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Global Infra, Tech, Utilities & Renewables, Cap Goods, Construction, Real Estate

Global Data Center Capacity Growth to Increase 6x

Given the surge in AI capex - led by the Big 4 US Hyperscalers - we introduce our Global Data Center Model, which projects worldwide data center capacity growth of +23% pa until 2030. However, our latest AlphaWise survey suggests energy is not the only constraint to building new / bigger data centers. Our new Global DC screen highlights stocks - by geography and sub-sector - exposed to this theme.

alphawise α

Key Takeaways

- Our AlphaWise survey identifies energy as the primary obstacle to building DCs, but constraints such as planning permission, supply of electricals and low carbon materials are not far behind.
- AI capex is surging led by the Big 4 US Hyperscalers - we expect their capital outlay to grow at +19% pa on a 5-year view (2024a-29e).
- We introduce Global DC forecasts. We expect +23% pa capacity uplift (by 2030e). The US represents 60% of growth, China rebounds, while UAE and KSA increase 6x-7x.
- Powering AI remains a core DC sector debate. While natural gas-fired DCs and repurposing Bitcoin sites will be key, nuclear is entering center stage (US, China, France).
- How to gain exposure to the theme? We present our cross-sector DC stock screen, along 8 geographies and 8 sectors.



Tech Diffusion

A Morgan Stanley Research Key Theme of 2025

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Europe

Industry View **Attractive**

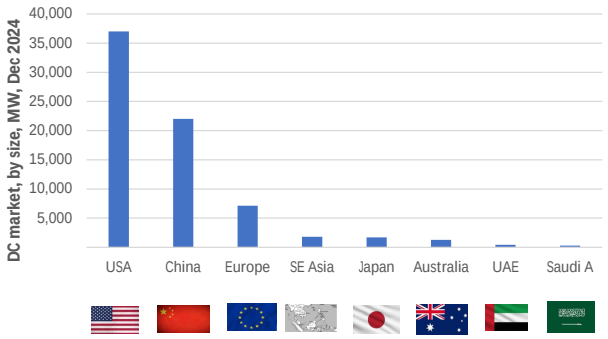
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Exhibit 1: Global DC Market by current capacity - this is set to increase sixfold by 2035



Source: Morgan Stanley Research

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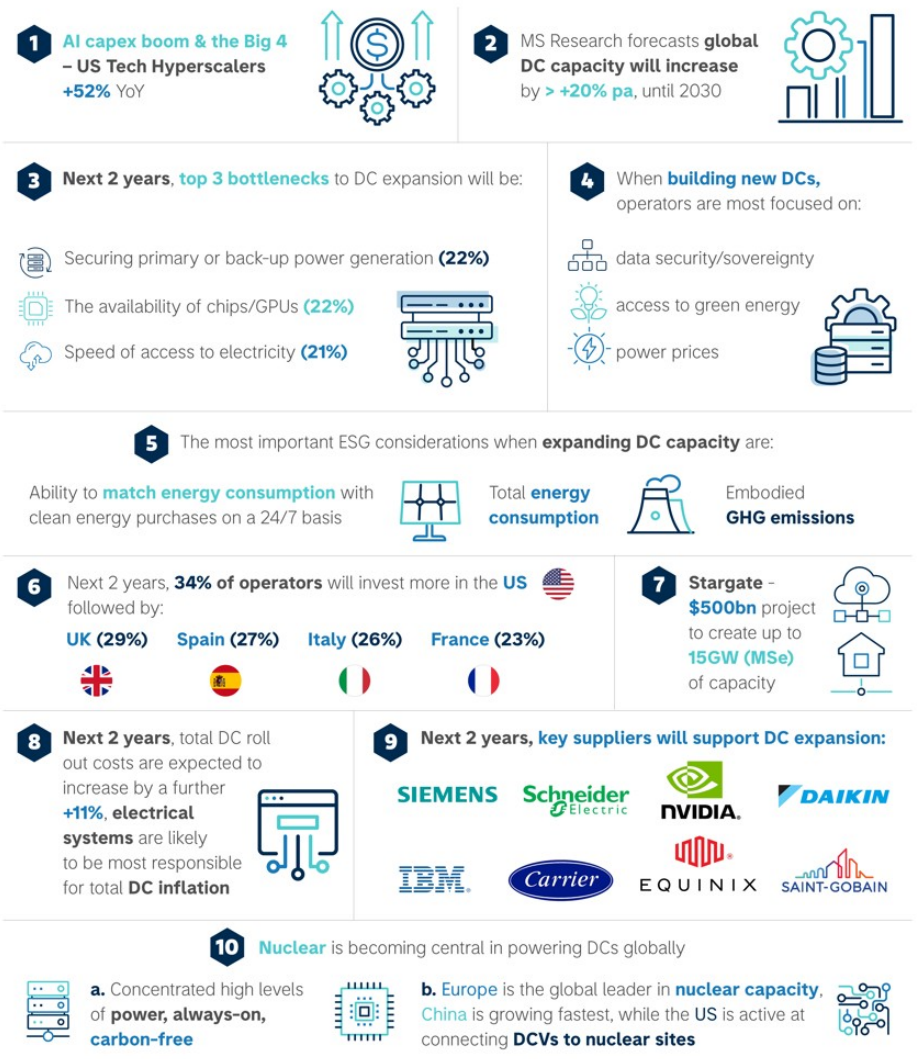
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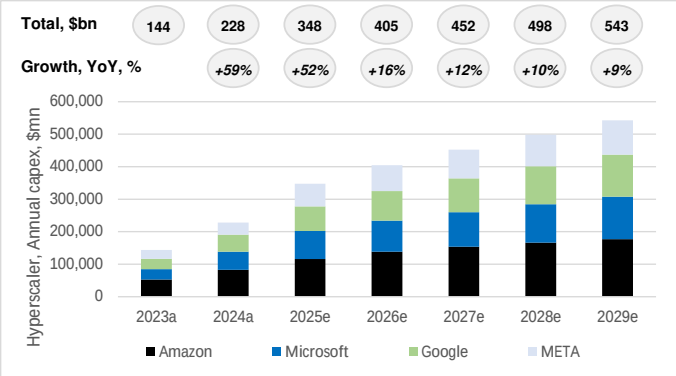
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The Story in Pictures



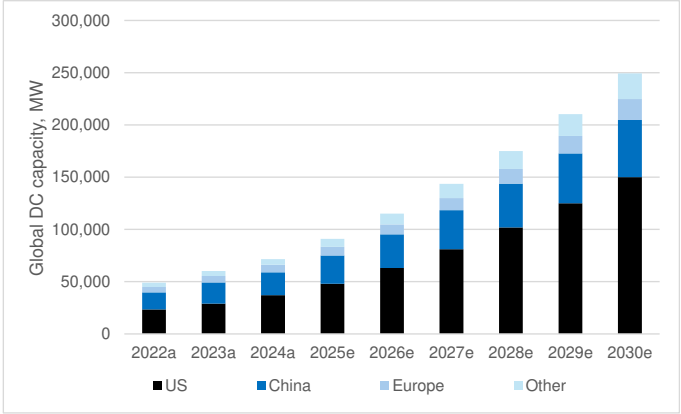
Six Key Charts

Exhibit 2: AI capex is surging led by the Big 4 US Hyperscalers … we expect their capital outlay to grow at +19% pa on a 5-year view (2024a-29e) …



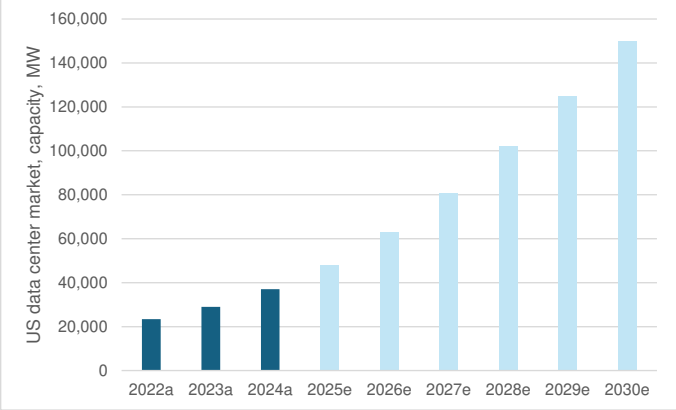
Source: Company data, Morgan Stanley Research estimates (e)

Exhibit 3: … which drives our *new* Global DC model, projecting worldwide capacity growth of +23% pa, until the end of the decade…



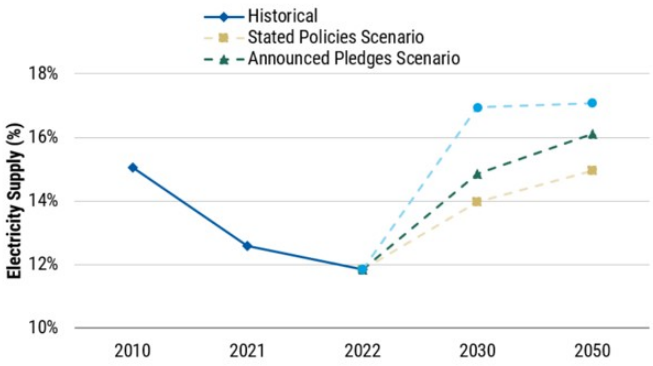
Source: Company data, Morgan Stanley Research estimates (e)

Exhibit 4: …this is led by the US, where we forecast that data center capacity will grow by +26% pa until 2030e …



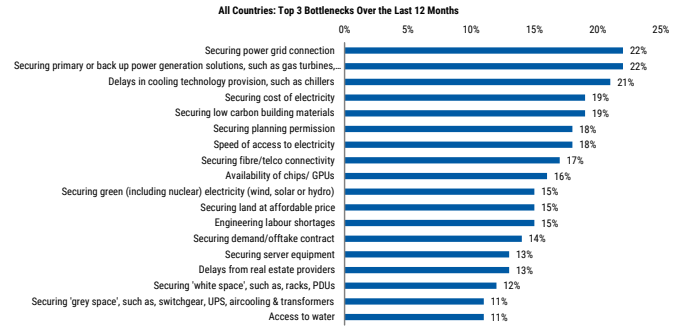
Source: Company data, Morgan Stanley Research estimates (e)

Exhibit 5: ..and the nuclear energy supply is expected to increase and power the DC growth, as DCs consume c 2% of global energy today, with this figure expected to increase >5x by 2035 (MSe) …



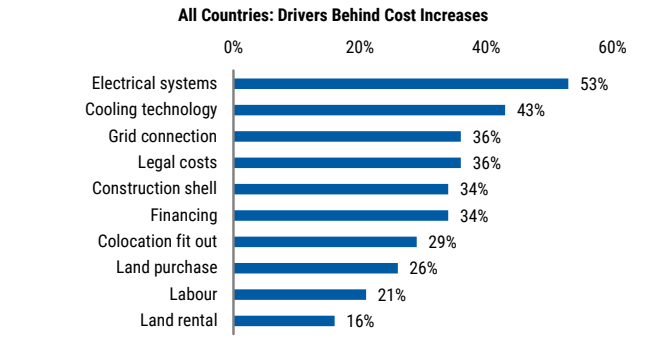
Source: IEA

Exhibit 6: … but a long list of bottlenecks has been identified in DC expansion, not just energy …



Source: AlphaWise, Morgan Stanley Research

Exhibit 7: … while costs for DC build are pushed higher by a wide array of factors.



Source: AlphaWise, Morgan Stanley Research

Executive Summary

Why write this note? It has been a very eventful 12 months in the global AI / data center sphere. Key recent events include the launch of Stargate (a potential 15 GW Supercomputer), France's AI Summit, US President Trump's recent visit to the Middle East (which triggered a number of AI/DC-related announcements, incl. the creation of *HUMAIN*), Meta's increased DC efforts, and the planned re-opening of Three Mile Island (a nuclear facility in Pennsylvania) to power Microsoft DCs. Meanwhile, US Tech Hyperscalers have been ramping up their projected capex spend, very meaningfully (we expect the Big Four will spend >$345bn this year, +52% YoY). However, there have also been a number of speed-bumps - geopolitics, delays in Europe (DC moratorium), the '*DeepSeek moment*' and GPU / AI chip supply. Our research takes all of these factors into account, to introduce our new Global DC forecasts across eight geographies. We also update our European data center capacity forecasts.

What are the obstacles to building new / bigger data centers? We have conducted proprietary AlphaWise surveys (in the US and Europe and across both DC owners and suppliers) to identify key stumbling blocks to expanding DC capacity. Energy is a well-known constraint (consensus view). However, our survey feedback suggests other factors (supply of cooling technology, energy prices etc) are almost equally important.

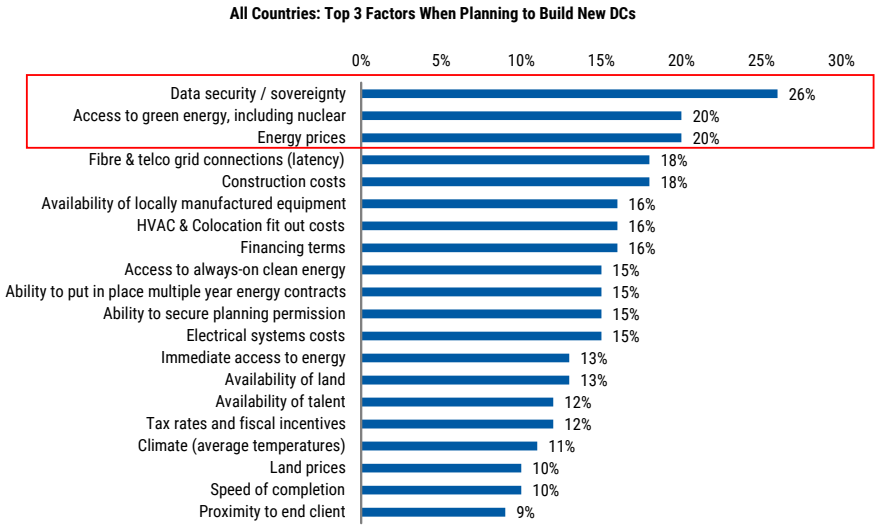
Which stocks will be impacted? Morgan Stanley Research has collaborated across sector and geography to present our Global DC stock screen.

This note digs into five current key debates on Data Centers:

1. What are the greatest logistical constraints to building out DCs / AI in both the US & Europe?

It's not just about power - Our proprietary AlphaWise survey suggests energy is not the only obstacle to building new / bigger data centers. Our AlphaWise survey (DC operators and suppliers, across the US and Europe) highlighted that, over the next two years, energy supply is expected to be, by some distance, the primary obstacle to DC build (this result was exactly as expected). However, perhaps more interestingly, the survey suggests that securing planning permissions, and provision of low carbon building materials, are now also meaningful obstacles. When building new DCs, operators tend to be most focused on data security/sovereignty, access to green energy and power prices. Over the past 12 months DC roll-out costs have been rising (ca +10%), with electrical systems most responsible for cost inflation. Over the next 2 years, this theme is expected to prevail, with total DC roll-out costs projected to increase by a further +11% pa, on average. Sustainability remains a key focus for DC operators, with the main ESG consideration among operators being the ability to match energy consumption with clean energy purchases on a 24/7 basis.

Exhibit 8: Top 3 factors when planning on building DCs (US, UK, Italy, Spain and Norway)



Source: AlphaWise, Morgan Stanley Research

2. Is global data center build-out across the Globe as robust as previously thought (US, Europe and China)?

Commentary from key players on the trajectory of DC/AI growth remains reassuring - and the capex numbers keep growing. We have collated a large volume of qualitative and quantitative data on DC roll-out, from both corporate and geographic perspectives (Exhibit 38). **i.** Our recently updated cloud capex tracker now points to +43% YoY growth in 2025 (Exhibit 40), up markedly from the forecast of +31% at the end of March. We now predict the *Big 4* will see capital outlay of >$345bn this year (+52% YoY, Exhibit 39); **ii.** According to Amazon CEO Andrew Jassy (Q1 results call): "*Our AI business right now is a multi-billion dollar annual run rate business that's growing triple-digit percentages year-over-year. And as fast as we actually put the capacity in, it's being consumed … We plan to bring on an increasing amount of capacity in the back half of the year*'" **ii.** Meta's Q1 print included a capex guidance raise, with a new FY capex outlook of $64bn-$72bn (vs $60-65B previously, a rise of +9% at the mid-point). Perhaps equally interestingly, we expect Meta capex to continue to grow by +10% pa until 2028; **iii.** At its Q1 results print, Nvidia noted that inference demand is very strong and is not being met - for every Hyperscaler delaying a building, three more take its place. According to Nvidia: "*We are under-earning, GB200 numbers will keep getting revised upwards, and some China revenues will materialize*"; **iv.** US President Trump's recent visit to the Middle East coincided with a number of AI-related announcements. In KSA, a JV between AWS and PIF-backed HUMAIN, will oversee the roll-out of up to 500MW of DC capacity via investments of $5bn in AI (beyond the $5bn AWS had previously committed to invest, in 2024). In the United Arab Emirates, UAE Stargate was unveiled, a 5GW facility to be built in Abu Dhabi by G42. **v.** France hosted *The AI Action Summit* in February. The European Commission announced the launch of *InvestAI*, to mobilise €200bn of investments in AI. Furthermore, the French government announced €109bn of AI-related projects.

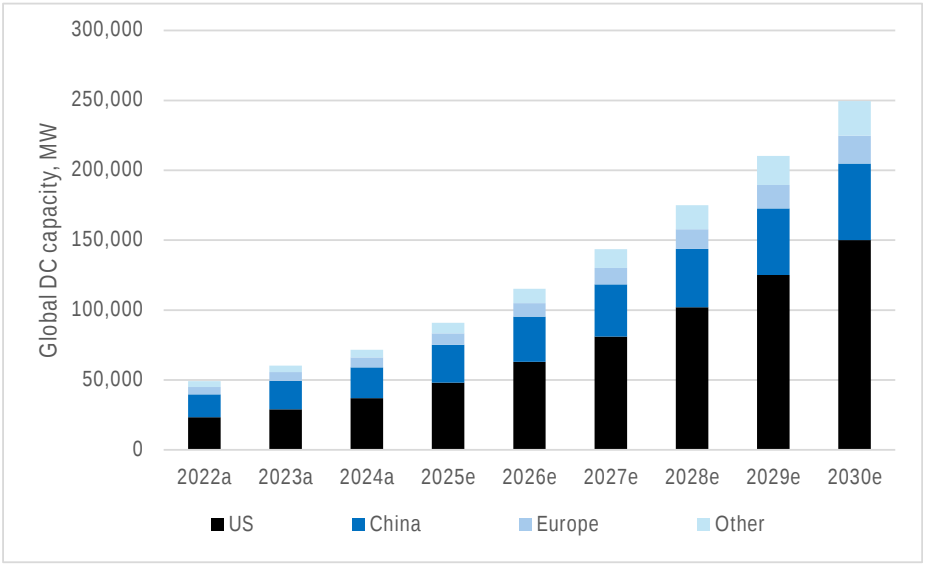
3. What are the latest developments on powering DCs / AI & could nuclear energy / bitcoin conversion / natural gas powered plants be of growing importance?

Nuclear could enter center stage in powering AI. At present, DCs consume just ca 2% of global energy - but we expect this figure to increase >5x by 2035. At the most extreme level, DCs already consume ca 25% of the Irish grid. At our recent US TMT Conference (San Francisco, March 2025), OpenAI's Founder Sam Altman noted the following: *"Power is the limiting factor"* for AI progress / building data centers. Mr Altman also noted that *"the cost of intelligence should converge to the cost of energy"*. We continue to forecast a power bottleneck in the US totaling 45GW through 2028. More encouragingly, we do see a handful of important 'de-bottlenecking' solutions: re-purposing Bitcoin mining sites, off-grid natural gas-fired data center complexes using power turbines and fuel cells, and nuclear. We believe that nuclear energy is poised to play a central role in the Powering AI debate - which is unsurprising, given its highly-concentrated and stable levels of energy, always-on power stream, and carbon-free footprint. Indeed, in May 2025, US President Trump ordered the nation's independent Nuclear Regulatory Commission to "*cut down on regulations and fast-track new licenses for reactors and power plants, seeking to shrink a multi-year process down to 18 months*". In September 2024, it was announced that Constellation Energy would restart the nuclear facility at the Three Mile Island plant, and sell the nuclear energy to Microsoft, for powering DCs / AI purposes. Meanwhile, Meta has signed a 20-year PPA for the nuclear output of the Clinton Clean Energy Center (owned by Constellation Energy) - equating to 1.1GW of emissions-free nuclear energy, as of June 2027. We believe that nuclear could also play a key role in French DC/AI expansion. Indeed, when announcing its 1GW super-computer project, Fluidstack noted (link here): "*The new facility will leverage France's abundant, carbon-free, and predominantly nuclear energy*".

4. What are our latest forecasts for global DC growth?

We introduce our Global Data Center Model, which projects worldwide data center capacity growth of +23% pa until 2030. i. We collaborated across multiple geographies to build a global DC model, collating figures from 8 large DC markets. **ii.** The US is, by some distance, the largest DC market in the world - accounting for 37GW of capacity (>60% of the global total, having realised ca +30% YoY growth during 2024a). These stats are unsurprising, given global AI leadership, the home / presence of the Hyperscalers, availability of capital etc. Moreover, the US will account for ca 65% of global DC growth until the end of the decade, we forecast - again hardly unexpected, given Hyperscaler growth, the roll-out of projects such as Stargate (potentially 15GW), possible access to nuclear energy etc. **iii.** We also project very strong capacity uplift in China (the world's 2nd largest DC market), with growth of +16% pa until 2030e (a nice acceleration vs the +9% realised last year), with secondary markets playing a core role. **iv.** Our forecasts imply Chinese capacity reaches ca 42GW by 2028. We forecast particularly strong growth in Middle Eastern DCs, with the UAE and Saudi DC markets to grow 6x and 7x by 2030e, respectively. **v.** Europe lags the US and Chinese DC markets, by some distance (absolute levels and growth). Indeed, our estimates for European DC capacity fall, by an average of -15%, due to weaker growth during 2024a, planning permission delays (FLAPD), challenges to access renewable energy, the slow-down in Ireland (Europe's second largest DC market) etc. However, with new markets emerging (Aragon, North of France, Berlin, Milan, Zurich etc), and a potential boost from data sovereignty, we believe that capacity growth will accelerate to +19% pa (24a-30e, CAGR), from the mere ca +13% reported last year.

Exhibit 9: Global DC forecasts - we project worldwide capacity growth of +23% pa, until the end of the decade (with global DC capacity rising 6x by 2035e)



Source: Morgan Stanley Research estimates

Where could we be wrong? **i.** Limited access to (clean) energy could curtail DC growth; **ii.** Hyperscalers could scale back AI ambitions, if financial returns fail to meet expectations (GenAI Monetization – Assessing The ROI Equation); **iii.** Slower planning permission may delay DC roll-out; **iv.** Supply-side constraints may persist – from chips to cap goods; **v.** Input cost inflation may lead to projects being scaled back or cancelled.

5. What are the implications by sector?

5. We present our Global DC screen highlighting stocks - by geography and sub-sector - exposed to the data center theme. Our screen comprises eight geographies (US, China, Europe, Japan, ASEAN, South Korea, UAE, KSA). Meanwhile, our DC/AI-relevant sectors include real estate, construction, cap goods, infrastructure, utilities, energy & renewables, tech (hardware, software, internet) and telcos.

Exhibit 10: Global DC stock screen

				ASEAN / Australia				
Hyperscale	amazon, Google, Microsoft, Meta	Alibaba, Tencent						
Infra, co-location	EQUINIX, DIGITAL REALTY, DIGITALBRIDGE	VNET, GDS万国数据			SK Telecom, kt, LG U+			
Cloud	ORACLE, DigitalOcean, IBM, CoreWeave	Baidu百度	IONOS, WIIT		kakao, kt, NAVER		OMIS	
AI, Network, Optical	NVIDIA, CISCO, ciena, ARISTA	中际旭创	arm, Infineon, NEBIUS					
Power & Renewables Development	SEMPRA, VISTRA, TALEN, nrg, TC Energy, aes	CGN, NARI	ENGIE, Ørsted, RWE	TENAGA NASIONAL, agl, sembcorp, GULF, ptt	KEPCO	ADNOC		Hokkaido Electric Power Co., Inc.
Building, Real Estate	HOLCIM, BELIMO, SEGRO, Kingspan, SKANSKA, ACS, MERLIN			Goodman				
Cap Goods, Telcos	VERTIV., EATON, GE VERNOVA	Envicool, WEICHAI	legrand, Schneider Electric, SIEMENS energy	Singtel	SK Telecom, HD, LG U+, kt		stc	HITACHI, Fuji Electric, MITSUBISHI
Private Equity & Financials	Blackstone, BlackRock, Brookfield, ARES, APOLLO, KKR	中国人寿, PING AN	EQT, CVC, PARTNERS GROUP, Bridgepoint	Infratil			BSF Capital	

Source: Morgan Stanley Research

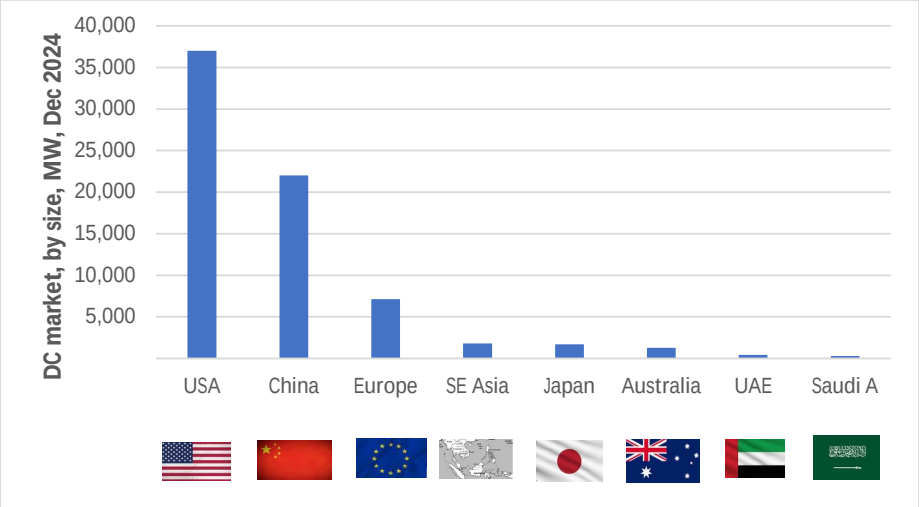
Background: Strong DC growth prevails, but the tone has changed

Cloud & AI continue to drive significant growth in data center capacity

MS Research has written extensively about Global data centers (DCs) and the capital-intensive cost of building AI infrastructure.

- Our Global Infrastructure & Tech research outlined very strong growth potential in Global DC industry capacity*, driven by *three* factors: **i.** Cloud; **ii.** AI; **iii.** Data sovereignty (notably in Europe and the Middle East). This research also showcased the industry-overlapping nature of data center build - including real estate, cap goods, construction, utilities, energy, renewables, and of course Technology;
- Our work on Powering AI has highlighted how access to green energy remains the primary bottleneck to building more DC capacity, in the US & Europe (chip supply is the main obstacle in China, not power). We have identified a number of 'de-bottlenecking' solutions including re-purposing of Bitcoin mining sites, off-grid natural gas-fired data center complexes (power turbines and fuel cells) and access to nuclear power plants;
- Our H2 2024 Global DC report highlighted the potential for particularly strong DC growth in secondary DC markets, across the US (e.g. Texas, Nevada, Tennessee, Mississippi, Indiana, Wisconsin) and Europe (e.g. Spain, Milan, Zurich, Marseille, Warsaw, Scandinavia) - driven by the greater availability of (green, cheaper, readily-available) energy, easier planning permission, cheaper real estate, cooler climate (Northern Europe) and AI-business-friendly government initiatives. We are also seeing new DC markets emerge in Saudi Arabia (Jeddah and Dammam) and China (Northern China - Ulanqab in Inner Mongolia, Datong in Shanxi).

Exhibit 11: Overview of the global DC market, by capacity



Source: Morgan Stanley Research

Overview - a number of shifts in the tone of the DC/AI debate

Background

It has been an extremely eventful 6-9 months in the global data center market. Key events include the planned re-opening of Three Mile Island (nuclear facility in Pennsylvania, to power Microsoft DCs), the '*DeepSeek moment*', the launch of Stargate (a potential 15 GW Supercomputer), France's AI Summit, and President Trump's recent visit to the Middle East (Saudi Arabia and UAE, including the creation of *HUMAIN).*

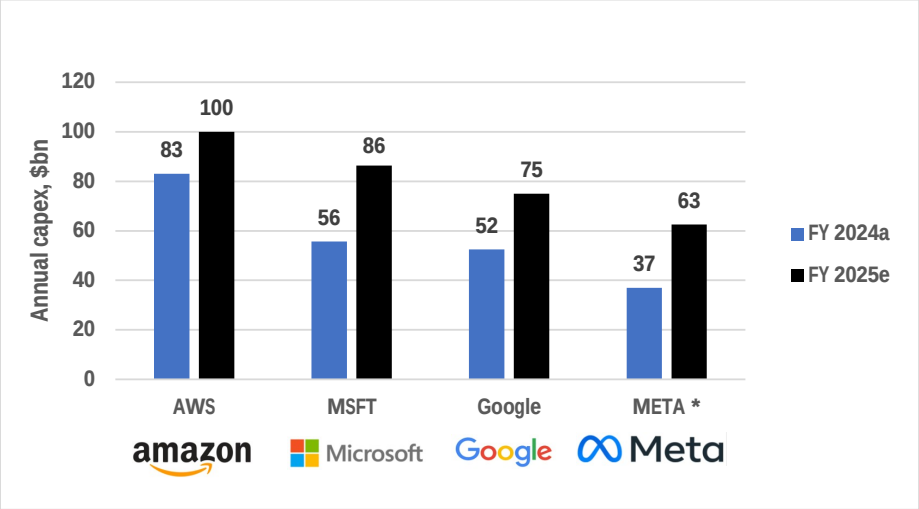
Moreover, we believe that AI is beginning to penetrate the mass market. Our proprietary AlphaWise survey indicates that ~14% of Americans aged 16+ use ChatGPT, Gemini, and/or Meta AI daily, up from 11% six months ago, with 40% using them monthly (research link here).

From the January 2025 AI capex boom …

At the beginning of 2025, capex announcements from US Tech Hyperscalers (and other Tech companies) suggested to us that global DC & AI investment plans remained robust and were in fact accelerating:

- Amazon announced that its capex would total $100bn this year (representing a ca +20% YoY increase, vs $83bn spent in 2024a);
- Microsoft >$85bn in capex and capital leases in FY 2025e (MSe $86.3bn), with considerable spend on AI / DCs / infrastructure;
- Google unveiled its intentions to spend $75bn on capex this year (a +43% YoY rise). Interestingly, Google had previously not issued capex guidance; *while*
- Meta outlined capital outlay plans of $60bn-$65bn for FY 2025e (vs $37bn for FY 2024a, with a further upgrade announced at Q1).

Exhibit 12: FY 2025 capex guidance (AWS, MSFT, Google and Meta) suggested that global DC AI investments were accelerating very sharply



Source: Morgan Stanley Research estimates

… to a number of question marks …

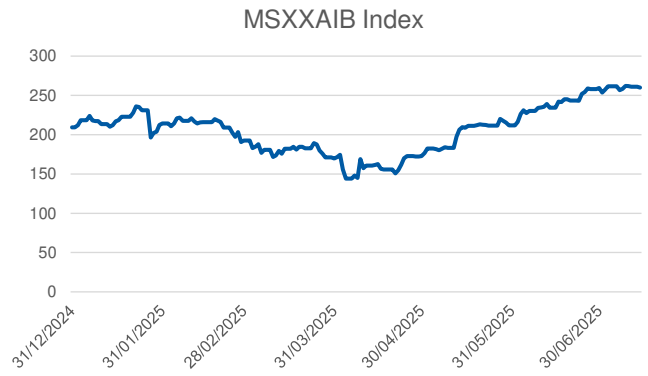
However, since February/March, we have noted increased investor / corporate / media debate, regarding whether a data center / AI industry 'bubble' has emerged. Key drivers of this 'bubble' debate include:

- **The DeepSeek moment.** In January 2025, DeepSeek, a Chinese AI startup, released two AI models (DeepSeek-R1-zero and DeepSeek-R1). These models explored the potential for LLMs to develop reasoning capabilities without any supervised data, focusing on self-evolution through a pure reinforcement learning process. The low cost (DeepSeek-v3 trained for just $6mn) and compute (just 2.8mn H800 GPU hours vs ~30.8mn H100 GPU hours for Meta's Llama 3 405B) raised question marks about the $bns being spent by US Tech Hyperscalers on AI applications;
- **Microsoft.** According to articles in Bloomberg, the US Tech giant scaled back DC projects in both the US (Ohio, North Dakota) and Europe (London). In January 2025, the city of Heath (Ohio) signed an agreement with Microsoft to offer infrastructure including roads and water connections for a planned DC in Heath. However, in late March, Microsoft disclosed it would halt the projects in Heath and two nearby cities. At other locations (Wisconsin, Jakarta), the Seattle-HQ'ed company has paused DC construction on land it owns;
- **Stock market turbulence.** Many investors / observers assume that heavy stock market declines seen in April 2025 would see Hyperscalers / Tech companies postpone (or even cancel) capex decisions;
- **Alibaba comments.** On 25 March 2025, Joe Tsai (Chairman of Alibaba) noted that he is starting to observe the beginning of a bubble in data center build-out (Source: Bloomberg). Mr Tsai believes the pace of construction of DCs may outpace the initial demand for AI services. He also noted that the erection of server bases in the US and Asia appeared indiscriminate, with many projects built without clear customers in mind;
- **Geopolitics and Tariffs.** Higher tariffs / escalating trade wars could increase the cost of building DCs (importing chips, cap goods etc), meaning investments are delayed / scaled back;
- **Multipolar World / Slowbalisation.** This may see US Hyperscalers invest more at home (rather than internationally / in Europe);
- **Potential recession.** An economic recession could see AI investment levels curtailed.

...to a more re-assuring outlook, once again (strong bounce since early April)

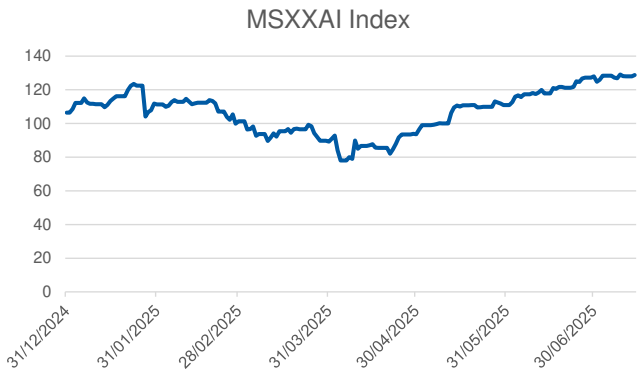
We note that two core AI baskets - our MS Broad AI basket and AI Tech Beneficiaries basket - have bounced strongly since the early-April 2025 lows.

Exhibit 13: The AI Tech Beneficiaries basket includes Semis, Networking and Storage names



Source: Bloomberg

Exhibit 14: MSXXAI is MS' broad AI basket, covering AI Tech, AI Power and the Hyperscalers



Source: Bloomberg

We have seen a long list of positive AI-related milestones / announcements in recent months:

- We have raised our capex forecasts for Hyperscalers. Our recently updated cloud capex tracker now points to +43% YoY growth in 2025, up +4ppts from just a month ago and from the forecast of +31% at the end of March. Meta raised its capex guidance, and is potentially seeking partners to co-fund AI/DC investments;
- Construction of the 15GW Stargate project has already begun in Texas;
- In early May, President Trump visited the Middle East, which triggered a number of AI/DC-related projects; *while*
- In early July, Nvidia reached $4trillion of market capitalisation.

