

ARTIFICIAL INTELLIGENCE AND REAL ESTATE SERIES | PART I

Front runners: The property types more likely to benefit from rising AI adoption



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In the first installment of our artificial intelligence (AI) and real estate series, we introduce a framework to analyze the impact of the rising adoption of AI technologies on the commercial real estate environment. We will focus in greater detail on those sectors we believe will likely benefit the most from AI adoption in the near- to intermediate-term, including data centers, life sciences, logistics, and retail warehousing. We will discuss the remaining property sectors—those with smaller immediate gains and sectors at risk—in parts II and III of this series.

A framework for assessing AI's impact on real estate

Ambitious pioneers laid the first rudimentary neural network algorithms aiming to simulate human intelligence as far back as the 1950s. Since then, this branch of computer science, commonly referred to as AI, has evolved dramatically, sparking the imagination of entrepreneurs and investors.

Today, new AI-enabled products and services have risen to popular fame and made their way into people's lives. Digital assistants such as ChatGPT and Copilot are helping employees find and analyze information. Content-creation apps like Instagram and Stable Diffusion enable influencers and artists to edit pictures or create videos from a single text string. Meanwhile, car manufacturers and engineering companies are testing autonomous vehicles and smart robotics for commercial use.

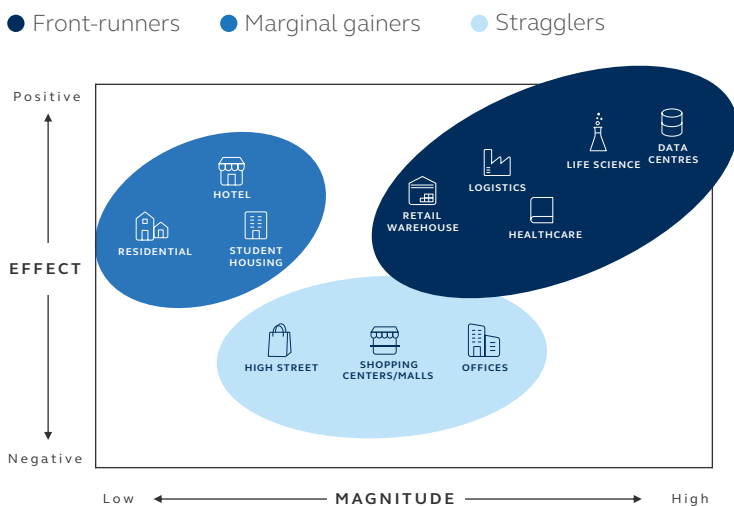
And yet, the AI revolution and its implementation remain in its infancy. Being a general-purpose technology—it can be applied to virtually any sector due to its versatility, adaptability, and transformative potential—AI is likely to disrupt several fields, with far-reaching implications for society, businesses, and the economy.



Although the exact impact and ripple effects are difficult to predict with a high degree of certainty, of something we can be sure—the real estate industry will not be immune. From smart buildings to warehouse robotics, AI has the potential to shift occupational demand and reshape the way properties are developed, operated, and valued. The implications are profound and wide-ranging, with different real estate sectors poised to experience varying degrees of change. Indeed, as much as the rise of e-commerce and hybrid working technologies have altered the structural drivers underpinning the demand-supply fundamentals of logistics, retail, and office buildings, the AI revolution will have its winners and losers. But what properties will be the primary beneficiaries of this new wave of innovations? And what are those exposed to the most significant downside risks?

This paper presents a framework to address these questions. The framework divides the impact of AI on the real estate environment across two variables: magnitude and effect. The magnitude dimension indicates whether the impact on a particular property type will be high, medium, or low over the medium term (five years). The effect dimension refers to the direction of the impact—positive, neutral, or negative. Our analysis has identified three groups of properties: front runners, marginal gainers, and stragglers.

EXHIBIT 1: Is AI a real estate friend or foe? The answer is sector-dependent
AI impact by property sector over the medium term (2025-2030)



| Real estate potential impact (magnitude and effect) | | |
|---|------------|---|
| Category | Definition | |
| MAGNITUDE | High | AI to drive a significant and radical transformation of business models, operational requirements and occupiers' demand. |
| | Medium | AI to change the way companies operate, but the change will be incremental rather than radical. |
| | Low | AI to produce a limited impact, mainly enhancing the operational efficiencies of supporting functions. |
| EFFECT | Positive | AI to fuel occupiers' demand, capital flow and property performance. |
| | Neutral | AI to have a neutral impact as (a) it will not affect the sector significantly or (b) positive and negative effects will largely offset each other. |
| | Negative | AI to have a detrimental impact on the companies in the sector by weakening fundamental trends or creating structural headwinds. |

Source: Principal Real Estate, December 2024

The former group includes data centers, life science, healthcare, logistics, and retail warehousing. Although in different degrees, these real estate sectors will likely enjoy a large and positive impact, as the adoption of AI is likely to boost occupier demand or enhance tenants' business models.

