Knight Frank

Quantifying technology in real estate

Spring 2025 | Tech trends reshaping global real estate dynamics | knightframk.com/research

Foreword

The impact of technology on real estate hasn't always been obvious, but today it is undeniable. This report provides a snapshot of our latest insight and views on the myriad ways technology is changing the real estate landscape; from the world of work to investment decisions, from valuations to the very design of the spaces we build.

AI is at the forefront of this transformation, driving efficiency and uncovering deeper insights across real estate. The global AI market in commercial property is projected to more than treble from $303 billion in 2025 to nearly $1 trillion by 2029, underscoring just how central AI is to the industry's future.

We are already seeing the impact that the convergence of AI and other technologies is having on real estate. Data centres are a case in point: with mounting pressures on power and cooling, the sector is evolving rapidly, both driven by AI demand and optimised by its intelligence.

Meanwhile, automation is redefining how goods are manufactured, stored and distributed in the industrial and logistics sectors. Autonomous "dark factories" could become increasingly prevalent within the next decade.

Underpinning many of these innovations are semiconductor chips – the critical components at the heart of modern technology. As corporates and governments scale domestic production, real estate demand will follow, directly supporting chip facilities and the ecosystems clustering around them.

Sustainability is inseparable from this evolution. For example, the UK's tech-enabled net-zero economy grew three times faster than the broader economy in 2024, a trajectory expected to continue. Real estate is central to this growth, delivering diverse, flexible and sustainable spaces to meet the needs of climate-focused sectors.

As the network of digital infrastructure advances, so does our ability to turn data into actionable insights. The promise of improved decision-making and greater operational efficiencies is real, but the full potential will only be unlocked with high-quality data.

So yes, what once seemed unlikely is now indeed undeniable: technology is foundational to real estate's future. But just as importantly, physical real estate will always be essential to technology's transformation.

WILLIAM BEARDMORE-GRAY
KNIGHT FRANK SENIOR PARTNER
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Instant insights

What are chips?

Chips, or semiconductors, act as the 'brains' of electronic devices. Typically made of silicon, they contain billions of microscopic transistors that control the flow of information.

Why do chips matter?

Chips are fundamental to the modern world and demand is set to double by 2030. Governments globally are investing billions into the chip industry, which needs specialist real estate, creating new demand in key locations.

Where are the global hotspots for semiconductors?

The semiconductor industry is a globally interconnected ecosystem. The US and the UK are at the forefront of semiconductor R&D and chip design, whilst Asia dominates chip manufacturing.

What is the net-zero economy?

Sectors and activities, such as clean and climate tech, that contribute to reducing greenhouse gas emissions to a state where total emissions are balanced by the amount removed from the atmosphere, creating a 'net-zero' impact.

Why is real estate crucial for clean tech companies?

Real estate is key to the growth of clean tech by providing tailored spaces like labs, manufacturing sites and flexible offices that support sustainable operations and scalability.

How is technology driving change in logistics real estate?

Technologies such as AI, robotics, and drones are revolutionising warehouse and fulfilment centre operations, reshaping demand in site design, power needs and building specifications.

What is the significance of AI energy use for real estate?

As AI models become more compute-intensive, the energy demands of supporting real estate - particularly data centres - are rising, requiring innovations in energy sourcing, storage and management.

Why are data centres undergoing an evolution?

The rise of AI workloads, the growth of cloud computing, the increasing demand for real-time data processing and emerging technologies like quantum computing are shaping data centre markets.

How is AI used currently in real estate decision making?

AI is being used to enhance forecasting, automate data analysis, refine portfolio strategies, scenario plan and generally improve efficiency. AI enhances human expertise and enables more informed strategic decisions.

What is an autonomous dark factory?

An autonomous dark factory is a fully automated manufacturing facility that operates without human intervention, using robotics, AI and advanced systems for continuous, 24/7 production.

Why is technology now a cornerstone of real estate strategy?

Technology has moved from optional to essential, becoming the key to attracting capital, improving occupier experience and building resilient, long-term value.

How is digital infrastructure becoming as important as location?

Connectivity, data capacity and energy resilience are now fundamental property metrics, influencing everything from occupier fit to asset value and investment strategy.

Net-zero technology

Net-zero technology: encompassing clean tech and climate tech; defined broadly as technologies and innovations designed to limit the impact of human activity on the environment by improving efficiency and performance as well as technologies to address or mitigate climate change-related problems by reducing greenhouse gas emissions.

3x

The UK's 'net-zero' economy grew three times faster than the broader economy in 2024

3,669

As of the end of Q1 2025, there were 3,669 active clean tech companies

95%

The UK government has pledged to decarbonise 95% of the electricity grid by 2030

Powering clean tech innovation through property

AUTHORS
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The UK's 'net-zero' economy grew three times faster than the broader economy in 2024[1], and this rapid pace is expected to continue. Within this field, various interconnected sub-sectors exist, notably clean and climate tech. Real estate will play a critical role in facilitating this ongoing growth by providing suitable spaces that reflect the diverse needs and principles of the net-zero economy, ranging from office environments to specialised facilities like vertical farms and laboratory spaces. Equally, the sector will be key in embedding operational and technical support within collaborative, innovation-driven ecosystems.

THE NET-ZERO ECONOMY

The net-zero economy largely encompasses clean tech and climate tech. While there is a significant amount of inter-connectivity and cross-over, they predominantly cover ten main areas below:

1. Renewable Energy
2. Energy Storage and Management
3. Carbon Capture, Utilisation, and Storage (CCUS)
4. Sustainable Transportation
5. Building Technologies
6. Circular Economy
7. Agriculture and Food
8. Nature-Based Solutions
9. Industrial Process Innovation
10. Deep-Sea Mining and Resource Extraction

For this paper, we focus on clean tech, where the sector has 3,669 active companies as at the end of Q1 2025, according to analysis of Beauhurst data, up from just over 1,000 a decade ago. In terms of industries, which companies can be listed under multiple, renewable energy comes out top with over half of those businesses, followed by energy management and reduction. Looking at 'buzzword' areas they operate in, electric vehicles (EV) are the most prevalent, with 15% listing this, followed by biomass & biofuels with 6.5%.

Industry	% share by number of companies (top ten)
Renewable energy	54.14
Energy management and reduction	18.82
Heating, ventilation, air conditioning and mechanical and electrical systems	18.38
Tradespeople and trade services	15.36
Cars, motorcycles and other road vehicles	14.87
Application software	13.29
Waste management and recycling	11.36
Energy storage	8.77
Manufacturing	8.44
Data provision and analysis	7.11

Source: Beauhurst, Knight Frank Insight

The UK's clean tech ecosystem is characterised by a high proportion of startups. Indeed, 40% of the sector comprises seed companies, and 64% of companies employ fewer than 20 people[2] .The UK's academic institutions play a pivotal role, with breakthroughs in labs often turning into spinout companies. Imperial College London, for instance, is a global leader in clean energy research – its scientists developed the fuel-cell technology behind Ceres Power, one of the UK's most valuable clean tech companies. Elsewhere, the University of Cambridge's spinout GaN Devices recently raised £25m. Their technology claims that efficiency levels of over 99% are achievable, translating into energy savings of up to 50% in a wide range of high-power applications. The University is home to multiple research institutes, such as the Centre for Climate Repair and the Cambridge Institute for Sustainability Leadership.

Top five UK universities for spinout activity:

1	Imperial College London	22
2	University of Cambridge	21
3	University of Oxford	17
4	Royal College of Art	14
5	University of Manchester	10

Source: Beauhurst, Knight Frank Insight

There is a small number of medium size enterprises poised to become the sector's next significant successes, which have included four UK clean tech unicorns, as of February 2025: Wayve, Zenobe, Octopus Group, and OVO Group. Most of the sector is experiencing growth, though at varying rates. Among clean tech firms reporting employee data over the past three years, 57% have recorded positive headcount growth over that period. Survival rates are also robust, considering the complex risk profile of the sector. Only 10% of companies

founded five years ago have ceased operations, rising to 27% for companies founded a decade ago[3]. However, the limited number of successful exits highlights the need for greater support to ensure these businesses successfully reach commercialisation.

An extensive ecosystem of stakeholders supports these companies, including venture capital firms, private investors, research institutes, industry bodies, inward investment agencies, and accelerators and incubators. The sector's impact is far-reaching, with many additional organisations indirectly contributing through supply chain roles. Notably, the Ellison Institute of Technology has announced a £100m joint venture investment with Oxford University to address global challenges such as climate change, green energy, and sustainability, including a dedicated facility featuring research laboratories and advanced supercomputing capabilities[4]. Additionally, the Qatari government is investing £1bn in climate technology, including the establishment of new climate tech hubs in the UK[5].