Q1. What are the key constraints to building DCs?

We conducted *two* AlphaWise surveys to gather insights from DC operators and their builders & suppliers on the key challenges in building out DCs, how input costs are evolving, the market shares of the dominant suppliers in the space and how this might change in the future. Our surveys covered the US and four European countries (UK, Italy, Norway, Spain).

Key takeaways from our AlphaWise surveys include:

- Over the next 2 years, **energy is expected to be, by some distance, the primary obstacle in DC build** ...
- … but it's not just about access to energy/power - **planning permissions and provision of low carbon building materials are now also key obstacles.**
- Over the past 12 months DC roll-out costs have been rising (ca +10%), and **1 in 2 operators believe that electrical systems are most responsible for cost inflation** ...
- ... over the next 2 years, this theme is expected to continue, with **total DC roll-out costs projected to increase by a further +11% pa**, on average.
- When building new DCs, Operators tend to be most **focused on data security/ sovereignty, access to green energy and power prices**.
- For **builders & suppliers challenges continue to center around power**, in line with DC operators surveyed.
- **Sustainability remains a key focus for DC operators**, with the main ESG consideration among operators being the ability to **match energy consumption with clean energy purchases** on a 24/7 basis.

~~Exhibit 15~~: AlphaWise Survey

Primary Research

See what others don't.

1) Data security/sovereignty, access to green energy and energy prices are the most important considerations for operators when building new DCs. Over the next 2 years, operators believe the main bottlenecks will be: securing primary or back up power generation, availability of chips/GPUs and speed of access to electricity. 2) Capacity has increased by an average of 5% over the last 12 months and could increase by 9% in the next 2 years. In the next 2 years, 34% of operators say they will invest more in the US, followed by the UK (29%), Spain (27%), Italy (26%) and France (23%). 3) In the next 2 years, operators believe that total DC costs will increase by an average of 11.48%, with electrical systems most responsible for total DC cost increases, followed by cooling technology and grid connection. For builders & suppliers, DC related building & supply costs are expected to increase by an average of 14% in the next 2 years.

Methodology

In March 2025, we carried out 2 surveys (with a total sample size of 473) to understand DC expansion over the next 2 years in the US and Europe.

DC Operator Survey

We carried out a total of 239 online interviews with senior procurement & sourcing decision makers at data center operators.

Sample size by country: US: 52, UK: 54, Italy: 52, Spain: 52 & Norway: 29

Sample size by procurement responsibility: DC builders: 136, Construction materials: 96, Electrical systems: 122, HVAC/Mechanical systems: 133 & Colocation fit out: 89

DC Builders & Suppliers Survey

We carried out a total of 234 online interviews with senior sourcing decision makers at data center builders & suppliers for data center operators.

Sample size by country: US: 57, UK: 48, Italy: 48, Spain: 49 & Norway: 32

Sample size by supplier type: DC builders: 134, Construction materials: 118, Electrical systems: 134, HVAC/Mechanical systems: 129 & Colocation fit out: 77

Team behind the analysts.

AlphaWise Primary Research gathers alternative data and generates unique insights via an innovative analytical and visualization platform.

Source: AlphaWise

There have been many bottlenecks to building new DCs (not just energy)…

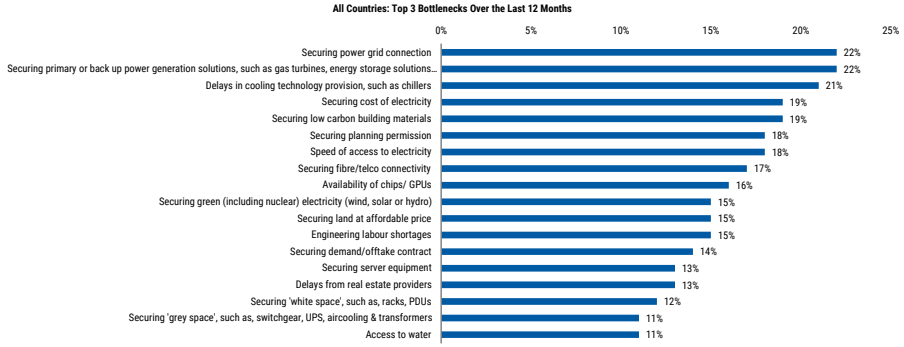
When looking at the building of new DCs over the past 12 months, our AlphaWise survey identifies a long list of almost-equally-important bottlenecks. Securing power grid connection (an un-surprising result) and securing primary or back-up power solutions (designated to be equally important) top the list, closely followed by delays in cooling technology provision.

Interestingly, a number of further bottlenecks were cited as being almost as important (as power supply):

- Securing the cost of electricity;
- The provision of low carbon building materials;
- Planning permission; *and*
- Speed of access to electricity.

Essentially, there are many sources of bottlenecks to DC expansion, not just electricity.

Exhibit 16: DCs have identified a long list of bottlenecks when building DCs over the last 12 months



Source: AlphaWise, Morgan Stanley Research

Geographically, there were varying responses by the DC operator community (outlined in Appendix 2):

- **US:** Securing fibre/telco connectivity (31%) was cited as *the* primary bottleneck (not securing energy);
- **UK:** Securing the cost of electricity (31%) and the power grid connection (30%) were almost equal obstacles;
- **Italy:** A shortage of engineering labour (25%) was the main issue;
- **Spain:** Securing planning permission was the primary bottleneck (31%);
- **Norway:** The two main challenges were securing primary or back-up power (34%), while the availability of chips/GPUs was the number two potential stumbling block (31%).

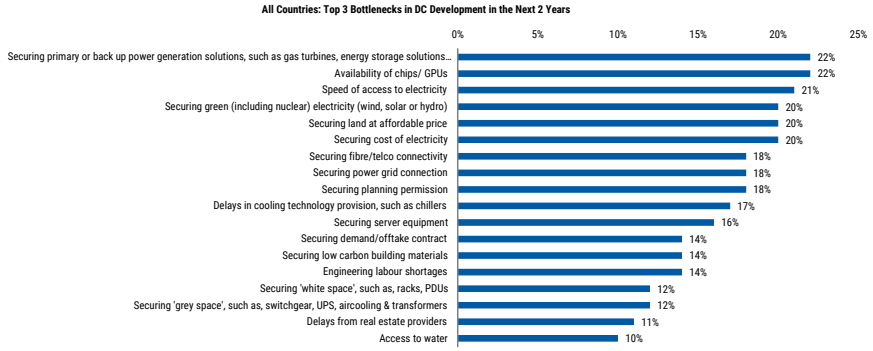
… although energy is expected to emerge as the main obstacle over the next 2 years

Over the next 2 years, DC operators predict that the Top 3 bottlenecks will be:

- Securing primary or back-up power generation (22%)
- The availability of chips/GPUs (22%); *and*
- Speed of access to electricity (21%).

Essentially, although we note a long list of future constraints, the most prevalent are likely to be very power-centric.

Exhibit 17: DC build: Sources of potential future bottlenecks (all five geographies)



Source: AlphaWise, Morgan Stanley Research

On a country-by-country basis, potential bottlenecks differ.

- **US:** The cost of securing electricity (29%) is predicted to be the biggest bottleneck, as well as speed of access to electricity (27%);
- **UK:** The major bottlenecks being experienced at present are expected to prevail over the next 2 years - securing primary or back-up power generation solutions (37%) is anticipated to be the leading constraint;
- **Italy:** Present constraints are expected to be sustained, i.e. a shortage of engineering labour (31%);
- **Spain:** Securing green energy is projected to be the main challenge (29%).

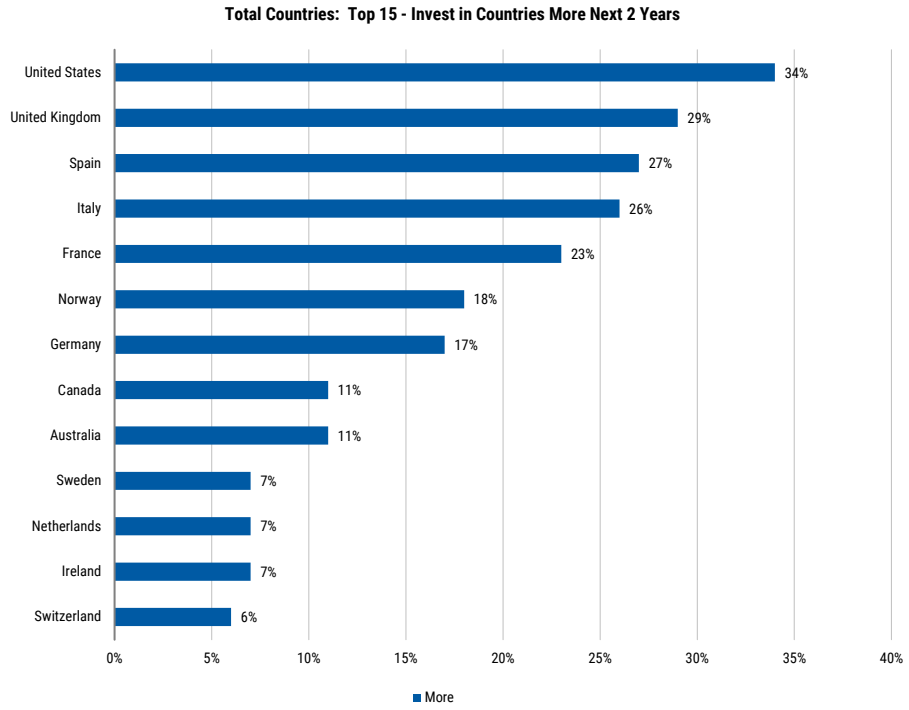
Interestingly, large data centers (with over 50 MW of capacity) see a different set of potential future roadblocks:

- The availability of chips/GPUs is cited as the biggest potential bottleneck (34%); *while*
- Securing greyspace such as switchgear is a potential impediment cited by 28% of respondents.

We believe that identifying these bottlenecks - and trying to overcome them - dictates where DC operators will allocate capital and resources.

- In the next 2 years, 34% of operators say they will invest more in the US, followed by the UK (29%), Spain (27%), Italy (26%) and France (23%);
- Interestingly, the NL and Ireland (two of Europe's more capacity-constrained FLAP D markets) are further down the list;
- In a European context, we view projected growth in France as being particularly interesting, given the recent AI Summit (Paris, Q1), the emergence of super-computer projects, potential access to French nuclear power;
- Meanwhile secondary markets - like Spain, Italy and Norway - are all in the Top 6 growth markets (in terms of projected future DC expansion).

Exhibit 18: Where DC operators are planning to add capacity in the coming years



Source: AlphaWise, Morgan Stanley Research

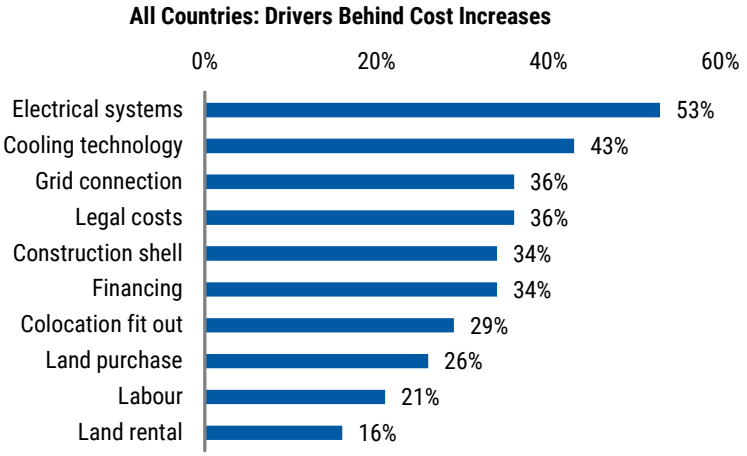
Data center roll-out costs are rising - and are expected to rise further

i. DC expansion has happened in an inflationary environment (costs +10% over the last year)

Our AlphaWise survey suggests that total DC costs have increased by an average of +10% (past 12 months, YoY). In terms of key reasons for this trend:

- 1 in 2 operators believe that electrical systems were most responsible for DC input cost inflation;
- Other drivers of rising costs were cooling technology (cited by 43% of those surveyed), grid connection and legal costs (both 36%).

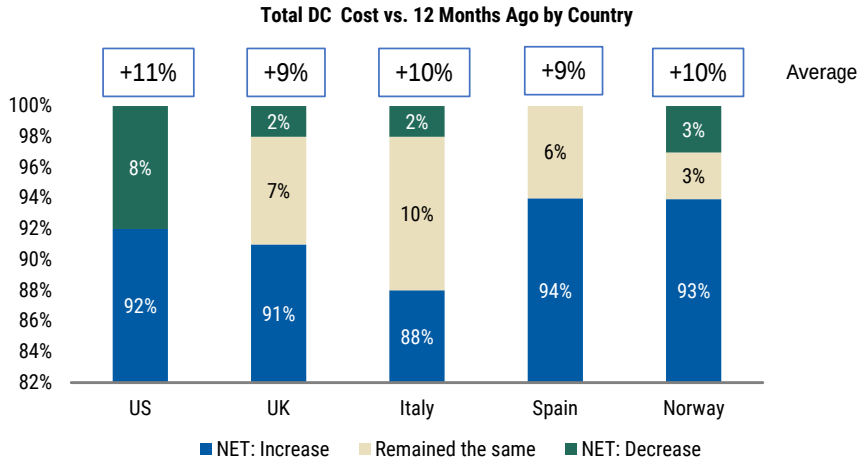
Exhibit 19: Drivers behind DC cost increases (by procurement area, all countries, past 12 months)



Source: AlphaWise, Morgan Stanley Research

We note that DC price increases were very consistent across geographies - from +9% (lowest inflation recorded by UK and Spain DC owners) to +11% (USA).

Exhibit 20: DC inflation by geography (all procurement areas, past 12 months)



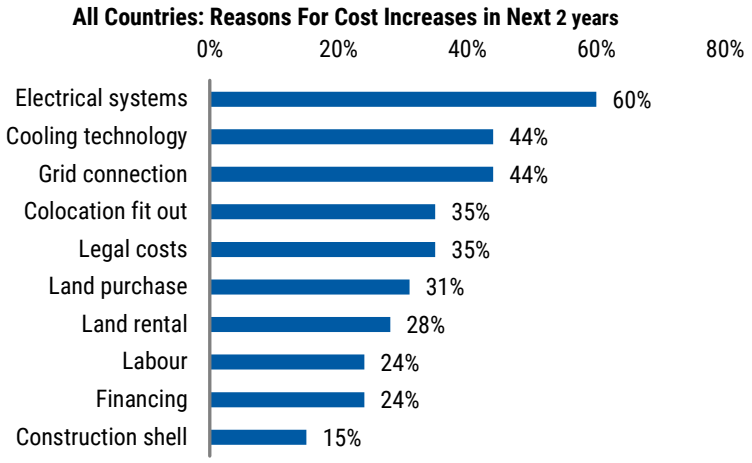
Source: AlphaWise, Morgan Stanley Research

ii. DC roll-out costs will continue to increase double-digit % (next 24 months)

Going forward, over the next 2 years, total DC roll-out costs are projected to increase by a further +11%, on average:

- Electrical systems are expected to be most responsible for total DC inflation (60% of responses);
- Cooling technology & grid connection (both +44%) are also cited as Top 3 DC inflationary drivers.

Exhibit 21: DC roll-out: Reasons for expected inflation (next 2 years)



Source: AlphaWise, Morgan Stanley Research

Scope for future DC cost rises by geography:

- US operators cite cooling technology (58%) as their main inflationary concern, markedly ahead of other aspects;
- All other DC operators (Europe, ex-US) believe that electrical systems are most responsible for projected cost increases;
- Total DC cost is expected to rise by between +10% (Italy) and +13% (Norway) across the five surveyed countries (over the next 2 years), with US costs projected to increase +12%.

Exhibit 22: Drivers of projected DC roll-out cost (next 12mths), by geography, and by procurement area

	Country				
	US	UK	Italy	Spain	Norway
Land purchase	33%	20%	35%	18%	26%
Land rental	15%	10%	24%	16%	19%
Cooling technology	58%	43%	28%	41%	44%
Grid connection	29%	41%	24%	39%	56%
Labour	15%	33%	24%	12%	22%
Construction shell	35%	27%	41%	41%	22%
Electrical systems	46%	61%	48%	53%	63%
Colocation fit out	23%	24%	33%	29%	41%
Legal costs	40%	31%	43%	37%	22%
Financing	40%	39%	37%	29%	19%
All aspects increased in cost	-	2%	4%	-	-
Base	48	49	46	49	27

Source: AlphaWise, Morgan Stanley Research

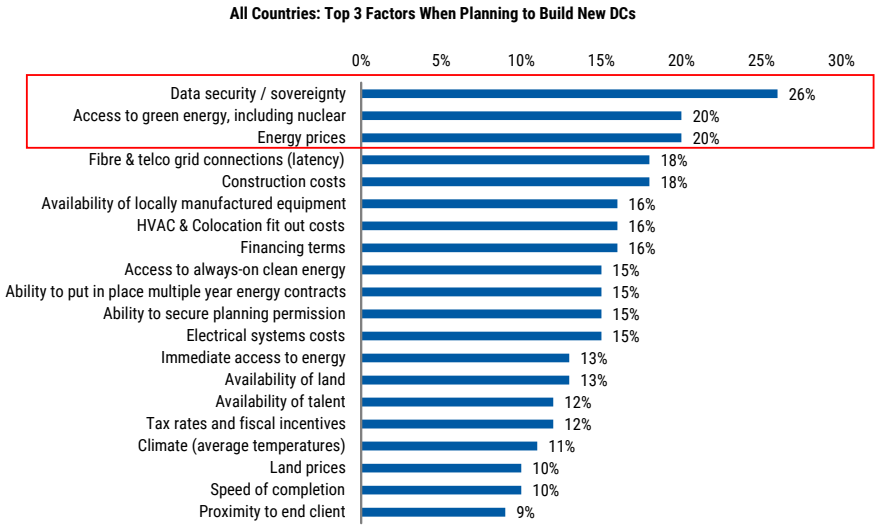
DC operators are focused on data security, green energy and power prices

When building new DCs, operators are most focused on: data security/sovereignty, access to green energy and power prices.

In the US (35%) and the UK (30%) data security/sovereignty is by far the most important factor for new projects.

- **US:** The security focus is followed by energy prices (21%), immediate access to energy and speed of completion (both 19%);
- **UK:** DC operators are also focused on electrical costs (24%), fibre & telco grid connections (22%) and access to green energy (22%) are also important considerations.

Exhibit 23: Top 3 factors when planning on building DCs (US, UK, Italy, Spain and Norway)



Source: AlphaWise, Morgan Stanley Research

Interestingly, beyond the US and UK, DC operators' motivations are quite different (outlined in Appendix 2).

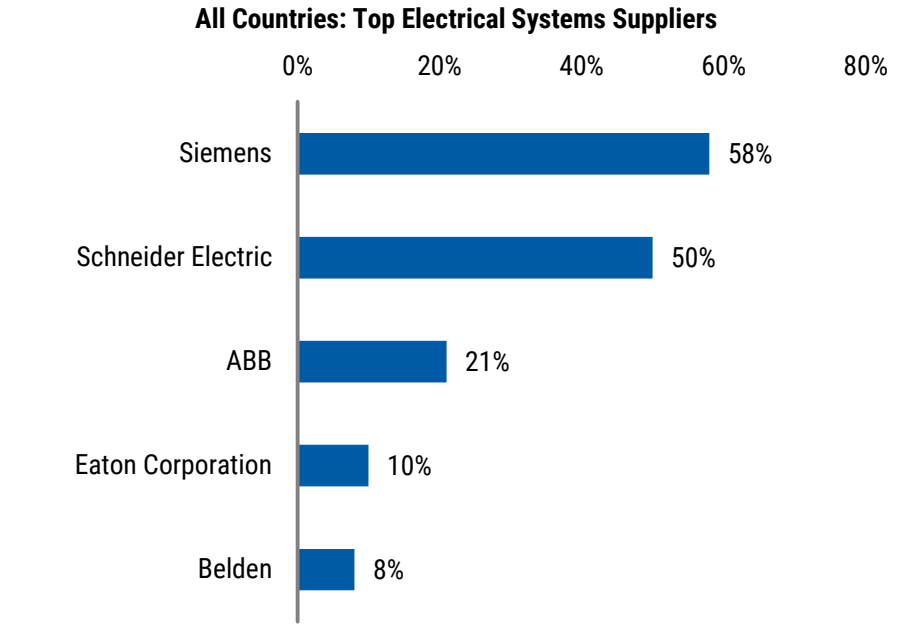
- **Spain:** DC operators are primarily and equally motivated by financing terms, access to green energy and power prices (all 23%);
- **Italy:** The availability of locally manufactured equipment is the main concern (29%), with HVAC and co-location fit out costs coming second (25%), and energy prices and data security/sovereignty the third most cited considerations (both 23%);
- **Norway:** Fibre & Telco grid connections is the primary DC operator focus (28%), followed by access to green energy, tax rates and fiscal incentives, construction costs, and financing terms (all 21%).

Which builders/suppliers will DC operators use (more or less), as they grow their portfolio?

i. Electrical Systems: Siemens and Schneider appear set to increase their already-elevated market share (coming 2 years)

Among those surveyed, the present market leaders in supplying electrical systems to DCs are Siemens (58%) and Schneider Electric (50%). There is a significant gap to the shares of ABB (21%), Eaton Corporation (10%) and Belden (8%).

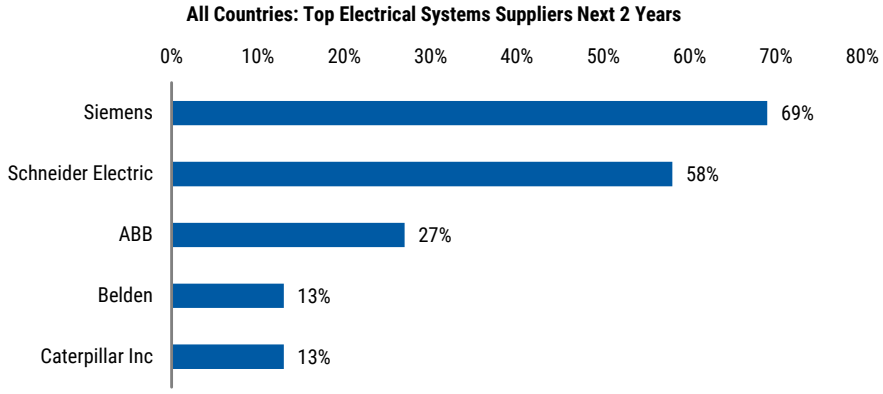
Exhibit 24: Top DC Electrical System Suppliers - Current market shares



Source: AlphaWise, Morgan Stanley Research

Looking ahead, our survey suggests scope for Siemens and Schneider to win quite significant further market share in the DC electrics market.

Exhibit 25: DC Electrical System Suppliers - Potential shifts in market shares

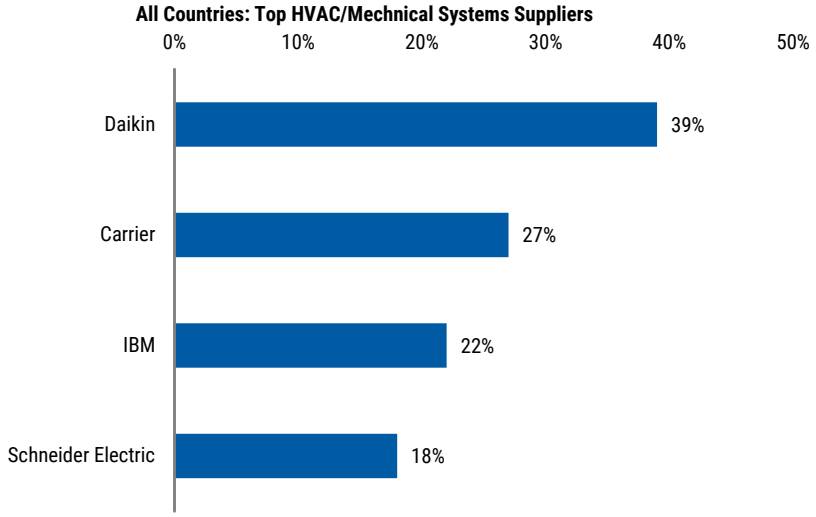


Source: AlphaWise, Morgan Stanley Research

ii. HVAC and Mechanical Systems: Daikin to remain top, IBM to grow

Our poll highlighted four large suppliers of HVAC/mechanical systems (to US and European DC owners) - Daikin (39%) is the most used, with Carrier a distant second (27%). IBM (22%) and Schneider Electric (18%) trail the two leaders.

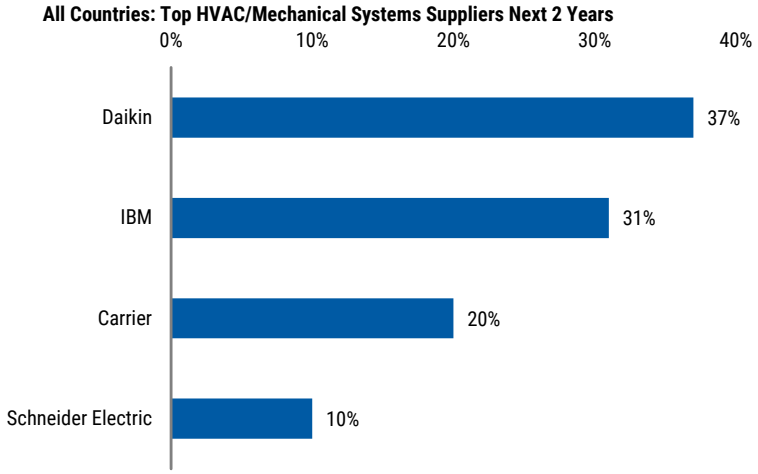
Exhibit 26: DC HVAC and Mechanical Systems - Approximate market shares, according to our survey



Source: AlphaWise, Morgan Stanley Research

Our AlphaWise survey suggests the top 4 suppliers are likely to remain the same - with the two leaders potentially losing share, while IBM could emerge as a potential significant winner.

Exhibit 27: DC HVAC and Mechanical Systems - Potential changes of market share

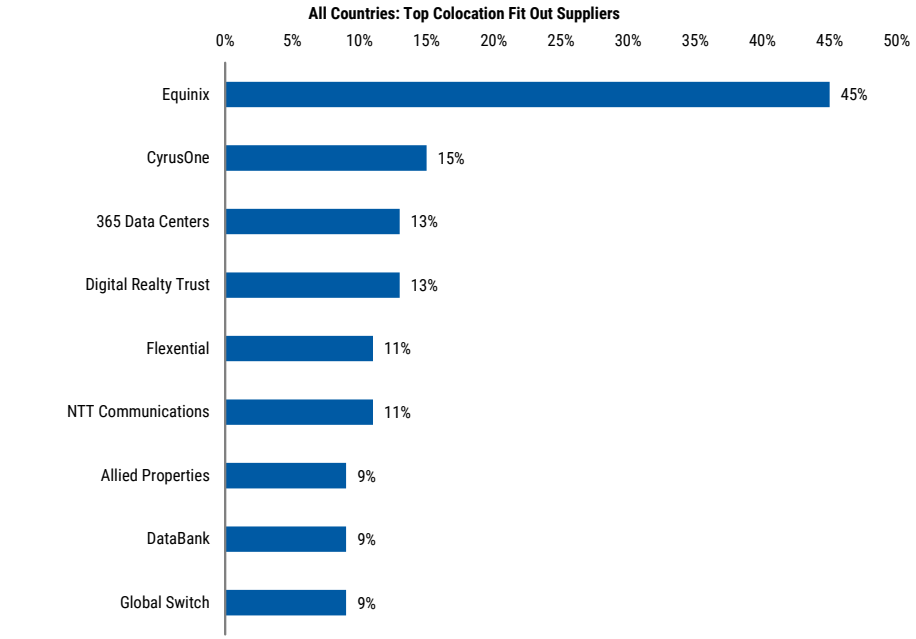


Source: AlphaWise, Morgan Stanley Research

iii. Co-location fit-out - Equinix most popular, likely to remain dominant

Equinix was - by a very considerable distance - the most popular co-location player among our survey respondents.

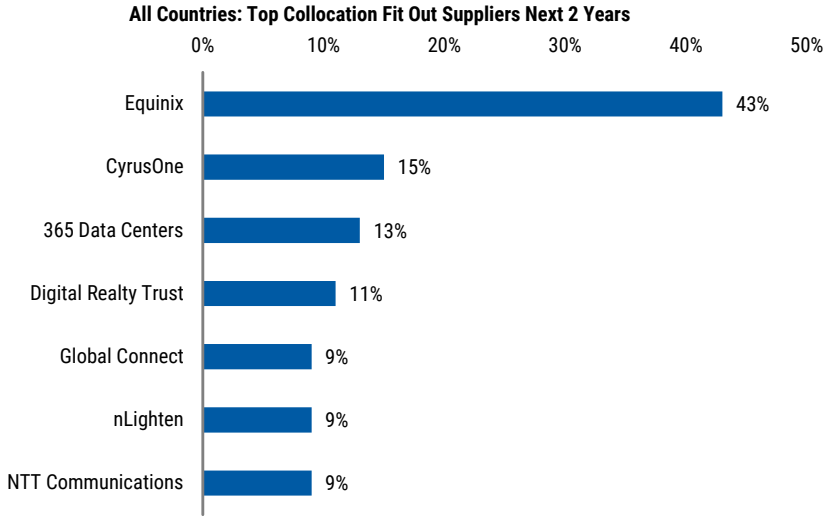
Exhibit 28: Top DC Co-location fitout providers



Source: AlphaWise, Morgan Stanley Research

Our survey suggests that Equinix is poised to remain the leading player among those we surveyed, with only small share loss projected.

Exhibit 29: Potential changes of co-location fit out share



Source: AlphaWise, Morgan Stanley Research

iv. DC Construction: Saint Gobain is dominant, and will likely stay in pole position, but question marks for Kingspan

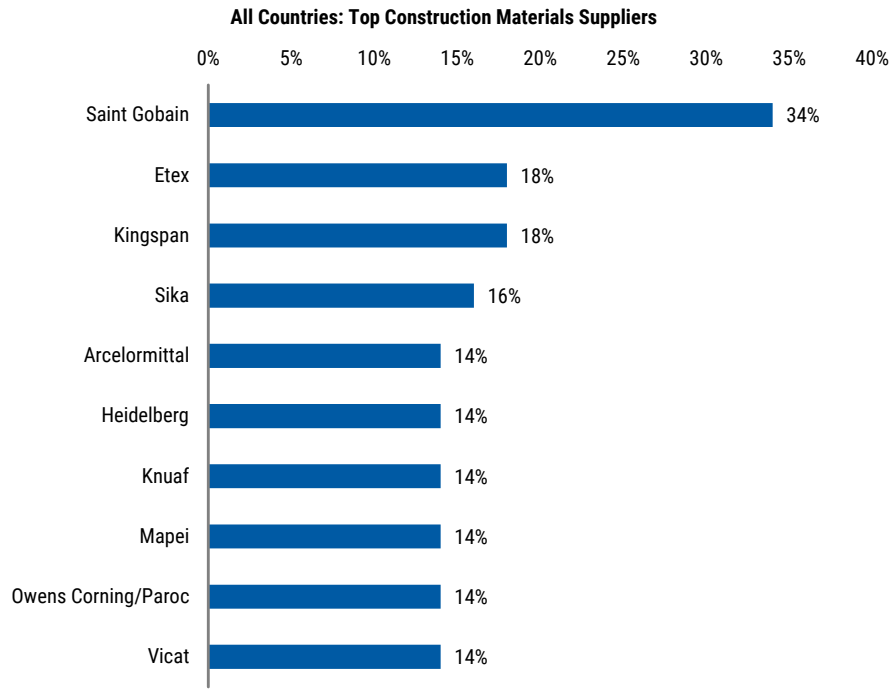
Among those DC operators we surveyed, Saint Gobain was the leading supplier for data center construction (materials), being used by 34% of DC owners / operators across five markets (US + four countries in Europe).

There were 10+ mid-tier suppliers used (share below Saint Gobain), with Kingspan (18%) and Etex (18%) at the top end, while Holcim (11%) and Soprema (11%) were less prevalent suppliers.

We were surprised to see that Saint Gobain featured prominently when it came to materials and solutions provided for data center construction, as this is not a large end market for the business at present, relative to its exposure to residential renovation. But, on reflection, it's interesting to see that other businesses that also feature prominently (Etex and Kingspan for example) also have a small direct exposure to the data center market. We think it is rather the product mix (energy efficiency solutions like insulation) that results in these businesses being the suppliers of choice for data center construction. Said differently, data centers are a small part of these businesses' revenues, but for data centers these companies are the material providers of choice that are able to produce performance solutions.

Saint Gobain's key products for data centre applications include fire resistant gypsum boards, Isover glasswool solutions, stone wool insulation, waterproofing membranes for water protection. **Kingspan's** products cover both insulation, raised access flooring systems, solutions for airflow management and containment. **Sika** provides solutions from the foundation to the roof and floors. Solutions look to reduce embodied CO2 and operational CO2, while also speeding up construction times.

Exhibit 30: Top DC Construction Suppliers - Current market shares (across five geographies incl US, UK etc)



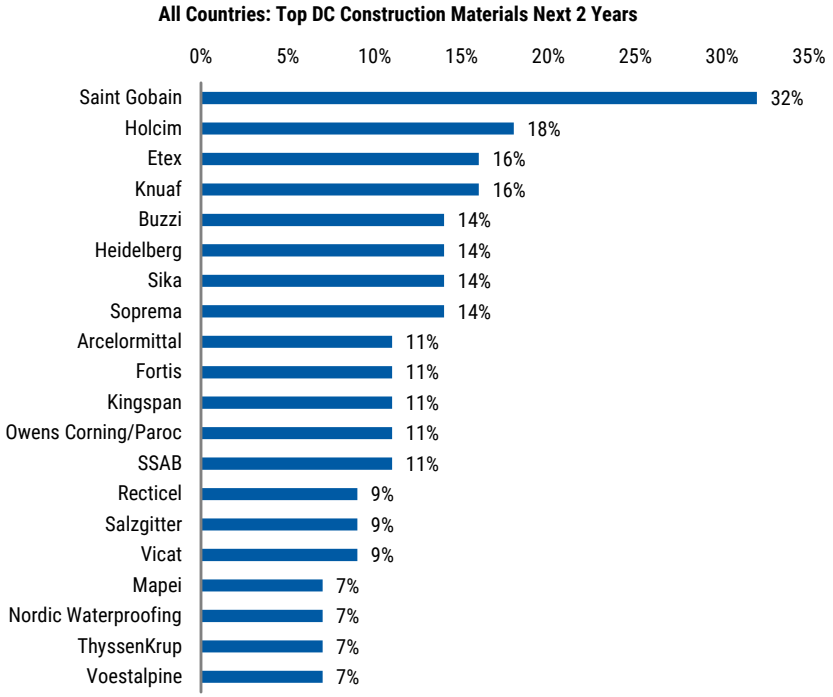
Source: AlphaWise, Morgan Stanley Research

Looking forward, over the next 2 years, our survey results suggest Saint Gobain will retain healthy market leadership (among those we surveyed).

- Other potential share winners could be Recticel, Holcim, Buzzi and Soprema;

- Meanwhile, on the flipside, potential share losers could comprise Kingspan, Mapei and Vicat.