The second group, the marginal gainers, includes the property types comprising the “living sector,” namely hotels, student housing, and residential (multifamily, single-family rentals, manufactured housing, student housing, and senior living). The companies operating in this space will potentially still benefit from a positive impact from AI. However, we believe this will be smaller in magnitude, primarily inducing efficiency gains without creating new business models or shifting demand-supply fundamentals.

The third and final group, the stragglers, may not be as lucky. We fear the widespread adoption of AI technologies may generate headwinds for shopping malls, high-street retail, and offices. The section that follows will examine the front runners in more detail.



Data centers

The data center sector is undoubtedly the first real estate asset that comes to mind in relation to AI. This property type comprises the core infrastructure enabling the storage, processing, and use of all the digital data essential to AI algorithms. The demand for this asset class accelerated significantly in the last few years, driven by streaming services and the migration of enterprise servers to the cloud. This segment will likely grow by 20% annually.⁽¹⁾ Additionally, the recent boom in AI has generated one more layer of demand, which is expected to grow even faster. All large tech companies, commonly referred to as hyperscalers, are investing heavily in the field, spending billions of dollars to expand their digital infrastructure worldwide.

For instance, the four most prominent technology groups—Microsoft, Meta, Amazon, and Google's parent, Alphabet—are on track to surpass \$200bn in AI-related capital spending in 2024, equivalent to a 62% increase over the year prior. Data centers account for about 80% of that total.⁽²⁾ Equally, global investment powerhouses are also betting on the future of the sector, pouring billions into the construction of new data centers.

The capital flow is so significant that McKinsey Global Institute forecasts AI workloads will account for around 70% of data centers' capacity by 2030, equivalent to an increase of 30% annually between 2023 and 2030. We believe this wave of AI investments will elevate the relevance of data centers as a real estate asset class and shift its geographical footprint.

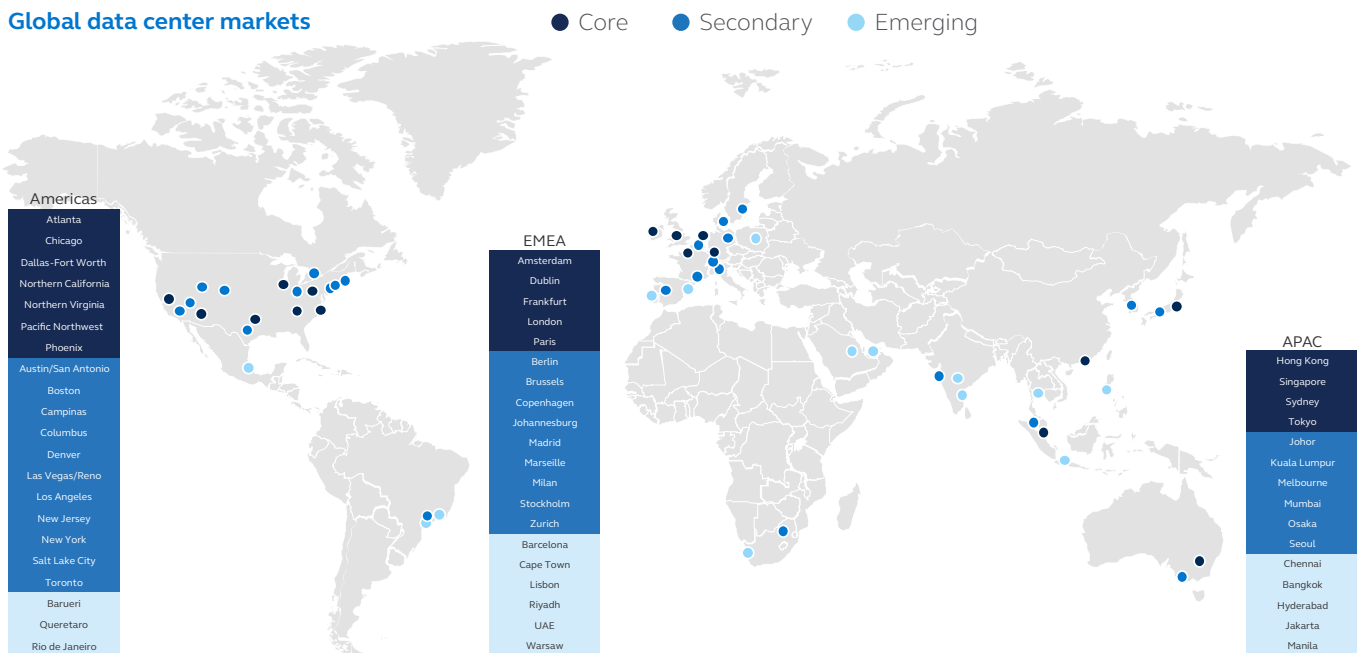
Historically, the development of new facilities was dictated by connectivity and latency. Consequently, data centers are clustered in the major peering points of the internet cable networks, which usually coincide with major financial hubs. The core data center markets of Northern California and Chicago in the U.S.; London, Frankfurt, and Paris in Europe; and Hong Kong and Singapore in Asia are clear examples of this connectivity effect. But these markets cannot accommodate the surge in demand AI created. The local power grids are at capacity. Thus, new data centers—especially those dedicated to AI model training for which low latency and proximity to end customers are less essential requirements—are sprawling across secondary and emerging markets with access to cheap renewable energy and abundant land availability. For a more detailed analysis, please refer to our [AI is transforming the data center](#) paper.