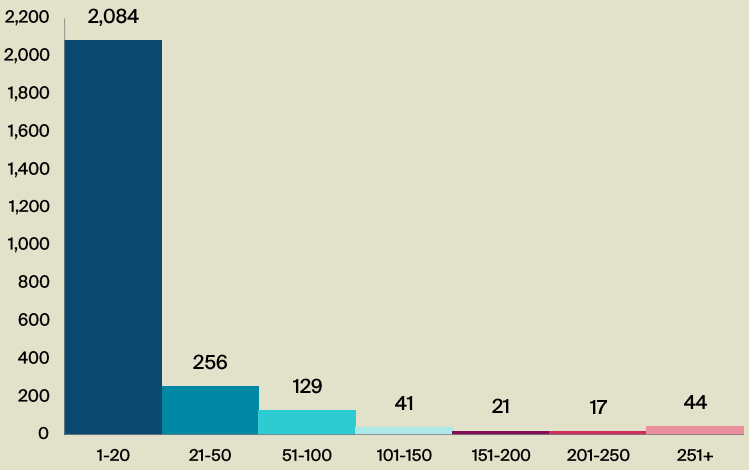
At the top are large corporations. Numerous examples exist of companies in adjacent sectors pivoting towards clean tech via in-house restructuring, collaboration and investment in startups. For example, Shell has a venture arm investing in clean tech (and acquiring promising startups), and Barclays Bank has their Climate Ventures portfolio to invest up to £500m of equity capital in climate tech startups between 2020 and the end of 2027.

CLEAN TECH HOTSPOTS

Geographically, the sector is concentrated in London, the East of England and the South East, home to just over 50% of active companies. There are also significant clusters at a local authority level outside of these regions, including Edinburgh (78 companies), Bristol (72), Glasgow (55), and the Cornwall (44). Nationally, every region has seen a growth in the number of active companies between 2019 and 2024, with London (+488), South East

Sizing the market

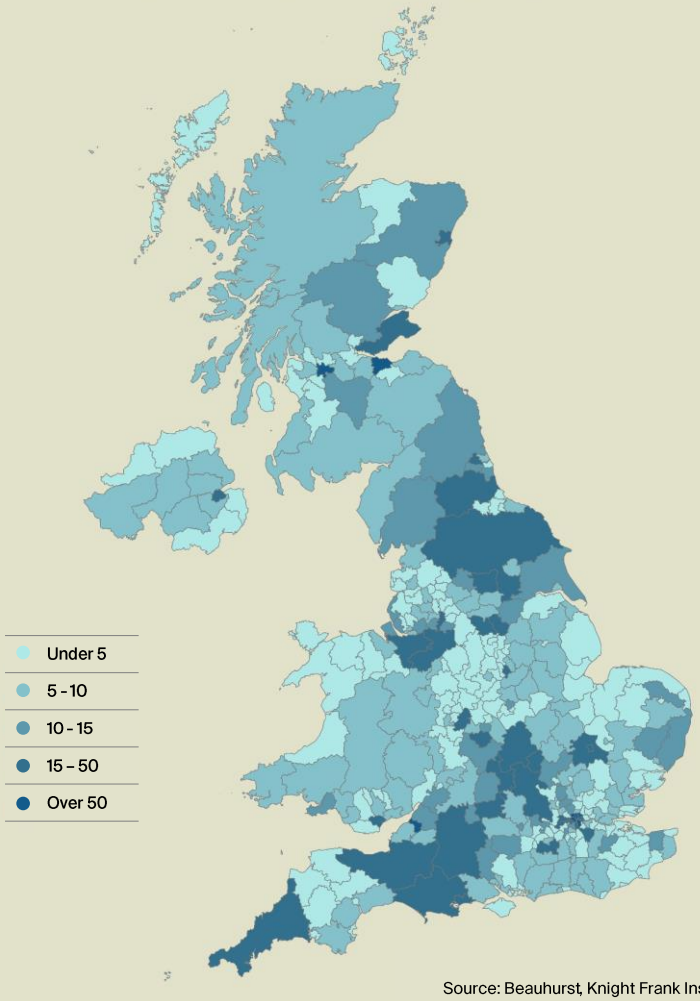
Number of active companies by number of employees



Source: Beauhurst, Knight Frank Insight. Only includes companies where figures are disclosed.

UK clean tech hotspots

Clean tech companies count by local authority, HQ or registered address only



Source: Beauhurst, Knight Frank Insight

(+175) and the East of England (+122) seeing the largest gains.

FUTURE GROWTH AND BARRIERS

The sector is expected to grow across the UK more broadly with the advent of the government's UK Modern Industrial Strategy, Invest 2035. The strategy outlines a commitment to advanced manufacturing & clean energy, and with the UK's legally binding net-zero commitment, this is unlikely to waver. Creating GB Energy, planning reforms, and establishing a National Wealth Fund will add further impetus. The pledge to decarbonise 95% of the electricity grid by 2030 and regulations such as Minimum Energy Efficiency Standards, putting the built environment on a decarbonisation trajectory, will see clean and climate tech sectors at the fore. As other major economies seek to row back or limit commitments, the UK has an even greater opportunity to lead in the net-zero economy and attract significant investment and entrepreneurship.

Fundraising activity remains essential for the sector's growth. Although total funding declined in 2024, aligning with broader market trends, the sector has attracted more than twice the amount of capital post-pandemic compared to the three years preceding[7].

Furthermore, debt financing is increasingly complementing venture capital funding. In 2024, £2.79bn of debt financing was invested across 24 strategic deals[8]. Nevertheless, a shortage of Series B and later-stage funding remains, which must be addressed to enable companies to achieve commercialisation.

Other barriers to growth include limited grid and manufacturing capacity and slow planning processes that delay clean infrastructure. Financial pressures on universities also threaten the research and talent pipelines vital to early-stage clean tech innovation.

SELECT GOVERNMENT INVESTMENTS

£22bn – carbon capture and storage

£2.7bn – nuclear energy

£3.4bn – energy efficiency

£163m – extension of the Industrial Energy Transformation Fund, alongside introducing a Carbon Border Adjustment Mechanism (CBAM)

Skills passport scheme alongside regional skills investments worth almost £4m

WHAT THIS MEANS FOR REAL ESTATE

Demand from the clean tech sector is set to grow, with the data showing significant clustering activity. Unlocking regional opportunities will require a granular analysis of the sub-sectors that dominate in target locations, as there will be variations in real estate needs. For example, Manchester's heritage in engineering and manufacturing makes it well-suited for startups in areas like advanced materials and energy systems. Elsewhere, Cornwall has carved a niche in geothermal energy and is the site of Britain's first spaceport, aiming to launch satellites for earth observation/climate monitoring.

Clean tech companies have specific requirements – below, we look at some of the main real estate needs.

Given the nature of their operations, clean tech companies typically prioritise sustainability when selecting real estate, often choosing buildings with robust environmental credentials.

As most clean tech firms smaller, affordable and adaptable spaces are crucial, alongside operational support to enable growth. Small firms often want to co-locate with research partners, so regions that develop specialist innovation hubs will benefit significantly, as will those that actively develop relevant skills. Our analysis finds close to 100 'clusters' where three or more

Type of Space	Notes
Laboratory space	A significant subset of clean tech firms require lab facilities – a chemistry lab for testing carbon capture solvents, a bio-lab for engineering algae that absorb CO_2, or an electronics lab for prototyping energy-efficient sensors.
Workshops and industrial sites	Many clean tech innovations need more than a desk – they need physical assembly and testing space. Battery startups, for instance, need safe facilities to build and stress-test battery cells, and vertical farming startups require warehouse-like spaces to set up their growing racks.
Office and collaboration space	Some clean tech companies sit within the software, fintech, or consulting-oriented – like climate risk analysis startups or carbon accounting firms – and these fit into standard offices or coworking spaces. They may prefer to be in innovation hubs or co-locate with other like-minded companies.
Recycling facilities	Facilities for waste recovery and recycling – e.g. collection centres, materials recovery facilities (sorting/recycling plants), composting sites, waste-to-energy plants, and remanufacturing units that turn recycled inputs into new products.
Manufacturing and logistics	Space that supports manufacturing of clean tech components and advanced manufacturing. For example, electric vehicles and wind turbine components. Some may have bespoke requirements, such as accommodating automation and robotics systems.

clean tech companies are within 50 metres of each other. If we extend the buffer to 100 metres, it is almost 130 clusters, although this is limited by the HQ or registered address data and the true numbers may be larger. Some are flexible office spaces and others more targeted sector specific 'hubs'. Within these, the median cluster size is seven companies, with the median number of employees being five.

Real estate needs vary significantly across the renewable energy sector. For example, large-scale solar projects require extensive, flat land with high solar exposure. In contrast, urban solar solutions typically utilise rooftops or existing buildings. Hydrogen production facilities, meanwhile, resemble industrial sites, demanding large quantities of water and renewable electricity, and are usually located in industrial areas with suitable infrastructure. Industrial properties will support the manufacturing of components, such as wind turbines. These may be best suited to port locations, as quayside access is important.

Advanced manufacturing operations may have bespoke building requirements to accommodate precision manufacturing operations with high levels of automation and robotics systems; these requirements may relate to power, floor loading and finish, building height, and other design features. The exact nature of the manufacturing will dictate other specific requirements. For example, commercially sensitive operations may require security (both physical and cyber) to protect their IP. In contrast, additive manufacturing (3D printing) may require advanced fire safety measures or explosion-proofing, and battery and semiconductor manufacturing typically require clean room environments.

IN SUMMARY

The sustained growth of the clean tech sector will be enhanced by the UK's supportive policies and continued investment, presenting a transformative opportunity for the real estate industry. As such, demand for specialised spaces to support the sector, such as laboratories, workshops and sustainable offices, will rise. Regions with established clean tech clusters, like London, Bristol, Cambridge and Edinburgh, offer significant opportunities. At the same time, emerging hubs such as Cornwall and Manchester highlight the importance of regional strategies. Demand for sustainable spaces and evolving needs will require innovative solutions to align with strategic goals. Real estate can play a pivotal role in driving the clean tech sector's expansion by addressing these trends.