Exhibit 31: Top DC Construction Suppliers - Potential shifts in market shares



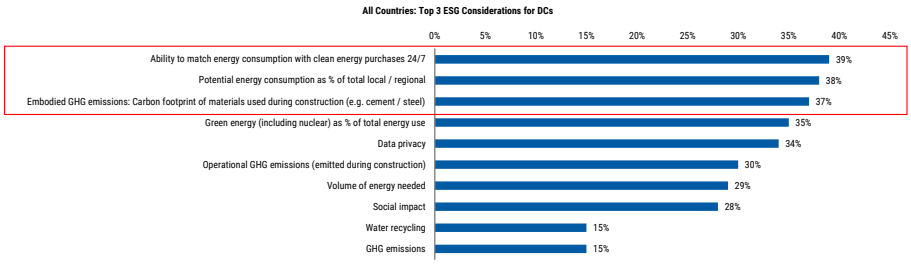
Source: AlphaWise, Morgan Stanley Research

Sustainability: It's all about energy

When planning DC new build / capacity expansion, the most important ESG considerations are:

- The ability to match energy consumption with clean energy purchases on a 24/7 basis;
- Total energy consumption (as % of local / regional power);
- Embodied GHG emissions.

Exhibit 32: DC build-out - what are the leading ESG / Sustainability considerations?



Source: AlphaWise, Morgan Stanley Research

When DC operators consider expanding, again, there are significant differences in ESG focuses, by geography (outlined in Appendix 1: AlphaWise Survey #1 - DC Operators):

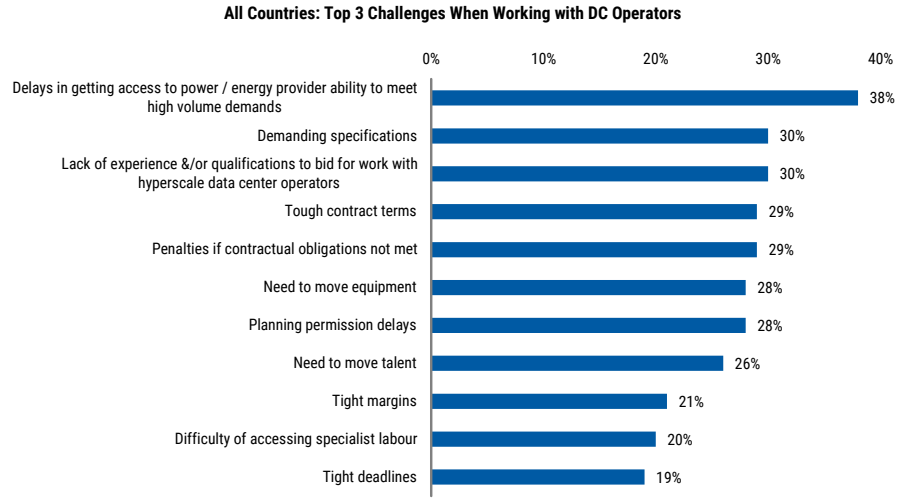
- **US:** Data privacy (46%) and 'ability to match energy consumption with clean energy purchases on a 24/7 basis' are the most important factors;
- **UK:** Similar to the US, matching energy consumption with clean energy purchases takes precedence, followed by 'green energy' (44%) and data privacy (41%);
- **Other countries:** In Norway (55%), Italy (50%) and Spain (40%), the top consideration is 'potential energy consumption as % of total local / regional'.

Supplier Survey - Top challenges for builders & suppliers when working for DC operators center around power

Our AlphaWise survey suggests that delays in getting access to power / energy provider's ability to meet high volume demand is the main challenge that builders & suppliers are facing in their work with DC operators.

Demanding specifications and lack of experience and/or qualifications to bid for work with hyperscale DC operators tie for the next key challenge faced.

Exhibit 33: Main challenges faced by builders & suppliers

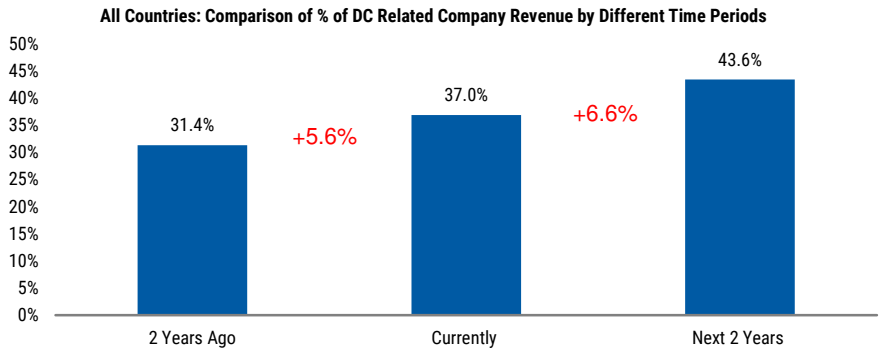


Source: AlphaWise, Morgan Stanley Research

Data center related revenues are expected to grow from 31.4% of total (data supplier & builder) company revenues (2 years ago) to 43.6% of revenues over the next 2 years, across the 5 countries surveyed.

- Italy and Spain expect the greatest % growth in the next 2 years at +8.1% and +7.6%, respectively, bringing DC revenues as a % of company revenues to >50%;
- Meanwhile, the UK sees the lowest expected growth at +4.4% with DC revenues only making up ~34% of total revenues.

Exhibit 34: DC revenues expected to become a large proportion of company revenues for builders & suppliers



Source: AlphaWise, Morgan Stanley Research

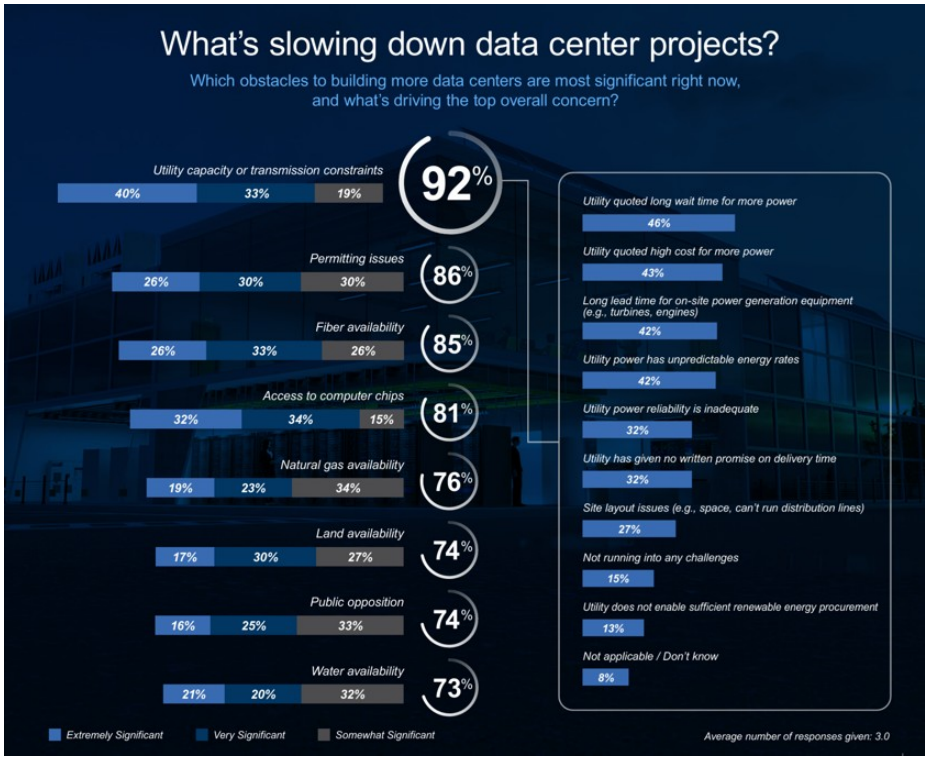
AlphaWise results largely consistent with recent Schneider Electric & Bloom Energy surveys

Schneider Electric - energy / grid connections (by far) the most common constraint

Schneider Electric recently conducted a survey on identifying and quantifying the key constraints of DC expansion. During January and February 2025, Schneider surveyed 149 senior employees of American or Canadian data center related companies, as well as *Data Center Frontier* readers. These respondents were selected as they were actively building out new data centers and working in energy-related roles. Key takeaways are as follows:

- Energy / grid connections remain the No1 constraint, with 92% of respondents viewing this as a challenge;
- New DC projects are increasingly bigger in scale. Almost half (48%) of respondents noted that new DCs average 100+ MW in capacity;
- Lead times are getting longer, with 44% of those surveyed reporting utility wait times of 4+ years;
- The DC/AI boom is making sustainability goals more challenging. Carbon emissions have increased in 35% of cases over the past two years;
- DC builders are exploring energy alternatives, e.g. 62% of respondents have explored on-site power generation.

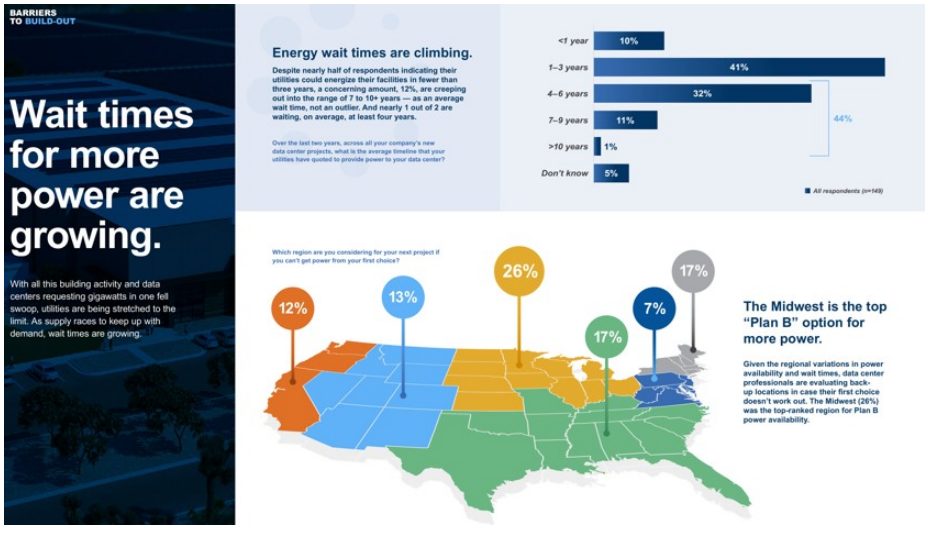
Exhibit 35: Energy / grid connections remain by far the most common constraint to building new DCs / expanding capacity



Source: Schneider Electric

We believe the Schneider Electric survey results are pretty consistent with our AlphaWise survey conclusions

Exhibit 36: Grid connection times are getting longer and longer



Source: Schneider Electric

Bloom Energy - power supply is the top consideration for DC developers

Bloom Energy recently issued their mid-year data center power report (link here). Key conclusions included:

- Power availability is the top issue for DCs, with 84% of respondents ranking it among their top three considerations;
- The median DC size is expected to grow from ca 175MW (today), to ca 275MW (2030), and even further to 375MW (by 2035). These larger sites will face greater challenges meeting their unique power needs through the grid;
- DC developers are turning to onsite power generation to overcome energy supply challenges. By 2030, some 38% of facilities are expected to incorporate primary onsite generation (vs 13% just 1yr ago).

Exhibit 37: Drivers of data center site selection - Average rating of key considerations from most important (10) to least important (1)

Current rank	Consideration	Average rating	% Rated in top 3 considerations
1	Availability of power	7.8	84%
2	Proximity to customers/end-users	5.5	39%
3	Proximity to fiber optic	5.3	34%
4	Local regulations	5.3	39%
5	Availability of labor	4.8	16%
6	Availability of green power	4.7	27%
7	Availability of water	4.2	27%
8	Proximity to industry partners	4.1	16%
9	Reliability of weather conditions	3.3	16%

Source: Bloom Energy, June 2025

Q2. Is Global DC build-out as robust as previously thought?

MS does not foresee weaker data center / AI spend

Our research has highlighted multiple signs of continued strength (in particular in the US) in AI infrastructure spend from key companies including Amazon, Nvidia, Meta and Google. Indeed, we see a skew to the upside, given:

- The importance of continuing to invest in next generation capabilities to further advance these companies' early leads (see below);
- Large product pipelines that need GPUs (for example, Meta has 9 teams with products ready to ship that are GPU constrained, AWS has demand to come, Google is partnering with CoreWeave for capacity);
- The importance of US-led LLM offerings (in particular part of thought process at Meta and Google).

Indeed, we have identified a number of key results announcements / events that suggest continued considerable strength in the global DC / AI complex.

Exhibit 38: The past 9 months - and in particular calendar Q1 2025 results - have signalled ongoing strength of the global DC / AI universe

		Background / Earnings Commentary	Additional Comments
Stargate		Stargate is the est $500bn AI/DC project in the US expected to reach 15GW of capacity. We view this project as a particularly bullish signal for AI infrastructure demand. Arm, Microsoft, Nvidia, Oracle and OpenAI have been cited as key technology partners with the first site being built in Abilene, Texas. Indeed, the State of Texas has been earmarked as the *'flagship'* State for the new infrastructure venture, according to Chris Lehane (OpenAI's vice president of global affairs).	We expect much of the power used to fuel Stargate will be natural gas. We also see potential for nuclear and renewables to play a meaningful role. According to the press release: "*This project will not only support the re-industrialization of the United States but also provide a strategic capability to protect the national security of America and its allies*".
France		France hosted The Artificial Intelligence Action Summit in February where 2 key announcements were made. **i.** The European Commission announced the launch of InvestAI, to mobilise €200bn of investments in AI; **ii.** The French gov't announced €109bn of AI-related investments. Notably, within Europe, France is the leading generator of nuclear power, with 18 commercial nuclear power plants, whereby excess power could be used by DCs.	MS remains cautious on the outlook of the InvestAI project, as it is a 'show me' story. We estimate a very significant €150bn of the funds will need to be pledged by the private sector, and commitments thus far are unclear. Brookfield has committed to investing €20bn in AI projects across the country, with a 1GW facility in the North of France being the core investment.
KSA		A JV between AWS and PIF-backed HUMAIN, will oversee the roll-out of up to 500MW of DC capacity via investments of $5bn in AI (incremental, beyond the $5bn AWS had previously committed to invest, in 2024)	Nvidia has announced it will sell 'several hundred thousand' chips to HUMAIN (first tranche of 18k Blackwell chips). Advanced Micro Devices (AMD) signed a $10bn collaboration with HUMAIN to build 500MW of AI hardware, while Qualcomm has signed an MOU to build a data center central processor.
UAE		On the back of US President Trump's trip to the Middle East in mid-May, an AI mega-data center in the UAE was announced. The UAE "Stargate" will be built in Abu Dhabi by G42, targeting a capacity of 5GW (first phase will be a 1GW cluster). US tech companies including OpenAI, Nvidia, Oracle and Cisco are said to be supporting the project. The site is expected to utilize nuclear, solar and gas power.	US Secretary of Commerce Howard Lutnick noted, "*In the UAE, American companies will operate the data centers and offer American-managed cloud services throughout the region. The agreement also contains strong security guarantees to prevent diversion of US technology*".
UK		In September 2024, the UK government designated DCs as being *Critical National Infrastructure* (CNI), placing them on par with essential public services like water, energy, and emergency services. A new AI action (50-point) plan was launched by the government - including the creation of AI growth zones.	A number of bluechip DC launches have been announced - including plans for the UK's largest data center (a 1GW campus in North Lincolnshire, 15 data halls spanning 1.5mn sqm, construction costs of £5.5bn-£9.0bn over 10yrs).
China		The Chinese DC capex inflection (Q2-Q3 2024) happened around 1.0-1.5 years later than US Hyperscalers (after watching the US AI development status). It was initiated by ByteDance's significant capex spending (Rmb80bn in 2024 and potentially Rmb150-160bn in 2025 based on market consensus and some channel checks), and aggressive data center bookings (~1.5GW in 2024 in China), while other Hyperscalers joined this competition on AI computing power build-up from 2025 after the DeepSeek moment.	We believe that Chinese Hyperscalers' investment in AI should bring significant upside to upstream IDCs: We estimate that the top six internet and cloud service providers (CSPs) in China will increase their annual capex by +59%, to Rmb373bn (US$50bn+) in the next three years. For AI training workloads, MS sees remote/rural places in Northern China emerging as a secondary market, (eg Ulanqab in Inner Mongolia, Datong in Shanxi and, to some extent, Zhangjiakou in Hebei).
Amazon	amazon	The bulk of capex is being deployed in AWS (AI, DCs). The CEO noted, "*The majority of this spend is to support the growing need for technology infrastructure. It primarily relates to AWS as we invest to support demand for our AI services and increasingly in custom silicon like Trainium as well as tech infrastructure…*"	We expect Amazon capex to be c $115bn and c $138bn in each of 2025e and 2026e. Our recently-updated forecasts saw MS analysts raise Amazon capex forecasts (by ca +6%).
Nvidia	NVIDIA.	Nvidia recently released strong April Qtr results. Highlights included: **i.** April turnover of $44.0bn (+12% QoQ, +69% YoY), which beat Street and MS expectations by +1% and +4%, respectively; **ii.** Without the H20 ban, the US Tech company would have beaten guidance by >$3bn for April; **iii.** Data Center revenues of $39.1bn, which was +10% QoQ (ex H20 headwind grew +17%), and +73% YoY.	Nvidia noted that inference demand is very strong and is not being met - for every Hyperscaler delaying a building, three more take its place.. According to Nvida: '*We are under-earning, GB200 numbers will keep getting revised upwards, and some China revenues will materialize*'. H2 outlook seems very strong, but there are continued constraints. Some of the Middle East projects were already in backlog, and others might not ramp until next year; further, the hyperscalers are still challenged to bring data centers up quickly enough. We still expect upside possibilities, but will continue to model somewhat conservatively for 2H.
Microsoft	Microsoft	Q3's total capex (including leases) of $21.4bn was slightly below target of $22.6 billion. The company cited timing issues. Microsoft expects H2 spend to be in-line with their original targets (~$45.2 billion) - this would imply FY 25 capex spending up +58% YoY.	Despite the postponement of some DC projects (Ohio, London) we believe that this could be caused by two factors: **i.** Microsoft increasingly investing in DC / supercomputing power via its partner, OpenAI; **ii.** Shortages of accessible power could be a primary cause of delayed DC construction.
Google	Google	Data centers remains the Group's second largest investment line: 'With respect to CapEx, our reported CapEx in the first quarter was $17.2bn, primarily reflecting investment in our technical infrastructure with the largest component being investment in servers, followed by data centers to support the growth of our business across Google Services, Google Cloud and Google DeepMind'	Our recently-updated model implies that Google capex will increase, from $52.5bn (2024a) to $75.4bn (2025e), an increase of +44%. We believe that Google's pace of GenAI product roll-out is accelerating with multiple encouraging signals (commercial queries, Overviews, Lens, AI mode, etc). Google has expanded 'sovereign cloud' options in the EU that can provide addt'l cybersecurity protections to European clients.
Meta	Meta	Meta issued new capex guidance for FY 2025 of $64-$72bn (vs $60-65bn previously), a rise of +9% at the mid-point. Perhaps equally interestingly, we expect Meta capex to continue to grow by +10% pa until 2028. The company plans to bring 1GW of compute / data center capacity online this year.	Meta Founder Mark Zuckerberg has stated that the company plans to invest "*hundreds of billions … over the long term*" on AI infrastructure. In 2024, Zuckerberg stated he "*would rather risk building capacity before it is needed rather than too late, given the long lead times for spinning up new [infrastructure] projects*". Zuckerberg has started to assemble a team of ~50 AI experts for an AI lab dedicated to "superintelligence" following disappointment/frustration with Llama 4 results.
Oracle	ORACLE	Q4 was a relatively in-line print and saw a limited backlog build - RPO up just $8bn or +6% QoQ versus a 5-year avg of +17% QoQ, but management presented a remarkably positive view on growth into FY26. Management guided FY26 RPO to grow >100% in the year ahead, Oracle Cloud Infrastructure is expected to accelerate from 50% to >70% YoY, and overall Cloud revenue is expected to accelerate from 24% to >40% in FY26.	If this guidance proves realistic Oracle will end FY26 with close to $280bn in backlog, assuming roughly ¼ of this is current, they will have almost 90% of their $104bn FY29 target already in backlog. In FY26, Oracle expectes capex of $25bn, up 18% YoY and ahead of consensus at $19.8bn. Management noted this target could prove to be conservative.
Three Mile Island		In September 2024, it was announced that Constellation Energy would restart the nuclear facility at the Three Mile Island nuclear plant, and sell the nuclear energy to Microsoft, for powering DCs / AI purposes. The plant (Unit 1, which is separate from the facility which saw an accident in 1979) will be re-named as Crane Clean Energy Center. The facility is expected to come online in 2028 (subject to final approvals from the Nuclear Regulatory Commission and completion).	The 20-year power purchase agreement will see 835MW of carbon-free energy added to the grid in PJM and provide 7m MWhs of new, renewable energy annually. On the call following the annoucement, CEG noted that the deal is "*the most powerfuel symbol of the rebirth of nuclear power as a clean and reliable energy resource and reflects all of the lessons learned from the past, the technical capabilities of the present, and aspirations for a sustainable future*".

Source: Company data, Morgan Stanley Research estimates

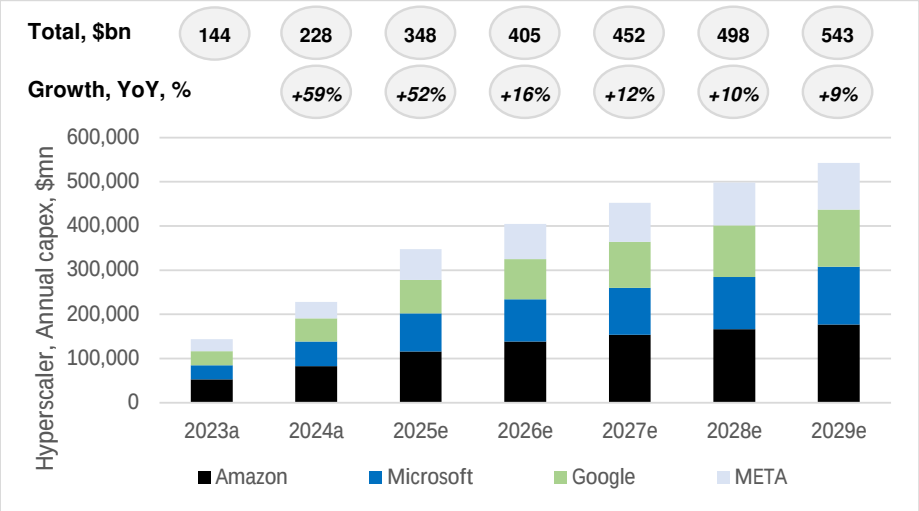
When examining our Cloud capex tracker, and in particular, capex trends at the Big 4 Hyperscalers during Q1 results:

- Our recently updated cloud capex tracker now points to +43% YoY growth in 2025, up +4ppts from just a month ago and from the forecast of +31% at the end of March (Exhibit 40 , below). *Cloud capex includes capex from Amazon, Alphabet, Microsoft, Meta Platforms, Tencent, Baidu, CoreWeave, Apple, IBM, and Oracle*;
- None of the Big 4 Tech companies downgraded capex guidance;
- In fact, Meta increased its FY 2025 capex guidance by +9% (to a range of $64bn-$72bn);
- We expect Amazon capex to be $104-105bn (c $115-138bn) in each of 2025e and 2026e. MS recently raised its Amazon capex forecasts (by ca +6%, link here, new link here);
- Microsoft expects H2 spend to be in-line with their original targets (~$45.2 billion) - this would imply FY 2025e capex spending rising +58% YoY;
- Our recently-updated model implies that Google capex will increase, from $52.5bn

(2024a) to $75.4bn (2025e), an increase of +44%;

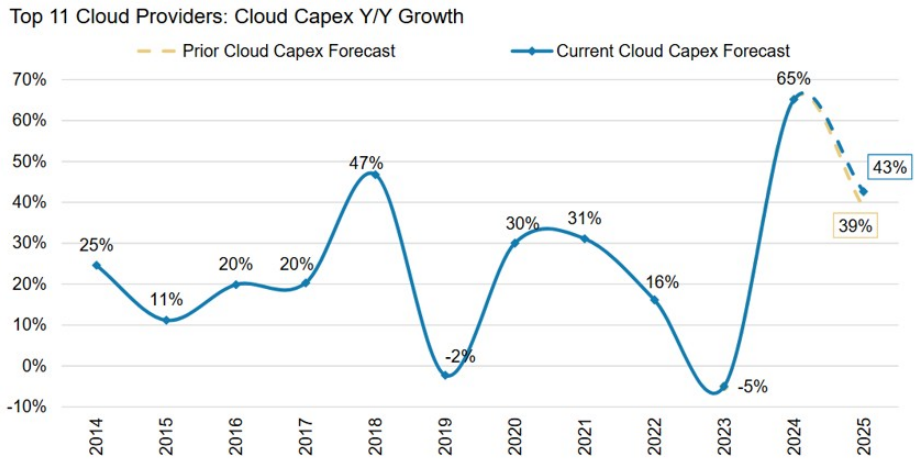
- We now predict the Big 4 will see capital outlay of >$345bn this year (+52% YoY);
- Perhaps more interestingly, we expect that figure to grow +19% pa on a 5-year view (2024a-29e).

Exhibit 39: We now predict the Big 4 Hyperscalers will report capital outlay of >$345bn this year, growing at +19% pa on a 5-year view (2024a-29e)



Source: Company data, Morgan Stanley Research estimates (e)

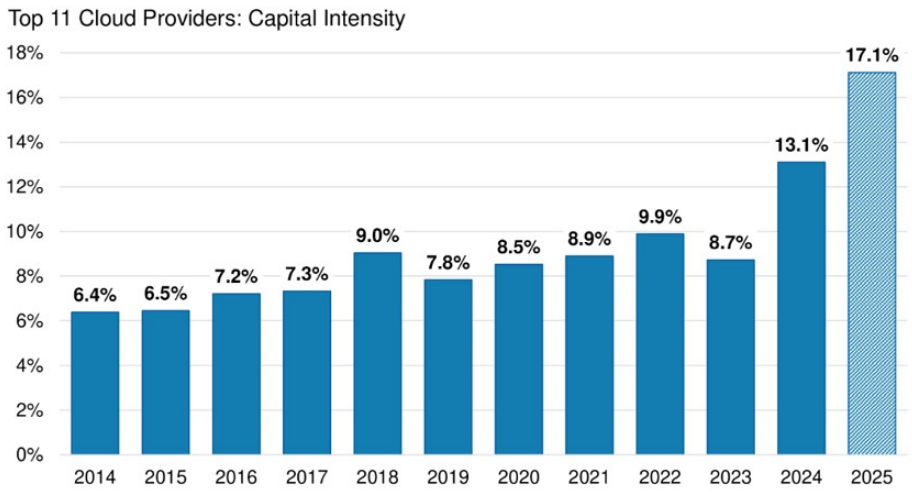
Exhibit 40: Our cloud capex tracker now points to +43% YoY growth in 2025, up from a forecast of +31% at the end of March



Source: Company data, FactSet, Morgan Stanley Research estimates, irs.gov. Note: Cloud capex includes capex from Alphabet, Amazon, Microsoft, Meta Platforms, CoreWeave, Tencent, Baidu, Apple, IBM, and Oracle. Forward estimates include MSe for Tencent and Baidu, consensus est. for the others; Alphabet's CY25 capex is based on the company's guidance, while the remaining CY25 numbers are Consensus estimates-->REMOVE Alphabet sentence - not in footer of the updated graph]

We now expect overall Cloud capital intensity to exceed 17% for FY 2025 (broadly double the 8.5% capex /sales ratio seen in 2020)

Exhibit 41: With stronger cloud capex now expected in 2025, overall capital intensity is now exceeding 17%, a new all-time high



Source: Company data, FactSet, Morgan Stanley Research. Note: Cloud capex includes capex from Alphabet, Amazon, Microsoft, Meta Platforms, Tencent, Baidu, CoreWeave, Apple, IBM, and Oracle. Forward estimates include MSe for Tencent and Baidu, consensus est. for the others.

Q1 results highlight why Amazon remains committed to AI / DC investments

Q1: AWS performing well, notably in terms of EBIT / profitability - while strong capex growth is still projected

Amazon recently reported its Q1 results (research link here, stock covered by Brian Nowak). Highlights included:

- AWS revenue growth of +17% YoY (in-line with our expectations);
- The AWS order backlog totaled $189bn at the end of Q1, which was +20% YoY (vs +14% YoY in Q4 2024);
- AWS EBIT margins of ~39% - these were comfortably above our expectations (~35%), as we believe AWS continues to exercise discipline in hiring and budgeting;
- We believe AWS is deploying more GenAI efficiency enablers, coding, sales assistants to help teams do more with the same/fewer total headcount. AWS is also continuing to improve its server utilization to optimize its infrastructure costs.

Amazon remains particularly optimistic about AI applications and associated turnover growth.

Indeed, according to Amazon CEO Andrew Jassy (Q1 results call): '*Customers doing AI at any significant scale realize that it can get expensive quickly. So the 30% to 40% better price performance that Trainium2 offers versus other GPU-based instances is compelling … We've been bringing on a lot of P5s, which is a form of NVIDIA chip instances as well as landing more and more Trainium2 instances as fast as we can. And I would tell you that our AI business right now is a multi-billion dollar annual run rate business that's growing triple-digit percentages year-over-year. And as fast as we actually put the capacity in, it's being consumed … We plan to bring on an increasing amount of capacity in the back half of the year*'.

The bulk of Amazon capex is being deployed in AWS (AI, data centers). According to the CEO: '*Our cash capex was $24.3bn in Q1. The majority of this spend is to support the growing need for technology infrastructure. It primarily relates to AWS as we invest to support demand for our AI services and increasingly in custom silicon like Trainium as well as tech infrastructure to support our North America and International segments.*'

Amazon's recent constructive comments about AI investments

Amazon remains particularly optimistic about the outlook for AI and associated investments - as exemplified by Amazon CEO Andy Kassy's 2024 letter to shareholders (link here).

- In this letter Amazon outlined the Group's positive opinion on the generational / societal benefits of AI: '*We continue to believe AI is a once-in-a-lifetime reinvention of everything we know, the demand is unlike anything we've seen before, and our customers, shareholders, and business will be well-served by our investing aggressively now … Fundamentally, if your mission is to make customers' lives better and easier every day, and you believe every customer experience will be reinvented by AI, you're going to invest deeply and broadly in AI.*'
- In terms of Amazon's commitment to capital investments: '*We spend this capital upfront, even though these assets are useful for many years (in the case of datacenters, for at least 15-20 years). We only start monetizing this capital investment many months after we spend the capital, and over many years — which leads to attractive long-term FCF and ROIC* '
- Amazon believes that the price of this technology (chips, inference etc.) will decline over time - referring to Jevon's Paradox: '*We feel strong urgency to make inference less expensive for customers. More price-performant chips will help. But, inference will also get meaningfully more efficient in the next couple of years with improvements in model distillation, prompt caching, computing infrastructure, and model architectures. Reducing the cost per unit in AI will unleash AI being used as expansively as customers desire, and also lead to more overall AI spending. It's like what happened with AWS. Revolutionizing the cost of compute and storage happily led to lower cost per unit, and more invention, better customer experiences, and more absolute infrastructure spend*'.

When questioned about potential DC project delays, Kevin Miller (VP, Global Data Centers) of Amazon stated (21 April 2025):

- *'First and foremost, we continue to see strong demand for both Generative AI and foundational workloads on AWS … Some options might end up costing us too much, while others might not deliver when we need the capacity. Other times, we find that we need more capacity in one location, and less in another. This is routine capacity management, and there haven't been any fundamental changes to expansion plan'.*

Strategically, we believe that Amazon is almost-certainly moving away from a co-location model (leasing capacity from neutral / independent DC providers, such as Equinix, Digital Realty etc.) towards self-build.

Microsoft: capex to rise almost +60% this year, driven by AI & Infrastructure

Microsoft delivered a strong Q3 results print (research link here). Highlights included a 2% turnover expectations beat (higher than consensus across all three business segments), and Azure growth of +35% YoY in constant currency (well ahead of consensus expectations of +31%, constant currency).

From a DC / AI perspective:

- Q3's total capex (including leases) of $21.4bn was slightly below target of $22.6 billion. The company cited timing / phasing issues;
- Microsoft expects H2 spend to be in-line with their original targets (~$44-45 billion) - this would imply FY 25 capex spending up >55% YoY;
- CFO Amy Hood reiterated previous commentary on FY26 capex growth being positive, but a growth rate below the levels seen in FY25. This yields a wide range of outcomes.

We believe that Microsoft's recent and highly publicised postponement of DC projects (Ohio, London) changes can be explained as follows:

- Microsoft may be increasingly investing in DC / supercomputing power via its partner, *OpenAI*;
- We believe that shortages of accessible power (and perhaps building materials) may be the primary cause of delayed DC construction. Indeed, according to the Mayor of Heath, Mark Johns "*They have not given any indication that these projects are dead and gone … what they've told us is they're basically paused*'.

Indeed, Microsoft's data center head Noelle Walsh has stated: "*Datacenter planning is a multi-year and capital-intensive program … we plan for years in advance to ensure we have sufficient infrastructure in the right places*."

Google: Q1 focus on AI / Copud / relationship with Nvida - we see capex growing +44% this year

Google / Alphabet results - presented on 24 April - were meaningfully above consensus expectations.

At the beginning of the year, MS Research emphasized how Google needed to develop and ship more new LLM and GenAI enabled products faster in order to re-enforce its position at the top of the funnel within the online ecosystem (see here and here). Currently, we believe that Google's pace of GenAI product roll-out is accelerating with multiple encouraging signals (commercial queries, Overviews, Lens, AI mode, etc).

At its Q1 results, Google released a number of updates and data points highlighting that AI remains a core focus for the Group:

- *'AI Overviews is going very well with over 1.5 billion users per month, and we are excited by the early positive reaction to AI Mode. There's a lot more to come ahead';*
- *'Cloud grew rapidly with significant demand for our solutions, and you saw our leadership in AI at Cloud Next across infrastructure, agents and more. Our*

differentiated full stack approach to AI continues to be central to our growth';

- *'This quarter was super exciting as we rolled out Gemini 2.5, our most intelligent AI model, which is achieving breakthroughs in performance and it's widely recognized as the best model in the industry';*
- *'Our strong relationship with NVIDIA continues to be a key advantage for us and our customers. We were the first cloud provider to offer NVIDIA's groundbreaking B200 and GB200 Blackwell GPUs, and will be offering their next-generation Vera Rubin GPUs'.*

Our recently-updated model implies that Google capex will increase, from $52.5bn (2024a) to $75.4bn (2025e), an increase of +44%.

- Data centers remains the Group's second largest investment line: '*With respect to CapEx, our reported CapEx in the first quarter was $17.2bn, primarily reflecting investment in our technical infrastructure with the largest component being investment in servers, followed by data centers to support the growth of our business across Google Services, Google Cloud and Google DeepMind*'

Nvidia - a strong April print (DC revenues +73% YoY)

Nvidia released strong April Qtr results (research note here). Highlights included:

- April turnover of $44.0bn (+12% QoQ, +69% YoY), which beat Street and MS expectations by +1% and +4%, respectively;
- Without the H20 ban, the US Tech company would have beaten guidance by >$3bn for April;
- Data Center revenues of $39.1bn, which was +10% QoQ (ex H20 headwind grew +17%), and +73% YoY;
- Nvidia noted that inference demand is very strong and is not being met - for every Hyperscaler delaying a building, three more take its place. According to Nvida: '*We are under-earning, GB200 numbers will keep getting revised upwards, and some China revenues will materialize*';
- H2 outlook seems very strong, but there are continued constraints. Some of the Middle East projects were already in backlog, and others might not ramp until next year; further, the hyperscalers are still challenged to bring data centers up quickly enough. We still expect upside possibilities, but will continue to model somewhat conservatively for 2h.