⁽¹⁾ Structure Research, an independent research and consulting firm

⁽²⁾ Financial Times - “Wall Street frets over Big Tech's \$200bn AI spending splurge” - 1 November 2024

EXHIBIT 2: AI fuels a new wave of data center development in established and new geographies

Global data center markets



Source: JLL, Structure Research, DC Byte Principal Real Estate, 2024

Life sciences and healthcare

Life sciences (and healthcare) is another real estate sector poised to benefit from the advancements in AI. The industry comprises companies that apply biological and technological sciences to develop and produce a broad range of applications that solve several challenges society faces, including but not limited to medical diagnostics, medical devices, genome-mapping, and biotech-based products (food, garments, packaging, cosmetics, and medicines). Unlike the case of data centers, AI will not directly fuel the demand for life sciences assets, as these don't play an integral part in the supply chain enabling the flow, storage, and processing of large datasets.

However, advancements in AI, computing, and automation are pivotal in accelerating the growth of the biotech industry.

Traditionally, drug and molecule discoveries involved a long, expensive, labor-intensive, and unpredictable process, often taking 10 or more years and billions of dollars to bring a single solution to market. The implementation of deep learning and generative AI algorithms in conjunction with growing computational power can help streamline and improve these processes exponentially.

Global management consulting firms predict that AI could reduce biotech R&D time and cost by 25-50% or increase the R&D throughput by tenfold. For instance, a Hong Kong-based company recently discovered a new compound for fibrosis in under 18 months using AI—a process that traditionally takes four to five years. The treatment is undergoing clinical trial at the time of the writing of this report.

Similarly, DeepMind's AlphaFold revolutionised protein structure prediction with an algorithm that successfully captures nearly the entire universe of 200 million proteins. Not surprisingly, Nvidia, the world's leading AI chipmaker, announced multiple partnerships with healthcare companies this year, ranging from imaging, medtech, drug discovery, and digital health.