KEY TAKEAWAYS

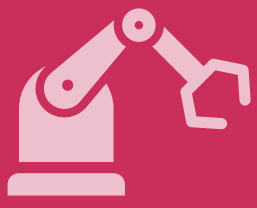
1. Growing demand for clean tech real estate will be boosted by further investment and supportive policies.
2. Established clean tech clusters are growing, and new hubs continue to emerge. Combining real estate data with economic growth insights will be crucial for identifying supply-side opportunities in real estate early on and pinpointing optimal locations for occupiers.
3. Academia is driving demand by incubating promising startups. Space within these locations will be pivotal to success. Furthermore, startups need flexible, scalable spaces and supportive ecosystems. The operational aspects of real estate are just as critical as the physical built environment.
4. The sector is comprised of several sub-sectors that require tailored real estate solutions. Real estate needs vary from lab space to manufacturing, logistics to coworking and beyond.
5. Corporate restructuring among large companies and the creation of new research institutes are driving fresh demand in the real estate market.

Digital meets physical infrastructure

Digital meets physical infrastructure: the convergence of core digital systems, such as data centres, fibre networks and cloud platforms, with physical infrastructure like transport networks, utilities and industrial facilities. Enabling smarter, real-time monitoring and management through technologies like IoT, automation and digital twins.

24/7

Continuous production made possible by autonomous dark factories



UP TO 25%

Increased picking efficiency seen by companies who have implemented AR in warehouses

40%

Reduced cooling power use in data centres, through implementation of AI

On the radar: Tech trends shaping tomorrow's warehouse

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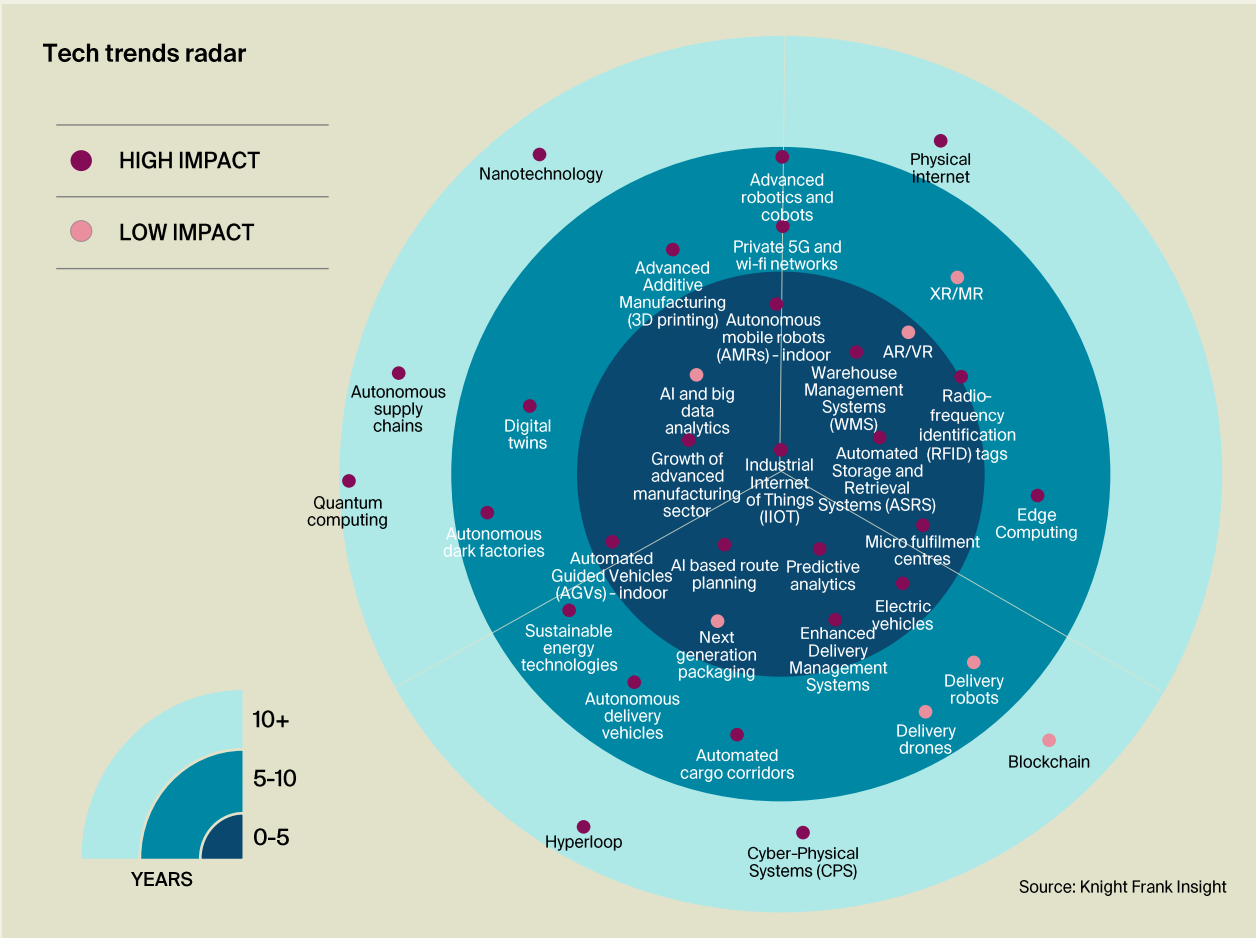
Technological advancements have had a huge impact on the way we live, work and shop - shaping our use of real estate. However, the industrial and logistics sector is concerned with the making and moving of physical goods. While technology is changing how (and where) we make, store and distribute goods, it cannot replace the need for industrial and logistics facilities. Goods can't be stored in the cloud or delivered via a cable. Manufacturing and logistics involves physical goods, and movement of these goods to real locations and thus requires physical infrastructure and buildings.

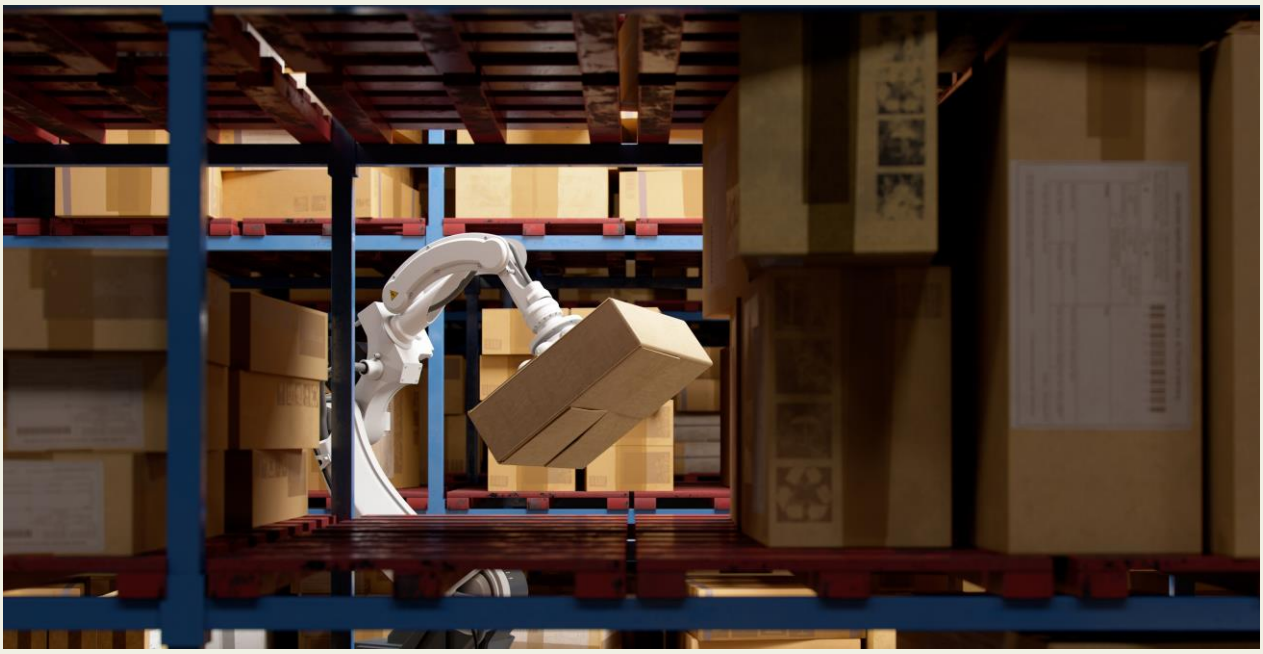
However, technological advancements and improving affordability are driving changes in the ways that goods are made, stored and distributed. Occupiers are increasingly choosing to adopt technological solutions for more tasks and across more aspects of the supply chain, enabling greater automation within fulfilment centres and manufacturing plants.

TECH TRENDS RADAR

Our tech trends radar considers the key technologies that will impact the industrial and logistics sector over the next five to ten years and beyond. Some of these technologies are already in use, while others are in their infancy or test phases. The radar assesses when these technologies will become widespread and evaluates their significance in influencing operations and real estate decisions.