Speaking at a conference in late April 2025 (link here), Nvidia's Senior Director Josh Parker noted:

- 'We haven't seen a pullback'. NVDA sees compute and energy demand only rising due to AI, describing the reaction to DeepSeek as 'kneejerk'.

Meta results: FY 2025 capex guidance increased

Meta recently released a strong Q1 print (see here).

We continue to believe that META remains the cleanest GPU-enabled leader in the

internet space / sector. As illustration, the AI-driven feed and video recommendations continue to drive better engagement, with +7% / +6% growth in time spent on Facebook/ Instagram in the last 6 months (following +8% / +6% lifts in the first nine months of last year).

From a DC / AI perspective, all eyes were on capex:

- Post results, we raised our Meta capex forecast by ca +10% / ~$7bn to ~$72bn;
- Indeed, Meta issued new capex guidance of $64bn-$72bn (vs $60-65B previously), a rise of +9% at the mid-point;
- Perhaps equally interestingly, we expect Meta capex to continue to grow by +10% pa until 2028.

Q1 results commentary from Vertiv, GE Vernova and Belimo

Vertiv seeing accelerated scaling of AI deployments…

Vertiv, the digital infrastructure service provider (power, cooling, IT - for DCs), released a strong Q1 2025 results print (link here), with highlights including:

- Orders topped expectations, re-accelerating to +13% YoY growth (vs flat in Q4). The top line beat was driven by strength in Americas Products and APAC Products, the two largest groups, offsetting misses across the rest of the business;
- Our math suggests Q1'25 orders were the highest in company history;
- The company's FY 2025 organic top-line growth target was raised to 16.5-19.5% (new mid-point: +18%) from 15-17% (old mid-point: +16%).

According to Giordano Albertazzi, the CEO of Ohio-based data center supplier Vertiv

- '*We continue to see accelerated scaling of AI deployments across the data center market, with strong demand signals reinforcing both our near- and long-term growth*'.

…while GE Vernova suggest strong AI/DC industry growth

GE Vernova, the energy equipment manufacturer (including gas turbines), has signed several supply agreements with utilities and data center customers in 2025.

- In late April 2025, US utility Duke Energy acquired 11 natural gas turbines (from GE Vernova) to meet demand from the DC/AI and manufacturing sectors. This takes total orders by Duke to 19 for this year. Duke Energy CEO Lynn Good has disclosed that DCs now represent 50% of the company's pipeline until 2029;
- In January 2025, GE Vernova and NextEra Energy announced a framework agreement to develop gas-fired generation to meet the spiking energy requirements for DCs, notably for large-load customers, including Hyperscalers. According to NextEra CEO John Ketchum: '*This agreement has the potential to support multiple gigawatts for data centers, the reshoring of manufacturing, and the electrification of industry, as well as serve investor-owned utilities, municipalities, cooperatives, and commercial and industrial customers*'.

GE Vernova delivered a particularly strong Q1 (see here).

- Adj. EBITDA beat our estimate and consensus by 31% and 45%, respectively;
- Gas Power was the key positive stand-out in the quarter as the company booked 7.1 GW of new orders (vs. expectations of ~5-6 GW). This translated into $6.3bn of total order volume within Power in 1Q25 (inclusive of Service), which meaningfully beat consensus at $4.6bn;
- Additionally, GEV now has 21 GW of gas turbine slot reservations (7 GW secured in 1Q25) that should convert to firm orders over the next several quarters (~20 GW of orders expected in FY25);
- Management reiterated its 2025 guidance targets, while also embedding $300-$400m of tariff impacts, net of mitigating actions. As a result, it's clear in our view that GEV's underlying business is far exceeding expectations.

Belimo upgraded FY25 guidance on the back of higher-than-expected demand for DCs

Belimo, a Switzerland-based company active in selling HVAC field devices for data centre cooling end-market (10-15% of group sales), delivered local currency growth of 22% LfL in 1Q25 driven by higher-than-expected growth across data centres (+50% YoY growth). Our conversation with management confirmed Belimo's rising exposure to liquid cooling combined with its relationship with chip OEMs (ie NVDA) in designing cooling solutions should support demand uptick for valves (vs. actuators for air cooling), positively impacting profitable growth mid-term. The firm recently upgraded FY25 sales and profitability guidance taking into consideration the growth momentum/visibility observed year-to-date across data centre (DC), coming from hyperscalers/chip OEMs discussions, without providing quantitative estimates. We expect data centre to represent 18-20% of group sales by YE25.

Belimo Holding AG: Deep Dive into Data Centre Opportunity (14 Aug 2024)

Statements from the real estate industry

We believe that KPIs (and executive comments) from the property industry can be a good lead indicator for DC roll-out, as real estate companies (including private equity) play an increasing role in the data center industry - certainly in the *passive* element (planning, real estate, shell construction, installment of cap goods including electrics and cooling etc).

According to Pat Lynch, executive MD for commercial real estate company, CBRE's Data Center Solutions (April 2025, Source: CNBC, link here):

- *'All of that has created a scenario where the data center industry is taking a bit of a pause, broadly … I think it is a temporary pause … I remain cautiously optimistic about future demand, particularly when you think of large AI training models'*

John Carrafiell - co-CEO of BGO - a global real estate investment manager, stated (March 2025, Source: BGO, link here):

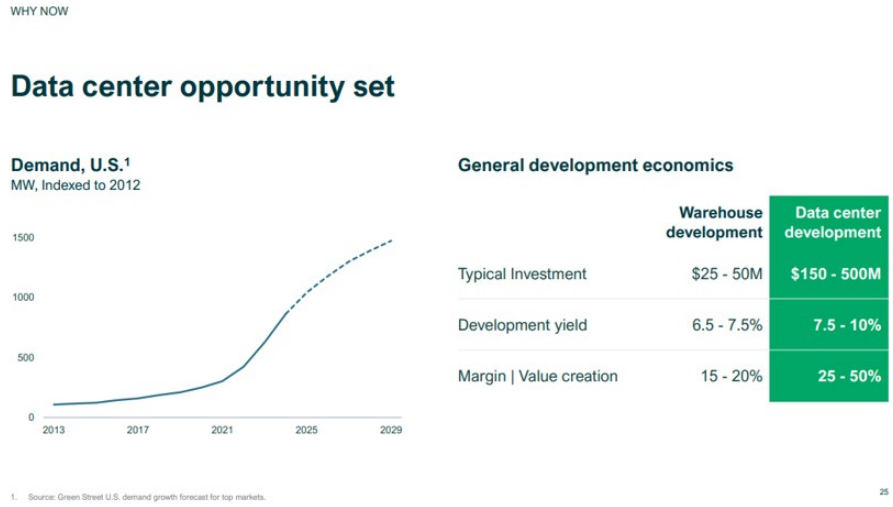
- *We're not seeing a retreat from demand but a strategic reallocation… Rather than a bust, this is a reshuffling of the deck in an environment where power in particular,*

along with fiber, water, and land — are scarce and strategic … We aren't even in the first inning yet'

Prologis (PLD), the largest owner and operator of logistics real estate in the U.S., has been strategically leveraging its land bank to pursue data center opportunities. The company has presented a 3-4GW medium-term data center opportunity and a 10GW long-term opportunity with anticipated margins of +25-50%. In terms of power capacity, Prologis has already secured 1.4GW (including 300MW currently under development) with an additional 2.0GW in advanced stages of procurement.

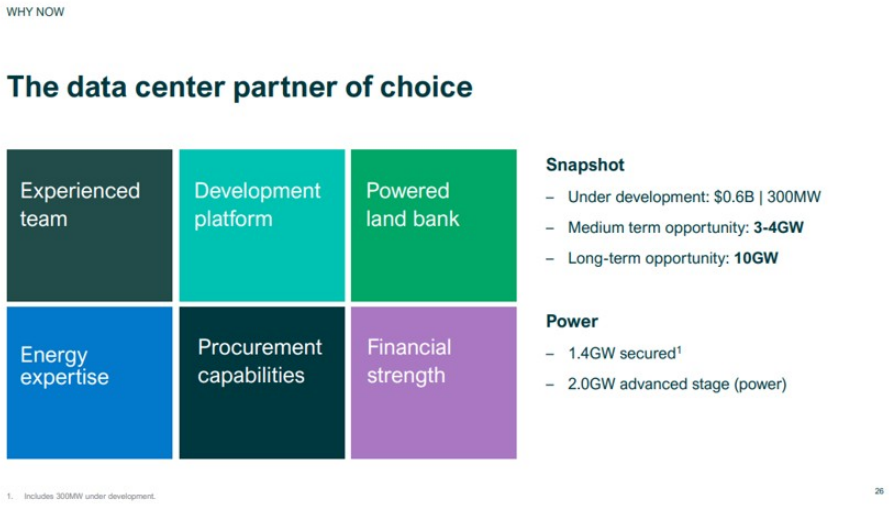
At the recent NAREIT (National Association of Real Estate Investment Trusts) conference, the company highlighted the rapid expansion of its data center business, which has grown from zero staff 3 years ago to over 40 employees today. Management noted that this opportunity has exceeded initial expectations, though it will require substantial funding. Despite these capital requirements, the data center business continues to be a bright spot in Prologis's growth strategy.

Exhibit 42: Data centers in focus



Source: PLD presentation

Exhibit 43: Data centers in focus



Source: PLD presentation

Is a US vs Europe divide emerging? Yes. European growth appears slower than US and Asia

Company commentary suggests slower growth in Europe - perhaps unsurprising

We have noted company commentary suggesting some European DC softness, when compared with other global markets:

- **Schneider:** '*In Western Europe, demand continued to be adversely impacted by several factors including power availability, AI-design and broader macroeconomic uncertainty. Sales growth was led by North America and the Asia Pacific region which saw execution on projects both with internet giants and colocation providers*' - Source: Q1 2025 results release;
- **Vertiv:** '*In the Americas, we are seeing strong performance with TTM organic orders up more than 30% and particularly strong pipelines. APAC in general continues to show order strength and pipeline growth. EMEA still lags the other regions. The dynamics we discussed in February continue. EMEA pipelines though are robust and growing*' - Q1 2025 results release.

This outcome is maybe not hugely surprising, when considering:

- Energy constraints across Europe - notably in three of the five FLAPD markets (Dublin, Frankfurt and Amsterdam);
- Slow planning permission / bureaucracy;
- Less capital availability; *and*
- The fact that all Hyperscalers are US-based / US-headquartered.

Very specific reasons why European DC investments will continue apace

On the flipside / more positive note, we note a statement from Microsoft regarding its plans to expand its European DC presence (link here).

- The Seattle-headquartered Hyperscaler plans to expand its European capacity by +40% over the coming two years (a doubling of European data center capacity, between 2023 and 2027);
- Investments will be spread over 16 countries - and will result in a 200 DC presence across the Continent.

We have identified a number of reasons why we believe that European DC growth rates will remain elevated, over the medium term:

- **European DC market still under-penetrated (notably on a GW per POP basis).** Our estimates suggest that, at the end of 2024, the US data center market had 112MW (per mn POPs), vs 13MW in Europe (9x more penetrated, essentially);
- **Cloud & AI.** We believe that increased rates of Cloudification (Enterprise and B2C) as well as further advancements of AI (and the emergence of new applications) are likely to markedly increase European DC capacity needs;
- **Emergence of new secondary (and even third) data center markets.** As outlined in previous research, we note the growing importance of new European DC markets - beyond FLAPD - in Spain, Milan, Zurich, Marseille Poland - and even in third layer markets (Wales, Portugal, Southern Ireland, North of France etc);
- **Data sovereignty.** We believe that a greater focus on data security and privacy - combined with recent geopolitical changes - means more sovereign DCs are likely to be built in Europe;
- **Development of new supercomputers.** We believe that the *Stargate* announcement is likely to trigger similar / competing announcements in Europe (eg Fluidstack in France).

Q3. What are the latest developments on powering AI?

Background

The Powering AI thematic remains a core DC/AI investor debate. At present, data centers consume just ca 2% of global energy - but we expect this figure to increase >5x by 2035. We believe that AI - and to a lesser extent, Cloud - are the key drivers of DC energy consumption (driven by increasing AI adoption and commitment among LLM developers to continued innovation and cost reduction).

At our recent US TMT Conference (San Francisco, March 2025), OpenAI's Founder Sam Altman noted the following: "Power is the limiting factor" for AI progress / building data centers. On the upside, he noted that if nuclear fusion technology emerges, this could relieve backlogs. Mr Altman also noted that "*the cost of intelligence should converge to the cost of energy* ".

Also at the 2025 US TMT Conference, Bloom Energy's CEO KR Sridhar noted that there is a mismatch between the Power & Utility sector and the Tech industry:

- The Energy sector moves in 5-year planning and 15-year execution cycles (the push); vs
- The Tech industry operates in quarters with fast growth and disruption (the pull).

In April 2025, Anthropic co-founder Jack Clark said 50 GW of new power capacity will be needed by 2027 to support AI. That is the equivalent of about 50 new nuclear plants (Source: NBC, link here).

- *"Anthropic and the other AI companies, what we're seeing is tremendous growth in the need for new baseload power. We're seeing unprecedented growth*".

In terms of key recent Powering AI announcements and developments:

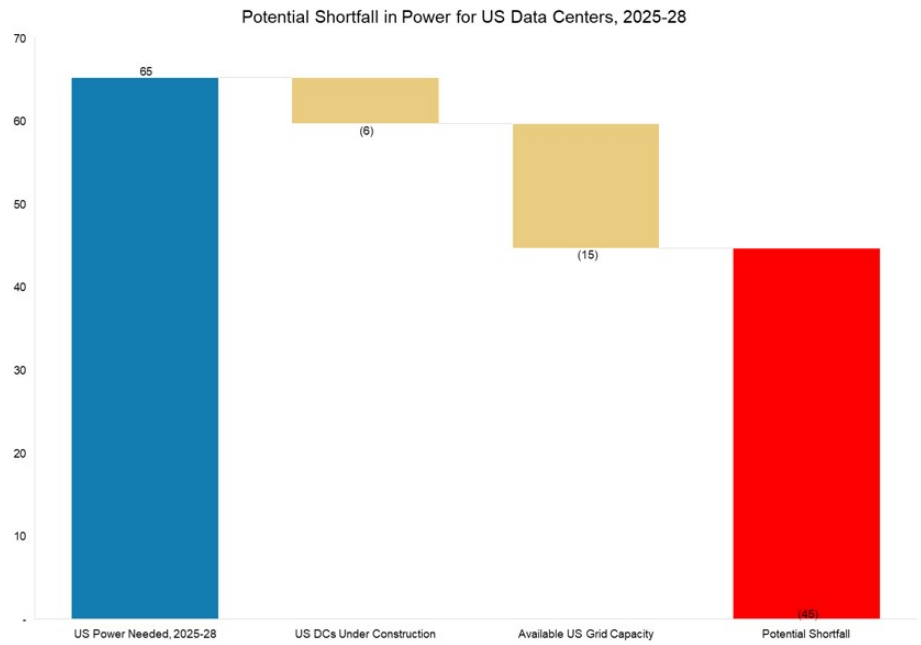
- A recent deal between CoreWeave and Galaxy Digital to host AI/HPC activity (link here);
- The US administration announced it would be willing to sign an executive order to spur coal energy to power AI data centers (see here);
- Fermi America has announced plans to build America's largest energy and data complex. The campus could deliver up to 11GW of energy, powered by nuclear, natural gas and solar. No completion data has been disclosed for the Hypergrid project, which would be a partnership with Texas Tech University. According to an article in Reuters (link here), the facility would cover ca 5,800 acres and '*also have capacity for large artificial intelligence data centers*';
- Bitcoin miners continue to build out AI/HPC data center infrastructure as referenced on earnings calls - these companies include Core Scientific, Hive Digital Technologies and IREN (formerly Iris Energy);
- Hyperscalers signing onsite power agreements with power providers (e.g. GE Vernova and AWS - see here);
- Securing green energy remains a key aim, albeit a challenge, for DC owners. As an illustration, Google has invested in >1 GW of PPAs in the Netherlands, most lately

a contract with Shell to extend the life of the Netherlands' oldest windfarm by +4yrs (ca 110MW of power);

- The US government has identified 16 potential federal sites on US Department of Energy land where data centers and power plants could be developed. Potential sites include National Laboratories in Idaho, Los Alamos and Oak Ridge;
- Over the past 9mths, we have seen a surge of announcements relating to powering AI using nuclear energy (see Nuclear energy becoming central to powering Global DCs).

As we have highlighted in recent research (Powering AI in the US: Data Points Skew Bullish; Prepare for Transaction Liftoff), we forecast a "power bottleneck" in the US totaling 45 GW through 2028 (as a frame of reference, the power usage for the greater Philadelphia metropolitan area is ~3 gigawatts (on average). Indeed, our US utilities analysts recently highlighted how US DC demand continues to grow, driving up utility load growth forecasts, capex, rate base and earnings (research here). In recent months, utilities have seen a continued increase in data center demand and advanced-stage load numbers, with forecasts still changing actively as data center projects firm up and new projects get added to interconnection queues.

Exhibit 44: Potential shortfall in Power for US data centers, 2025-28 (GW)



Source: Morgan Stanley Research

The power shortage is not US-specific - but also applies to Europe, in particular to the UK, Ireland, Germany and NL. Four US Tech players announced >£6bn of investments in UK DCs in 2024. In November 2023, Microsoft announced a £2.5bn plan to build AI infrastructure (largely AI data centers) across a number of UK sites - London, South Wales and the North of England - to be completed by 2030. However, this target has been called into question, as National Grid has stated that it can not guarantee grid connections until 2035 (19 April 2024, Ofgem). Microsoft has stated: "*The ongoing energy connection reforms are moving in the right direction and we're hoping that this will result in dates that will meet the needs of our investment timelines*" (30 March 2025, *The Telegraph*).

We have identified multiple bottlenecks to data center growth in the US and Europe:

- Grid access;
- Power equipment;
- Labour; *and*
- Political capital.

More encouragingly, we do see a handful of important 'de-bottlenecking' solutions (individually addressed below):

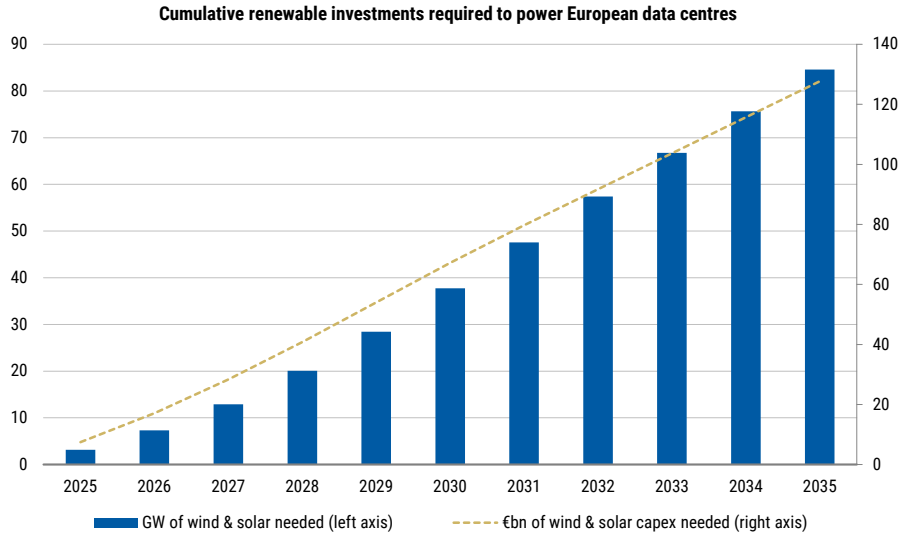
- Re-purposing Bitcoin mining sites;
- Off-grid natural gas-fired data center complexes using power turbines and fuel cells; *and*
- Leveraging the extensive power infrastructure of large power plant sites (especially nuclear).

Interestingly, we believe that the sources of incremental energy for powering new DCs varies by continent:

- **US:** Natural gas and Renewables;
- **Europe:** Renewables (and potentially nuclear in France and Nordics) - see Exhibit 45 below;
- **Asia:** Coal and natural gas (and perhaps nuclear). Interestingly, *powering a new DC in Asia takes about 1-2 years - much faster than in the US.*

We estimate that very heavy investments in developing new renewable energy will be required, to meet new DC's demand for clean / green power - as illustrated for Europe, in Exhibit 45 , below.

Exhibit 45: Powering new European data centers will require very significant investments in renewables



Note : Illustrative chart assuming 100% of additional power demand from data centres is supplied by renewables. Assumption of stable unitary capex levels for wind & solar going forward.

Source: Morgan Stanley Research estimates

Nuclear energy becoming central to powering Global DCs

Background: nuclear power has many advantages

As outlined in our previous research (Global Data Centres: Strongest future growth lies in new secondary markets - July 2024), DCs are looking increasingly toward nuclear solutions to power their energy-intensive facilities, given nuclear power source's numerous advantages:

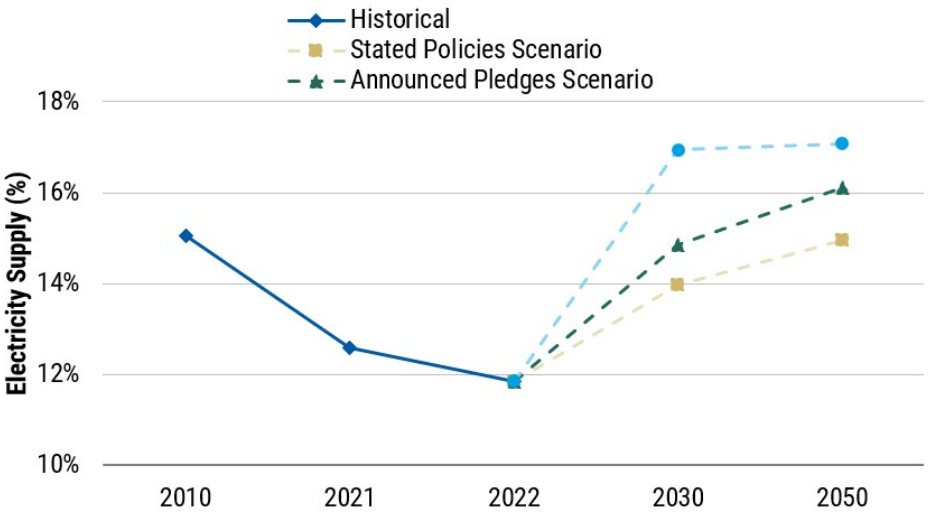
- Nuclear can offer very highly-concentrated and stable levels of power;
- Nuclear is a source of baseload power ('always-on', unlike wind and solar);
- Moreover, nuclear energy could be packaged with available land banks, water infrastructure and security; *while*
- Nuclear power has a low carbon footprint.

However, key challenges relating to nuclear include cost overruns and project development timeline delays (eg at Flamanville 3 in France or Hinkley Point C in Somerset, UK).

Nuclear power supply sources are also growing:

- To put nuclear into perspective, today, the world has about 420 GW of nuclear capacity, providing close to 10% of global electricity;
- At COP28, over 20 countries (incl. France) signed a joint declaration to triple nuclear power capacity by 2050;
- Perhaps more interestingly, with >105GW of capacity, Europe is the No1 generator of nuclear energy, on a global basis (>25% of the total, incl. the UK). Significant volumes of nuclear power are produced in France;
- However, China is unquestionably the clear leader in the development of new nuclear power plants.

Exhibit 46: Nuclear as a % of overall electricity supply



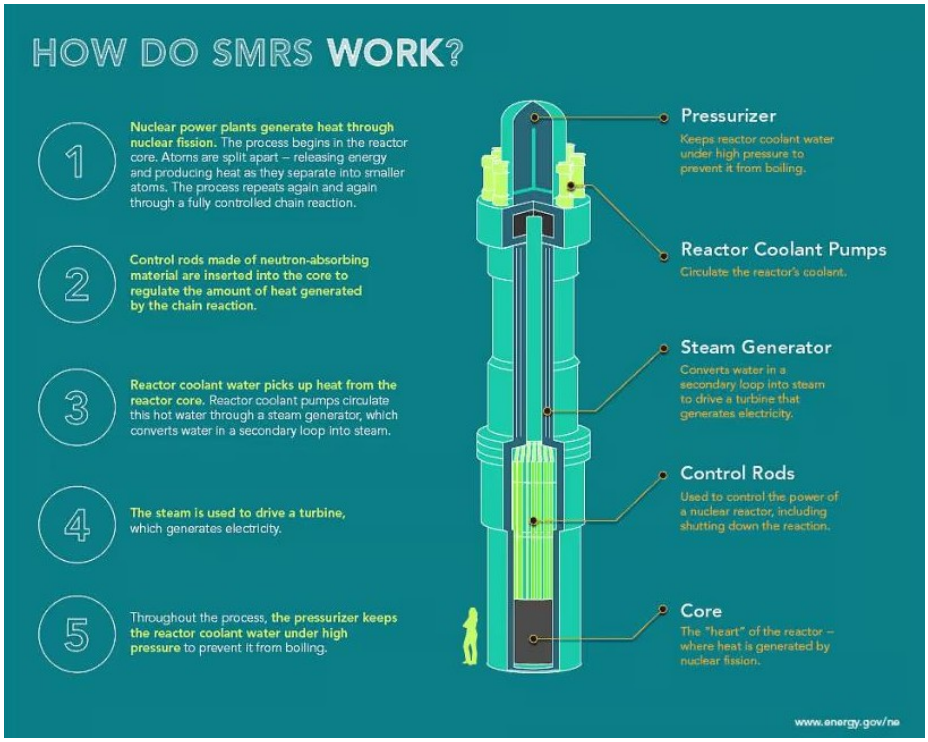
Source: IEA

We believe that SMR (small modular nuclear reactor) technology could hold one of the

keys to powering DCs / AI growth:

- We note attractions in terms of power density, scalability (needing 35-50 acres/ GW vs 832 acres for traditional pressurised water reactors / PWRs), and modular assembly benefits;
- Companies like NuScale Power, Oklo, Rolls-Royce, Curtiss-Wright, Mitsubishi Heavy Industries, the GE-Hitachi JV, TerraPower, Kairos Power, X-Energy and Westinghouse are working on SMR design and development at the moment;
- However, there are only two commercially operational SMRs globally (in north eastern China and northern Russia), while only one company in the US (NuScale) has design certification from the Nuclear Regulatory Commission (NRC);
- MS estimates suggesting up to 5GW of potential SMR capacity by 2035 in the US.

Exhibit 47: How do SMRs work?



Source: Office of Nuclear Energy - https://www.energy.gov/ne/articles/4-key-benefits-advanced-small-modular-reactors

US data centers are increasingly attaching themselves to nuclear power

Given the high concentration of energy needed to power DCs – and also a delay / shortage of available grid connections – the DC industry has concluded that it may need to 'bring the DC to the power', including nuclear energy.

- In May 2025, US.President Trump ordered the nation's independent Nuclear Regulatory Commission to '*cut down on regulations and fast-track new licenses for reactors and power plants, seeking to shrink a multi-year process down to 18 months*' - article link here. According to US Interior Secretary Doug Burgum (who also leads the White House Energy Dominance Council) - "*This is going to turn the clock back on over 50 years of overregulation of an industry*";
- In late June, President Trump ordered the replacement of Chris Hanson, a

Commissioner at the five-member Nuclear Regulatory Commission.

We have noted a number of nuclear-linked DC initiatives in the US:

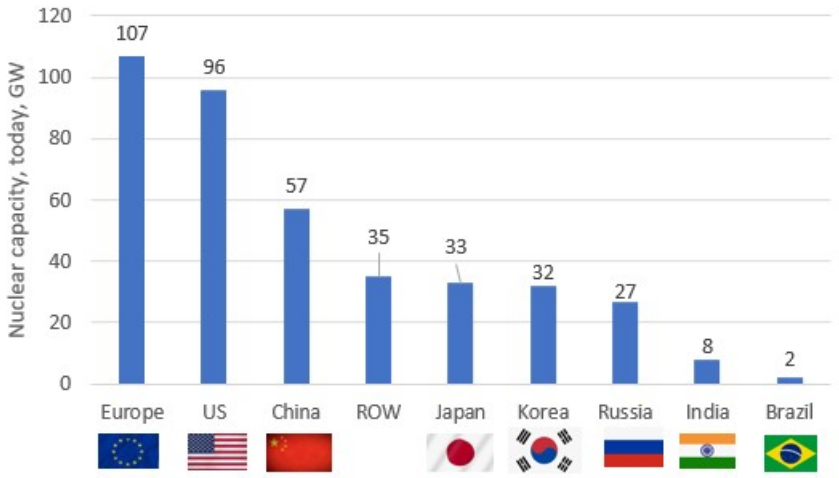
- **Microsoft / Three Mile Island.** In September 2024, it was announced that Constellation Energy would restart the nuclear facility at the Three Mile Island nuclear plant, and sell the nuclear energy to Microsoft, for powering DCs / AI purposes. The plant (Unit 1, which is separate from the facility that saw an accident in 1979) will be re-named as Crane Clean Energy Center. The facility is expected to come online in 2028 (subject to final approvals from the Nuclear Regulatory Commission and completion);
- **Amazon / Talen Energy.** Amazon has acquired and is building DCs adjacent to nuclear facilities - and has signed PPAs to buy nuclear energy. First In March 2024, AWS announced the purchase of a data center campus called Cumulus Data, based in Pennsylvania, from Talen Energy, for a consideration of $650mn. The facility is a 1,200 acre campus and is powered by Talen's Susquehanna Steam Electric Station (lies adjacent, not part of the transaction, generates 2.5GW of power). AWS plans to develop a data center on the site, with capacity of up to 960MW, and has signed a number of PPAs with Talen (Talen will provide fixed-priced nuclear power to the new DC with two 10-yr extension options tied to nuclear licence renewals). Second, in early June 2025, Amazon announced a $20bn investment in DCs / AI in Pennsylvania (the largest private sector investment in the history of the State, link here). We believe this project could represent >600MW of DC capacity. Salem and Falls have been disclosed as the first campus facilities (with further locations to be revealed in the future). One of the data centers is being built next to the Susquehanna nuclear power plant. As part of a separate agreement, Talen and Amazon extended their pre-existing (nuclear energy supply) relationship, to provide 1.9GW of carbon-free energy from the Susquehanna plant to AWS DCs. Moreover, Talen and Amazon will explore building new SMRs (modular nuclear reactors). The agreement will supply ramp up over time (reaching full capacity by 2032), and extends to 2042 (with an option to extend beyond). In terms of pricing, this is a '*front-of-the-meter*' arrangement ;
- **Meta / Constellation Energy (Illinois).** Meta has signed a 20-year PPA for the nuclear output of the Clinton Clean Energy Center (owned by Constellation Energy) - equating to 1.1GW of emissions-free nuclear energy, as of June 2027. The agreement has scope to expand to include a Small Modular Reactor as well. According to Urvi Parekh, Head of Global Energy at Meta: "*We are proud to help keep the Clinton plant operating for years to come and demonstrate that this plant is an important piece to strengthening American leadership in energy*". The Clinton facility was scheduled for closure in 2017, but this decision was reversed by the Future Energy Jobs Act;
- **Microsoft / SMRs.** The Seattle-based Tech company is examining the potential for next-generation nuclear reactors (small modular reactors / SMRs) to power its DCs and AI initiatives (Source: The Register, Jan 2024). Indeed, former Microsoft MD Bill Gates is a Founder and Chairperson of TerraPower, an incubator developing SMR designs;
- **Oracle.** The US tech giant has said it is designing a new DC facility, which will be powered by three small nuclear reactors.

France's vast nuclear energy supplies suggest an advantage in building DCs

Today, the world has about 420 GW of nuclear capacity, providing close to 10% of global electricity.

- Perhaps more interestingly, with >105GW of capacity, Europe is the No1 generator of nuclear energy, on a global basis (>25% of the total, incl the UK).
- Within Europe, France is the leading generator of nuclear power.

Exhibit 48: When compared for installed nuclear capacity, Europe is the No1 region in the world, followed closely by the US



Source: World Nuclear Association, data further aggregated and calculated by Morgan Stanley Research

In terms of its nuclear capabilities:

- France has 18 commercial nuclear power plants. These 18 plants are home to >55 operable reactors;
- We note that 7 of the 18 French nuclear facilities are located in the North of France;
- In 2014, the French government announced its target of reducing nuclear's share of electricity to 50% (by 2025). In 2019, this target was pushed out to 2035. The target was subsequently abandoned completely in 2022-23 and France has adopted a significantly more pro-nuclear agenda (see EDF: Promises of a Nuclear Renaissance? (10 Feb 2022)) with a commitment to reactors' life extension when possible as well as the plan to launch a new nuclear build program
- The average age of France's nuclear reactors is ca 37yrs, with licenses renewed by the government in 10yr cycles;
- In 2022, France disclosed its intention to build six new reactors / EPR-2 PWRs, with an option to build a further eight. President Macron outlined a plan to increase electricity supply by "up to 60%", as France seeks to wean itself off oil and gas consumption, by 2050.

Exhibit 49: Locations of France's nuclear power plants



Source: Connexion (2024, link here)

We believe the sign posts are encouraging that French DCs could access this vast nuclear power supply. Why?

- The AI Action Summit outlines long-term energy prices / partnership contracts (of 10-15 years) for AI / DC operators seeking access to nuclear production (link here);
- Fluidstack plans to build a 1GW super-computer. According to the company (link here): *"The new facility will leverage France's abundant, carbon-free, and predominantly nuclear energy"*;
- We expect France to be keen to maximise the **competitive advantage** that access to nuclear power brings its AI industry;
- Some 4 of the 35 sites (ear-marked by the French government for potential data center projects) are owned by French state-owned power company **EDF**, which operates the country's nuclear power fleet;
- France may be keen to **emulate the US** - the global leader in DCs/AI - which is moving towards nuclear-powered DCs;
- **Excess power** produced by French nuclear power plants can be used by DCs.
- French nuclear power plants' operator EDF could launch auctions to sell some of its nuclear power volumes under medium/long-term agreements at fixed prices. The March article from BFM (see here) flagged a potential total of 10 TWh to be sold per year from 2026 under this scheme.

Converting Bitcoin mining to DCs

Conversion of Bitcoin facilities may prove ideal for dedicated AI factories

The CEO of Nvidia Jensen Huang has called for the development of dedicated 'AI factories' - a trend he believes is happening in the US, India, Sweden, Japan and France (link here).

- *"There is a new class of data centers and this new class of data centers, unlike the data centers of the past where you have a lot of applications running used by a great many people that are different tenants using the same infrastructure … These new data centers host very few applications, if not one application, used by basically one tenant and it processes data, it trains models and then generates tokens and generates AI. And we call these new data centers 'AI factories.'".*

Our research has consistently highlighted the scope for Bitcoin mining companies to convert their infrastructure to host data centers / AI / supercomputing workloads (reports here and here). This phenomenon has been driven by the demand for energy / AI computing power. Bitcoin miners are also seeking to diversify and future-proof their revenue streams. We estimate that ~80% of bitcoin management teams are focused on this opportunity.

Bitcoin facilities typically already have the necessary basic infrastructure already in place (energy, cooling/HVAC, security etc) for computing operations. Converting a crypto mining facility to be a data center has a number of requirements:

- Upgrades to power supply units;
- Additional cooling systems;
- The addition of backup generators (to ensure reliability);
- There is a significant difference in engineering requirements, while we also note constrained supply chains.

We believe the most common conversion model will be a long-term lease structure between a hyperscaler and a Bitcoin mining firm in which the Bitcoin mining firm (acting alone or in partnership with a large Data Center development firm) builds a powered shell for a hyperscaler.

