing demand for power is supporting a new cycle of grid investment. The US spent \$US115 billion on transmission and distribution in 2025 – nearly a quarter of the global total – and is expected to spend another \$US1.0 trillion between 2026 and 2035. Europe is projected to require about \$US1.2 trillion over the same period.⁷

The main constraint is execution. The time to connect new projects to the US grid has increased from under two years in 2008 to around four to five years on average in 2025.⁸

AI in action



What if there's an overbuild or forecasted demand doesn't materialise?

Many investors worry this could be a bubble – but the data may tell a different story. Demand for AI-related infrastructure is running ahead of available supply. Vacancy rates in key North American markets reached a record low of 1% at the end of 2025, and 92% of capacity under construction is already spoken for.¹¹ Europe's major markets are seeing a similar pattern.

This also looks different from the dot-com era. Today's hyperscale companies are largely funding growth from their own cash flow, with relatively low debt – about 0.9x debt to EBITDA across the five largest players.¹² That said, more complex financing structures that sit off the balance sheet are an area worth monitoring.

7. BloombergNEF, "New Energy Outlook 2025: Grids" (August 2025).

8. Berkeley Lab, Energy Markets & Planning, "Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection" (2025).

9. Journal of Embedded Systems Security and Intelligent Systems, "Applying Artificial Intelligence Algorithms for Optimizing The Electricity Distribution Network" (November 2024).

10. American Journal of Advanced Technology and Engineering Solutions, "AI-driven fault detection and predictive maintenance in electrical power systems" (January 2025).

11. S&P Global Ratings (March 2026), annual data as of 31 December 2025 (Microsoft and Oracle LTM 31 December 2025 and 28 February 2026).

12. JLL, North America Data Center Report Year-end 2025 (February 2026).

3 Renewables

Sector	AI drivers	Key risks
Renewables	Data centre buildout supports power purchase agreement (PPA) volumes and pricing; AI improves forecasting and maintenance	Grid access: interconnection queues and permitting delays

AI-driven data centre growth is adding to an already durable source of electricity demand. US data centre power demand is expected to more than double over the next 10 years, although it will still account for less than 10% of global electricity demand growth.¹³ Broader demand from industries, electric vehicles, appliances and space cooling is expected to be even larger, supporting long-term contracts and clearer cash flow visibility for renewable energy platforms. Higher and more volatile power prices are also increasing demand for on-site generation and storage, but grid access remains the main constraint, with interconnection queues and permitting delays slowing deployment globally.