Some of these tech trends share underlying technological architecture but differ in application, altering their adoption timeframe and impact. For example, autonomous supply chains will utilise AI-driven decision-making, warehouse robotics, Automated Guided Vehicles (AGVs), autonomous delivery vehicles and drones, Industrial Internet of Things (IIoT),





blockchain and digital twins. While some of these trends may have limited impact individually, their combined potential could be significant. Autonomous dark factories, also known as lights-out manufacturing facilities, operate entirely without human intervention, enabling continuous, 24/7 production. These factories integrate multiple technologies, including robots and automation, Internet of Things (IoT), Cyber-Physical Systems (CPS), AI and big data analytics and Additive Manufacturing (3D printing).

Some tech trends will have varying impacts across different parts of the sector. For instance, digital twins will significantly impact the logistics sector by optimising supply chain efficiency and enhancing warehouse automation. However, their greatest impact will be within manufacturing, where they allow firms to simulate and test production changes before implementation. This is particularly valuable in high-precision industries such as aerospace and semiconductor manufacturing.

Advances in 3D printing and additive manufacturing are changing how goods are produced enabling efficient small-scale production. Designers can rapidly develop and create prototypes, while replacement parts can be printed and dispatched as needed. This speeds up market entry, reduces shipping times, and minimises storage needs by enabling local, on-demand production rather than bulk overseas manufacturing.

Technologies such as AGVs, Autonomous Mobile Robots (AMRs), and Warehouse Management Systems (WMS) are already in use within the most advanced fulfilment centres, with adoption expected to increase over the next five years as costs decline. A WMS can utilise IoT technology to connect to various communication and automatic identification technologies, such as sensors and Radio Frequency Identification (RFID) tags. AGVs, including automated forklift trucks typically follow magnetic strips or tracks, whereas AMRs create their own routes using sensor data and dynamically reroute when necessary.

Over the next five years, we anticipate the IIoT will have far-reaching applications for logistics and warehouse operations. IIoT warehouse devices enable real-time scanning, recording, and monitoring of inventory. RFID tags and sensors can track goods throughout the supply chain and ensure correct storage conditions.

Extended Reality (XR), or Mixed Reality (MR) which incorporates both Augmented Reality (AR) and Virtual Reality (VR), are improving logistics and manufacturing operations by enhancing efficiency, training and decision-making. AR smart glasses can overlay real-time inventory data and guide workers to the exact shelf location of an item. Companies like DHL and UPS have already implemented AR in warehouses, increasing picking efficiency by up to 25%. AI and the use of big data analytics stand to improve supply chain efficiency. As technology for collecting,

ABBREVIATION GLOSSARY

AGV - Automated Guided Vehicle

AMR - Autonomous Mobile Robot

AR – Augmented Reality

ASRS – Automated Storage and Retrieval System

CPS - Cyber-Physical System

IIoT - Industrial Internet of Things

MCF – Micro-Fulfilment Centre

MR – Mixed Reality

RFID - Radio Frequency Identification

VR – Virtual Reality

WMS - Warehouse Management System

XR - Extended Reality

storing, and analysing data improve, the opportunities to extract insights from big data grow. Machine learning, a subset of AI, is increasingly used for predictive analytics in distribution route planning and consumer demand forecasting. Some warehouse operations integrate augmented guidance and robotic systems to enhance and scale inventory management.

Drones are already improving inventory management within warehouses by autonomously checking stock levels and storage conditions. GEODIS has implemented drones that scan barcodes and update inventory systems in real-time. Advances in drone technology, such as improved battery life and payload capacity, will make drone deliveries more viable.

However, for widespread rollout, regulatory changes, such as adjustments to CAA regulations mandating that drones maintain line of sight, will be necessary.

Other evolving transport systems may impact logistics supply chains in the future. Automated cargo corridors are dedicated logistics routes equipped with autonomous vehicles, smart infrastructure, and digital systems. Concepts vary; in Japan, a "conveyor belt road" will connect Tokyo and Osaka by the mid-2030s, while in the US, the focus is on autonomous trucks. Hyperloop, a proposed high-speed transportation system moving cargo pods through low-pressure vacuum tubes at near-supersonic speeds, was first conceptualised by Elon Musk in 2013. Despite setbacks, such as Virgin Hyperloop ceasing operations, countries like China, India and the UAE are still exploring applications. Automated cargo corridors utilising hyperloop technology may become commercially viable within 15-20 years.

IMPLICATIONS FOR REAL ESTATE

Advances in technology are influencing building specifications. Greater automation and robotics usage will increase power consumption, while large-scale, bespoke automation equipment may necessitate design adaptations, such as greater eaves height and improved floor loading capacity. This will restrict suitable locations for these facilities and increase demand for bespoke design-and-build solutions.

Robots typically require very smooth, obstacle-free floors. However, advancements in robotics have significantly mitigated this requirement, with modern robots better able to navigate rough and uneven terrain. This extends their applicability to facilities where smooth floors are impractical. Nonetheless, smooth surfaces remain essential for robotic solutions that can maximise precision and efficiencies.

The ability to deploy robotics in smaller, less specialised environments is enabling new hyper-local fulfilment models. Micro-fulfilment centres (MFCs) are small urban warehouses utilising automated systems for rapid and efficient order fulfilment. Their compact size allows them to be situated in densely populated areas, enabling operators to reduce last-mile delivery times and costs by being closer to customers.

IN SUMMARY

As warehouses become increasingly tech-enabled, the requirements for workers will also evolve. The warehouse of the future will be increasingly reliant on an educated and highly specialised workforce, needing specialists trained in robotics, warehouse management systems and other advanced technologies. As warehouses increasingly compete for skilled, educated labour, they will need to offer high-quality amenities if they are to attract workers to these roles.

KEY TAKEAWAYS

1. Technological advancements are transforming the industrial and logistics sector, but physical infrastructure remains essential. Goods can't be stored in the cloud or delivered via a cable, so real estate remains crucial.
2. AI, warehouse robotics, AGVs, autonomous delivery vehicles, IIoT, blockchain, and digital twins will shape the sector in the next 5-10 years. These technologies will influence operations and real estate decisions.
3. Autonomous Dark Factories operate without human intervention, integrating robots, IoT, CPS, AI, and 3D printing for continuous production. This will impact real estate by requiring specific building designs to accommodate these technologies.
4. Advances in 3D printing enable small-scale production. This reduces the need for large storage spaces and allows for local, on-demand production, shifting location requirements.
5. Some technological advancements will require changes in building specifications, e.g. increased power, greater eaves height, improved floor loading capacity and better amenities.

Data centres in transition

Driving the future of digital infrastructure

AUTHORS
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In today's digital age, data is often dubbed the "new oil." As technological advancements accelerate, data centres are transforming rapidly to meet growing demands for efficiency, scalability and sustainability. With increasingly complex workloads, modern data centres are evolving to support emerging technologies while managing environmental footprint.

AI: RESHAPING THE DATA CENTRE LANDSCAPE

The proliferation of deep learning models and large-scale AI workloads has significantly increased demand for high-performance computing, resulting in a growing number of data centres optimised explicitly for AI. As applications in automation, predictive analytics, and generative technologies continue to scale, data centres are needing to adapt to escalating computational requirements.

Foremost, the accelerated growth of AI has heightened energy consumption, driving the need for sophisticated cooling and power solutions. Interestingly, data centres are increasingly adopting AI-driven energy management systems to address this, enabling more efficient power usage and reducing environmental impact.

CLOUD EXPANSION: HYPERSCALE AND EDGE COMPUTING

Cloud computing has been the principal disruptor of the data centre landscape in recent years. Cloud platforms offer scalable, on-demand computing, reducing reliance on traditional infrastructure and shifting demand from conventional colocation to hyperscale data centres.

Edge computing is emerging as a pivotal extension of cloud infrastructure, addressing latency challenges by processing data closer to source and end users. Applications such as autonomous vehicles, smart cities, and industrial IoT rely on edge computing for real-time responsiveness. This trend is driving investment in micro data centres and decentralised infrastructure, enabling faster data processing.

QUANTUM COMPUTING: FUTURE DISRUPTION

Quantum computing potentially marks a significant leap in computational power, with profound implications for data centres. Unlike traditional binary systems, quantum computers use qubits to perform complex calculations at unmatched speeds, with transformative potential across cryptography, AI, and optimisation. This technology could reduce reliance on conventional infrastructure, prompting a shift toward quantum-ready environments and advanced cooling solutions. It also challenges current encryption standards, requiring new cybersecurity measures. While still emerging, quantum computing is expected to become a key part of high-performance computing, driving the need for quantum-compatible infrastructure in data

centres. Against this backdrop, data centres are undergoing a fundamental transformation in infrastructure design to meet the evolving demands of today and the future.

COOLING THE FUTURE: NEXT-GEN INNOVATIONS IN DATA CENTRE EFFICIENCY

Data centres are adopting cutting-edge cooling technologies as high-performance workloads generate increasing heat loads. Chip-level liquid cooling is gaining prominence alongside immersive cooling, which involves submerging entire servers in dielectric fluid. Immersion cooling can increase the return water temperature compared to traditional air cooling, potentially up to 50 degrees C. This significantly increases the 'free cooling' envelope, allowing compressor-free cooling all year and improving instantaneous and annualised PUEs. It is particularly well-suited for AI, blockchain, and other compute-intensive applications where traditional air- or water-based cooling methods often prove insufficient.