Our research (Bitcoin-to-Data Center Conversions: More Opportunity Than Appreciated) has highlighted a potentially significant value arbitrage by converting Bitcoin mining sites to HPC Data Centers, driven by our "Time to Power" mathematics.

On the downside, Bitcoin mining facilities are often located in remote rural settings - rather than urban centers. This calls into question the speed of connectivity. However, we note clarifying comments from Dan Roberts, CEO of IREN (link here): "*You're not running lifetime, cloud computing applications on your desktop, you're not doing mission-critical systems for hospitals, governments, or corporates … It's inference, it's training, and it's data processing. The company's latency is still fractions of a second, around 20 to 40 milliseconds rather than five milliseconds for a colocation provider in a dense commercial area … If you're running a training model, and you're paying 80% less, do you really care if you're waiting point two seconds longer to get your data back?*"

A number of examples (IREN, Core Scientific)

- **IREN.** Iris Energy (IREN) has been a key player in the Bitcoin mining industry since the late 2010s. IREN has built five DCs in North America (three in BC/Canada, and two in Texas/USA). The choice of location was part-driven by the availability / low cost of land and renewable energy. IREN has 2,000 MW of energy secured (ca 400-500 MW operational today). IREN has secured its first AI customer (Poolside AI), which is using AI to improve code development.
- **Core Scientific.** Bitcoin Miner Core Scientific has converted a portion of its 500MW DC grid for AI purposes. According to Core Scientific CEO Adam Sullivan (Q1 2024 earnings call): '*We aim to become a market leader and provide the digital infrastructure for high-performance computing*.' AI infrastructure provider CoreWeave (CRWV, covered by Keith Weiss) recently announced a deal to acquire Core Scientific (CORZ, not covered) – CoreWeave: CORZ Deal Announced – Securing Power & Verticalizing the Data Center Footprint (7 Jul 2025)

US developing natural gas-powered plants (new energy for DCs)

Overview

Hyperscalers have a clear preference to connect their infrastructure to fully-renewable energy. However, given delays to grid connections and energy shortages, DCs have started to explore alternative power sources, including natural gas.

The advantages of natural gas are numerous:

- **Natural gas offers flexibility for DC owners**. **i.** Natural gas power plants can be worked into hybrid power solutions, combined with renewable energy, battery storage etc; **ii.** The power source can be used for self-generation, or for backup power only; **iii.** Excess power can be sold back to the utility.
- Cost savings can be significant. We note that natural gas has a higher burn rate than diesel - however, the cost of natural gas is much lower.
- **Environmental impacts are notable**. **i.** Some natural gas power plant projects are also designed to potentially integrate carbon capture and storage technologies to reduce environmental impact; **ii.** Natural gas emissions (sulphur, carbon dioxide etc) are lower than other fossil fuels (eg diesel); **iii.** Natural gas has a higher success ratio for air permit approvals; **iv.** Noise pollution is less than the case for diesel generators.
- **Likely future progress in making natural gas cleaner and cheaper**. The development of more advanced turbines, coupled with a greater hydrogen content will enhance efficiency.

Chevron is partnering with both GE Vernova and Engine No. 1 to construct natural gas power plants. These will directly supply energy to DCs. We also note the Homer City & Kiewit announcement.

Homer City and Kiewit - 4.5G of incremental power

Homer City Redevelopment (HCR) and Kiewit have announced the conversion of the Homer City Generating Station to a natural gas-powered plant (link here).

- Previously, this facility was the largest coal-burning power plant in Pennsylvania - but the coal plant was shut down in 2023;
- This facility will provide 4.5GW of new / incremental power;
- Energy will be generated by seven high efficiency hydrogen-enabled, gas-fired turbines (supplied by GE Vernova);
- The energy will be used 'to support AI-driven hyperscale data centers'
- Construction is expected to commence in 2025, and is anticipated to produce power by 2027;
- The project aims to reduce greenhouse gas emissions by 60–65% per MWH (vs the former coal plant stats);
- The initial capital investment is expected to be >$10bn (power infrastructure, site readiness), with DC and AI investments to total 'billions more'.

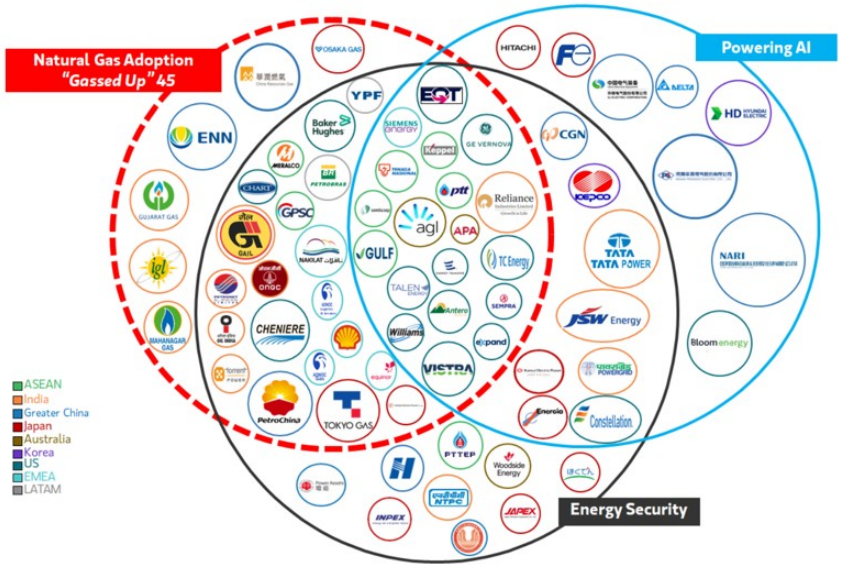
Energy Transfer sees scope for great expansion in Texas

Energy Transfer (covered by Robert Kad) has highlighted the powering AI/DCs opportunity in the US, powered by natural gas-fired power plants:

- The power company believes the State of Texas alone could see 150 DCs emerge, implying a "*gold rush*", with "*not a lot of capital' required for energy companies*" (Q1 25 Earnings Call);
- On DC opportunities outside of Texas, ET management stated: "*Even outside of Texas, we see Arizona as a very significant growth area for data centers, really growth area for natural gas demand in addition to data centers. Elsewhere, in other states for other states, we expect to make some significant announcements over the next four to eight weeks … We just couldn't be more excited about these opportunities we're chasing*" (Q1 25 Call);
- On Stargate, ET management noted on the Q4 2024 analyst call that the super computer project has '*high potential*', where ET is "*very well positioned to provide whatever is necessary there, and, we have our team working on that.*"

Powering AI stock screen

Exhibit 50: We previously explored the Powering AI theme (here), and see the below names benefitting.



Source: Morgan Stanley Research

Q4. What are our latest global DC forecasts?

Overview

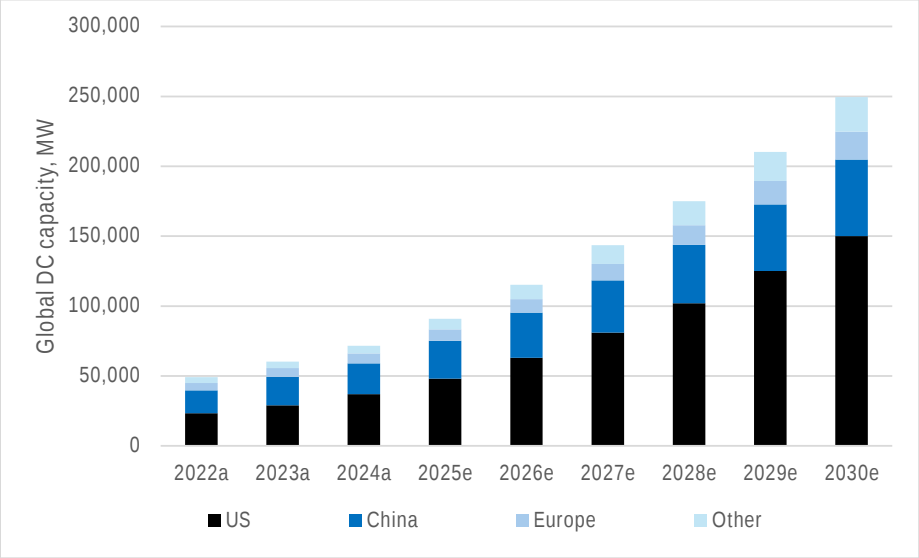
MS Research has collaborated across multiple geographies to build a global DC model - this includes:

- United States (North Virginia and long tail of secondary markets);
- China;
- Europe (incl UK, Switzerland and Eastern Europe);
- ASEAN / SE Asia (Singapore, Malaysia, Thailand, Philippines, Indonesia);
- Japan;
- Middle East (UAE and Saudi Arabia); *and*
- Australia.

Our model suggests the following:

- The US is, by some distance, the largest DC market in the world - accounting for 37GW of capacity (>60% of the global total, having realised ca +30% YoY growth during 2024a). These stats are perhaps unsurprising, given global AI leadership, the home / presence of the Hyperscalers, availability of capital etc;
- Moreover, the US will account for ca 65% of global DC growth until the end of the decade, we forecast - again hardly unexpected, given Hyperscaler growth, the roll-out of projects such as Stargate (potentially 15GW), possible access to nuclear energy etc;
- We also project very strong capacity uplift in China (the world's 2nd largest DC market), with growth of +16% pa until 2030e (a nice acceleration vs the +9% realised last year), with secondary markets playing a core role. Our forecasts imply Chinese capacity reaches ca 42GW by 2028 (>10% more than today's US DC market);
- Europe lags the US and Chinese DC markets, by some distance. However, with new markets emerging (Aragon, North of France, Berlin, Milan, Zurich etc), and a potential boost from data sovereignty, we believe that capacity growth will accelerate to +19% pa (24a-30e, CAGR), from the mere ca +13% reported last year;
- We forecast particularly strong growth in Middle Eastern DCs, with the UAE and Saudi DC markets to grow 6x and 7x by 2030e, respectively.

Exhibit 51: Global DC forecasts - we project worldwide capacity growth of +23% pa, until the end of the decade



Source: Morgan Stanley Research estimates

We analyse the dynamics of each DC market, in the sections below.

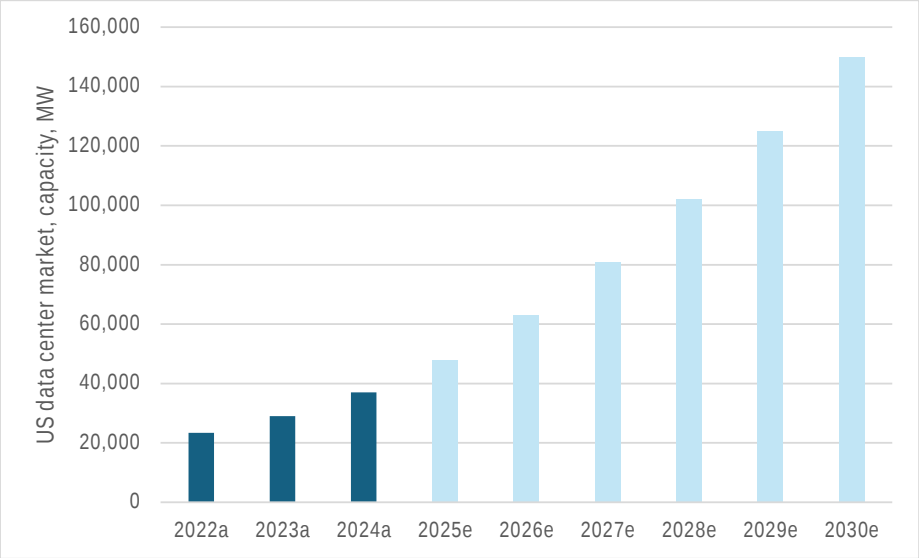
i. US - stellar growth expected to continue, after strong 2024 uplift in capacity

Background

The US remains - by some distance - the world's largest DC market, with capacity growth set to remain particularly elevated over the coming years. This position is un-surprising, given the US is the global AI leader, is home to the HQ of the three largest global Cloud players (AWS, Azure, Google Cloud) and Nvidia, the presence of co-location players (Equinix, Digital Realty etc), other Tech giants (notably Meta and Apple) and the availability of investors / capital (incl. private equity).

Our estimates suggest that the US DC market grew by ca +30% YoY in 2024a (reaching ca 37 GW of capacity). Going forward, we forecast an elevated ca +25% pa growth rate in American DC capacity, until the end of the decade (2030).

Exhibit 52: We forecast that US data center capacity will grow by +26% pa until 2030e



Source: Morgan Stanley Research estimates

North Virginia continues to lead the way

The North Virginia DC market - commonly referred to as *Data Center Alley* - remains the world's largest DC cluster. This success is due to excellent internet connectivity, historical ease of planning permission, tax incentives, a skilled workforce (notably the availability of engineers), proximity to large cities on the Eastern seaboard (including the nation's capital, as well as New York, Boston, Philadelphia etc), submarine connections (to Europe), and the reliability of power grids. Capacity has increased by ca +20% over the past year. Despite the rise in supply, rental yields have grown strongly (double-digit-% increases, YoY), while vacancy rates remain below 5%.

However, on the downside, growth in this region has been somewhat curtailed by both potential power shortages (for new DC facilities) and constraints relating to the availability of land / real estate (notably in Loudon County). Local power supplier Dominion Energy has therefore announced plans to significantly improve the grid (new transmission lines, upgrading existing substations, projects with other utilities including PJM Interconnection etc).

(New) secondary markets continue to experience strong growth … with Texas to the fore

Beyond North Virginia, we note that a number of secondary DC markets are projected to experience particularly strong growth - these include Texas, Tennessee, Reno, Phoenix, Atlanta, Silicon Valley, Chicago etc - as discussed in our previous research Strongest growth in secondary DC markets. Over the past 12 months, we note that Texas has gained particularly strong momentum.

We continue to believe that these new / expanding DC markets enjoy some advantages - the availability of energy (faster grid connection times/potential access to nuclear), a pro-business environment (tax incentives), and more affordable real estate prices (vs North Virginia).

Exhibit 53: Northern Virginia is still the dominant DC market, but other regions in the US are beginning to experience rapid DC capacity growth



Source: Morgan Stanley Research

Potential access to American nuclear energy

We believe that nuclear energy has emerged as a potential means to power large DCs (high concentration of power, always-on, carbon-free energy). Newsflow surrounding the use of nuclear to power US data centers has accelerated of late:

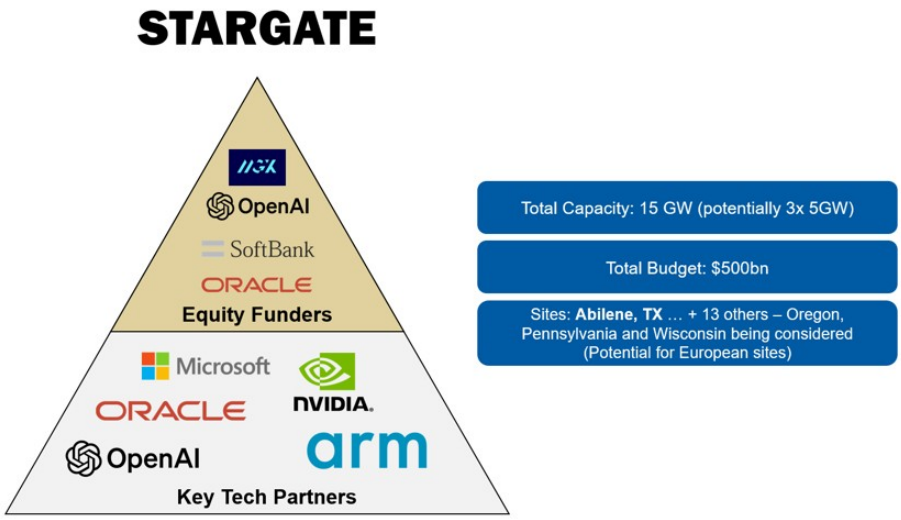
- Texas firm Fermi has applied to the federal government to build four 1 GW nuclear reactors and up to 11GW of data centers at the Amarillo campus;
- Meta signed a 20-year PPA with Constellation Energy for c 1.1 GW of nuclear energy from Clinton Clean Energy Center. There is the option for a small modular reactor (SMR) as well;
- President Trump signed an executive order with the goal of quadrupling nuclear-power generation in the next 25 years.

Indeed, we believe the US leads in the field of nuclear-powered data centers, with France also examining the scope of such projects.

The Stargate project - potentially the world's largest DC complex

In January 2025, a consortium of OpenAI, SoftBank, Oracle, and MGX announced funding plans for an AI computing system called 'Stargate'. Stargate's total projected capex will be $500bn - with some $100bn deployed almost immediately. Power demand would be ~15GW (MSe, see calculation below). The initial equity funders in Stargate are OpenAI, SoftBank, Oracle, and MGX.

Exhibit 54: Stargate: An Overview



Source: Company data, Morgan Stanley Research

Other Tech companies stepping up their DC efforts

We have noted that large US Tech companies - beyond the Big 3 (AWS, Azure, Google Cloud) - are markedly stepping up their efforts to expand their proprietary DC capacity:

- **Meta.** At present, Meta runs (and owns) its own data centers, while also renting AI servers from cloud providers including AWS and Oracle. Meanwhile, Meta is also reported to be in discussions to build a new blue-chip DC campus, in the United States, to fuel its AI efforts (link here, unconfirmed). According to the article, total capacity could be 5-7GW, with capital outlay of >$200bn. Moreover, in late June 2025, the FT reported that Meta was seeking to raise up to $29bn - from private credit - to fund the construction of its AI data centers (link to article here). *Meta did not comment.* Meta plans to bring 1 GW of compute / data center capacity online this year. It is therefore unsurprising that, at its Q1 results print, Meta issued new capex guidance of $64bn-$72bn, implying growth of ca +85% YoY (at the mid-point).
- **Apple.** Apple largely rents Cloud & data storage capacity off 3rd parties (Apple is a very large customer for Google Cloud and AWS). Apple owns and operates ca 10 DCs in a number of locations across the globe - accounting for <1GW of capacity (MSe). However, we believe that Apple has plans to more than double its DC capacity - with new DCs or expansion underway in North Carolina, Iowa and Houston. Indeed, in H1 2024, Apple hired Sumit Gupta (previously of Nvidia, IBM and Google) to lead its Cloud infrastructure team.

What are the co-location players saying?

Equinix hosted an analyst day at the end of June with a focus on creating a "durable" position in the digital infrastructure market. In October, Equinix signed a JV agreement with GIC and CPP Investments with the aim to raise over $15bn together. The JV is "intended to accelerate the Equinix xScale data center portfolio" and is expected to almost

triple the investment capital of the program.

ii. Europe

Background

Last year, we published our maiden forecasts for the European DC market and the growth outlook thereof, whereby we forecast a 6-fold rise in European DC capacity (by 2035, vs a 2023 base).

- DC capacity in Europe remains low, when compared with the US (certainly on a MW per POP basis - 13MW per 1mn POPs in Europe vs 112MW in the US, MSe), but we have identified scope for Europe to catch up;
- We quantified the five largest DC markets (called FLAPD - Frankfurt, London, Amsterdam, Paris and Dublin), while also identifying the emergence of secondary markets (North of Spain, Milan, Zurich, Warsaw, Berlin, Marseille, Norway etc);
- The availability of clean/green energy, planning permission (bureaucracy, moratoria etc) and the supply of electrical capital goods all remain key areas of blockage (as outlined in Section 1). Indeed, according to Schneider (Q1 results call): *'In Western Europe, demand continued to be adversely impacted by several factors including power availability, AI-design and broader macroeconomic uncertainty".*

Key Developments

In terms of key recent developments in the European DC market:

- **Power.** Despite world-leading new renewable energy development (notably in Spain / Norway / Italy), the availability of new incremental green energy remains the key and considerable obstacle to building new DCs across Europe. Indeed, we believe this factor has been main reason for relatively lower growth of European DC capacity base in 2024 and in H1 2025 (vs the US);
- **Secondary DC market growth remains strong.** We have seen a number of new secondary DC markets emerge across Europe - in the UK (Northern England, South Wales), France (Marseille, North of the country), Germany (Berlin Brandenburg), Portugal etc. We believe that Spain continues to be the No1 secondary market for new DC/AI projects (beyond FLAPD);
- **AI Summit pushes France to the fore.** The French government hosted an AI Summit during Q1 2025. We believe this event has propelled France towards the front of the European data center industry - with landmark announcements made by Brookfield (€20bn of AI investments, including a ca 1GW facility in Northern France), Fluidstack (Supercomputer), MGX (mega DC of 1.4GW) etc. Access to nuclear energy could emerge as a potential critical success factor in France we believe (65% of French energy derives from nuclear sources);
- **UK - DCs are now critical infrastructure.** In September 2024, the UK government designated DCs as being *Critical National Infrastructure* (CNI), placing them on par with essential public services like water, energy, and emergency services. A new AI action (50-point) plan was launched by the UK government - including the creation of AI growth zones (Vantage, Nscale, and Kyndryl all committed to new data center projects in these zones). A number of bluechip DC launches have been announced -

including plans for the UK's largest data center (a 1GW campus in North Lincolnshire, 15 data halls spanning 1.5mn sqm, construction costs of £5.5bn-£9.0bn over 10 years);

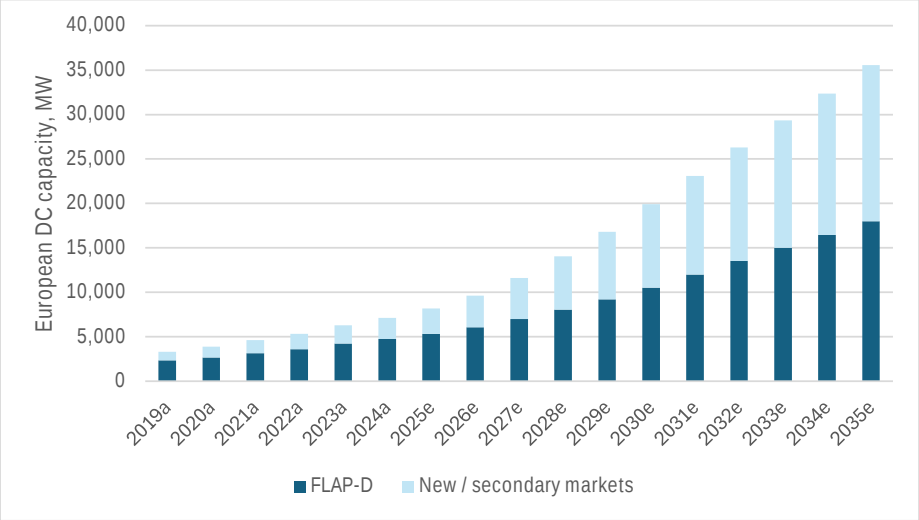
- **Ireland's DC moratorium beginning to bite.** Ireland remains among Europe's leading DC markets, with >1GW of capacity being hosted in Dublin, with Hyperscalers to the fore. However, with ca 24% of national power being consumed by DCs (2024, MSe), and Dublin facing significant energy constraints, the Irish electricity company Eirgrid has imposed a moratorium on new data centre applications (no new grid connections to DCs in Dublin until 2028). We believe this makes Dublin a far less attractive host city for DCs / AI / Supercomputers. Indeed, in 2024, AWS country lead for Ireland, Neil Morris, stated that '*Ireland is missing out on billions in data centre investment compared to other European countries*' - link here;
- **Data sovereignty.** Going forward, the location of where data is stored, who owns the DC and data security are all subjects of increasing importance and debate, we believe. We also expect this subject will continue to gather increased debate, in light of recent geopolitical developments. The three US Hyperscalers enjoy ca 85% Cloud market share in Europe. A key question is whether alternative *Made in Europe* Cloud platforms will emerge and win market share;
- **Super computers.** The Stargate project has raised questions about whether similar projects could emerge in Europe. The French AI Summit unveiled a number of projects (Fluidstack, evroc) while we see scope for some of the Stargate project to be Europe-based (given GDPR requirements);
- **EU initiatives.** The EU has announced a number of AI initiatives, including *InvestAI* - this is an EC-led initiative to mobilise €200bn for European investment in AI. This includes a new European fund of €20bn. The first AI Factories, and their locations, have already been announced in late 2024 - these AI technology hubs across Europe include Barcelona (Spain), Bologna (Italy), Stuttgart (Germany).

Our figures suggest that DC capacity grew by just over +10% YoY in 2024, a marked slow-down vis-à-vis the near-20% growth realised the previous year (2023).

European DC vacancy rates remain ca 5%-10%, while yields continue to rise mid-single-digit-% (YoY). We believe both statistics highlight robust demand dynamics.

In terms of our updated European DC projections, we forecast DC capacity growth of +15% pa (2024a-35e) - with industry capacity growing from 7GW (2024a) to 36GW (by 2035e).

Exhibit 55: European DC forecasts - we still forecast a 6x increase in DC capacity, by 2035 (vs a 2023 base)

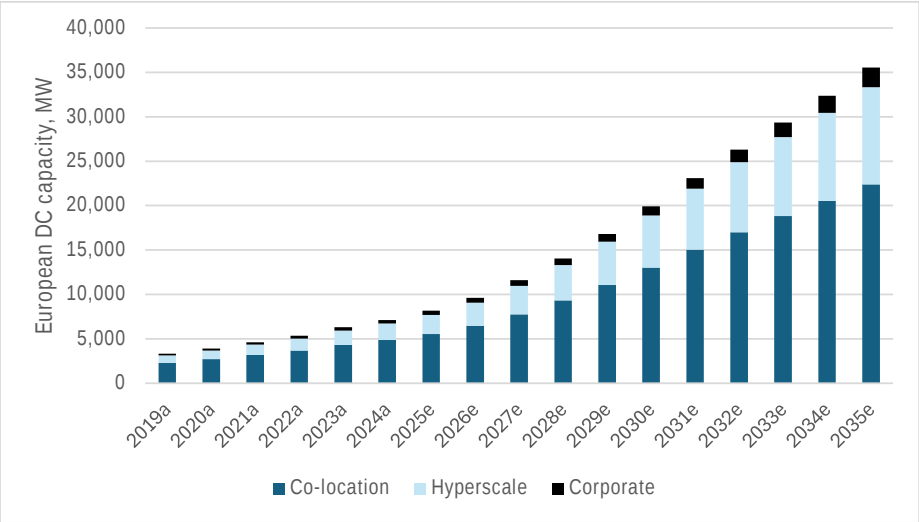


Source: Morgan Stanley Research estimates

In terms of key changes in European DC dynamics:

- We expect secondary DC markets (non-FLAPD) will represent 50% of DC capacity by 2035 (vs 33% today);
- Our model implies that Hyperscalers will account for one-third of European DC capacity in a decade's time (vs a quarter today).

Exhibit 56: Breakdown of European DC capacity, by owner / type



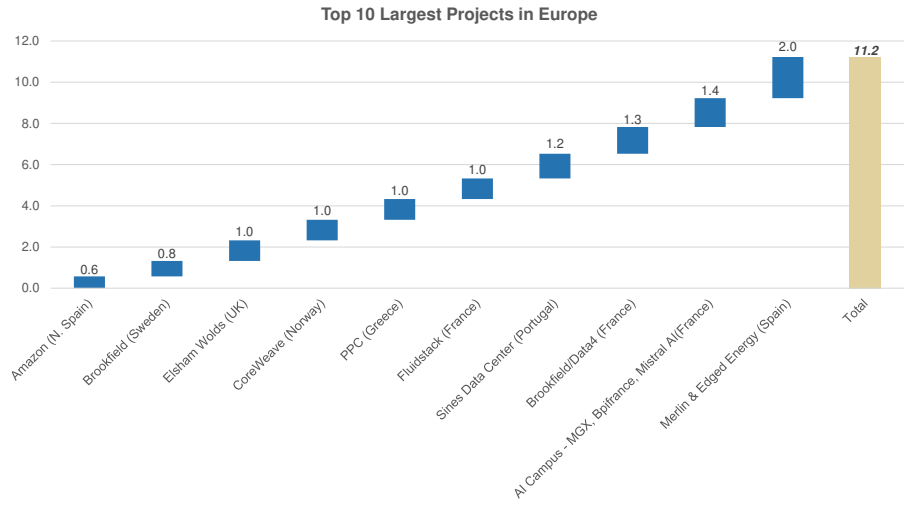
Source: Morgan Stanley Research estimates

Our research has highlighted the 10 biggest data center (and AI) projects across Europe (Exhibit 57 , below). These account for a combined 11GW of capacity, equating to ca 40% of our future industry growth projections. However, we acknowledge the following (and reflect in our forecasts):

- Some projects may not reach construction / completion phases, largely due to energy or capital constraints;

- There may be overlap between future DC/AI capacity targets announced by real estate, co-location, Hyperscalers and corporates.

Exhibit 57: The 10 largest DC projects in Europe account for 40% of our future growth projections



Source: Company data, Morgan Stanley Research

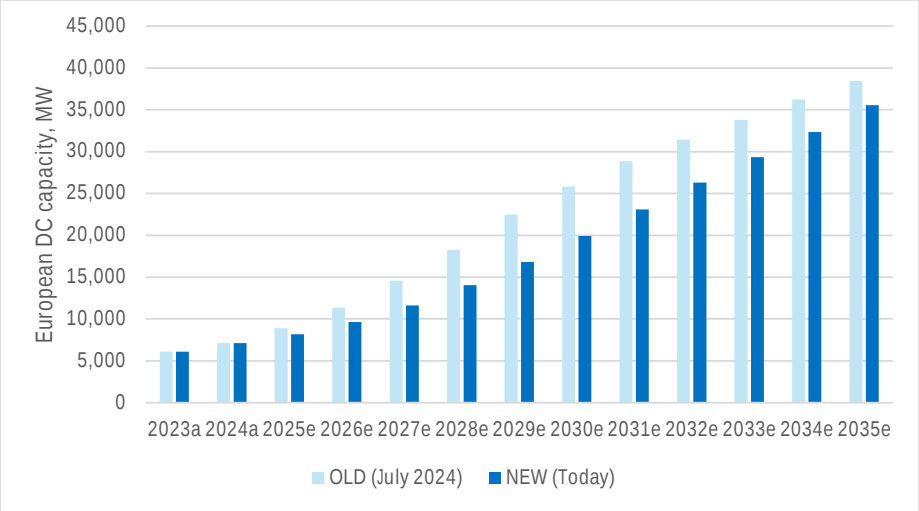
Encouragingly, we have noted a surge in more constructive announcements surrounding European DCs / AI over recent weeks:

- **Nvidia statements on European AI (AI delay and time lag 'will be resolved soon').** At the VivaTech conference in Paris (10 June), Nvidia's Jensen Huang claimed that Europe's time lag in AI "*will be resolved soon*", claiming that at least 20 mega DC campuses (including five gigafactories) are planned in Europe over the next 2 years. According to Mr Huang: "*Your AI shortage, your GPU shortage, will be resolved for you soon … Europe is going all in on AI … the amount of AI infrastructure being built here will increase by an order of magnitude in the next couple of years.*" Moreover, Nvidia and Mistral AI announced an expanded partnership;
- **European Telcos to become increasingly involved in DCs / AI. i. Deutsche Telekom.** The German Telco has partnered with Nvidia to build what they claim is Europe's first industrial AI Cloud for European manufacturers (link to DT release here). The partners claim that the use of 10,000 GPUs (B200 system) - to be added at Telekom's existing DCs - sets the path for the creation of an AI Gigafactory; **ii. Telefonica.** The FT reported that Telefonica 'is prepared to invest in data centres and cyber security services in a bid to convince European regulators to approve telecoms mergers' (unconfirmed, Source: FT, 10 June, link here);
- **Further landmark announcements.** These include a large pan-European DC/AI JV between Hypertec Group (which owns a DC business called 5C) and Together AI. The new venture plans to roll out some 2GW of DC and compute capacity, with 600MW expected to come online in 2025-26. The UK, France, Italy and Portugal have been identified as primary markets for hosting these DCs.

However, interestingly, our estimates for European DC capacity fall, by an average of -15%,

due to weaker growth during 2024a, planning permission delays (in the Big Five / FLAPD markets), challenges to access renewable energy, the slow-down in Ireland (Europe's second largest DC market) etc.

Exhibit 58: Our forecasts for European DC capacity fall by -15% on average



Source: Morgan Stanley Research estimates

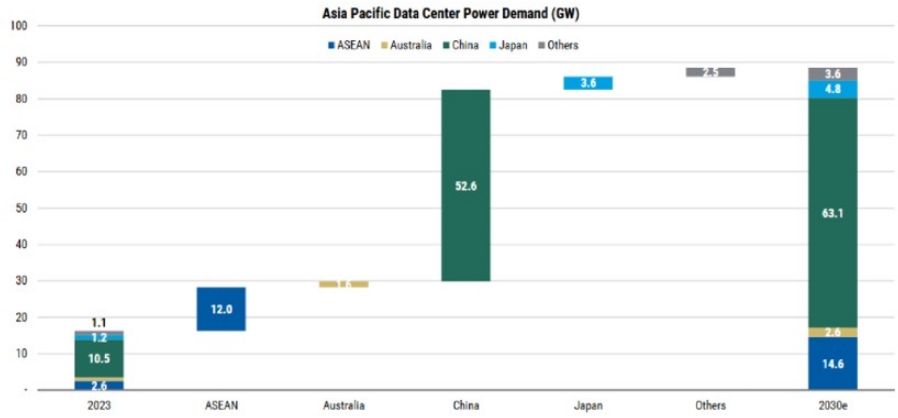
iii. China

Background

China is home to the world's largest 5G network and the second-largest data center industry, backed by energy-efficient and abundant power grids, which provide a solid foundation for the deployment of high-capacity computing power for future growth and training of large-scale AI models. MS Research recently published updated forecasts on Chinese data center capacity - China's Answer to Powering AI (29 April).

Indeed, China accounts for - by some distance - the bulk of projected growth across the Asia Pacific DC landscape, as per Exhibit 59 , below.

Exhibit 59: How we see DC power demand in Asia Pac evolving - China represents the bulk of projected growth



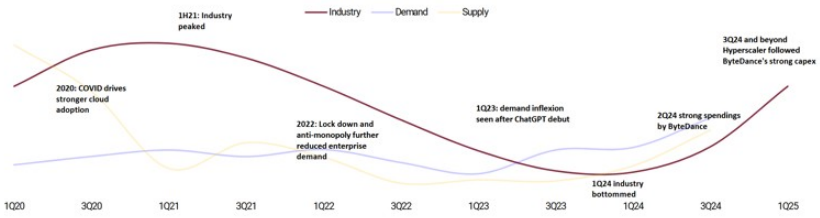
Source: Morgan Stanley Research estimates

Where are we in the cycle now?

From data center suppliers' observation and internet companies' reported capex, the inflection point (upwards) was three quarters ago and we believe we have entered a multi-year up-cycle, though it is an unbalanced up-cycle, driven by a couple of Hyperscalers/big internet companies.

The Chinese DC capex inflection (Q2-Q3 2024) happened around 1.0-1.5 years later than US Hyperscalers (after watching the US AI development status). It was initiated by ByteDance's significant capex spending (Rmb80bn in 2024 and potentially Rmb150-160bn in 2025 based on market consensus and some channel checks), and aggressive data center bookings (~1.5GW in 2024 in China), while other Hyperscalers joined this competition on AI computing power build-up from 2025 after the 'DeepSeek moment'.

Exhibit 60: Where are we in the cycle?