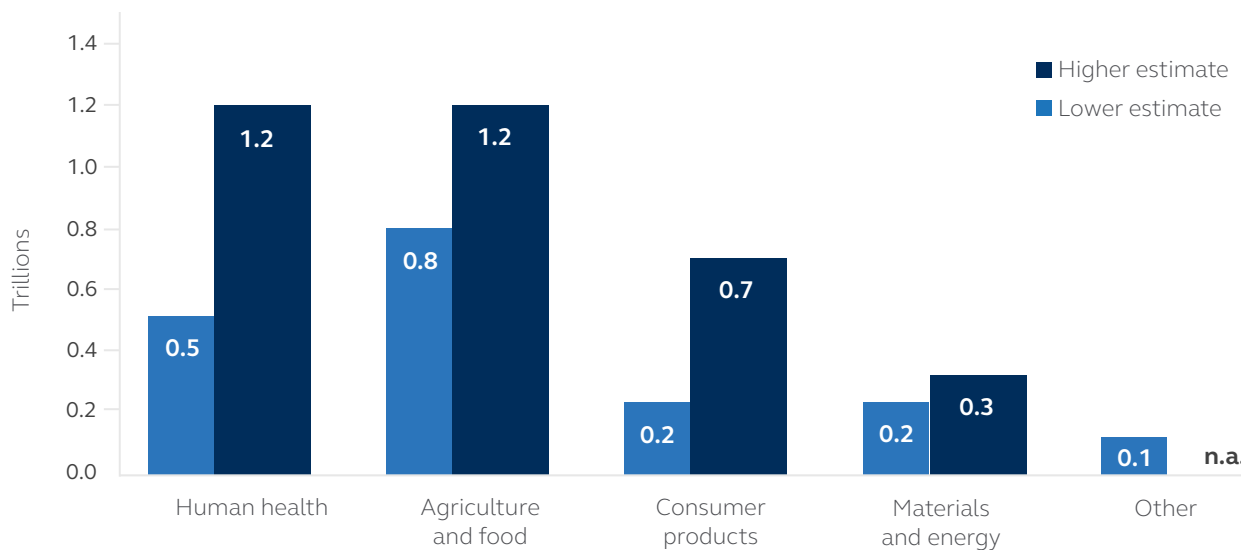
Advances in bioscience and accelerating development of computing and AI are likely to enable the penetration of life science solutions beyond healthcare. Eventually, as the process of molecule and protein discovery becomes faster and cheaper thanks to AI, biotech solutions will radiate out to almost every sector of the economy. The McKinsey Global Institute estimated the direct annual global impact of bioscience could reach between \$2 to \$4 trillion by 2040. Of this, more than half are likely to fall outside healthcare, primarily in agriculture, consumer products, materials, and energy. As life sciences-based solutions take off, the demand for this type of real estate asset type is poised to increase.

Traditionally, these buildings flourished in specific clusters—anchored around leading research institutions and large pharma companies. Being a knowledge-based and capital-intensive industry with a long lead time to market, companies located in these clusters benefit from highly specialised suppliers, a large pool of talent, knowledge transfer, and the cross-fertilisation of ideas. Cambridge-Massachusetts in the U.S., the Golden Triangle in the UK, and the Shanghai life science hub in China are some of the most successful examples. These centers will almost certainly continue to prosper.

However, the growing importance of AI and computer sciences could not only boost the space demand in these clusters but also catalyze the emergence of new ones. Additionally, over the next few years, we could witness a shift in space requirements. The proportion of floorplan dedicated to wet labs—the laboratory space designed to test biological matter, drugs, and hazardous products—could shrink in favour of AI labs, in which special-purpose algorithms unveil the mysteries of the biological world.

EXHIBIT 3: AI could turbocharge bio-tech innovative solutions as low as \$2tn and as high as \$4tn whose adoption will radiate across sectors

Global direct economic impact of biomolecules and biosystems innovation pipeline, \$tn, 2040



| Share of total estimate | 33% | 36% | 16% | 8% | 1% |
|-------------------------|-----|-----|-----|----|----|
|-------------------------|-----|-----|-----|----|----|

Source: McKinsey, Principal Real Estate, 2023

Logistics and retail warehousing

Logistics is another sector we believe will benefit from the widespread adoption of AI. There are essentially two primary reasons supporting our thesis. First, AI is expected to turbocharge advancements in warehouse automation and robotics. Indeed, when augmented with AI, robots can infer information from vision and data sensors in real-time. Through machine learning, these robots will also be able to understand their environment, develop new learning pathways and capabilities, and, ultimately, perform more complex tasks, faster and more accurately.

As a result, these technologies have the potential to expedite product delivery by pick-pack and route packages, reduce wastage, extend operating hours, improve productivity, and reduce human intervention. Not surprisingly, the warehouse automation market, which comprises both software and hardware covering the whole cycle of warehouse operations from storage to fulfilment and shipping, is expected to increase 4.5 times—from \$16bn to \$71bn by 2032 globally, as described in our [“European Logistics: an evolving landscape”](#) paper published in Spring 2024.