POWERING THE FUTURE: INNOVATIONS RESHAPING ENERGY INFRASTRUCTURE

To meet the rising demands of AI, cloud computing, and digital services, data centres are increasingly turning to advanced energy solutions that deliver sustainability, scalability and resilience:

- **Small Modular Reactors (SMRs)** are gaining momentum as a viable power source well-suited to supporting high-density workloads. With the ability to deliver continuous, high-capacity output, SMRs could significantly reduce dependence on fossil fuels.

- **AI** is also revolutionising energy management in data centres. AI-powered systems enable predictive demand forecasting, dynamic workload distribution, and optimised energy usage across operations. These advancements help ease pressure on the grid while enhancing overall energy efficiency.

- **Hydrogen fuel cells** are emerging as a clean substitute for diesel generators. They can provide both backup and primary power and produce minimal to zero emissions. Yet, wider adoption is currently limited by high capital costs, space demands and evolving regulatory standards.

- **Microgrids** present an additional route to energy autonomy and resilience. These self-contained systems integrate renewable sources, battery storage, and AI-powered controls. Microgrids strengthen operational stability in a rapidly evolving energy landscape by ensuring consistent power supply.

- Looking ahead, **fusion energy** represents a game-changing long-term solution. Though still in development, it promises virtually limitless, clean energy without radioactive waste. Commercial deployment could materialise within 10 to 15 years, reshaping the future of power for data centres.

IN SUMMARY

The convergence of emerging technologies, intelligent automation, and advanced energy solutions is poised to drive transformative growth across global digital ecosystems. At the core of this evolution lie data centres, which must continuously adapt to support escalating demands for speed, scalability and sustainability.

The next generation of data centres will rely heavily on cutting-edge networking technologies, AI-driven operations and highly energy-efficient infrastructure to meet these challenges. These innovations will enable ultra-reliable, high-performance computing environments and reinforce the critical role of data centres as the foundational pillars of the digital economy.

KEY TAKEAWAYS

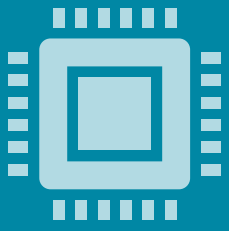
1. The rise of AI has increased the demand for high-performance computing, leading to data centres optimised for AI, requiring advanced cooling and power solutions to manage energy consumption efficiently.
2. Cloud computing has shifted demand to hyperscale data centres, while edge computing addresses latency by processing data closer to the source. This is crucial for applications like autonomous vehicles and smart cities.
3. Data centres are undergoing a fundamental transformation to support emerging technologies and manage environmental footprints, including adopting advanced cooling solutions and energy-efficient designs.
4. Advanced cooling technologies, such as chip-level liquid cooling and immersive cooling, are being adopted in some data centres to handle the heat from high-performance workloads, improving efficiency.
5. Data centres are exploring advanced energy solutions like Small Modular Reactors (SMRs), AI-powered energy management, hydrogen fuel cells, and microgrids to meet rising demands sustainably and resiliently.

Semiconductors

Semiconductors: also known as chips, act as the "brains" of electronic devices from smartphones, computers, banking systems and industrial automation technology. Typically made of silicon, they contain billions of microscopic transistors that control the flow of information.

$1tn

The chip market is expected to surpass total market size of $1tn by 2030



90%

Taiwan produces over 90% of the world's most advanced chips

$500bn

Governments worldwide have committed over $500bn to the semiconductor industry

Chips on the table

Real estate's role in the semiconductor race

AUTHOR
LILY NGUYEN, KNIGHT FRANK

SMALL BUT POWERFUL

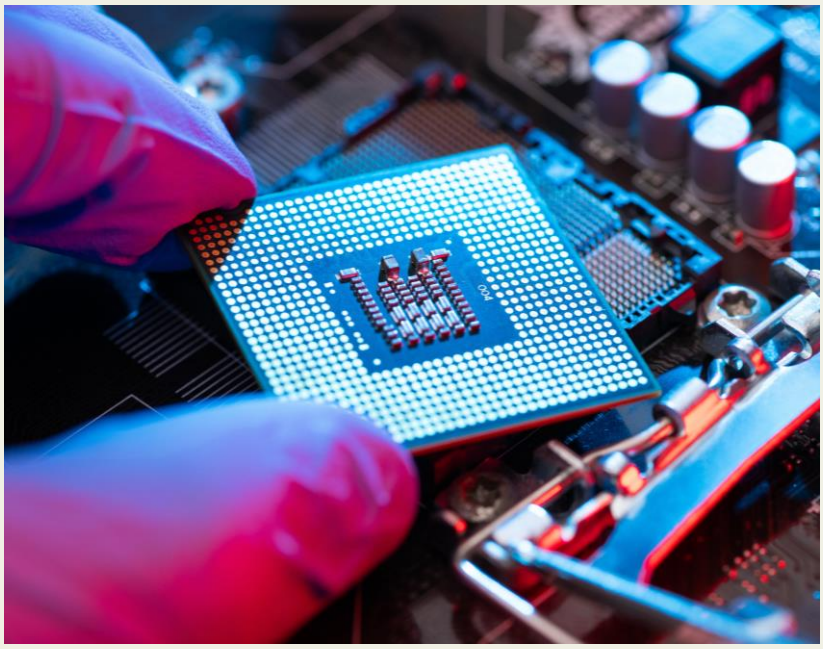
Semiconductors - or chips - are the tiny components powering modern life. Found in smartphones, data centres, medical equipment and defence technologies, they are the brains behind many of the technologies we rely on every day.

Made primarily from silicon, chips contain billions of transistors that switch electrical signals on and off in patterns of ones and zeros - the binary language powering every email, video and app we use today. Without them, modern technology wouldn't exist.

Chips don't just power today's world; they're shaping the future. From AI to quantum computing, they underpin the next generation of innovation.

With global demand expected to double by 2030[9], the semiconductor market is projected to exceed $1tn[10]. It already ranks as the world's fourth-largest industry, behind oil production, automotive and oil refining & distribution[11]. The race to produce them has never been more crucial.

For investors, semiconductors present an exciting opportunity - anchored in innovation, backed by governments and positioned for long-term growth.



THE GLOBAL LANDSCAPE

The semiconductor industry is a globally interconnected ecosystem in which chips are designed, manufactured, assembled, tested and packaged before being installed in devices.

The US and the UK are at the forefront of semiconductor R&D and chip design. Major chip designers like NVIDIA and AMD are based in the US, powering AI and gaming advancements. The UK leads in semiconductor intellectual property (IP), with Arm Holdings providing chip architectures in most smartphones worldwide.

Asia dominates chip manufacturing. Taiwan, South Korea, Japan and China lead the way. Taiwan alone accounts for over 60% of global semiconductor production and 90% of the most advanced chips[12]. Taiwan Semiconductor Manufacturing Company (TSMC) - the world's largest contract chipmaker - holds more than half of the global foundry market, suppling industry giants like NVIDIA and Apple[13]. By 2030, China is expected to surpass Taiwan in semiconductor production[14].

Beyond manufacturing, the assembly, packaging and testing (AT) phase is even more concentrated. 90% of these processes occur in Asia, particularly in Taiwan and China[15].

Supporting this entire process are essential tools and materials from the Netherlands, the US, Japan, and Germany, forming the backbone of the global semiconductor supply chain.

GOVERNMENTS ACT

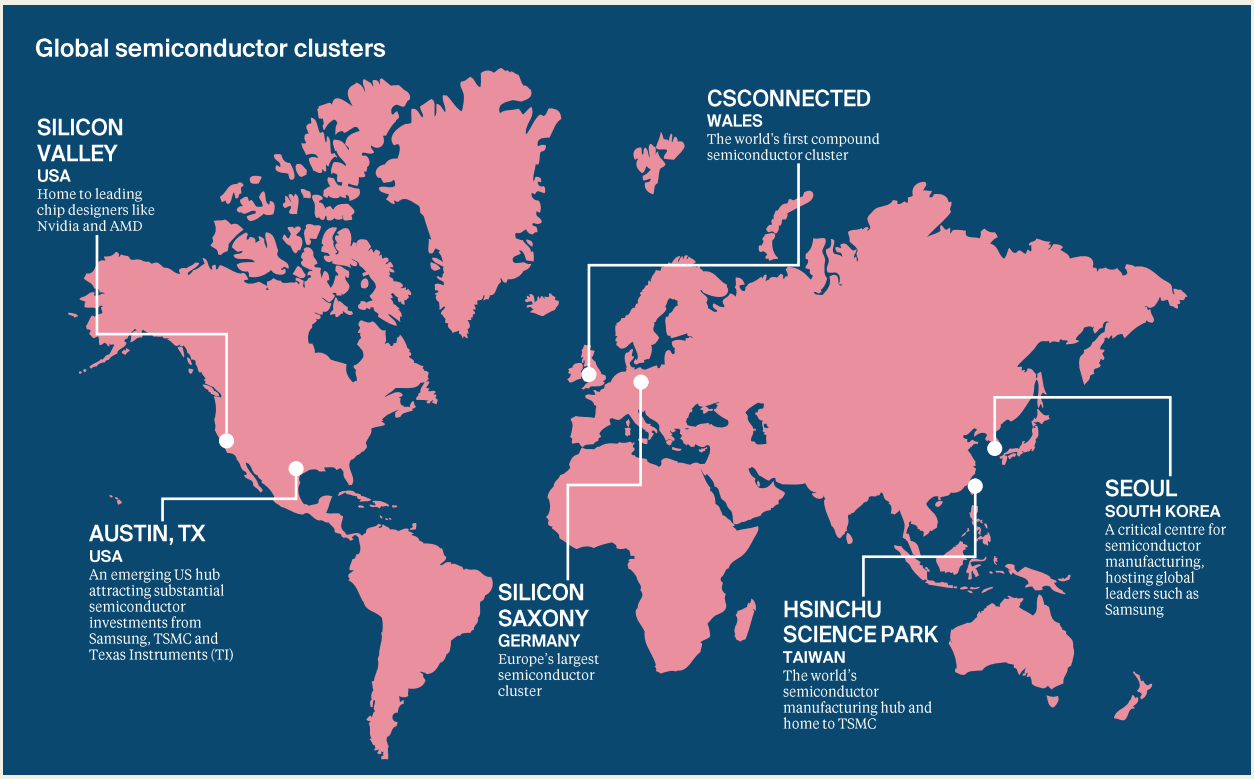
The heavy reliance on a single region poses significant risks. Geopolitical tensions, trade disputes or natural disasters could disrupt supply chains. During COVID-19, global chip shortages exposed these vulnerabilities, stalling industries and increasing prices across multiple industries.