Source: Morgan Stanley Research estimates

GPU availability - the key stumbling block

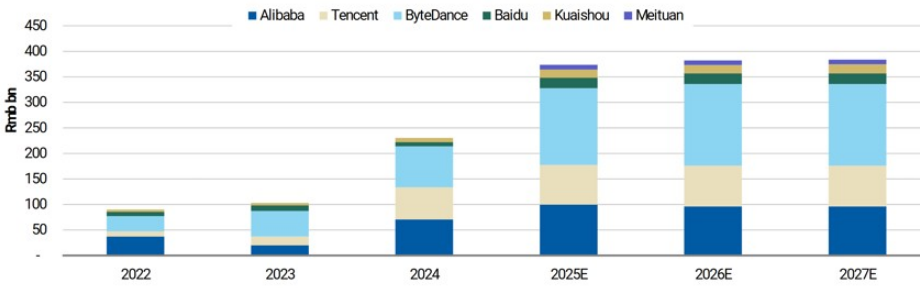
The availability of GPUs has been the biggest risk to the Chinese DC / AI growth engine, hitherto - *not* the availability of energy (as seen in the US and Europe). However, we now have great confidence in the domestic (*Made in China*) GPU supply chain. *Why?*

- Huawei has introduced a new AI computing rack system, CloudMatrix 384 Supernode, a rack scale system built on 384 Huawei Ascend 910C AI chips;
- We expect China's AI GPU self sufficiency ratio to rise from 34% (2024a) to 82% (2027e).

Hyperscaler capex growth (as seen in the US)

We believe that Chinese Hyperscalers' investment in AI should bring significant upside to upstream IDCs: We estimate that the top six internet and cloud service providers (CSPs) in China will increase their annual capex by +59%, to Rmb373bn (US$50bn+) in the next three years.

Exhibit 61: Total capex by top players based on market feedback and channel checks

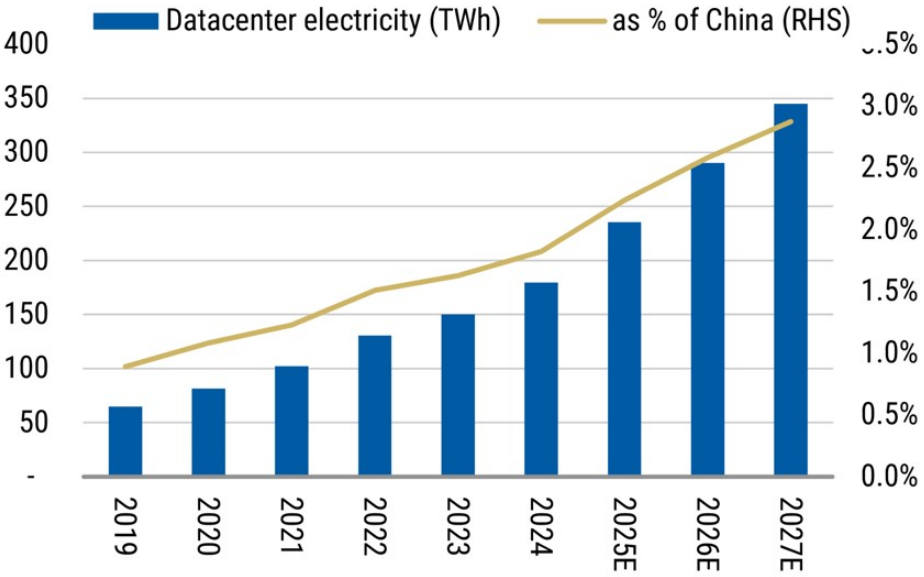


Source: Company data, Morgan Stanley Research estimates (E)

Power supply – not a bottleneck

We calculated that the electricity usage of Chinese data centers will likely account for 345TWh / 2.9% of the social electricity in three years' time, not a significant number in our view (e.g. compares with 11% in the US). Our utilities team also noted that in the longer term, data center power should be 100%-sourced from green energy and the capacity should be sufficient to do so.

Exhibit 62: Data center power consumption

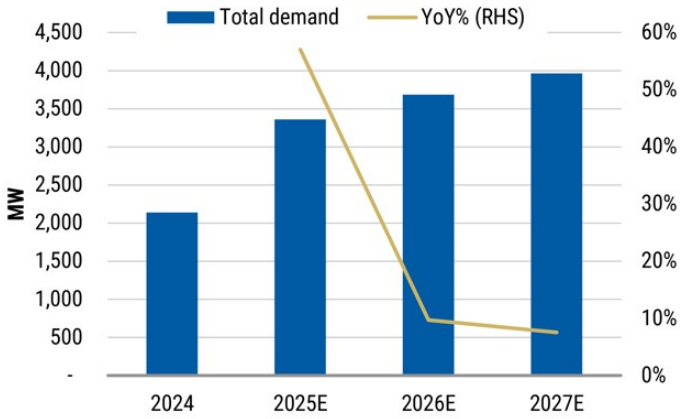


Source: NBS, E = Morgan Stanley Research estimates

Supply vs demand

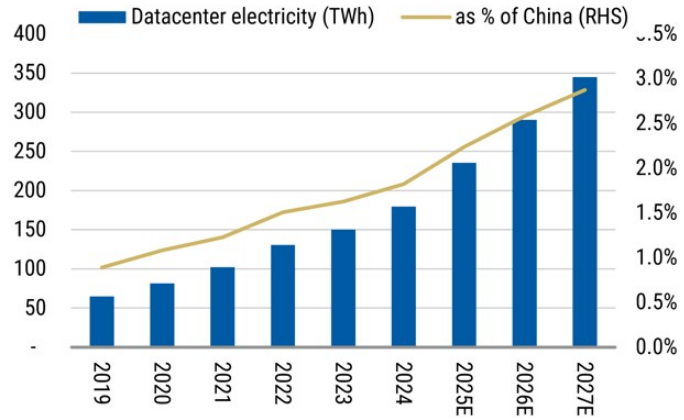
We expect the DC supply-demand balance to turn around in the near future, led by Chinese Hyperscalers' investment in AI, along with Northern China. We project this to translate into average new data center booking demand of 3-4GW p.a. in the next three years (vs. ~2GW in 2024 and ~1GW in 2023) – a 20% CAGR.

Exhibit 63: Data center demand forecasts



Source: Company data, Morgan Stanley Research estimates (E)

Exhibit 64: Data center power



Source: NBS, Morgan Stanley Research estimates (E)

Secondary data center markets (as seen in the US and Europe) - Northern China emerging

For AI training workloads, we believe it is most suitable to deploy data centers in locations with abundant power supply, low energy tariffs, and cold weather, which can lower the operating cost of hyperscalers. Due to a lack of interaction with end users, training is not sensitive to network latency. So an ideal place for training is in remote/rural places in northern China, especially Ulanqab in Inner Mongolia, Datong in Shanxi and, to some extent, Zhangjiakou in Hebei.

Exhibit 65: Northern China DC market area (AI deployment hub)



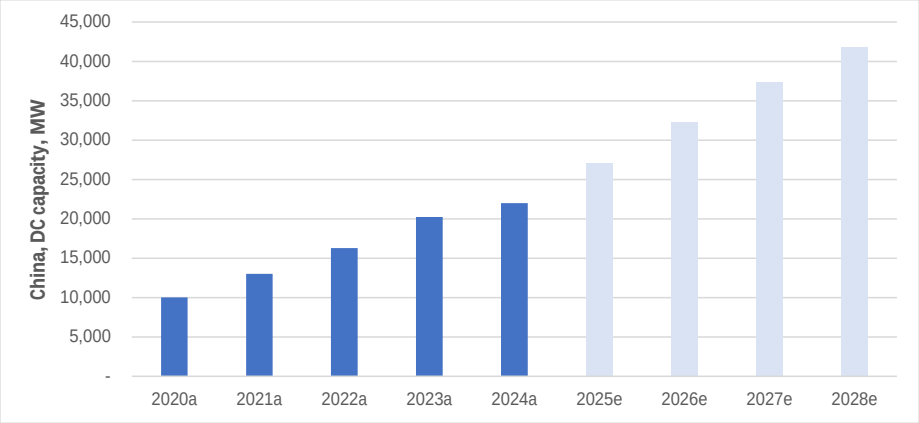
Source: Google maps, Morgan Stanley Research

MS data center forecasts for China

Our forecasts imply that Chinese DC capacity growth will rebound strongly (+18% pa,

2024a-28e), after registering more lackluster growth last year (+9% YoY). We estimate that Chinese DC capacity will reach >40GW, by 2028e.

Exhibit 66: Our estimates suggest that Chinese DC capacity will reach >40GW, by 2028e



Source: Morgan Stanley Research estimates

iv. South Korea

Initial stages of AI data center build out

Korea has been an early adopter of many new technologies including cellular networks, broadband, smartphones, and app based services. However, on AI adoption it has trailed countries such as the US and China, with an absence of government leadership serving as a headwind to early adoption. As a result, there have not been many stocks deemed as beneficiaries of AI adoption so far, while risk of disruption has emerged.

That said, we see 2025 being the initial year of adoption of AI based services by local IT service companies. Leading Internet service operators such as Naver and Kakao have announced ambitious plans to incorporate AI features in their platforms, with Kakao recently announcing plans to spend W600bn to build its second data center cluster in Namyangju, and Naver also indicating a sharp increase in AI related capex. We expect other industries to quickly follow suit as AI becomes a critical tool to drive additional revenue and achieve efficiencies.

According to SK Telecom estimates, Korea's data center market size was over 600MW as of 2024, with demand expected to reach 1GW by 2027. Most of the demand so far has been for co-location services, with global CSPs (Cloud Service Providers) accounting for a significant share of capacity. This forecast, however, does not incorporating AI data centers and hence we expect significant upward revisions as operators announce new projects.

The incoming Lee government has placed high priority on AI

Korea's recently elected president Jae-myung Lee has put utmost priority on growing the nation's competitiveness in AI. His agenda includes plans to spend up to KRW100tn (~US $75bn) on AI related projects.

On June 15th, the president's office named Jung-woo Ha, head of Naver's AI Innovation Center, as the country's first ever presidential secretary dedicated to AI policy. A new AI

focused unit is expected to be established to support the role. Mr. Ha is expected to come up with a road map to support the development of AI, which we think will likely include a sovereign AI and supporting AI infrastructure.

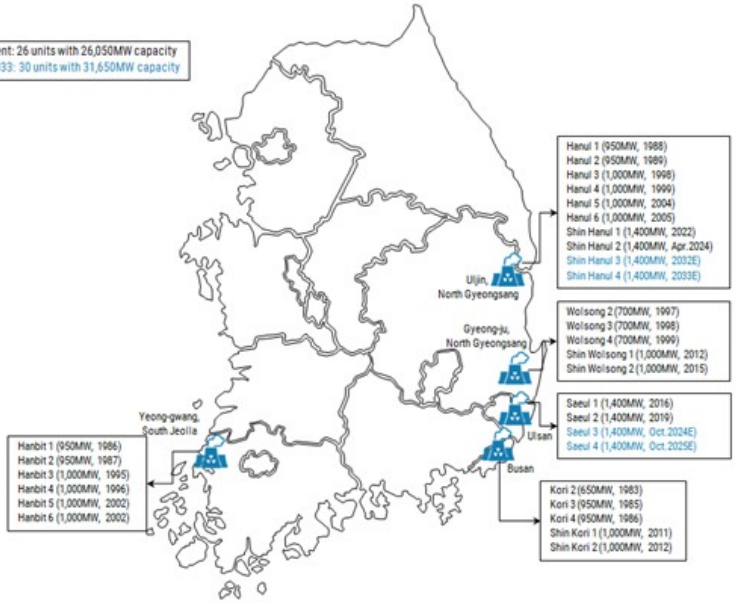
In the past month, some of Korea's leading corporates have announced large investment plans related to AI, with Kakao announcing plans to invest W600bn to build its second data center cluster in Namyangjoo, and the SK Group unveiling plans to invest trillions of KRW, in conjunction with Amazon, to build an AI data center cluster in Ulsan city.

Nuclear power additions, decentralization of power supportive of build outs

In terms of power, we see Korea's significant and growing nuclear fleet offering ample future power build out for GenAI data centers. KEPCO's 10-year plan reflects four new nuclear power plants coming online by 2036, increasing power generated to 231TWh (from 188TWh in 2023), and accounting for 35% of Korea's total electricity output. As one of a few countries outside of China with an expanding nuclear fleet, we see Korea having ample supply to operate data centers required for future GenAI applications.

Moreover, recent changes to energy policies are paving the way for operators to build data centers at the power source and lock in negotiated prices. Given the strong push from the newly elected Lee government, we believe well executed policies could give Korea an advantage in terms of power supply as well as pricing.

Exhibit 67: Korea's nuclear power generation capacity is expected to grow to 32GW by 2033, coming from a total of 30 units



Note: Blue denotes planned capacity
Source: KHNP,

We see Korean telcos as potential beneficiaries

Korean telcos have so far been the largest suppliers of data centers for Korea, leveraging network offerings and B2B sales networks. In recent years, the partnerships with global

hyperscalers have expanded in tandem with the need for capacity, with increasing requests for data centers dedicated to single tenants. With the emerging need for HPC data centers, we believe hyperscalers will likely take a dual-track strategy, operating directly owned DCs, and leasing facilities owned and/or operated by telecom partners.

v. SE Asia

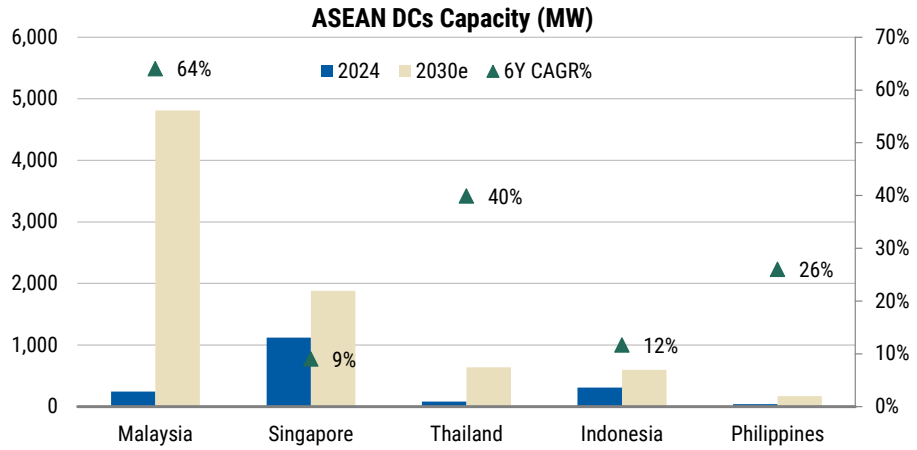
We estimate data center capacity in ASEAN will grow 28% CAGR, between 2024a and 2030e, from ~1.8GW in 2024 to ~8GW in 2030e.

The Singapore market continues to see tight supply, given the constraints in both energy and land. In the past few years, we have witnessed demand over-spill into Johor Bahru, Malaysia. Some of Johor's data center capacity was developed during Singapore's moratorium on new data centers. Singapore has long been a data center hub for the Asia-Pacific with more than 70 data centers and >1GW of capacity, but a squeeze on power and land led to a data center moratorium that went into effect in 2019, and was only lifted later, in 2022. The GenAI wave drove further new build announcements in Johor Malaysia from multiple different players, including US hyperscalers in 2023-24.

However, in the past few quarters, that incremental demand has waned, while we have noticed that the local Johor government is rejecting nearly 30% of new data center applications, as the authorities focus on conserving resources and regulating the industry to ensure maximum benefits for the local economy. Johor, which has emerged as Malaysia's top data center market and is poised to be the largest in South-east Asia, began vetting applications through an ad hoc committee in June 2024 following concerns that data centers worth billions of dollars could strain local resources, such as water and electricity supplies, in the coming years. The committee rejected those data center applications mainly because the operators concerned did not demonstrate sustainable practices to reduce water and power usage

- **Singapore:** >1GW capacity currently, with plans to release at least 300MW of additional DC capacity in the near term with no committed timeline;
- **Malaysia:** Data center capacity has grown exponentially, from just 10 MW (at the start of 2021) to around 1.1 GW (by the end of 2025), and we expect that figure to rise to 4.8GW by 2030e, with Malaysia becoming the largest DC market in Asean, the bulk of it concentrated in Johor Bahru.
- **Thailand:** DC capacity to grow from <100MW in 2024 to ~600+MW in 2030e.
- **Indonesia:** DC capacity to grow from ~300MW in 2024 to ~600MW in 2030e.
- **Philippines:** DC capacity to grow from <50MW in 2024 to ~170MW in 2030e.

Exhibit 68: We expect double-digit growth in ASEAN's DC market, except in Singapore



Source: Company Data, Morgan Stanley Research estimates (e)

Exhibit 69: Overview of key DC projects across Asia Pacific

Company	Value (US$ bn)	Investment Scope
Malaysia		
Amazon Web Services (AWS)	6.0	Expand AI & cloud infrastructure by 2037
AirTrunk	NA	JHB1 DC, 50MW iniitally by 2024
Microsoft	2.2	Expand AI & cloud infrastructure 2024-28
Google	2.4	Expand AI & cloud infrastructure by 2035
Nvidia - YTL Power	4.3	AI Cloud and Supercomputer Infrastructure
GDS Holdings	2.0	Johor Data Center Expansion
ST Telemedia Global DC	1.0	Johor Data Center Expansion
NTT Communications	NA	290MW campus (68.5acres), 48MW by Apr-27
Yondr Group	NA	200MW campus (72.8acres at Johor STP)
Bridge DC	NA	110MW campus at Johor STP
PDG	NA	150MW campus (31acres at Johor STP), 60MW by 2Q24
Thailand		
Microsoft, Google	3.5	Expand AI & cloud infrastructure
Amazon Web Services (AWS)	5.0	Expand AI & cloud infrastructure by 2037
Gulf Energy	0.1	Data Center Expansion with AIS and Singtel
GDS Holdings	0.8	Hyperscale DC Project operational by 2027
Darmac	1.0	3-4 each 20MW DC Projects
TikTok	8.8	Datacenter and Cloud infrastructure
Indonesia		
Microsoft	1.7	Expand AI & cloud infrastructure 2024-28
GDS Holdings	NA	Batam Data Center Expansion
Singapore		
Amazon Web Services (AWS)	8.6	Expand AI & cloud infrastructure by 2028
Singtel	1.0	~90MW Advanced Data Center pipeline in SG,TH&MY
Google	4.2	Increase Investments to US$5bn with 4th DC
Singapore Government	0.7	Govt. comits ~US$700 in AI Development
ASEAN Total	**53.2**	
Japan		
Amazon Web Services (AWS)	15.0	Expand cloud infrastructure from 2023-27
Microsoft	2.9	AI & cloud infrastructure 2024-26
Oracle	8.0	Expand cloud infrastructure by 2034
Google	1.0	Boost connectivity to Japan via two subsea cables
Australia		
Amazon Web Services (AWS)	5.0	Expand cloud infrastructure in Sydney through 2027
Microsoft	1.0	96MW Sydney Data Center
Microsoft	2.2	Expand AI & cloud infrastructure by 2026
NEXTDC	NA	550MW Sydney DC
Greater China		
GDS	0.4	Data Center Expansion in Hong Kong
Alibaba	52.0	AI infrastructure
Tencent	13.0	Increased annual cloud capex
ByteDance	22.0	Increased annual cloud capex
Baidu	1.4	Increased annual cloud capex
Kuaishou	2.0	Increased annual cloud capex
Meituan	1.5	Increased annual cloud capex
Greater China	**92.3**	
India		
Reliance	NA	1GW AI ready DC partnering with Nvidia
TATA Communications	NA	AI ready DC partnering with Nvidia
Amazon Web Services (AWS)	4.0	Expand cloud infrastructure
Princeton Digital Group	1.0	AI ready DC with total capacity of 230 MW
ST Telemedia Global DC	1.0	Data Center Expansion in India
Google	NA	Soverign AI cloud and Gemini 1.5 Flash AI model DC
Microsoft	3.5	Cloud and Gen AI
India Total	**10.0**	
Asia Others		
Keppel DC REIT	2.0	Data Center Expansion in China and Keppel Pipeline
Asia Total	**192.6**	

Source: Company Data, Morgan Stanley Research

Taiwan's supercomputer

Taiwan's National Center for High-Performance Computing (NCHC) is examining the potential build of a new NVIDIA-powered supercomputer.

- Academic institutions / universities, government agencies and small businesses will be able to access the new system;
- The supercomputer will encompass NVIDIA HGX H200 systems (>1,700 GPUs), two NVIDIA GB200 rack-scale systems and an NVIDIA B300 system;
- The new facility will deliver over 8x the AI performance / capacity, when compared with the center's previous Taiwania 2 system;
- We believe that sovereign AI will be a key focus of the project. According to Chau-Lyan Chang, Director General of NCHC: '*The new NCHC supercomputer will drive breakthroughs in sovereign AI, quantum computing and advanced scientific computation*';
- The supercomputer is expected to go live later this year.

vi. Saudi Arabia

The Saudi data center market: A favourable backdrop, very strong growth potential

The Saudi data center market remains relatively small, with ca 300MW of current installed capacity:

- This compares with ca 1.3GW in London, and ca 1.1GW in Dublin (co-location and Hyperscalers).

KSA's capital city Riyadh has emerged as the primary Saudi DC hub - while secondary DC markets comprise Jeddah and Dammam.

Exhibit 70: The Saudi DC market - 3 hubs & Neom



Source: Morgan Stanley Research

Encouragingly, we see a number of reasons for very strong projected DC growth in the

KSA:

- The Kingdom's *Vision 2030* aims to boost growth in the IT / technology / TMT sectors - including a *$100bn* investment in AI and DCs, named *Project Transcendance*;
- The recent visit of US President Trump saw a number of landmark data center and AI announcements, including the formation of *HUMAIN* (see below);
- Moreover, *The Line* (linear city, in Neom) will see considerable investments (potentially >$500bn made in technology-centric projects). Indeed, a cognitive technology company - Tonomus - is working to create a data center hub called ZeroPoint in Neom (Oracle will be the first tenant);
- The Saudi market benefits from very low energy prices (>50% cheaper than global average, per MW);
- From a telecoms and connectivity perspective, Saudi Arabia is linked to Europe, Asia and other Middle Eastern countries - via the *2Africa* subsea cable;
- We see a Tech-savvy Saudi economy emerging, notably given its young population (median age 29-30yo, 60% of the population is <30yo);
- The Saudi technology regulatory framework is clear and favourable, we believe. The Cloud Computing Regulatory Framework (CCRF) is aimed at ensuring data sovereignty. Meanwhile, Saudi Arabia introduced the Saudi Arabia Personal Data Protection Law (PDPL) in September 2023 (entities had until September 2024 to comply) - this is the equivalent of the EU's GDPR regulation, and aims to regulate the processing of personal data, and to ensure data privacy and protection; while
- KSA is seeing very strong GDP growth, driven by population uplift, natural resources etc.

We also saw a number of recent AI/data center announcements, during the recent May 2025 visit of President Trump to the Kingdom. These include:

- A JV between AWS and PIF-backed *HUMAIN*, which will oversee the roll-out of up to 500MW of DC capacity via $5bn of AI investments (incremental, beyond the $5bn AWS had previously committed to invest, in 2024);
- Nvidia has announced it will sell 'several hundred thousand' chips to HUMAIN starting with a first tranche of 18,000 Blackwell chips;
- Advanced Micro Devices (AMD) signed a $10bn collaboration with HUMAIN to build 500 MW of AI hardware;
- Qualcomm has signed an MOU to build a data center central processor;
- The Saudi firm Datavolt will invest $20bn in US infrastructure (DCs and energy).

However, the KSA DC market also faces challenges:

- We believe that there is a potential shortage of labour expertise in the area, notably in mechanical engineering. Indeed, AWS has disclosed an investment in developing / training local talent (see below); *while*
- Higher ground temperatures can lead to more elevated cooling costs. The heat can also increase the possibility of breakdown at DC facilities (via over-heating).

Overview of the key players in the Saudi DC industry

Key data center players in Saudi Arabia include the following:

- **Amazon Web Services. i.** In 2024, AWS disclosed plans to invest >$5bn in KSA by 2026 (when its new AI Zone goes live). Our estimates suggest this could imply a 150-250 MW DC mega campus; **ii.** In May 2025, AWS unveiled a new partnership with PIF-backed HUMAIN to invest an incremental $5bn in AI. Amazon claims this is a 'first-of-a-kind AI Zone', which will combine AWS AI data centers with semiconductors, UltraCluster networks, AWS services (machine learning tools such as SageMaker and Bedrock) and AI application services (e.g. Amazon Q, the coding assistant). The JV will work on developing a unified AI agent marketplace, and the growth of LLMs (incl. Arabic Large Language Models);
- **Gulf Data Hub (GDH).** This business owns DCs in both the UAE (Dubai and Abu Dhabi) and KSA - and has also disclosed plans to expand into other markets including Egypt, Bahrain, Qatar, Kuwait, Oman, Morocco and Jordan. The Saudi portfolio currently comprises one facility in each of Jedda and Dammam (with total capacity of 40MW). Future DC construction plans include new facilities in Riyadh (potentially 12 buildings, each with 16 MW, implying a total of 192MW) and Jeddah (three further DCs, 16MW each, totalling ca 50MW). Essentially, future GDH capacity could reach ca 300MW;
- **Mobily.** The Saudi Telco is offering co-location services in the KSA, across 8 facilities (3 DCs in Riyadh, 2 in Jeddah, 2 in Dammam and 1 in Unaizah);
- **Datavolt.** A total investment of $5bn will see 300MW of data center capacity developed in the coming years (by 2030);
- **DAMAC.** DAMAC is building DC facilities in both Dammam and Riyadh – with projected capacity totalling ca 60MW by 2025;
- **BSF / MIS.** BSF Capital (a financial services company) and MIS (Al Moammar Information Systems) have signed an agreement to expand its DC capacity in the KSA, from ca 25MW (at present) to ca 65MW, at a cost of ca $0.6bn;
- **Microsoft.** In 2023, Microsoft disclosed a new data center region in KSA. There are few details available on the project;
- **Huawei.** The Chinese tech company has also launched a cloud region in Saudi Arabia, offering Cloud and AI services;
- **PIF.** The Saudi sovereign wealth fund invested in a partnership with DigitalBridge to develop DCs in KSA, and also across GCC.

Khazna plans KSA push

During an interview in April 2025, UAE data center developer Khazna disclosed that they are "*hoping to get at least 25% market share*" in Saudi Arabia. Despite many start-up developers in the market, CEO Alnaqbi has noted "*None of them have the experience to handle the hyperscalers, in terms of design, delivery and operation*".

Recent regulation that personal and financial data must be stored in local data centers will create further demand by global companies to have facilities within Saudi Arabia to avoid losing any contracts. As previously stated, during a guest lecture at Standford University, Abdullah Alswaha (Saudi Minister of Communications and IT) stated the country is currently building close to 2GW in computing capacity. Based on this assumption, Khazna could be looking to build c. 500MW of capacity in the coming years (MSe). Khazna has identified two (yet unnamed) locations for these DC facilities in the

Kingdom.

STC's data center portfolio (Center3) - plans to develop 750MW of capacity

Consistent with KSA's 2030 vision, STC is aiming to build a digital and DC hub (across Saudi, but also the broader Middle East). Driven by this strategy, in October 2022, STC launched *Center3* (previously called MENAHub). This is an integrated DC platform that will provide Hyperscalers, gaming and content providers, cloud providers and global international carriers with flexibility and speed to serve regional customers. Partners and clients include five Hyperscalers and >20 content providers. Data center services include:

- White space;
- Co-location;
- BTS (Build-to-Suit);
- Add-on; and
- Flexible-space.

Essentially, we believe that STC may ultimately offer all three layers of DC services - co-location (passive real estate, with racks / energy etc), Cloud (CPUs, data storage and processing) and AI (GPUs, potentially including GPUaaS).

Also, in early 2025, STC announced it would partner with AWS, to launch Cloud / AI services for multiple sectors, including government, education, healthcare, finance, energy, sports, industrial etc. STC has been designated as a *System Integrator Premier* partner for AWS (Amazon's highest tier partner). According to Riyadh Muawad, Chief Business Officer at STC: "*AWS shares our vision of advancing the Kingdom's digital transformation. Through this strategic collaboration, the Group strategy and its subsidiaries to target critical sectors in the Kingdom, we will create cutting-edge solutions, develop local talent, and pave the way for a digitally advanced future in Saudi Arabia*."

STC currently has ca 350MW of data center capacity - either in operation or under construction (we believe the latter is the far greater component). In terms of the existing DC portfolio:

- STC owns 25 DCs across Saudi Arabia, Bahrain and Kuwait;
- DCs situated across the Kingdom include Riyadh (capacity recently increased by ca +10MW), Dammam (20MW), AlKhobar (25MW), Khurais Riyadh etc.

STC is working to expand its portfolio to reach 750MW by 2030. This target is contingent on demand (from Hyperscalers, corporates etc) - so could potentially fall short of this target. The data center expansion will cover not only KSA, but also the broader MENA region;

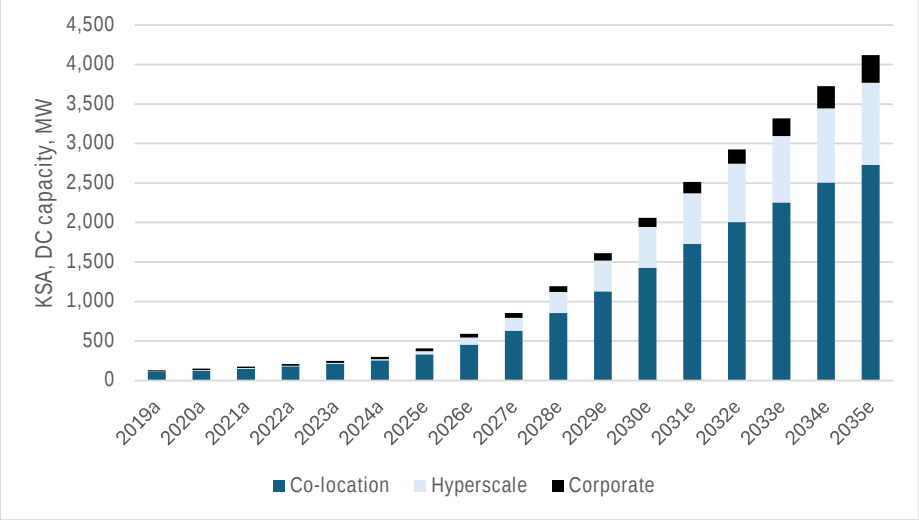
The 750MW target would equate to the current scale of the Amsterdam data center market in Europe (one of the core Big Five European FLAPD territories).

KSA data center forecasts

We forecast explosive growth in KSA DC capacity - from 300MW (2024a) to >4GW (2035e). This 13x increase is perhaps not surprising, given:

- AI / DC announcements made upon US President Trump's recent visit to the Kingdom - eg the formation of *HUMAIN*;
- Kingdom investment projects including *The Line* (Neom);
- Ambitious expansion plans disclosed by Khazna, STC, AWS etc;
- The availability of investment capital; *and*
- Abundant supply of cheap energy etc.

Exhibit 71: We forecast a 13x rise in DC capacity (across the Kingdom of Saudi Arabia) over the coming decade



Source: Morgan Stanley Research estimates

vii. UAE (Dubai and Abu Dhabi) - a 5GW DC campus has been unveiled

Overview - from relatively small, to potentially very large

With ca 450MW of installed capacity, the UAE data center (DC) market remains fairly small, certainly in a relative context.

Local DC operator Khazna expects UAE data center (DC) industry capacity to grow to at least 850MW by 2029 (this estimate now appears *very* conservative, in our opinion - following the UAE / Stargate / 5GW project announcement). Our estimates project far stronger growth (see below).

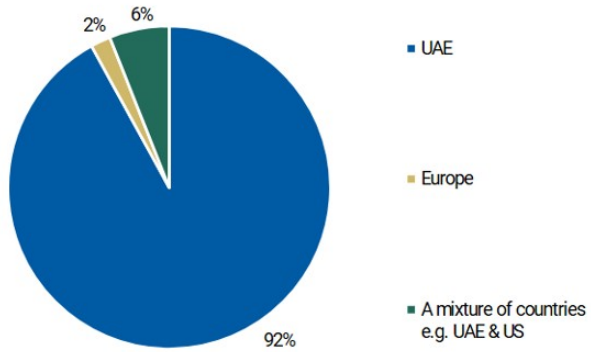
Indeed, we believe that data center volume growth in the UAE will be driven by three key factors:

- **Cloud**. UAE corporates moving their data from the office (basement / IT room) to the Cloud will continue to be the primary source of data center capacity uplift in the UAE, certainly over the near term, we believe;
- **AI**. Even as global AI gathers momentum, we believe the UAE will likely lag the US by 24-36 months, but will almost certainly experience very strong AI-driven DC growth. Our previous research (Feb 2024) has suggested that AI can increase already-strong DC capacity growth rates by +50%;

- **Data sovereignty**. We believe that a small portion of UAE data is processed / stored abroad (in the US, Europe and / or Emerging Markets - Exhibit 72). However, we believe that potential legal framework changes, the possibility of security breaches and B2B / consumer demand could be catalysts for UAE data to be 'brought home', as per the twin themes of 'slowbalisation' and 'near-shoring'. We have noted a particular focus on data sovereignty in the Emirate of Abu Dhabi. Notably, 94% of surveyed companies in our AlphaWise survey believed that it is 'important' that sensitive data is stored and processed in the UAE *and* that their company would be willing to pay a premium for this (Exhibit 73).

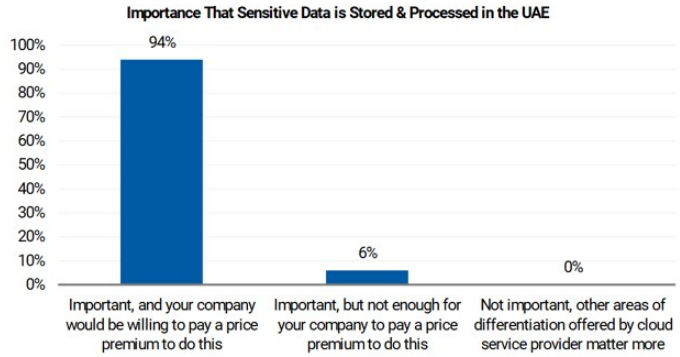
AlphaWise UAE B2B Cloud and GenAI Survey. To better understand current levels of Cloud & GenAI technology, and to gain insights into the roadmap for corporates in the UAE we ran a proprietary AlphaWise survey. In terms of key takeaways, **i.** public cloud adoption in the UAE is running ahead of W European countries; **ii.** data security is the key concern when moving data and workloads into a cloud environment; **iii.** vast majority of respondents' cloud company data is onshore.

Exhibit 72: 92% of surveyed companies report the location of their cloud data is in the UAE



Source: n = 50. Source: AlphaWise, Morgan Stanley Research

Exhibit 73: All surveyed respondents believe that it is 'important' that sensitive data is stored and processed in the UAE



Source: n = 51. Source: AlphaWise, Morgan Stanley Research

Why the UAE DC market is poised & well-positioned for strong growth (MS view)

Data center hubs have emerged in both Dubai and Abu Dhabi (growth has been stronger in Abu Dhabi of late - given access to capital, presence of corporates and investment funds). The region is well poised for growth due to a number of critical factors:

- **An abundance of cheap energy**. The UAE remains among the most energy-rich countries in the world. Moreover, the UAE market benefits from very low energy prices. We have also noted an increased focus on renewable energy in the UAE, with the government now targeting 75% clean energy usage by 2050e, vs ca 15% today;
- **Connectivity**. From a fiber / Telco connectivity perspective, the UAE is linked to Europe, Asia and other Middle Eastern countries, via *2Africa* and almost 20 other subsea cable networks (including *Falcon*);
- **Strategic location**. The UAE's geographic position in the Middle East places the country at a cross-roads between Eastern and Western economies;
- **A young and internet-savvy population**. With a heavy weighting of Generation Z

among its population, it is perhaps un-surprising that Internet penetration is >99% in the UAE;

- **Government support**. The UAE Vision 2031 places a focus on advanced digital security and technology/data infrastructure to further support economic growth. Meanwhile, the local Dubai government has introduced the *Dubai Data Initiative* and the *Dubai AI Roadmap*;
- **Tax incentives**. Free zones across the country offer pro-businesses initiatives including tax incentives, a critical attraction for DC providers (as seen in secondary US data center markets);
- **AI hub**. We believe that (much like Saudi Arabia) the UAE will seek to be a regional hub for AI. Indeed, Dubai and Abu Dhabi have launched the *Dubai Universal Blueprint for AI* and *AI & Advanced Technology Council*, respectively.