Moreover, the adoption of AI systems will significantly impact the intensity at which facilities operate and dictate warehouse space requirements, including design, size, height, and location. Take fulfilment centers as an example. Until now, these were only housed in large, flat buildings on out-of-town trading estates. New robots allow these facilities to become smaller, taller, and closer to the end customers in densely populated areas. In other words, new technologies could open the opportunity to convert non-performing real estate property types, such as retail stores, offices, and car parks, into valuable assets able to significantly reduce the cost of the last mile

delivery, which at present accounts for a staggering 40% of total supply chain expenses, according to a study by Capgemini, a global advisory company.

The second important reason why we believe logistics assets will benefit from the rising adoption of AI technologies is demand. Globally, e-commerce revenue, which is the main force driving logistics real estate leases, is expected to increase by 9% between 2024 and 2028, according to Forrester. The integration of emerging technologies such as AI into digital sales and marketing channels is also expected to be one of the main contributors to this growth, in conjunction with the increasing number of internet users and social media commerce trends.

For example, AI-driven tools can enhance customer experiences and increase conversion rates. Industry giants such as Amazon and eBay have been using smart algorithms to learn about customers’ behavior and provide personalised recommendations for years. However, as these technologies improve and expand along the shopping journey—including but not limited to virtual fitting rooms, AI shopping assistants, and predictive replenishment—buying online will become an increasingly preferable channel.

The two trends presented in the previous paragraphs, AI-enabled automation and e-commerce growth, are not exclusively favourable for the logistics sector. In our view, retail warehouses will also benefit, although to a lesser degree. Indeed, this property type has adapted to the rise of e-commerce and will continue to gain from it. In particular, retail warehouses have become central to those retailers with a multi-channel sales strategy. Brands have increased the share of the floorplans dedicated to logistics operations, and the rising adoption of AI technologies can further improve the efficiency and intensity at which online sales are fulfilled.

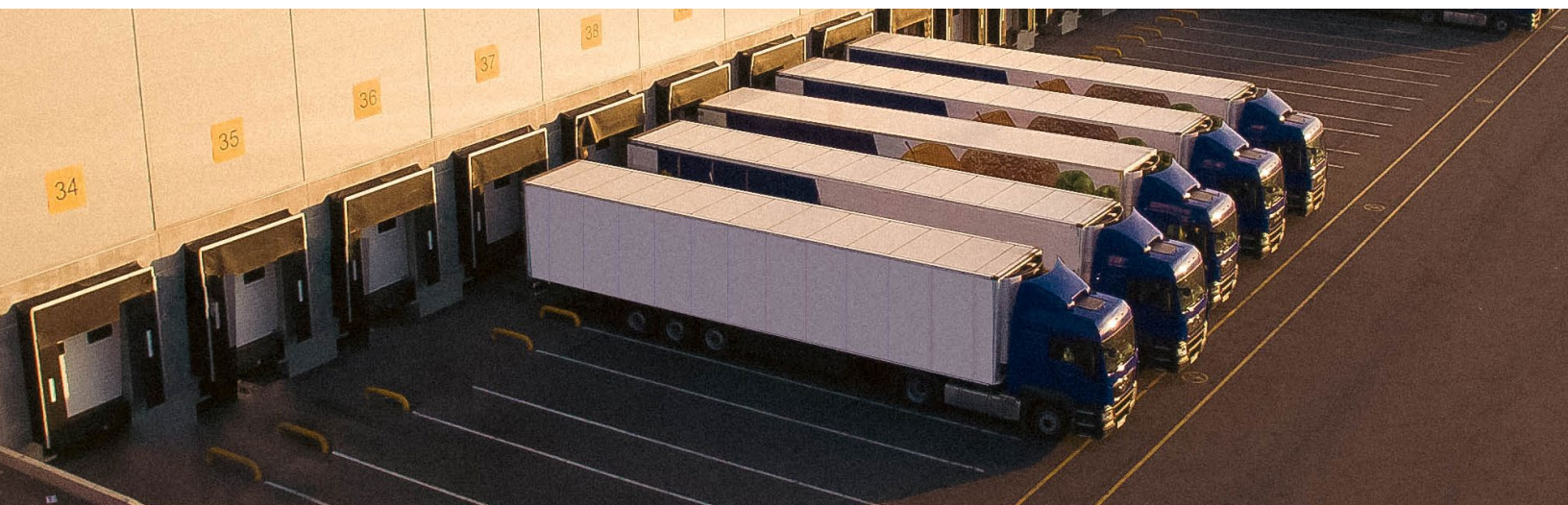
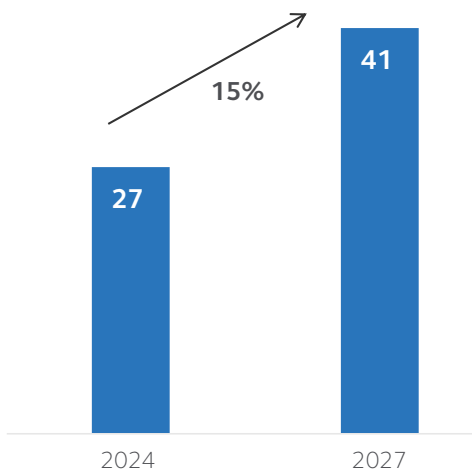