In response, governments are racing to strengthen domestic semiconductor capabilities.

United States

The CHIPS and Science Act (2022) allocated $52bn for domestic semiconductor manufacturing and R&D[16], alongside tax incentives to attract private investment.

Two years later, $32 bn has funded new factories across 15 states[17]. Notably, TSMC received $6.6bn in funding for its third manufacturing plant in Arizona, set to begin production before the end of the decade[18].



However, future funding is uncertain. President Donald Trump advocates for tariffs over subsidies, potentially affecting long-term investment strategies.

Europe

The EU's €43 billion Chips Act targets doubling Europe's global market share to 20% by 2030[19]. The act prioritises research, manufacturing and skills development.

Major projects include STMicroelectronics' wafer plant in Sicily[20] and Infineon's €5bn Smart Power Fab in Dresden[21], a manufacturing facility designed for energy and water efficiency.

Yet, slow progress and fragmented funding threaten competitiveness, prompting calls for a streamlined "Chips Act 2.0".

United Kingdom

The UK's £1 bn semiconductor strategy focuses on its R&D, IP and compound semiconductors strengths rather than large-scale manufacturing[22]. Key investments include the £20m ChipStart incubator, backing startups such as Wave Photonics, which develops photonic chips for data centres and quantum computing[23].

The government also acquired a chip factory in Newton Aycliffe, County Durham. It remains the UK's only producer of gallium arsenide chips, critical for military technologies such as fighter jets[24].

Industry experts urge a greater focus on compound semiconductors and an open-access foundry to sustain growth.

THE REAL ESTATE OPPORTUNITY

Governments are investing billions to strengthen domestic chip production and innovation, fuelling demand for specialised real estate to support growth.

LOCATION MATTERS

Semiconductor firms thrive in hubs where universities and chip companies collaborate. Clusters foster innovation, attract talent and optimise supply chains, driving demand for prime real estate. Locations with strong transport links - motorways, rail networks and ports - help build resilient supply chains and boost asset value.

REAL ESTATE DEMANDS

The semiconductor industry relies on facilities tailored to each stage of production.

Chip Design and R&D Centres: Office and lab spaces are designed for researchers and engineers to collaborate and innovate. These areas must provide seamless access to cleanrooms, testing labs and high-performance computing infrastructure. Access to talent, research institutions and clusters is key.

Manufacturing Facilities (Fabs): Fabs need expansive floor space, substantial investment and temperature-controlled environments. Cleanrooms are vital to prevent contamination, supported by advanced filtration systems and ultra-clean air. Reliable access to power and clean water is critical to keep operations running smoothly. Raised flooring conceals essential infrastructure such as gas pipes, water lines and electrical systems.

Assembly and Testing (AT) Facilities: Unlike fabs, which demand ultra-stringent cleanroom environments, AT facilities require less rigorous cleanrooms - yet still essential for maintaining quality. For these operations, location is everything. Proximity to logistics hubs ensures rapid distribution. As

INDIA SPOTLIGHT: A GROWING MARKET

India is rapidly emerging as a semiconductor hub. Its market is projected to reach $110bn by 2030[25]. As firms diversify supply chains beyond traditional Asian hubs, India's strategic location, competitive labour costs and growing infrastructure make it a prime destination for high-tech real estate investments.

Recent investors include US chipmaking tool provider Lam Research, committing to invest over $1.2bn in the Indian state of Karnataka over the coming years. The company has signed an agreement with the local government to lease and eventually purchase a land parcel owned by the Karnataka Industrial Areas Development Board (KIADB), located in Whitefield, Bengaluru.

firms look to integrate AT earlier in the chip design process, the demand for AT facilities closer to R&D hubs is expected to increase.

Semiconductor investments can trigger broader demand for real estate, including local offices and logistics centres. In locations like Arizona and Dresden, the influx of workers has fuelled urban development, reshaping local economies.

SUSTAINABILITY PRACTICES

Semiconductor fabs are resource-intensive, consuming vast amounts of power, water and chemicals. As sustainability and efficiency remain top priorities, leading manufacturers are integrating innovative green technologies to reduce their environmental impact.

Micron's 1 million sq ft fab in Taiwan provides a blueprint for sustainable chip production:

- **Chemical Recycling** - Converts waste chemicals, like isopropyl alcohol, into reusable materials.
- **Water Reclamation** - Recovers 80% of water used during wafer processing.
- **Vertical Greening** - Incorporates nearly 200,000 sq ft of vegetation, regulating temperature and reducing energy consumption.
- **Renewable Energy** - Powered by solar, saving enough electricity for a small town.

As global demand for chips surges, sustainable practices will be crucial for balancing growth with environmental responsibility.

THE TALENT GAP

The industry faces a global talent shortage, with labour gaps already delaying the construction of TSMC's Arizona fabs[26].

According to Deloitte, one million additional skilled workers, including technicians and operations specialists, will be needed by 2030[27].

Governments are investing in training programmes to ensure talent pipelines have the necessary skills. In the short term, companies may rely on internationally skilled workers to bridge the gap, underscoring the importance of flexible immigration policies.

Well-designed workplaces with quality amenities helps employers attract and retain top talent.

SO WHAT?

The semiconductor boom offers more than multi-billion-pound fabs, which require significant capital. R&D centres, AT facilities and logistics hubs present accessible, high-value investments that attract long-term tenants.

As the industry expands, demand for supporting real estate - including housing, retail, and leisure - will likely rise, creating further opportunities for investors.

Infrastructure is fundamental. Properties with reliable power, water and transport links are set to attract demand. Investors can also capitalise on utility infrastructure and industrial parks supporting semiconductor clusters.

In emerging markets like India, government subsidies and a strong talent pool make semiconductor-related real estate an attractive investment.

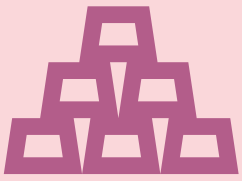
Strategic site selection near talent hubs and logistics corridors will allow investors to capitalise on a growing, government-backed sector while securing long-term value.

KEY TAKEAWAYS

1. Semiconductors, also known as chips, are essential for modern technology. They are the foundation of our connected world and are crucial for future technologies like AI and quantum computing.
2. The semiconductor industry is a globally interconnected ecosystem. The US and the UK lead in R&D and chip design, while Asia, particularly Taiwan, South Korea, Japan and China, dominates chip manufacturing.
3. Governments globally are investing heavily to strengthen domestic semiconductor capabilities. These initiatives aim to reduce reliance on a single region and mitigate risks.
4. The semiconductor industry's growth drives demand for specialised real estate, including R&D centres, manufacturing facilities and logistics hubs.
5. The industry faces challenges related to sustainability and talent shortages. Leading manufacturers are integrating green technologies to reduce environmental impact and governments are investing in training programs to address the talent gap.

Technological integration

Technological integration: the process of embedding advanced technologies into existing systems to improve performance, coordination and decision-making. Connecting tools and platforms that collect, process and apply information in new ways; unlocking insights, streamlining operations and maximising efficiency.

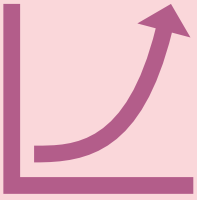


$18tn

in wealth will be intergenerationally transferred globally in the next five years

$303bn

Predicted market size of AI in real estate in 2025



$989bn

Predicted market size of AI in real estate by 2029

Why real estate must embrace technology in the face of global wealth transfer

Max Beard, Associate Innovation Architect at Knight Frank, and Jack Sibley, Head of PropTech and Innovation at Related Argent, explore the importance of technology-led strategies in an age of generational wealth shifts.

MB: The real estate industry stands at a pivotal moment. Across the globe, a generational wealth transfer is underway. Vanguard reports that by 2030, a projected $18tn in wealth will be transferred globally, the largest intergenerational transfer of wealth in history. As this younger, more digitally native generation becomes the dominant force in real estate investment and as consumers, expectations are shifting. Real estate is no longer solely hinged on location or square footage; it's increasingly about customer experience, connectivity and adaptability. Technology is not just a differentiator; it's becoming the baseline.

This transformation is visible across all asset classes. Property owners and developers are rethinking how buildings function, how they're managed and how they serve the needs of the occupants. One key driver of this shift is the prioritisation of lifestyle, wellness and convenience, all enabled by tech.