However, we would point out that the emergence of DC hubs in the energy-rich UAE is driving questions on green energy and energy efficiency. According to Suhail Al Mazrouei, the UAE Minister of Energy & Infrastructure, "*The demand is growing and growing very strongly, with more power required for data centers. It's overwhelming, I can tell you, even for a country like us in the UAE*" (media article link - here).

Nuclear may even come into focus. Mohamed Al Hammadi, CEO of Emirates Nuclear Energy Company (Enec) has stated: "*The world is waking up to the realities of grid security and the need for reliable, abundant, and clean electricity. If we want to lead in AI and digital infrastructure, we must lead in energy*",

5GW DC campus in UAE / Stargate (article)

On the back of US President Trump's trip to the Middle East in mid-May, a mega AI data center in the UAE was announced. Current details include:

- Total capacity is expected to reach 5GW (MSe)
- The campus will cover 10 sq miles and the first phase will include a 1GW cluster, according to the Trump administration. The first 200MW of the initial 1GW cluster is expected to come online in 2026;
- Interestingly, the campus will be built in Abu Dhabi (not in Dubai);
- UAE Stargate will be built by the Emirati company G42 (majority owner of UAE-based data center operator Khazna);
- US Tech companies including Nvidia, Cisco, Oracle and OpenAI are supporting the project (eg Nvidia to supply hardware with latest Blackwell GB300 systems, Nvidia has not confirmed);
- OpenAI has revealed that it would use a proportion of the campus for a local Stargate cluster. However, how much of the 1GW phase one - or the total 5GW - will be used by Stargate is unclear;
- The site is expected to utilize nuclear, solar and gas power;
- US Secretary of Commerce Howard Lutnick noted, "*In the UAE, American companies will operate the data centers and offer American-managed cloud services throughout the region. The agreement also contains strong security guarantees to prevent diversion of US technology*".

Who are the key existing DC players in the UAE?

Both UAE Telco operators have been actively investing in the data center space. While e& exited their stake in Khazna, one of the key players in the UAE, the company noted on their Q1 25 call that they still plan on remaining involved in the DC space, albeit with more of a focus on serving corporate and government customers (vs AI applications). MGX and Silver Lake became new minority shareholders in Khazna following e&'s exit. Du also enjoys a limited presence in the UAE DC space.

- **Khazna.** Khazna aims to be "the UAE champion", with a current portfolio of ca 360 MW capacity (and > 75% of the UAE's current data center capacity). The organic development of a further 250MW of installed capacity is expected within the next 5 years, via an expansion of the current ecosystem (according to CEO Hassan Alnaqbi, link here). The ultimate aim is to reach 2GW of DC capacity;
- **Du**. **i.** Most recently, Oracle and Du signed a partnership to develop a sovereign cloud platform in the UAE (similar to an agreement between Microsoft and Khazna); **ii.** Du also signed an agreement with Microsoft to build out a hyperscale data center.

Exhibit 74: Khazna is the leading DC provider in the UAE...



Source: Khazna

Exhibit 75: ...while Du is active in the DC space, albeit on a smaller scale



Source: Du

Other key players in the UAE include:

- **Amazon Web Services**. AWS launched in the UAE in 2022. This was the US Hyperscaler's second Cloud region (following the Bahrain launch in 2019). In Q4 2024, AWS and e& signed a $1bn agreement to combine the former's Cloud capabilities with e&'s Telco / networking efforts. The accord covers Cloud, data storage, cybersecurity and AI. Subsequently in May 2025, the two companies launched the UAE Sovereign Launchpad focused on accelerating the take-up of Cloud and AI services in the UAE public sector and regulated industries.
- **Microsoft (Azure)**. In April 2024, Microsoft invested $1.5bn in G42, an Abu Dhabi

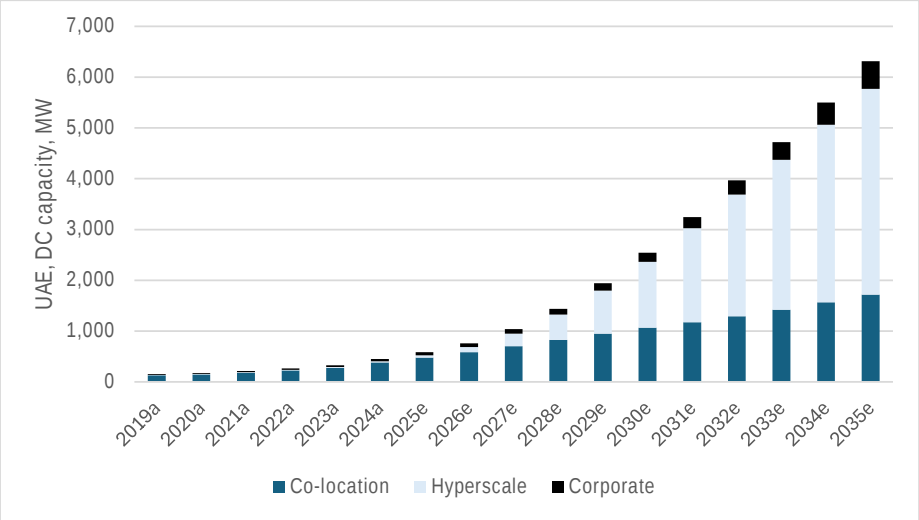
DC operator. Key product offerings include a sovereign cloud solution. In April 2025, Microsoft and Du signed an AED 2bn (US$ 544.5m) deal for Du to develop a hyperscale DC in the UAE with Microsoft as the main tenant;

- **Google**. Google currently has Cloud regions in Doha and Dammam, but not in the UAE (yet);
- **Equinix** owns four DCs across the UAE (three based in Dubai and one in Abu Dhabi);
- **Gulf Data Hub** currently enjoys capacity of ca 70MW in Dubai and Abu Dhabi, with a further 240MW under construction across the UAE;
- **DAMAC**. The UAE property company Damac established *Edgnex* in 2021 - the business is also known as *Damac Data centers*. The DC operator is building facilities in KSA (plans for 55MW, by 2025), Turkey (JV with Vodafone, $100mn investment), Malaysia (15MW in Jakarta), Indonesia (15MW), Jordan and Thailand ($1bn JV with Proen). Edgnex is also expanding into Europe, via its first foray into Spain (40MW in Madrid), Greece (25MW with PPC), and the Nordics (Acquisition of Hyperco). On a global scale, Edgnex is targeting 300+ MW by 2026, and ultimately >3,000MW of capacity;
- **Pure Data Centers**. Pure Data Centers is present in five countries: the UAE (45MW), the UK (90MW, a further 56MW planned with Segro), Ireland (three DCs), Indonesia and Spain (25MW). The UAE facility – based in Yas Island, Abu Dhabi – went live in February 2025, and is Pure's maiden project in the Middle East. Pure has also signed a JV with Dune Vaults to develop DCs in Saudi Arabia (potentially >100MW). Pure DC is owned / financially supported by Oaktree Capital Management;
- **Moro Hub**. The Dubai-based DC operator is targeting 100+MW of capacity. Interestingly, DC operations are powered by the Mohammed bin Rashid Al Maktoum Solar Park (MBR Solar Park), the world's largest solar-powered data center facility;
- **STC Data Centers**. The Saudi Telco owns 25 DCs across Saudi Arabia, Bahrain & Kuwait – totalling ca 325-350MW of installed capacity. Going forward, STC is working to expand its portfolio to reach 750MW by 2030 (this target is contingent on demand from Hyperscalers and corporates, so could potentially fall short of this target). The data center expansion will cover not only KSA, but also the broader MENA region, including the UAE.

Elsewhere, the Ministry of Investment of the UAE signed an MoU with the Greek government that has the potential to bring further DC capacity of up to 500MW to Greece.

We forecast strong DC / AI growth in the UAE (a 14x increase by 2035), with the Stargate UAE project (5GW campus) the key driver. Admittedly strong growth is somewhat driven by the low starting point / base.

Exhibit 76: We project particularly strong DC growth in the UAE, driven by Stargate UAE



Source: Morgan Stanley Research estimates

viii. Australia

Demand for data centers (DC) in Australia is increasing exponentially with over 2,300MW of new projects announced in 2024. Our Australia DC model forecasts growth to 3,200MW by 2030 (up from 1,275MW today) with higher uplift on surging demand from hyperscalers and enterprises. We recently upgraded our: 1) Supply model for 700MW out of 2,300MW new projects announced in 2024; and 2) Demand model following DC site visits and channel checks with specialists about rising IT load, which has meant average size of land purchased for DCs in Australia has grown from 1ha in 2018 to 15ha in 2025 (e.g. NXT's recent purchase of S7 at 26ha and capacity of 550MW). Access to capital is also easing on rising confidence from banks, industry funds and specialist investors as DCs show the hallmarks of traditional infrastructure assets underpinned by demand.

1. Australia Data center model

We have built an industry model to size the Australia data center market. We see healthy growth rates beyond 2030 underpinned by growing hyperscaler demand from AI investments as well as the digitalisation of corporate operations.

Key Findings:

- We forecast the AU data center market to grow from ~1,275MW today to ~3,200MW by 2030, implying a growth rate of ~17%.
- Assuming A$15-20mn/MW in build costs - we see A$31-42bn of data center investment over the next 8 years.
- An additional 2000MW capacity would create a ~A$8.5-12.7bn annual revenue opportunity for D/C players, on our estimates.

Exhibit 77: D/C Industry model assumptions

Assumptions	2021	2022	2023	2024	2025e	2026e	2027e	2028e	2029e	2030e
Australia population (millions)	25.8	26.0	26.6	27.4	27.6	28.1	28.6	29.0	29.5	29.9
		1%	*2%*	*3%*	*1%*	*2%*	*2%*	*2%*	*2%*	*2%*
Average devices connected to internet	4.0	4.0	4.1	3.8	4.0	4.2	4.4	4.6	4.8	5.0
		0%	*2%*	*-7%*	*5%*	*5%*	*5%*	*5%*	*4%*	*4%*
Total devices connected to internet (m)	103	104	109	104	110	118	126	134	142	150
		1%	*5%*	*-4%*	*6%*	*7%*	*7%*	*6%*	*6%*	*6%*
Total Data downloaded (million terabytes)	41	48	53	56	63.4	72.9	84.6	98.1	113.8	132.0
		16%	*11%*	*5%*	*14%*	*15%*	*16%*	*16%*	*16%*	*16%*
Annual Data per device (Gigabytes)	397.8	457.5	486.2	534.0	574.2	617.9	672.6	734.2	803.5	881.5
Data Centre Capacity MW	**811.9**	**954.5**	**1051.9**	**1275.9**	**1556.6**	**1774.5**	**2058.4**	**2490.7**	**2839.4**	**3236.9**
MW per million terabytes	0.20	0.20	0.20	0.23	0.25	0.24	0.24	0.25	0.25	0.25

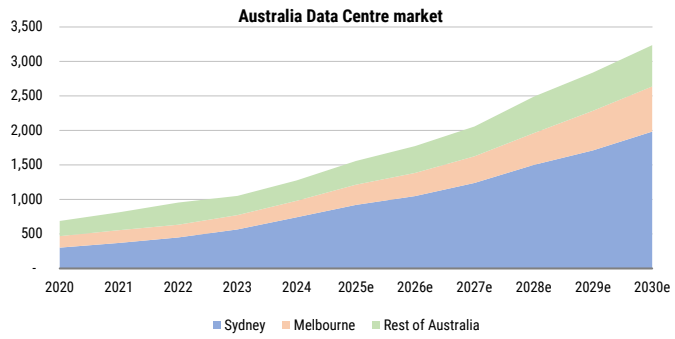
Source: ABS, ACMA, Morgan Stanley Research estimates (e)

Exhibit 78: Morgan Stanley data center model

Data Centre Power (MW)	2020	2021	2022	2023	2024	2025e	2026e	2027e	2028e	2029e	2030e
Australia	690	812	954	1,052	1,276	1,557	1,775	2,058	2,491	2,839	3,237
Sydney	302	369	449	565	742	921	1,050	1,240	1,501	1,711	1,983
Melbourne	166	184	185	210	240	292	333	387	460	575	656
Rest of Australia	221	259	321	277	294	343	391	432	530	554	598
MS Bull Case				**1,052**	**1,276**	**1,992**	**2,320**	**2,748**	**3,394**	**3,947**	**4,588**
MS Base Case	**690**	**812**	**954**	**1,052**	**1,276**	**1,557**	**1,775**	**2,058**	**2,491**	**2,839**	**3,237**
MS Bear Case				**1,052**	**1,276**	**1,292**	**1,420**	**1,606**	**1,918**	**2,186**	**2,331**

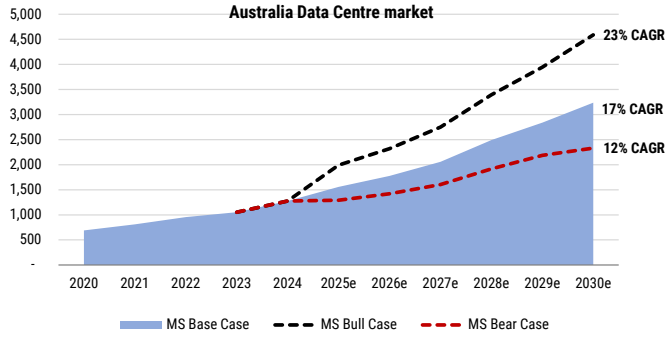
Source: Morgan Stanley Research estimates

Exhibit 79: We see the AU data center market growing to ~3,200MW by 2030 up from ~1,275MW today



Source: Morgan Stanley Research estimates

Exhibit 80: Our bull case represents 23% CAGR compared to our base case at 17% and bear case at 12%



Source: Morgan Stanley Research estimates

2. What gives us conviction

We have held discussions with over 10 industry experts and visited 5 DC sites across Australia. The feedback is summarised into the key points below:

- Australia is a top investment destination for hyperscalers such as AWS, Microsoft, Oracle, Google, Apple etc. given the growing trends in cloud migration, population and economic growth and low geopolitical risk.
- Cloud storage revenues have increased 30% over the past 3 years to ~A$5bn and IBIS World forecasts this will reach A$10bn by 2030.
- Access to capital is becoming easier given rising confidence from banks, industry funds and specialist investors as DCs are showing the hallmarks of traditional infrastructure assets, underpinned by strong demand.
- AI will provide future uplift as inferencing rises within Australia. At the moment most of the AI model training is being conducted offshore.
- Data centers rarely run at full IT load and at most times below 50% of nameplate capacity, reducing energy overuse concerns in the near term.
- AU pricing dynamics remain strong given undersupply. Similar trends are seen

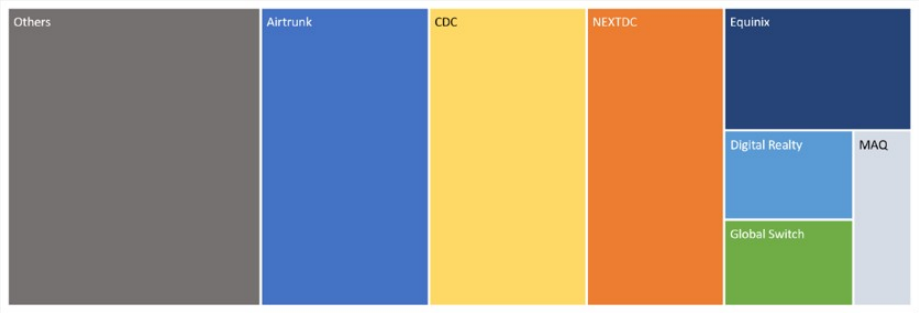
globally, i.e. Digital Realty recently reported 3Q24 earnings noting renewal was at record levels at +15.2% yoy with a record level of bookings at US$521m, which was more than double the last record seen in 1Q.

- DC operators rank lease renewal risk above access to power risk in 5 years time; however, current demand levels mean this risk is low.
- Future DC sites above 100MW will commonly involve strategic partnerships to share development costs.

3. Key Data center players

- AirTrunk (not listed) is a hyperscale data center specialist creating a platform for cloud, content and large enterprise customers across the Asia-Pacific & Japan (APJ) region. Across Sydney and Melbourne, Airtrunk operates Australia's largest hyperscale data center campuses, offering 700+MW of capacity. In Japan, Airtrunk is the largest hyperscale data center, offering 410+MW of capacity as well as 78+MW of capacity in Singapore. Airtrunk also has capacity in Malaysia (150MW+) and Hong Kong (35MW+).
- NEXTDC ~A$9bn market cap (NXT.AX, covered by Andrew McLeod): NXT is an Australian owner and operator of data centers and more recently has been expanding globally to New Zealand and ASEAN. NXT total power planned is over 1GW. NXT currently has ~244 of contracted utilisation.
- Equinix ~US$87bn market cap: Equinix owns and operates a network of 260 data centers located in 71 major metros around the world. Equinix has approx ~70MW of built-out capacity across eight facilities in Sydney and ~20MW across four facilities in Melbourne. Equinix does not disclose MW capacity at all data centers so we estimate capacity using land size and cross-check against industry sources.
- Digital Realty ~US$58bn market cap: provides connectivity to 300+ data centers across 25+ countries, and over 50+ metros. Digital Realty has ~25MW currently built out in Sydney in Erskine Park, including its latest build, a single tenant facility on Lockwood. SYD11 is a 19MW facility with access to PIPE-IX and Digital Realty acquired additional land in 2020 for a campus of up to 250 MW. Digital Realty also operates 2 Melbourne facilities with approximately 25 MW of capacity. DLR does not disclose MW capacity at all data centers so we estimate capacity using land size and cross-check against industry sources.
- Canberra Data Centres (CDC, not listed): owns and operates 20 data centers in four markets in Australasia: Sydney, Auckland, Melbourne and Canberra. CDC has power ability up to ~318MW.
- Hyperscalers such as Microsoft (MSFT.O, covered by Keith Weiss) and Amazon (AMZN.O, covered by Brian Nowak) are building out large-scale data center campuses in Sydney and Melbourne. In November 2021, Microsoft filed plans to build a Kemps Creek campus in NSW. The A$1.3bn campus will span 14.4 hectares and see two two-story data center buildings developed with capacity of 96MW and with the potential to expand to 190MW.

Exhibit 81: 2024: data center market share in Australia



Source: Morgan Stanley Research, S&P Global 451 Research

4. Power Implications

Our DC power demand forecasts are significantly higher than those from the Australian Energy Market Operator. AEMO's "Accelerated" sensitivity (existing, committed, and some prospective DC build-out) sees DC power demand at 1% of generation (based on real-world metering data), growing to 3% in 2030. Our base case is ~80% higher, but we see incremental flat load as manageable this side of 2030, supporting electricity prices and renewables development – a tailwind for all utilities in our coverage.

Exhibit 82: Australia data center - power, emissions, and water estimates

Australia		Unit	2023	2024e	2025e	2026e	2027e	2028e	2029e	2030e	CAGR 2023-2028	Comment/Source
Data Centre forecasts (UPS)												
MS Bull Case		MW	1,052	1,565	1,951	2,272	2,691	3,323	3,865	4,494	23%	*Previously 20% pa growth*
MS Base Case		MW	1,052	1,252	1,527	1,741	2,020	2,444	2,786	3,176	17%	*Previously 13% pa growth*
MS Bear Case		MW	1,052	1,102	1,268	1,393	1,575	1,882	2,145	2,287	12%	*Previously 8% pa growth*
Power Usage Effectiveness (incremental)												
MS Bull Case	-	n	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	0%	*No improvement in power effectiveness*
MS Base Case	(0.05)	n	1.40	1.35	1.30	1.25	1.20	1.20	1.20	1.20	-2%	*Modest annual improvement*
MS Bear Case	(0.10)	n	1.40	1.30	1.20	1.20	1.20	1.20	1.20	1.20	-2%	*Fast improvement towards a PUE floor of 1.2*
Peak power demand												
MS Bull Case		MW	1,473	2,191	2,731	3,181	3,767	4,653	5,411	6,291	23%	
MS Base Case		MW	1,473	1,743	2,101	2,368	2,702	3,211	3,622	4,090	16%	
MS Bear Case		MW	1,473	1,537	1,736	1,887	2,106	2,473	2,789	2,959	10%	
Peak demand (Summer)		*MW*	*39,346*	*40,824*	*45,732*	*46,747*	*47,961*	*48,913*	*49,712*	*50,703*	4%	*AEMO forecasts for peak demand growth*
MS Bull Case		%	*4%*	*5%*	*6%*	*7%*	*8%*	*10%*	*11%*	*12%*		
MS Base Case		%	*4%*	*4%*	*5%*	*5%*	*6%*	*7%*	*7%*	*8%*		
MS Bear Case		%	*4%*	*4%*	*4%*	*4%*	*4%*	*5%*	*6%*	*6%*		*Even our Bear case contributes to peak growth*
Utilisation (total)												
MS Bull Case	20%	%	30%	52%	54%	56%	58%	60%	62%	64%	11%	*IT load flat, DC load mainly in daylight hours*
MS Base Case	2%	%	30%	32%	34%	36%	38%	40%	42%	44%		*Previously 70% utilisation, and previously +/-10% range*
MS Bear Case	-20%	%	30%	12%	14%	16%	18%	20%	22%	24%	-3%	
Electricity demand												
MS Bull Case		TWh	3.2	8.3	11.6	14.5	17.7	22.1	27.3	32.8	40%	
MS Base Case		TWh	3.2	4.5	5.7	7.0	8.4	10.4	12.6	14.9	25%	
MS Bear Case		TWh	3.2	1.6	2.0	2.5	3.1	4.0	5.1	6.0	10%	
AEMO Accelerated case		TWh	2.6	2.8	3.2	3.8	4.6	5.7	6.9	8.3	18%	
Australia electricity generation		*TWh*	*225.6*	*230.2*	*235.8*	*242.8*	*249.1*	*255.1*	*264.0*	*274.5*	3%	*AEMO native demand forecasts for NEM+SWIS*
MS Bull Case		%	*1%*	*4%*	*5%*	*6%*	*7%*	*9%*	*10%*	*12%*		
MS Base Case		%	*1%*	*2%*	*2%*	*3%*	*3%*	*4%*	*5%*	*5%*		*Our base case runs ahead of AEMO growth forecasts*
MS Bear Case		%	*1%*	*1%*	*1%*	*1%*	*1%*	*2%*	*2%*	*2%*		
AEMO Accelerated case		%	*1%*	*1%*	*1%*	*2%*	*2%*	*2%*	*3%*	*3%*		
Location-based Scope 2 emissions												
Emissions intensity		*tCO2e/MWh*	*0.69*	*0.62*	*0.56*	*0.48*	*0.39*	*0.37*	*0.31*	*0.25*	-13%	*DCCEEW grid intensity estimates weighted to NSW/VIC*
MS Bull Case		*mtCO2e*	*2.2*	*5.2*	*6.6*	*6.9*	*6.9*	*8.1*	*8.4*	*8.3*		*For compairson, the annual supply of ACCU's is ~20m*
MS Base Case		*mtCO2e*	*2.2*	*2.8*	*3.2*	*3.4*	*3.3*	*3.8*	*3.9*	*3.7*		*Use of offsets may not be least cost abatement, in our view*
MS Bear Case		*mtCO2e*	*2.2*	*1.0*	*1.1*	*1.2*	*1.2*	*1.5*	*1.6*	*1.5*		
'Announced Policy' emissions		*mtCO2e*	*465.2*	*459.1*	*452.1*	*444.8*	*428.7*	*408.3*	*379.4*	*357.5*	-4%	*DCCEEW emissions estimates*
MS Bull Case		%	*0%*	*1%*	*1%*	*2%*	*2%*	*2%*	*2%*	*2%*		
MS Base Case		%	*0%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*		
MS Bear Case		%	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*		
Electricity sector emissions		*mtCO2e*	*151.7*	*139.5*	*131.6*	*123.7*	*109.1*	*101.0*	*89.8*	*81.4*	-9%	*DCCEEW emissions estimates for the electricity sector*
MS Bull Case		%	*1%*	*4%*	*5%*	*6%*	*6%*	*8%*	*9%*	*10%*		
MS Base Case		%	*1%*	*2%*	*2%*	*3%*	*3%*	*4%*	*4%*	*5%*		
MS Bear Case		%	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*2%*	*2%*		
Water Usage Effectiveness (incremental)												
MS Bull Case	-	ML/MW	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	0%	
MS Base Case	(0.05)	ML/MW	1.80	1.75	1.70	1.65	1.60	1.55	1.50	1.45	-3%	*Using NXT's average water usage per data centre MW*
MS Bear Case	(0.10)	ML/MW	1.80	1.70	1.60	1.50	1.40	1.30	1.20	1.20	-6%	
Water usage												
MS Bull Case		GL	1.7	2.4	3.2	3.8	4.5	5.4	6.5	7.5	23%	*For comparison the Sydney Desalination Plant capacity is 91.3GL*
MS Base Case		GL	1.7	2.1	2.5	2.9	3.3	3.8	4.4	4.9	16%	
MS Bear Case		GL	1.7	1.9	2.1	2.3	2.5	2.8	3.2	3.5	11%	

Source: S&P Global for current PUE and utilisation estimates, Australian Energy Market Operator (AEMO) for ESOO DC forecasts, as well as peak demand and electricity demand estimates, Department of Climate Change, the Environment & Water (DCCEEW) for emissions and emissions intensity estimates, otherwise, e = Morgan Stanley Research estimates.

Q5. What are the implications by sector?

Cap Goods (Max Yates and Claire Liu)

Capital Goods companies are key suppliers of Data Centre Equipment and Power supply. Electrical Cap Goods companies (Schneider, Siemens, ABB, Legrand) supply the LV/MV equipment (switchgear and transformers) which is used in the initial phases of data centre build out (grey space) as well the racks, servers, cooling and LV electrical products needed in the subsequent data center buildout stages (white space).

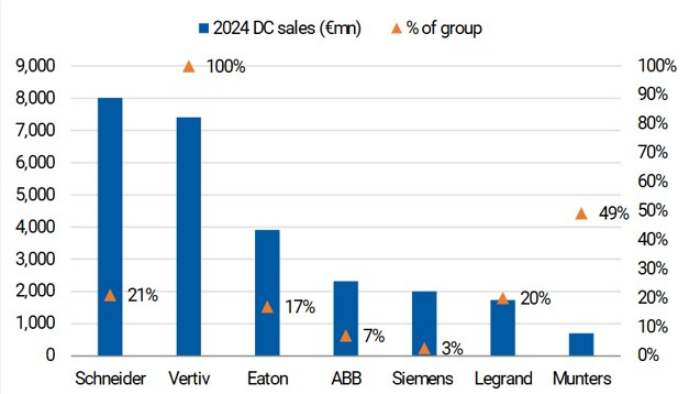
In addition to this Siemens Energy provide Gas turbines which are being used to power 'behind the meter' data centers. Siemens Energy have already started to receive bookings for reservation slots and some orders from these customers. We estimate data center demand will drive 10-15GW of a total gas turbine market size of 80GW this year. In addition, data center related demand in Grid equipment (HV grid) makes up €1bn of orders for this division for Siemens Energy, out of a total of €21bn in 2024.

For more details see: *our Data center Equipment Primer here.*

Sustained Data Center growth can further increase demand for key players. We think this will mean:

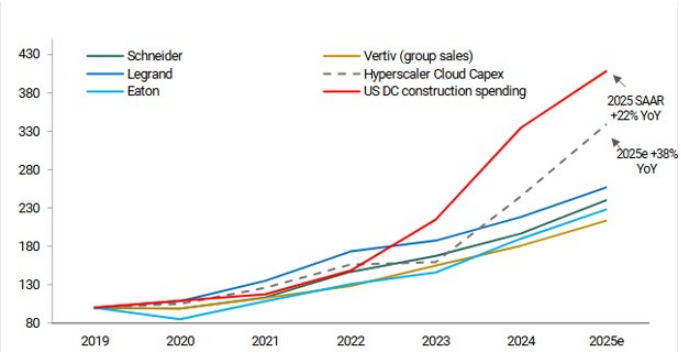
1) Data center businesses continue to grow at a healthy 'double digit CAGR'. Companies like Vertiv have given guidance of organic growth of 12-14% on average in 2024-29. We believe this is achievable, with arguably higher growth rates in the early part of this period. We are seeing shifts in the type of spending so far in 2026. We recently wrote in our Weekly Widget: Data Center. The 'white space' equipment growth catch-up has started (May 9, 2025) that while grey space equipment was the focus in 2024, these shells are now increasingly being filled with white space equipment, which may see relatively stronger growth in 2025-26. This was evidenced by Legrand's 1Q25 US data center growth rate of 50% which stood out vs the group of equipment suppliers. Similarly, we saw outsized order growth rates at nVent of 50% in 1Q25 (electrical products and liquid cooling). Geographic exposure is an important factor, where we see more benefit for companies that are more exposed to NA (Exhibit 89). Legrand expects HSD% CAGR in DC for 2025-2030, including DD growth in the first two years. Beyond 2026, Legrand expects continued growth in 2027-28 as data centers transition to an "optimization phase" where many of Legrand's products like Busways and Rear-Door Heat Exchanger remain important. We think these growth expectations can be pushed to the right.

Exhibit 83: 2024 Data Center sales across Cap Goods companies. Legrand and Schneider are the most exposed amongst EU names



Source: Company data, Morgan Stanley Research

Exhibit 84: Data center sales growth index. Data center construction put in place has grown faster than the equipment companies. We continue to think there is good runway for the data-center equipment companies to grow on a 2-3 year view.



Source: Company data, Morgan Stanley Research estimates (e)

2) Data centers are making an already tight global gas turbine market even tighter. Since 1Q25, we have seen a clear step up in gas turbines orders (Siemens Energy reported 20.4GW of orders in 1Q25 vs 14.1GW 2024 quarterly average). In addition to this, ENR received reservations for 20GW of gas turbines to be booked as orders in 2025/26, with customers now paying reservation fees, which speaks to the tightness in the market. We think industry supply, after announced capacity increases by the three large players, is moving towards 60-65GW by 2027-28. Ultimately, even after production capacity increases, the current demand levels will likely result in backlogs in Gas turbines continuing to build in 2025-27, which will extend this up-cycle well beyond 2028 for the turbine OEMs. We now forecast Siemens Energy to deliver 14.1% EBITA margins in FY25 (Sept year-end), +470bps YoY, and then expect margin expansion to continue at 140bps per year in 2026-28. This tightness will also mean that DC customers will need to look at alternative power supply players like Wartsila, which highlighted DC as a promising baseload opportunity for them.

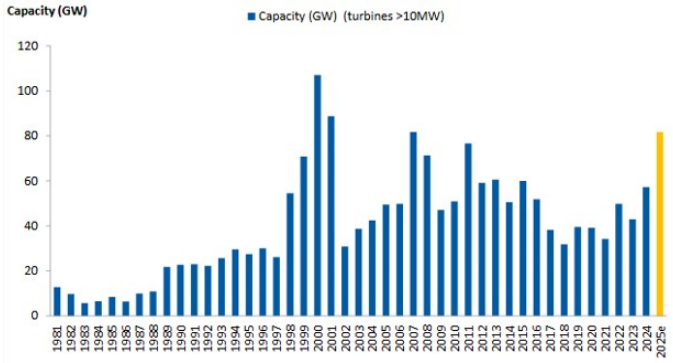
3) We are seeing Cap Goods companies continue to expand via M&A into data centers. Legrand has continued to build out its regional footprint in data centers, and over time will also broaden out its product portfolio more into grey space (it is currently 70% white space). Schneider has also done recent acquisitions in the data center space and acquired Motivair, a liquid cooling specialist, for $850m.

4) Some debate over grid margin normalization. In data center equipment, and grid equipment more broadly, we have seen a very tight supply demand situation in the past two years. Suppliers like Siemens, Schneider, Eaton and ABB have added capacity in medium voltage switchgear and lead times have been coming down to 30-35 weeks (from a peak of 52 weeks). We do expect some margin normalization over time, but for now, these companies have 6-9 months order backlog, and demand remains relatively healthy which means any step-down should be gradual. An acceleration in DC demand might push this normalization to the right, even with new MW capacity coming online through 2025. We have also heard companies like Siemens mentioned adding 30% capacity in their medium voltage products as a result of US capacity additions. We have also heard ABB mention that lead times in medium voltage switchgears peaked at 50 weeks, these have now come down to 30-35 weeks with new capacity additions, but still remain above the

normal 24 weeks.

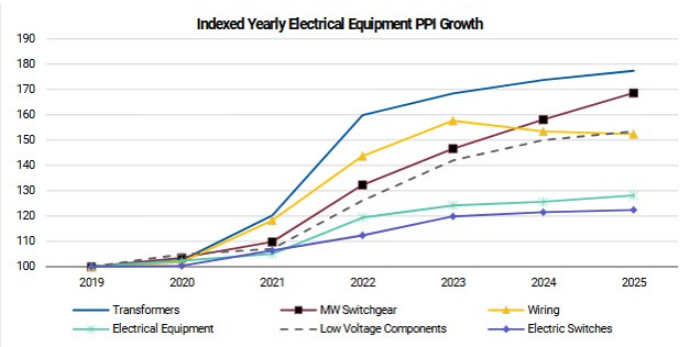
For more details on our previous work on Grids, see our reports; *(1) Weekly Widget: Rising grid costs. How much, is too much? (LINK), (2) Global Grid Equipment; Reaching a new peak (LINK)*

Exhibit 85: Global Gas Turbine Orders: 2025e is annualising at ~82GW, tracking to be the best year since 2007 (82GW), and also 57% higher than the 20-year average of 52GW



Source: McCoy data, Morgan Stanley Research

Exhibit 86: Electrical Equipment producer price inflation. Transformers and medium voltage switchgears have seen significant price inflation, but the rate of increases appears to have moderated.



Source: Datastream, Morgan Stanley Research

We highlight 2 key winners from further Data center growth:

1) Siemens Energy, Overweight PT €92, Top Pick

We think further data center buildout can give more runway to our bull case scenario. Our bull case assumes that **1)** Gas margins can return to prior peaks of 'high teens'; **2)** net pricing on new grid equipment orders does not turn negative in the next 12 months due to rising competition; **3)** despite a more challenging new order environment in wind equipment, Siemens' Gamesa can still reach low-to-mid single digit margins in 2028 (from -12% currently) – the wind division ultimately generates 30% of the incremental Siemens Energy group EBIT that we forecast in 2028 vs 2025.

On our bull case EBITA, Siemens Energy would be on 6.7x EV/EBITA in 2028. This would be a 40% discount to the EU Cap Goods sector, which currently trades on 11x 2028, on our numbers. On our base case 2028 forecast, the stock is on 8.5x 2028, a 23% discount to European Cap Goods. Arguably, ENR should trade at a discount to EU Cap Goods, but then for US investors there is GE Vernova (covered by Andrew Percoco) trading on 16x EV/EBIT in 2028e, which clearly also supports ENR's valuation.