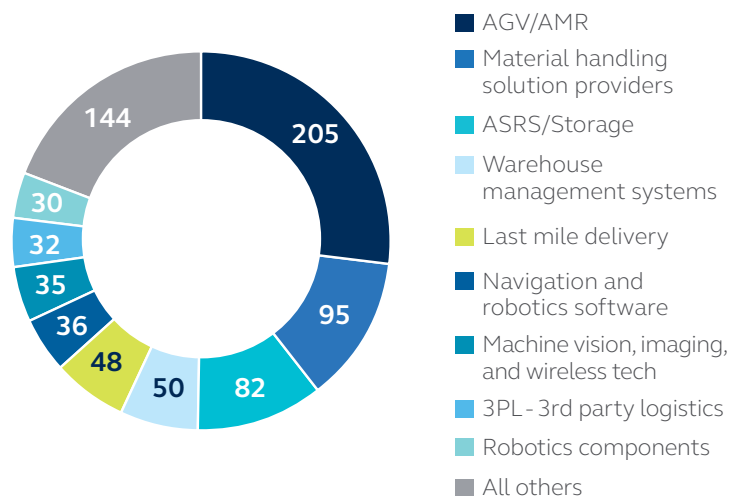
EXHIBIT 4: AI is set to drive the growth in the global warehouse automation market

Global warehouse automation market (bn\$, % CAGR)



Source: LogisticsIQ, Principal Real Estate, 2023
CAGR: compound annual growth rate

Warehouse automation companies by segment (no. of companies, world, 2024)



AGV: Automated guided vehicle
AMR: Autonomous mobile robot
ASRS: Automated storage and retrieval systems

Conclusion

The adoption of AI technologies is poised to reshape the real estate landscape, creating both opportunities and challenges across different property sectors. Our analytical framework highlights how AI’s transformative potential will likely drive varying levels of impact on property sectors and categorises these into three main groups: front runners, marginal gainers, and stragglers.

The front runners—data centers, life sciences and healthcare, logistics, and retail warehouses—are those real estate sectors that, in our view, are better positioned to gain from the rising adoption of AI, as this new technology will directly impact occupiers’ demand or will drive radical changes in tenants’ business models and core functions. Investors should also bear in mind that despite the aforementioned structural tailwinds, new waves of innovation are often paired with intra-sector compositional shifts. For example, the widespread adoption of warehouse robotics could widen the performance spread between newer and older logistics buildings. Equally, demand for AI-ready data centers could accelerate the technical obsolescence of less sophisticated facilities.

Thus, we recommend using our framework alongside other important investment considerations that are equally important but fall outside the scope of this paper, such as supply, asset quality, and micro-location. Partnering with a manager or operator with strong credentials, a proven track record, and solid sector expertise can help mitigate investment risks.

Risk considerations

Investing involves risk, including possible loss of principal. Past Performance does not guarantee future return. All financial investments involve an element of risk. Therefore, the value of the investment and the income from it will vary and the initial investment amount cannot be guaranteed. Potential investors should be aware of the risks inherent to owning and investing in real estate, including value fluctuations, capital market pricing volatility, liquidity risks, leverage, credit risk, occupancy risk and legal risk. All these risks can lead to a decline in the value of the real estate, a decline in the income produced by the real estate and declines in the value or total loss in value of securities derived from investments in real estate. International investing involves greater risks such as currency fluctuations, political/social instability, and differing accounting standards. Data Center properties are only attractive to a unique type of tenant, so a limited tenant base increases the risk of vacancy. Additionally, a property designed to be a data center may be difficult to relet to another type of tenant or convert to another use. Thus, if operating a data center were to become unprofitable, the liquidation value of properties may be substantially less than would be the case if the properties were readily adaptable to other uses.

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