Take senior living in the UK as a case in point. With an ageing population and a growing emphasis on dignified, independent later life care, operators are deploying advanced technologies to support residents and increase operational efficiency. Developers are installing circadian lighting systems that mimic natural daylight patterns to regulate sleep cycles and improve cognitive function of their residents. Wearable technology can monitor residents' movement patterns, alerting staff to irregularities without intruding on privacy. These innovations enhance safety, reduce emergency incidents and offer peace of mind to families. Across other sectors, Internet of Things (IoT) technologies are transforming how buildings operate; smart HVAC and energy systems adjust based on occupancy data and weather forecasts, reducing costs and environmental impact.

JS: At King's Cross, a range of sensors tracking air quality, footfall, noise and biodiversity have been installed in buildings and across the public realm to help drive sustainability outcomes. Technology also improves the experience for office users beyond their building and into the wider estate. For example, a partnership with SevenRooms means office workers (and all other users of the estate) have access to a single interface where they can view and book available tables at restaurants across the estate.

Fundamentally, we won't be able to achieve many of our goals without technology. PropTech and innovation are lynchpins which power customer experience, sustainability and operational excellence across the estate.

MB: Importantly, tech isn't just about occupant experience and comfort, it is also about value creation. Smart buildings can command rental premiums and can have lower void periods. Predictive maintenance software can reduce downtime and capex by addressing small issues before they become major repairs.

Globally, we're seeing governments and investors favour "smart" and sustainable developments. For example, at the Diriyah Gate development, Riyadh, Saudi Arabia. The development is built in the traditional Salmani style and is a walkable city. Vehicles and utilities are located in a subterranean basement of roads, technology and services. This consolidation reduces surface level congestion for residents and the workforce alike. The super basement is not just an engineering feature; it's a foundational element of the city's smart and operational DNA.

For real estate players, the message is clear: technology is no longer optional. As wealth and influence shift to younger generations, technology-led strategies will be critical to attracting investment, enhancing user experience and unlocking sustained value in a rapidly changing world.

Harnessing innovation

Navigating the future of commercial real estate

AUTHOR
DAMU BASHYAM, BERKADIA

The commercial real estate (CRE) industry is experiencing a transformative shift, driven by technological innovation and evolving market dynamics. Success in this fast-paced environment now demands proactive adaptation and strategic use of cutting-edge tools. Advancements in real-time data analytics, automation, smarter workflows, and the rise of generative artificial intelligence (GenAI) are fundamentally altering the way real estate professionals approach their work. Technology isn't just changing the game but rewriting the playbook entirely, offering new opportunities and challenges for the industry.

The global AI market in CRE has grown from $222.65bn in 2024 to $303.06 billion in 2025 and is expected to grow to $988.59bn by 2029, at a compound annual growth rate (CAGR) of 34.4%[28]. This rapid expansion highlights the accelerating pace of AI adoption across the industry, as real estate firms realize the potential of technology to streamline operations, enhance efficiency, and uncover new valuable insights. GenAI, machine learning (ML), and automation are transforming the way professionals analyse and aggregate vast datasets from both private and public sources. These technologies enable companies to turn raw data into actionable insights, enhancing decision-making, improving overall performance. AI-powered platforms are transforming market analysis, forecasting and research, improving accuracy and speeding up processes by automating manual tasks. These tools also foster greater transparency among production teams, investors, borrowers, and lenders, enabling faster, more informed decisions. Research further supports the growing role of AI in refining investment strategies, with ML increasingly used to predict market trends and optimize portfolio management, ultimately enhancing investment outcomes[29].

In the multifamily sector, AI adoption is also gaining momentum. The National Multifamily Housing Council (NMHC) and National Apartment Association (NAA) report significant AI-driven innovations, such as dynamic pricing models, predictive maintenance, and enhanced resident experience tools. These solutions are helping property managers stay ahead of the curve, addressing the evolving demands of both residents and investors[30].

However, integrating these technologies into legacy systems remains a challenge. Many companies struggle with outdated infrastructure and lack scalable platforms to support innovation. Overcoming these hurdles requires a forward-thinking strategy focused on flexible, enterprise-wide architecture. Additionally, forming dedicated teams to manage the strategic implementation, governance, and ethical use of AI is crucial for aligning with business objectives and regulatory standards.

Looking ahead, the key to realizing the value of GenAI lies in the ability to measure its true value-add. While many companies are eager to implement AI solutions, success lies in identifying and scaling use cases that drive measurable and meaningful business outcomes. Companies that link AI adoption to tangible impact, such as improved efficiency, enhanced client services, and smarter investment strategies, will lead the next wave of industry transformation. One example of this is the development of prospecting assistants that combine AI capabilities with data platforms, helping CRE professionals identify new business opportunities and refine their strategies.

As technology continues to reshape the CRE landscape, those organizations that embrace innovative tools and adapt to technological changes will shape future market trends.

INDUSTRY VIEW

The critical role of quality real estate data for AI

Nick Wadge, Chief Technology Officer at Knight Frank, explains why data should be the solid bedrock upon which AI infrastructure can be built.

AI'S EXPANDING FOOTPRINT IN PROPERTY MARKETS

For the past few years, the use of AI has been rapidly expanding across all sectors, including real estate. Whether it's market forecasting, optimising portfolios or ensuring compliance with ESG targets, just about every tech company's salesperson will proudly (and perhaps somewhat disingenuously) tell you how their AI software improves their offering. However, as enthusiasm for these AI applications grows, so do cautionary tales and scepticism.

The effectiveness of any AI is only as good as the data feeding it. In real estate, we know that millions of pounds often hinge on decisions, and the quality and reliability of data inputs are fundamental to building trust in the insights that guide those decisions. In other words, if the data underlying an AI model is flawed, fragmented or biased, the model's output will be unreliable – a dangerous proposition when investment decisions or development plans are on the line.

"GARBAGE IN, GARBAGE OUT" STILL RULES

The real estate industry has long grappled with inconsistent data. Property records might be spread across hundreds of local registries, each updated at different intervals and with different data standards. Leasing and sales data might exist on thousands of spreadsheets or in siloed systems. As a result, property data can be filled with errors – incorrect square meterage, omitted maintenance records, or outdated occupancy rates. Feeding these fragmented and frequently inaccurate datasets into an AI model creates a classic "garbage in, garbage out" scenario. If an AI algorithm trains on flawed inputs, the resulting insights will, at best, be incomplete and, at worst, deeply misleading.

> *"The foundation of successful AI in real estate isn't the algorithm; it's the data."*

THE DATA QUALITY IMPERATIVE

AI systems don't possess any magic immunity to bad data – they amplify it. In practical terms, this means an AI model can't properly learn market dynamics if the inputs are flawed. Any AI's accuracy heavily depends on data quality, as biased or noisy datasets will inevitably lead to flawed predictions. Data are the ontological bedrock of AI. AI's outputs (recommendations, classifications, decisions, etc.) are not standalone entities but emergent properties that arise from the structure and quality of the data they are trained on. Without well-formed, relevant and representative data, AI lacks a coherent substrate from which to form anything meaningful. Treating AI as a magic layer to be applied after the fact without attending to the underlying data is like expecting your house to stay standing without solid foundations.

A DATA-DRIVEN FUTURE

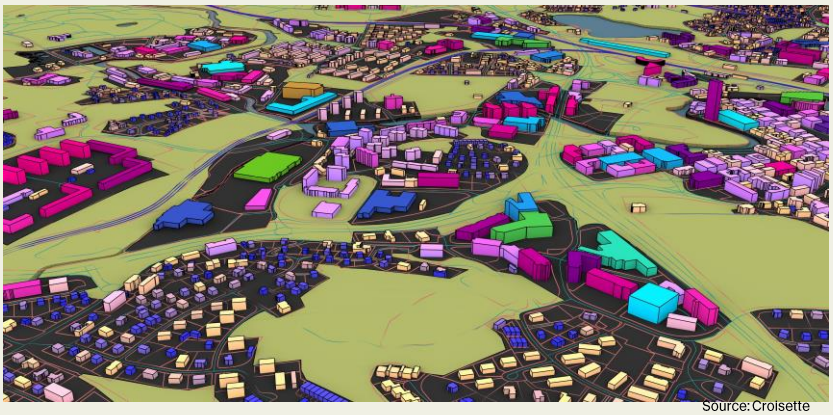
The real estate industry is on the cusp of an AI revolution, and standing still is going backwards. As we have seen, however, the true enabler of this revolution is high-quality data. When data are accurate, granular, and trustworthy, AI can unlock tremendous value, uncovering patterns we humans might miss and bringing new efficiency to an old industry. Conversely, AI will struggle or even backfire if data remains fragmented or inaccurate. It is critical to recognise this and act on it by investing in data quality; through standards, verification, and unified technology platforms. This paves the way for AI that consistently delivers reliable, unbiased insights to better service our clients.

The foundation of successful AI in real estate isn't the algorithm; it's the data.

Transforming real estate through data and technology

AUTHOR
OSSAMA GABRALLAH & ELVIS MIGLANS, CROISETTE

The real estate industry is undergoing a fundamental transformation. Traditionally driven by intuition, relationships, and slow-to-adapt methods, the sector is now embracing a new paradigm - one where decisions are powered by data, algorithms, and real-time multidimensional analytics. This shift is redefining how investors, developers, and advisors operate.