AI in action

Renewables



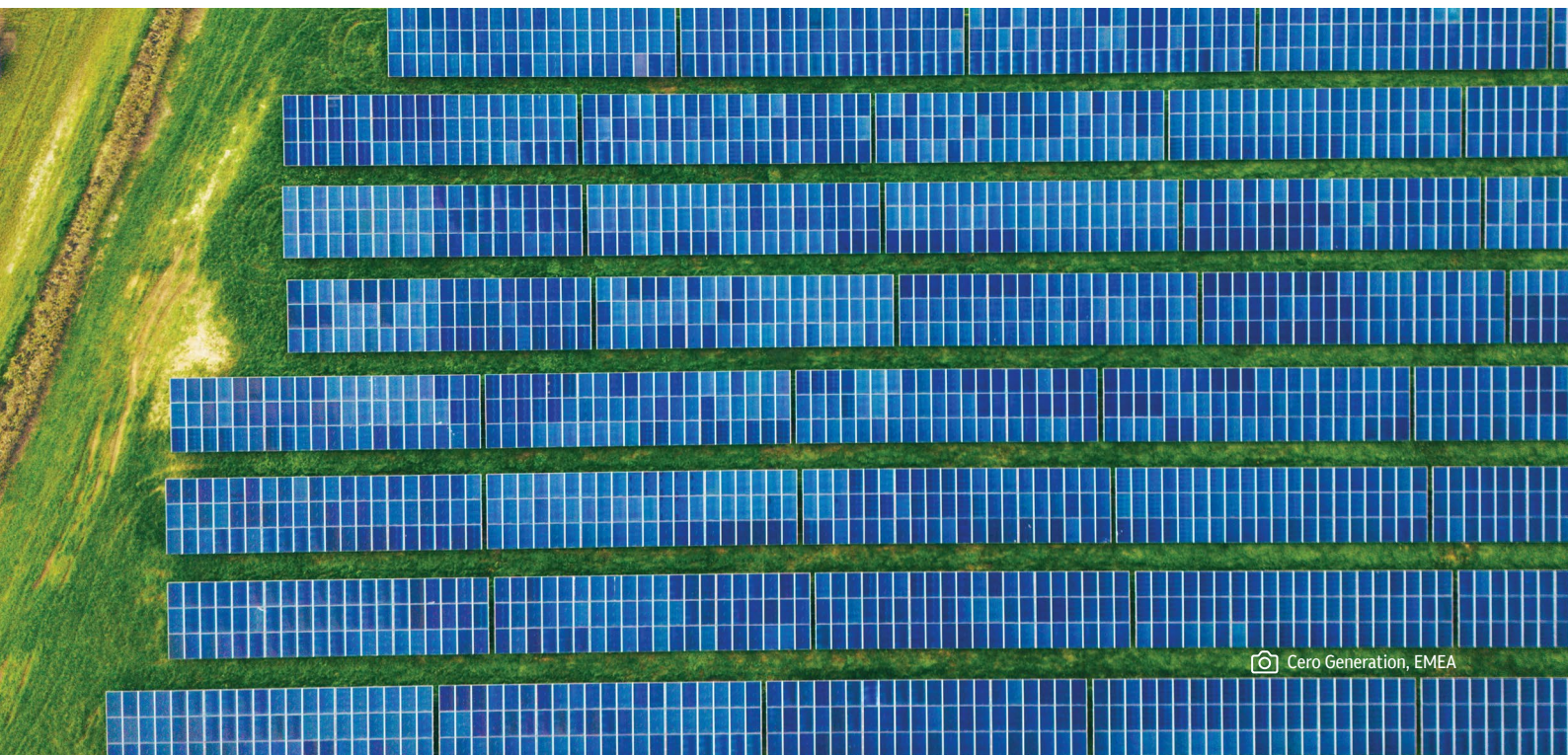
10-20%

reduction in operational costs¹⁴



15-30%

forecasting accuracy in predicting solar irradiance and wind speed fluctuations¹⁴



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13. IEA, "Energy & AI" report (April 2025).

14. Artificial Intelligence in Renewable Energy Optimization, Mayowa Emmanuel, Emmanuel Ok, Yusuf Adebayo (November 2025).

4 Transport

Sector	AI drivers	Key risks
Transport	GDP linkage benefits airports and toll roads if AI drives productivity growth, improve utilisation and throughput for container ports	AI-enabled remote work may reduce commuter frequency; reshoring risk for container ports

AI's impact on transport is likely to be more indirect than in digital infrastructure or utilities, but the productivity link still matters. Airports and toll roads are both exposed to GDP growth and mobility, so stronger AI-driven productivity could support long-term demand. Container ports may also benefit from AI-enabled automation, which can improve throughput and lower cost per shipment.

The key risks vary by asset type. For airports, business travel remains the main uncertainty, although stronger employment and more discretionary leisure time could help offset any moderation in corporate travel. For toll roads, AI-enabled remote work may reduce commuter frequency, even if autonomous vehicles expand the user base over time. For ports, reshoring is the main longer-term risk, but AI and robotics would need to make domestic production cost competitive with offshore manufacturing before import volumes are meaningfully affected.

AI in action

Airports	↑	<20% energy savings annually ¹⁵	↓	<40% reduction of system downtime ¹⁵
Toll roads	↑	40% increase in throughput ¹⁶	↓	28% reduction in queue length ¹⁶
Container ports	↑	15-20% increase in operational productivity (increased in TEU/hour) ¹⁷	↓	<30% reduction of failures and downtime ¹⁷

15. International Journal of Research Publication and Reviews, Khushi and Mrs Mahima Tanwar, "Role of Automation & AI in Improving Airport Operations," ISSN 2582-7421 (June 2025).

16. MDPI, Satendra Chandra Pandey and Vasanthi Kumari, "Adaptive AI-Driven Toll Management" (November 2024).

17. The American Journal of Applied Sciences, "The Role of Artificial Intelligence in Optimizing Operational Processes and Managing Port Logistics" (December 2025).

5 Diversified

Sector	AI drivers	Key risks
Diversified	Strong operational upside in healthcare and waste management	Location-specific demand risk in car parks; waste-to-energy volume risk longer term

Healthcare: AI improves diagnosis accuracy and referral rates across imaging, surgery, oncology and cardiology - supporting higher volumes. AI-enabled screening and clinical decision support can also expand the treated population for under-diagnosed conditions, broadening the revenue base.

Waste management: AI is likely to be a net positive for waste management, although the impact will vary across the value chain. The biggest opportunity is in recycling facilities, where AI-powered sorting systems can identify materials by type, colour and composition more accurately than manual sorting. This can lower the cost per ton processed and improve the quality of recycled materials. Collection has already benefited from route optimisation and process efficiencies, while disposal may face pressure over time if better sorting and higher recycling rates reduce the volume of waste sent to landfill or waste-to-energy facilities.

Car parks: Core demand is intact, but long-term disruption risk is real and location specific. AI-enabled mobility, including ride-hailing optimisation and autonomous vehicles, may reduce the time vehicles spend parked, although it is unlikely to eliminate parking demand entirely. The impact will depend heavily on location and user base.