Source: Croisette

INTEGRATING TECHNOLOGY, DATA, AND LOCAL EXPERTISE

Modern real estate analytics now integrates vast volumes of structured and unstructured data - ranging from socio-economic indicators to environmental metrics - into coherent, actionable insights. By leveraging dozens of data layers containing millions of data points, real estate analysis can now offer granular intelligence on everything from market dynamics to micro-locational trends.

Tailored algorithms and machine learning models make it possible to simulate future scenarios, evaluate risk, and optimise asset performance. This multidimensional approach enables more informed decisions that align with long-term value creation and sustainability.

ADDRESSING LONGSTANDING CHALLENGES IN THE INDUSTRY

Real estate has historically faced three major constraints: technological inertia, location bias, and subjective decision-making. Data-driven systems mitigate these issues by providing objective frameworks for evaluation. The use of digital twins allows for scenario-based comparisons of locations and developments, highlighting hidden opportunities and exposing latent risks.

This evolution also supports increased transparency. Stakeholders can now quantify tenant compatibility, model financial performance, and assess ESG impacts. This reduces uncertainty and adds clarity to high-stakes decisions.

FROM INSIGHT TO IMPACT

Machine learning models applied to real estate development have shown remarkable ability to uncover opportunities that may not be evident through traditional methods. For instance, scenario-based analysis has been used to evaluate and compare hundreds of tenant configurations in mixed-use developments. The outcome: optimised occupancy strategies, higher rental yields, and reduced tenant turnover - all grounded in clear, data-backed rationale.

SUPPORTING BROADER MARKET FUNCTIONS

Advanced analytics is not confined to investment strategy alone. It plays a central role in transactional services, leasing, and valuation. By integrating datasets across geographies and sectors, platforms serve as internal engines of insight,

enabling professionals to navigate complex markets more efficiently. This approach is further strengthened through collaborations that expand the breadth and depth of data available, supporting cross-border comparisons and access to international benchmarks.

CASE STUDY: OFFICE ASSET POSITIONING - HELSINKI VS STOCKHOLM

The analytic process of two office properties located in Stockholm and Helsinki highlights the significance of external factors including macro and micro-location dynamics, trends of market rents, vacancies, and tenant demographics. The detailed assessments reveal key insights into competitive positioning, connectivity, and the suitability for targeted tenants by examining their mobility trends. This type of comparable-based approach is only possible through the utilization of big data frames, which help the investors and owners in quantifying the key strengths and opportunities for strategic improvement of their assets.

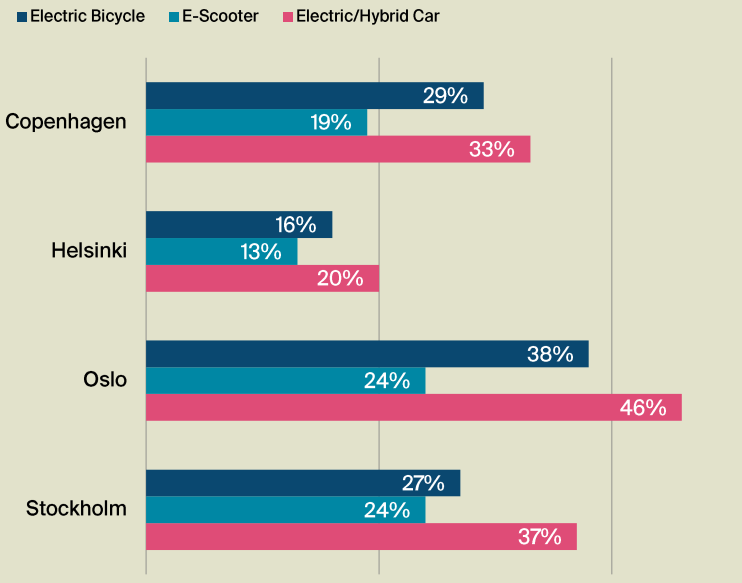
The systematic application of multidimensional data analysis enables an unbiased and objective comparison of the office market dynamics in Stockholm and Helsinki. Utilizing standardized data ensures consistency, highlighting clear differences: Stockholm's centralized structure, with 56% of jobs within 5 km of the city centre, supports high connectivity and lower car dependence. Conversely, Helsinki's dispersed layout, where only 34% of jobs are centrally located, shapes unique commuting behaviours and accessibility patterns, including higher reliance on public transport and walking. This method not only clearly differentiates the urban dynamics of both cities but also delivers actionable, fact-based insights critical for informed decision-making.

TOWARD A SMARTER, SUSTAINABLE REAL ESTATE ECOSYSTEM

The integration of research automation, big data analytics, and local expertise marks a turning point for the real estate sector. By shifting toward transparency, sustainability, and value creation, data-driven methodologies are establishing a new standard - one that is not only more intelligent but also more resilient in the face of a changing world.

Case study: data driven insights to inform amenity selections

Commuters using electric transport in Nordic capital cities, %



Source: Croisette

KEY TAKEAWAYS

1. Real estate decision making is undergoing a transformation, shifting from intuition and relationship drivers to data-driven decision-making powered by algorithms and real-time multidimensional analytics. This shift is redefining how investors, developers, and advisors operate.

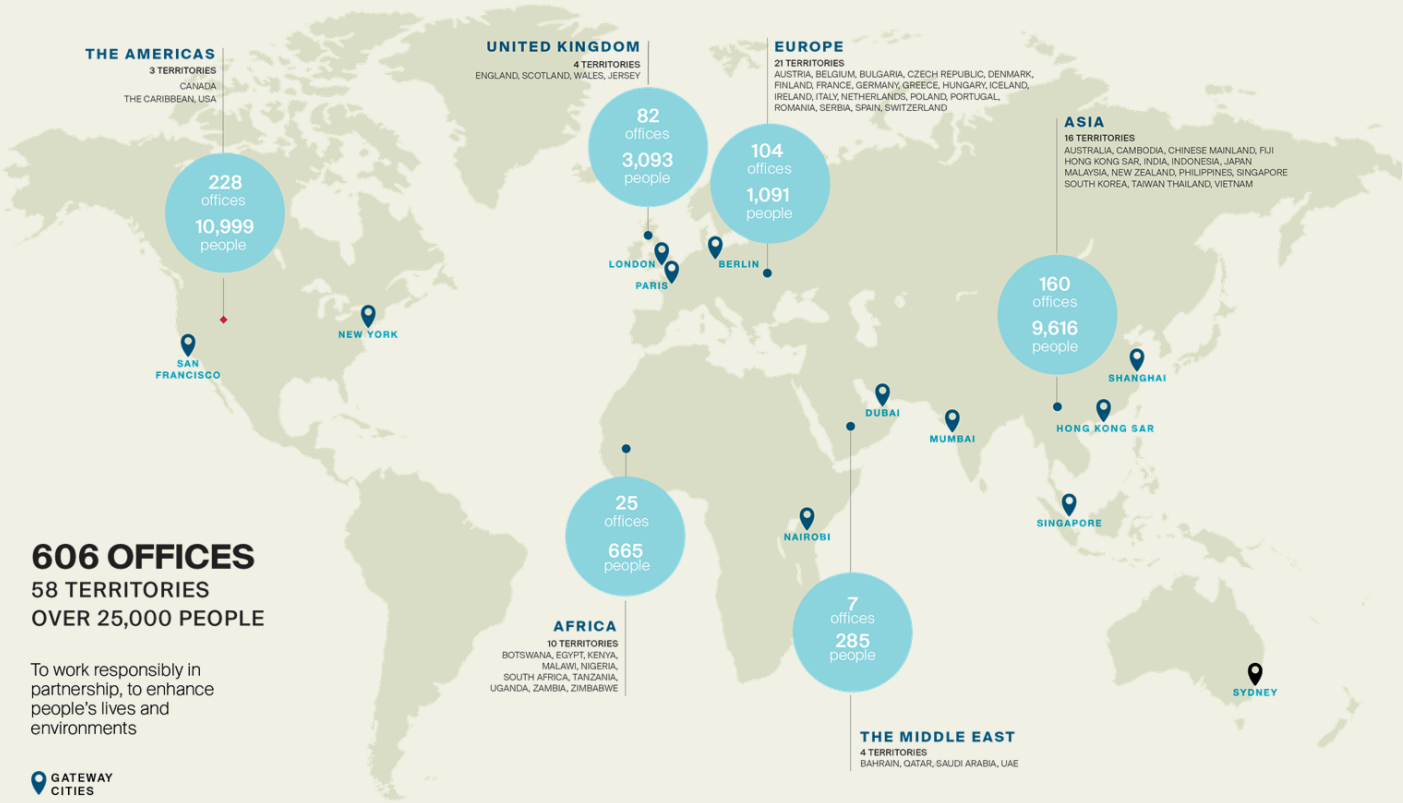
2. Modern real estate analytics integrate vast volumes of structured and unstructured data, into coherent, actionable insights, offering granular intelligence on market dynamics and micro-locational trends.

3. Data-driven systems mitigate technological inertia, location bias, and subjective decision-making, by providing objective frameworks for evaluation and increasing transparency.

4. Machine learning models applied to real estate development have shown remarkable ability to uncover opportunities that may not be evident through traditional methods, optimising occupancy strategies, rental yields, and reducing tenant turnover.

5. Advanced analytics play a central role in transactional services, leasing, and valuation. By integrating datasets across geographies and sectors, professionals can navigate complex markets more efficiently.

Our global network



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