AI in action

Healthcare	↓	30% time spent on documentation ¹⁸	↑	25% increase in resource utilisation ¹⁹
Waste management	↓	13.4% reduction in costs through AI-driven systems in waste collection ²⁰	🎯	99.15% high accuracy rates utilising computer vision in waste sorting ²⁰
Car parks	↑	65% increase in space utilisation ²¹		

18. Y. Park, "AI and predictive analytics in hospitals," Journal of Medical AI, vol. 25, pp. 89 to 102, 2022.

19. T. White, "AI for resource allocation in radiology," Journal of Diagnostic Imaging, vol. 9, pp. 77 to 92, 2021.

20. Fang B, Yu J, Chen Z, Osman AI, Farghali M, Ihara I, Hamza EH, Rooney DW, Yap PS, "Artificial intelligence for waste management in smart cities: a review," Environ Chem Lett (May 2023).

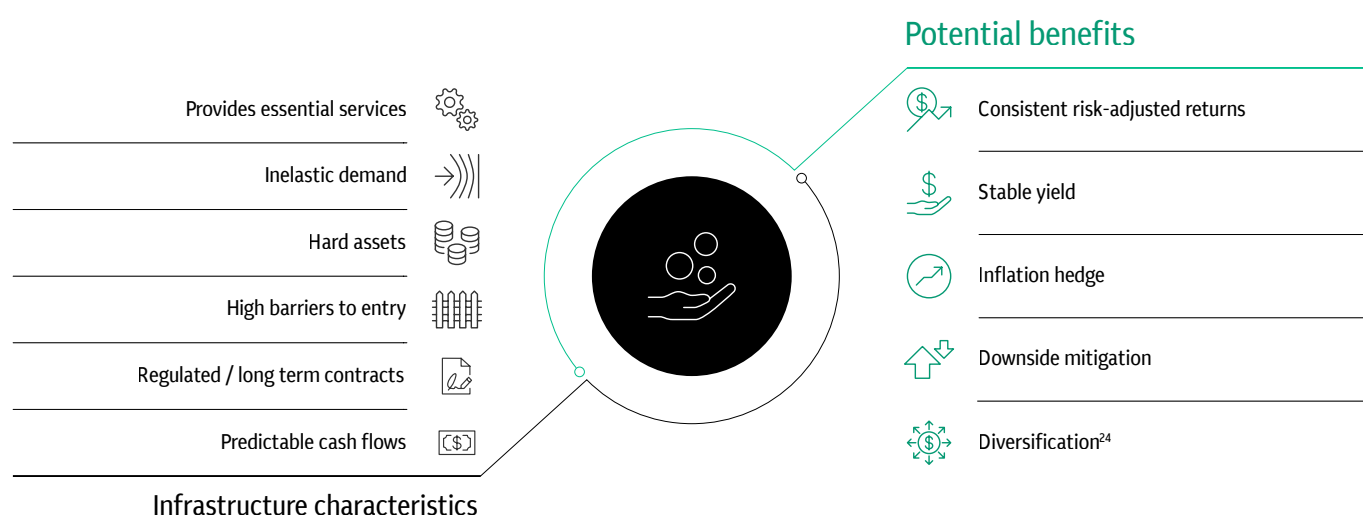
21. Sensors and Materials, Vol. 37, No. 9 (2025), "Implementation of an AIoT-based Smart Parking System for Urban Mobility and Sustainable Infrastructure Management" (September 2025).

The bottom line: The infrastructure investment case extends beyond AI

Data centres attract headlines, but the infrastructure opportunity runs much deeper. Decarbonisation, deglobalisation and demographics – alongside digitalisation – are together driving a \$US151 trillion global investment need through 2050.²²

These aren't short-term cycles. They reflect lasting changes in how economies are built, how people live and how essential services are delivered. For individual investors, these characteristics may offer potential portfolio benefits, including stable yield, consistent risk-adjusted returns and downside mitigation (Figure 2).

Infrastructure's characteristics offer potential portfolio benefits²³ (Figure 2)



22. PwC, Global Infrastructure Outlook 2025 to 50, as of 28 April 2026.

23. Capital is at risk. The value of investments may fall as well as rise and you may not get back the amount originally invested.

24. Diversification does not ensure a profit or protect against a loss. Past performance does not indicate future returns.

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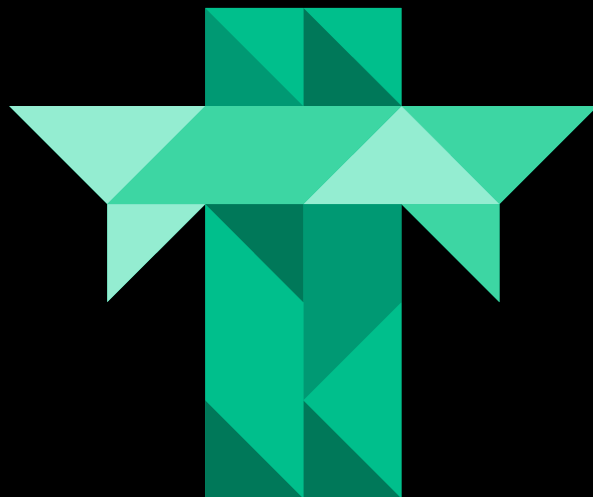
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