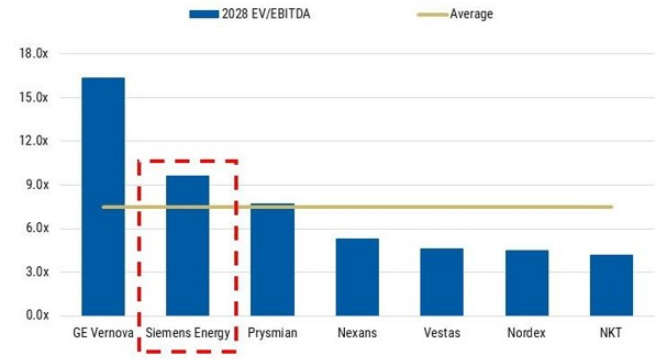
For our previous reports on Siemens Energy see : *(1) Face-Off: Siemens Energy vs Rheinmetall. (LINK) (2) Gas turbine orders. A clear step-change in 1Q25 (LINK), (3) Grinding higher. Still 22% ahead of consensus (LINK) (4) A new Top Pick. Our preferred Cap Goods name on rising German infrastructure spend (LINK), (5) Energy transition face off. GEV vs ENR (LINK).*

Exhibit 87: Siemens Energy's market outlook, showing its forecasts for Gas turbine new additions



Source: Siemens Energy 4Q24 conference call presentation

Exhibit 88: 2028 EV /EBITDA for Siemens Energy vs other 'Energy transition' names. Siemens Energy is still trading at a wide discount GE Vernova, which provides support for Siemens Energy's valuation



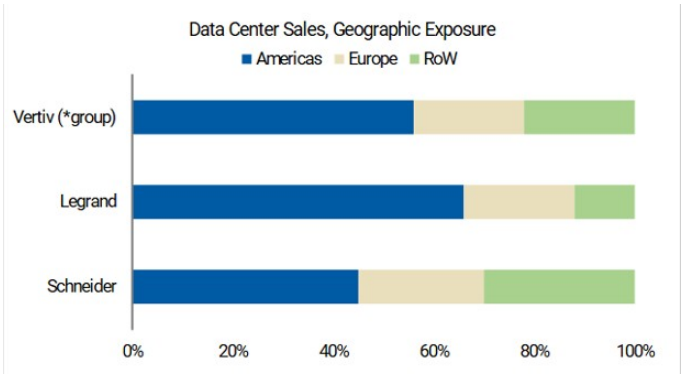
Source: Refinitiv, Datastream, Morgan Stanley Research estimates for GE Vernova, Siemens Energy, Prysmian and Vestas.

2) Legrand, Overweight PT €118

Legrand has benefitted from data center capex growth as 20% of its FY 2024 sales were exposed to Data Center. The company experience exceptional data center growth in Q1 25 with +50% data center sales, accelerating above peers. We expect Legrand to raise its 2025 organic growth guidance to 4-6% (from the current 2-4%), with their own forecast at 6.2% versus consensus at 5%.

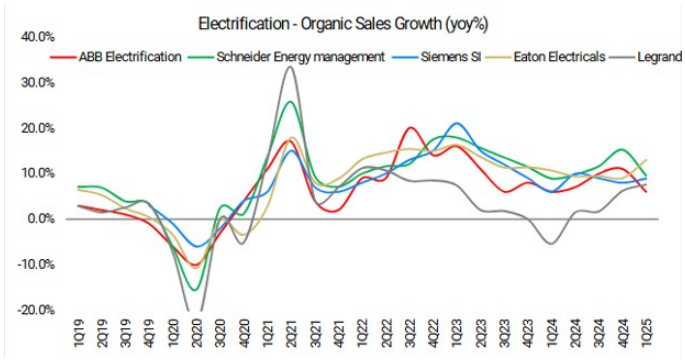
With a valuation of 20x 2026 PE, Legrand is relatively undemanding compared to Schneider (also 20% FY24 revenue exposure to data center) at 23x and ABB at 20x. Organic consensus estimates are edging up and we prefer it over Schneider as we see upside to Legrand's 2025 organic growth guidance.

Exhibit 89: Regional Exposure - Legrand is more exposed to North America at 66%



Source: Company data, Morgan Stanley Research

Exhibit 90: Electrification divisions organic growth: Legrand is catching up to peers



Source: Company data. Morgan Stanley Research

European Utilities & Renewables (Arthur Sitbon and Rob Pulleyn)

We think the rise of data centers in Europe could mainly imply three developments for the European utilities & clean energy sector:

- An inflection point in EU power demand;
- A power price tailwind;
- New opportunities with better returns for renewable developers (and possibly, in some cases, for nuclear power players too).

We wrote in more detail on implications from the rise of data centers on the European utilities & clean energy sector in Utilities - Data centers & AI: What they (really) mean for European utilities (22 Jul 2024).

Towards an inflection point on European power demand

After years of contraction, we believe data centers could be one of several drivers of growth in European power demand for the coming years.

While we expect data centers' installed capacity to grow fast and annual additions to remain elevated (and thus power demand from data centers to grow quickly), we acknowledge that the growth pace in the next few years may be slower than we initially anticipated due to some bottlenecks such as power availability as well as broader macro uncertainty.

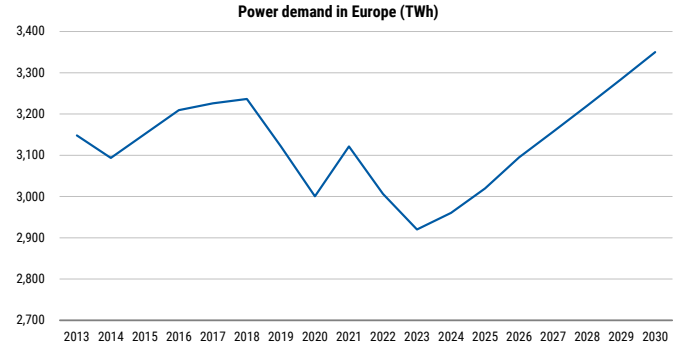
Our European data centers' power demand estimate comes down by only 5% for 2035. However, we have cut our power demand estimate from data centers by 17% for 2030e. In particular, we think the pick up in power demand directly related to AI usage will be slower - we expect 19 TWh of demand vs 31 TWh in 2030e.

We believe that European data centers could account for ~170 TWh of power demand by 2030 and ~300 TWh by 2035, or ~5% and ~8% of total European power consumption, respectively. This would represent ~95 TWh of incremental power demand by 2030 (~15 TWh directly from AI).

Most importantly, we think the rise in power demand from data centers will represent a meaningful share of total power demand increase in Europe in the coming years, in a context of more limited reshoring developments than in the US and given long-term nature of broader electrification of the European economy. Exhibit 92

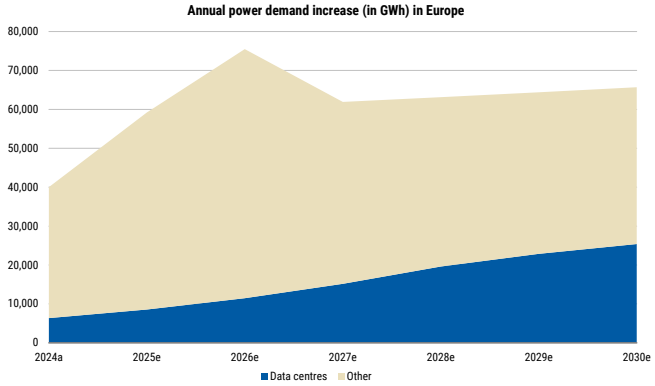
We expect data centers to account for ~25% of annual power demand increase in Europe in coming years.

Exhibit 91: We believe data centers could contribute to an inflection point on European power demand



Source: ENTSO-E, Morgan Stanley Research estimates

Exhibit 92: Over 2024-30e, we expect data centers to account for ~25% of annual power demand increase in Europe



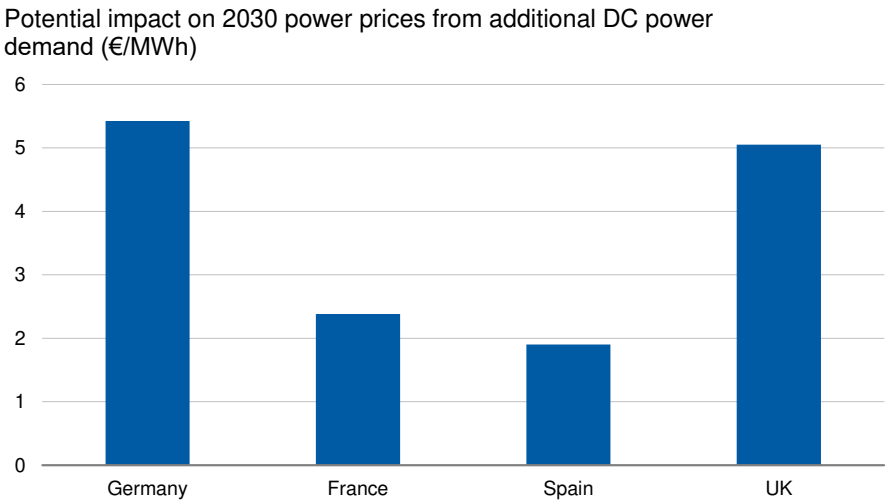
Source: ENTSO-E, Morgan Stanley Research estimates

Higher power demand = higher power prices

New data center power demand could represent a tailwind for European power prices by 2030. This is the conclusion of our in-depth merit order curve modelling work for the European power system. We expect power prices in Germany and in the UK to be the most impacted by the rise of data centers as shown below.

- 1. The significant pick up in installed data centers capacity we expect in the UK (with London being the leading / 1st European data center market, by installed capacity), especially relative to the size of the country's power market; and
- 2. The high sensitivity of power prices to higher demand in Germany due to the important role played by fossil fuel in the country's power mix. We expect a more modest impact of around €2/MWh in France in Spain on power prices by 2030.

Exhibit 93: New data center power demand could represent a tailwind for European power prices by 2030

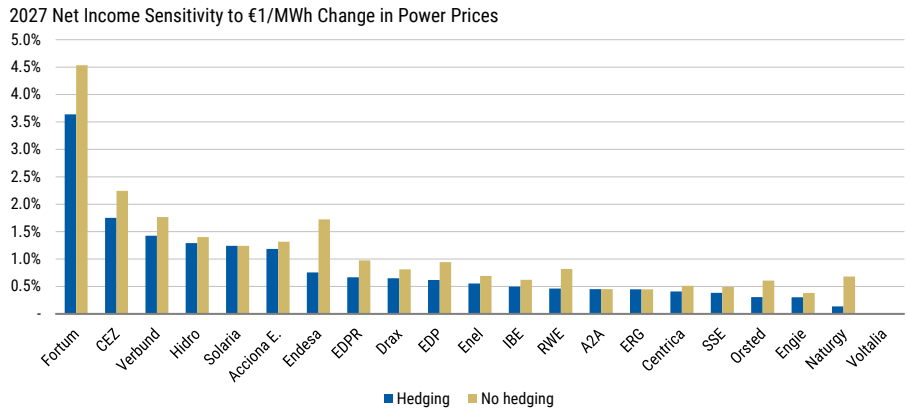


Source: Morgan Stanley Research estimates

This could drive upside on (or at least support) European power generators' earnings.

We show the theoretical 2027e net income sensitivity to changes in power prices for the main power exposed names in our European utilities coverage on Exhibit 94 . We would expect RWE to be amongst the main beneficiaries of potential data center demand-driven strength in power prices in Europe.

Exhibit 94: We show the names with the highest earnings sensitivity to European power prices



Source: Morgan Stanley Research estimates

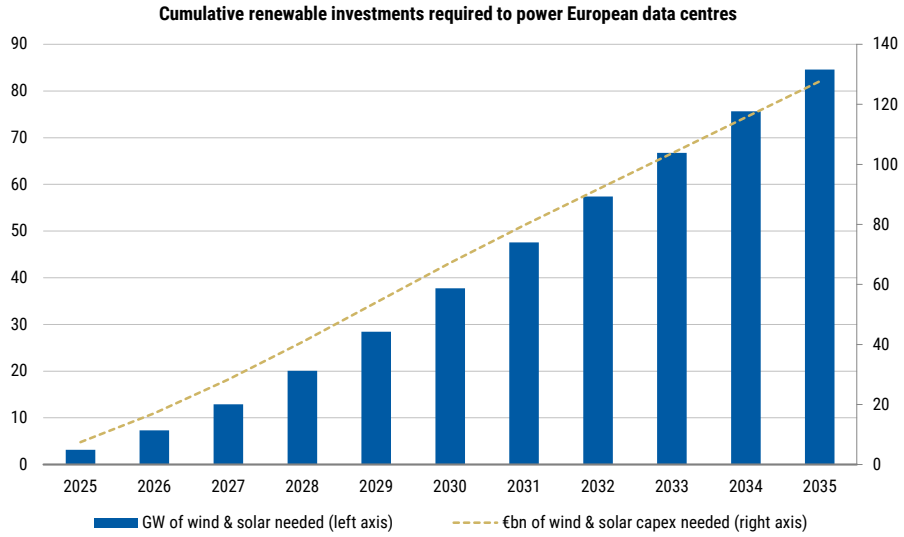
Growth optionality and potential to enhance pricing power for renewable developers

We think higher power demand from data centers will represent an investment opportunity for European renewable developers. In Europe, we believe that most of the increase in power demand from data centers will be met by new renewable capacity installations. We calculated that 35 GW of new wind & solar capacity could be needed to power all the additional power demand from data centers by 2030.

And we expect good returns on these projects given we believe Big Tech players may have a higher willingness to pay for clean power if it has a good time to market as explained in Utilities: The Overlooked Value of Power (10 Oct 2024).

We note that the first European renewable developers to benefit from this optionality should be those with a sizeable presence in the US, where there is already significant power demand growth and strong pricing power for new clean energy projects (especially those with a fast time to market). **We expect this to benefit in particular to EDPR/EDP and RWE.**

Exhibit 95: We calculated that 35 GW of new wind & solar capacity could be needed to power all the additional power demand from data centers by 2030



Source: Morgan Stanley Research estimates

We think the rise of data centers could also drive a pick up in demand for nuclear power, and potentially a few nuclear-backed PPAs similar to the ones we have already observed in the US (see Exhibit 96). In the US, these contracts have come with significant price premiums and if this were to also be the case in Europe, we think this could put under the spotlight the overlooked value of some European corporates' nuclear assets.

In particular, we think such contracts could potentially be signed in Nordic countries or in France. In the Nordic countries, we monitor potential developments with Finnish power generator Fortum (covered by Harrison Williams). While in France, French nuclear power plants' operator EDF (not listed) could launch auctions to sell some of its nuclear power volumes under medium/long-term agreements at fixed prices.

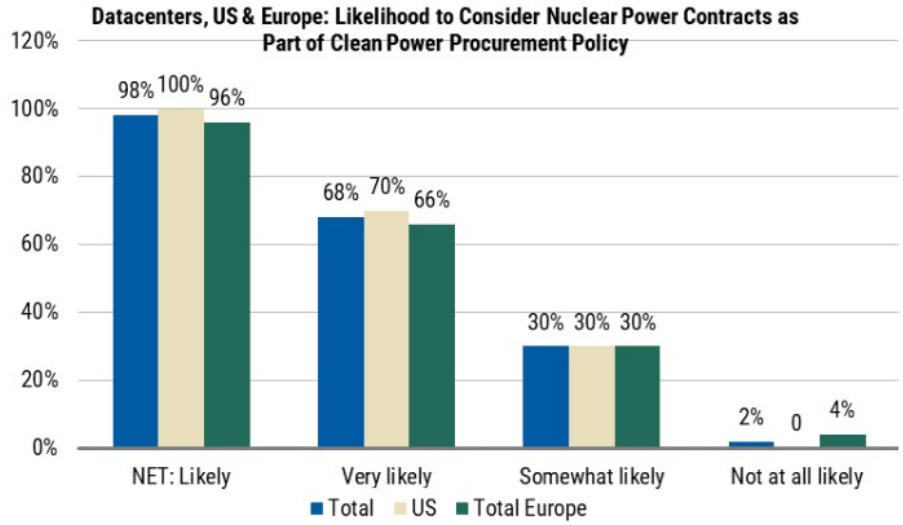
Exhibit 96: Several nuclear-backed PPAs have been announced in the US by Hyperscalers

Date	Country	State	MW	Data Center Company	Power Company	Start of the deal	Duration (years)	Nuclear plant
07/03/2024	US	Pennsylvania	960	Amazon Web Services	Talen Energy	2032	10	Operational
20/09/2024	US	Pennsylvania	835	Microsoft	Constellation	2028	20	Mothballed
03/06/2025	US	Illinois	1,121	Meta Platforms	Constellation	2027	20	Operational
11/06/2025	US	Pennsylvania	960	Amazon Web Services	Talen Energy	2032	10	Operational

Source: Morgan Stanley Research

While we think there may be more hurdles to nuclear-backed PPAs in Europe vs in the US, we note that as part of our AlphaWise survey conducted in Utilities: The Overlooked Value of Power (10 Oct 2024), data center companies showed a relatively similar willingness to sign such contracts in Europe than in the US - see Exhibit 97 Exhibit 97).

Exhibit 97: Data center companies showed a relatively similar willingness to sign nuclear-backed power contracts in Europe than in the US



Source: AlphaWise, Morgan Stanley Research

We calculate (see Exhibit 98) that if 15% of the additional European data centers' power demand to 2030 were to be supplied by nuclear, this would require 1.8 GW of nuclear-backed PPAs. This may require only a small number of contracts on a small number of reactors (given the capacity of large-scale nuclear reactors).

Exhibit 98: For illustrative purposes, we show how much GW of wind, solar or nuclear power would be needed to power the rise in data centers' power demand to 2030 in Europe

	% of additional European DC power demand supplied by renewables										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
GW of wind & solar needed	0.0	3.5	6.9	10.4	13.8	17.3	20.8	24.2	27.7	31.1	34.6
	% of additional European DC power demand supplied by nuclear										
	0%	3%	6%	9%	12%	15%	18%	21%	24%	27%	30%
GW of nuclear needed	0.0	0.4	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2	3.6

Source: Morgan Stanley Research estimates

US Utilities & Renewables (David Arcaro)

All signs point to greater growth

As discussed previously, we expect a growing shortfall in the supply of power given the significant data center demand ahead. For Merchant Power / IPP stocks in the US we see a continued strong opportunity for these owners of power plants (the scarce asset) to benefit from direct data center contracts at premium prices and higher market prices of electricity. For Regulated Utilities, the industry needs to build, and we expect an inflection of several hundred bp faster growth in generation and transmission investments for many utilities. For Clean Energy, solar/wind/batteries remain the most cost effective and fastest to build as new sources of power – over the medium term we expect strong demand, accelerating project development, and robust returns.

Stock Implications

Sempra (SRE) as the best regulated utility option on this theme. The company's Texas

utility is at the epicenter of the data center buildout and boasts top tier growth stemming from grid investments.

Vistra (VST) as a highly attractive IPP on the theme. We expect data center contracts and higher power prices to drive margin expansion.

NextEra (NEE): The largest renewables developer in the US, likely to gain market share through near-term industry turmoil related to policy uncertainty.

European Real Estate (Bart Gysens & Ana Escalante)

Segro has worked on the development of powered DCs for >20 years. The UK real estate company has relationships with global DC operators and the US Hyperscalers, playing a key role developing Europe's largest DC hub (Slough Trading Estate). Segro has power-enabled land banks in FLAPD - notably London, Paris, Frankfurt - and in secondary markets (Dusseldorf, Berlin, Marseille, Milan, Warsaw).

We have noted that Segro is seeking to move up the value chain, from delivering powered DC shells, to building fully fitted DC projects. Indeed, recently, Segro and Oaktree's Pure Data Centers signed a JV agreement to build a ca 56 MW DC in Park Royal, West London (on a 10-acre site previously owned by Segro):

- The project is expected to cost ca £1bn, reflecting a 9-10% net yield on cost;
- Segro will deliver some of its land-enabled power bank (which totals 2.3 GW) to provide energy to the project;
- Segro expects to pre-lease the data center to a hyperscaler.

Exhibit 99: Segro's data center real estate portfolio

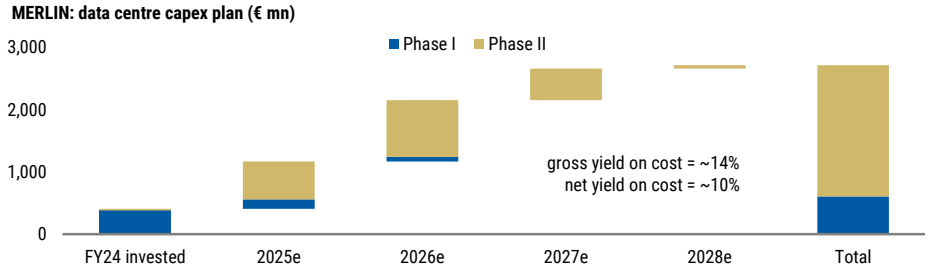


Source: Segro (link here)

MERLIN Properties is building fully-operated DCs across the Iberian Peninsula. Currently, the company has 42MW of installed capacity across its hubs in Madrid, Bilbao and Barcelona (93% let). It aims to reach 64MW by December 2026 as part of Phase I of its DC plan. This phase targets a net yield on cost exceeding 10% on a total investment of €608 million at completion. Looking ahead to Phase II, MERLIN has secured power for an additional 210MW, with project completion expected by 2029. This phase includes the launch of a new hub in Lisbon and anticipates an additional €2.1 billion in capex, with first rents expected by 2027. In the longer term, MERLIN envisions installing another 2.6GW of

capacity, including developing new hubs.

Exhibit 100: MERLIN's initial investment of €2.7 billion to ramp up



Source: Company data (e = capex plan), Morgan Stanley Research

Tritax BigBox (not covered) is also investing in DCs, adopting a powered shell model but including power infrastructure as well. It has partnered with EDF Renewables to gain access to grid connection agreements and accelerate power delivery. Its first project in London, within the Slough availability zone, targets 107MW by 2027 at a cost of £365 million and a yield on cost of 9.3%, with potential for an additional 40MW from 2029. It aims to achieve a pre-let by year end. Tritax has an additional pipeline of ca 1GW, including a second DC site within the broader London availability zone: 125MW of power scheduled by 2028, targeting £230 million of capex and a 10-11% yield on cost.

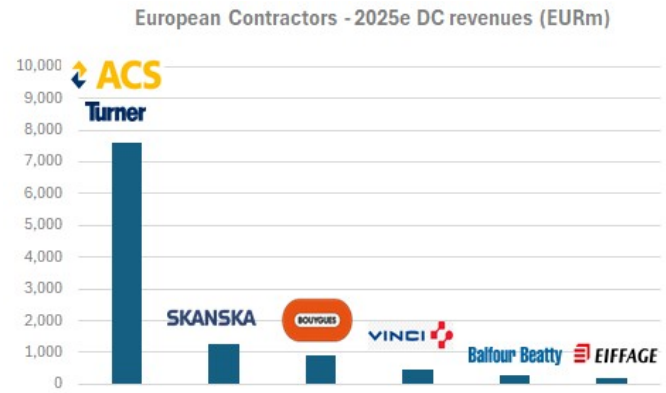
European Infrastructure (Nicolas Mora)

Background

European Contractors are involved in building the DC shells (construction) + mechanical/ fire & safety/electrical engineering/telecoms/HVAC (multi-technical services) as well as taking care of the grid connection infrastructure (substations). ACS bucks the trend in getting higher up the value chain, with an early build-up of a development pipeline and the set-up of a JV with ownership and O&M of the assets.

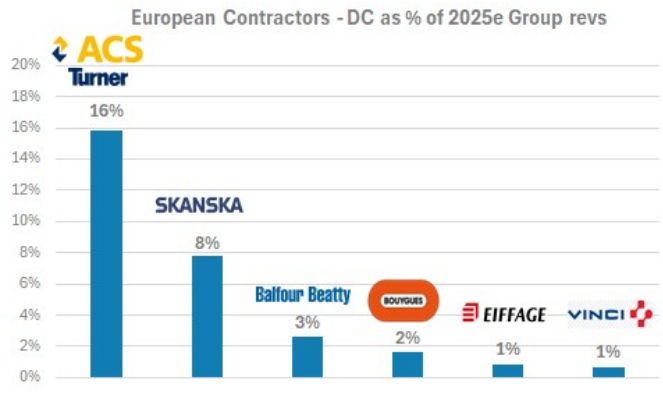
The DC hierarchy within European contractors has an obvious leader: ACS (US, Europe, APAC) with an impregnable leadership ahead of #2 Skanska (US, Nordics, UK) and #3 Bouygues (Construction + Equans).

Exhibit 101: European Contractors - 2025e DC revenues in €m



Source: Company data, Morgan Stanley Research estimates (e)

Exhibit 102: European Contractors - DC as % of 2025e revenues



Source: Company data, Morgan Stanley Research estimates (e)

The DC theme is a major driver of the ACS equity story (MSe ~25-30% of target equity

value), as a global leader in DC construction + a scarce role in DC co-development. This is far less the case for Skanska (question-mark on DC revenue flow from 3Q25 after a lengthy lull in orders), Bouygues, Balfour Beatty, Eiffage and Vinci, where the DC angle is dwarfed by other major drivers of stock prices/earnings/valuation.

ACS, the leader of the pack

ACS has built an early leadership in DC construction via its US subsidiary Turner (#1 US non-res builder), via established relationships with Hyperscalers, ability to deliver the full scale of DC sizes, wide US reach (Virginia + secondary/tertiary markets), internalised procurement vehicle (SourceBlue). This leadership has recently been extended to Europe (via Hochtief Europe's push into DC in Germany / Poland / UK + acquisition of Irish DC contractor Dornan closed in Jan-25) and APAC (Australia + ASEAN + India + HK presence in DC construction/fit-out).

We expect 2025e DC revenues to near ~€8bn, 7x larger than #2 Skanska, with the broadest geographic reach, unmatched ability to accompany hyperscalers in giant DC construction project and scale leveraged via a superior procurement product. From here, ACS over-indexes in the US (~3/4th of DC revs) and in the large DCs (for Hyperscalers) segment + solid presence in ASEAN + early structuring of its presence in Europe (early inning of leveraging US's Turner leadership and applying it to a fragmented European DC construction industry), which should drive top compounding growth into 2030e.

The DC construction exposure makes up ~20% of ACS target SOTP (~3/4 Turner + rest of the exposure via Hochtief Europe & APAC's Cimic units).

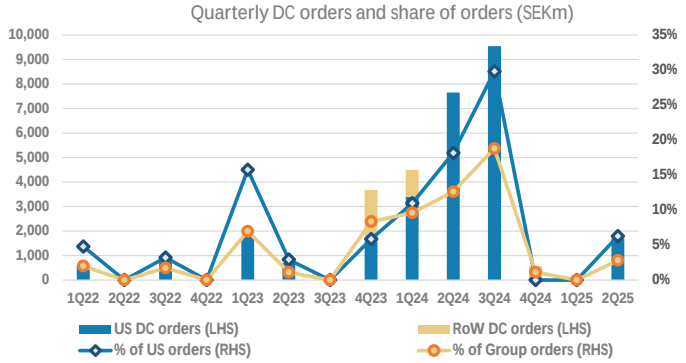
This is complemented by a new venture to become a co-developer of DCs and grab a larger share of the DC value chain. This is done via 2 vehicles:

- A 2.1GW development pipeline (US 1GW; Spain 900MW; Australia 200MW) in need of ~$19bn construction capex / $7bn equity lodged in a structure that management targets to open to a partner (land purchase, securing of grid connection + leasing to hyperscalers / ~$800m equity investment by year-end 2025e);
- A Germany/European-based decentralised EDGE data centers' network (15 DC pipeline for Germany + recent set-up of new subsidiary in the UK/Ireland). We view the value on offer in this second leg of ACS' DC strategy ~€1.2-2bn or ~7-11% of MSe target SOTP.

Skanska, in need of re-filling the DC pipeline

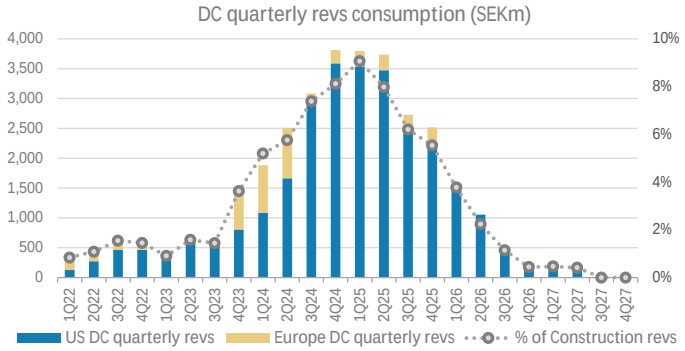
Skanska should deliver ~€1.3bn DC revenues in 2025e (~92% US / 8% Nordics & UK), #2 in our European Contractors' ranking. That said, the DC revenue contribution is under threat from 3Q25 into 2026/27e after a long ~7-month lull in orders. Moreover, Skanska built its winning streak of orders from 4Q23 to 4Q23 on repeat customers building series of identical DCs (~22-23K sqm shells) in two major markets (Arizona and Georgia). Yet the more limited customer base and geographic reach as well as ability to scale up and move into the delivery of hyperscaler DC should constrain growth compared to Turner/ACS.

Exhibit 103: Skanska - DC orders per quarter: impressive acceleration over 4Q23-3Q24, which has failed to carry through into 2025e



Source: company data, e = Morgan Stanley Research estimates

Exhibit 104: Skanska - Fast revenue consumption of 2023-24 DC orders exposes Skanska to a sharp slowdown from 3Q25 onwards



Source: company data, e = Morgan Stanley Research estimates

Bouygues, a surprising #3 targeting building/multi-technical services

Outside of the US-driven ACS/Turner and Skanska, Bouygues has been leveraging its Construction (Bouygues Construction) and Multi-technical services (Equans) units to make its name in the DC space in Europe mostly + Australia of late (just shy of €1bn 2025e revs in DC). Its approach combines the DC shell construction and part of the fit-out (HVAC + cooling, fire & safety, electrical engineering, etc). It also gets a boost from Equans' atypical inclination to take on larger projects vs. most peers centred on small flow/repeat business: this suits the DC segment well (large single projects requiring multiple services business units working as one under tight project management). Finally, the geographic spread of operations of both Bouygues Construction and Equans (France/UK & Ireland/ Benelux/Switzerland/Germany/Italy/CEE/US+Canada/Latam/Australia) offers multiple opportunities of the group, although the latest major DC contracts have tended to centre on France, the UK & Ireland and Australia.

Balfour Beatty, Vinci, Eiffage - Not quite moving the needle for now

Balfour Beatty (US/UK/HK), Vinci (ASEAN mostly + Europe) and Eiffage (France/Benelux/ Spain) play a lesser role within the DC space, with geographic limitations and/or less appetite for large/complex DC fit-out projects.

Balfour Beatty via its US non-res construction business has a relative presence in DC build-up (e.5% of US revs), yet this fails to move the needle at the group revs and profit level (€250-300m 2025e DC revs / < 3% of Group). It should continue to surf on the growth of the US DC market, although the increased skew to large hyperscale DC puts it at a disadvantage vs. its much larger local/European competitors (BBY's US DC revs are ~35x smaller than Turner/ACS, 6x smaller than Skanska USA). Its exposure to the UK DC market is limited today, yet its geographic coverage of its homeland + leadership in large, complex construction projects could offer opportunities to grow with multiple giant hyperscaler DC projects in the pipeline + emergence of projects outside the core London DC market.

As for Vinci (< €500m 2025e revs, < 1% of Group revs), a majority of the exposure to DC stems from Wah Loon in Singapore (ASEAN DC fit-out specialist) via Vinci Energies, which also delivers fit-out projects in Europe but tends to shy away from large works packages.

Outside of Wah Loon, Vinci's opportunity to make it bigger in DC could come from Cobra IS. Its Spanish moat (leader in multi-technical services in its homeland) + its EPC business eager for large turnkey projects are well suited to surf on the the fast-rise of the Spain as a key secondary DC market in Europe.

Finally, Eiffage (~€200m 2025e revs in DC, < 1% of Group revs) is mostly active in France/Benelux/Spain in the DC space. It is more open than Vinci Energies and Spie (Spie is covered by Remi Grenu) in seizing opportunities from large/complex hyperscale DC projects (eg: major contractor on CloudHQ's 140MW DC in Paris region), yet for now limits itself to one such project at a time due to personnel/risk constraints while targeting the HV/MV electricity distribution + ventilation/AC/cooling activities. Additional capability development in France (adding a 2nd team able to tackle hyperscale DCs) + a substantially-boosted presence in industrial services in Germany in 2024 (Salvia) + greater ambitions in industrial services in Spain could help leverage growth in the French/German/Spanish DC market over the medium term.

European Construction (Cedar Ekblom)

Belimo – optimisation of HVAC systems

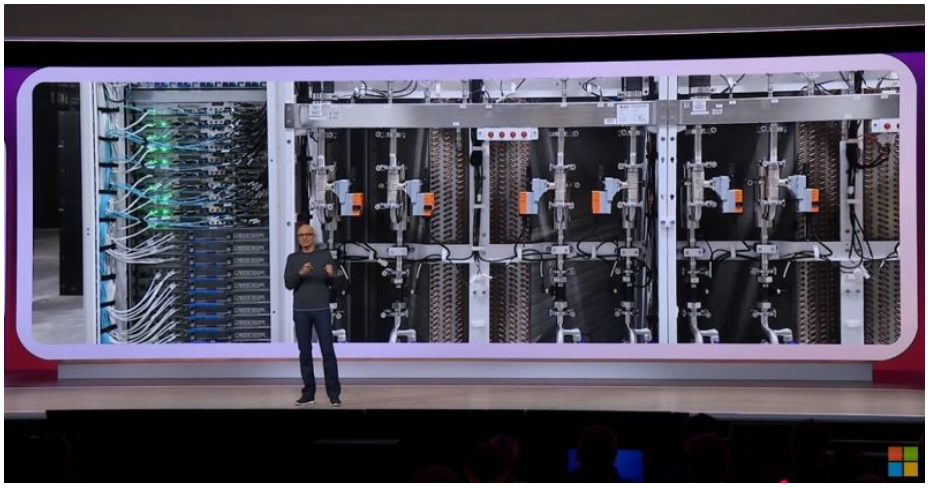
Data centers require precise control of temperature and humidity to protect IT equipment & chips, ensuring optimal operation and maximum uptime. With cooling responsible for up to 40% of a data center's power consumption, increasing the efficiency of air conditioning units (HVAC) is vital for profitable and sustainable operation. Whether a new build/retrofit, Belimo improves performance of HVAC units by reliably monitoring, controlling and adapting building conditions thanks to its portfolio of damper actuators, control valves, and sensors.

Belimo's field devices are installed across both areas to enhance HVAC energy efficiency levels while extracting heat from IT rooms using its actuators (ie air cooling) / valves (ie liquid cooling). Their products could be observed on air handlers, water-side economisers, cooling towers, dry coolers, chillers, cooling distribution units, single phase cold plate, generators.

Our analysis suggests rising levels of processing power driven by AI, combined with more demand for data centers will require products that improve energy efficiency. Belimo's share of HVAC-related data center spend increases with power density per rack as growth in cooling demand is rising. Therefore, the firm expects to see the global HVAC market for data centers to grow by 20-25% by 2027. While near-term bottlenecks to demand exist (ie equipment shortages), our industry cross checks confirm product performance, reliability, time-to-market and integration capability is more relevant for CSP owners/operators than cost reduction for now. Belimo's established relationship with CSPs/CDUs but also leading AI chip OEMs (ie design reference list) support its growth momentum in the medium-term, in our view. Belimo Holding AG: Deep Dive into Data Centre Opportunity (14 Aug 2024)

During the Microsoft Build 2025 opening keynote, management shared an impressive look at the infrastructure powering the cloud - including a scene featuring Belimo technology, as observed below. As AI demand accelerates, so does the need for reliable and energy-efficient cooling systems.

Exhibit 105: Belimo products highlighted in orange at Microsoft Build 2025 opening keynote



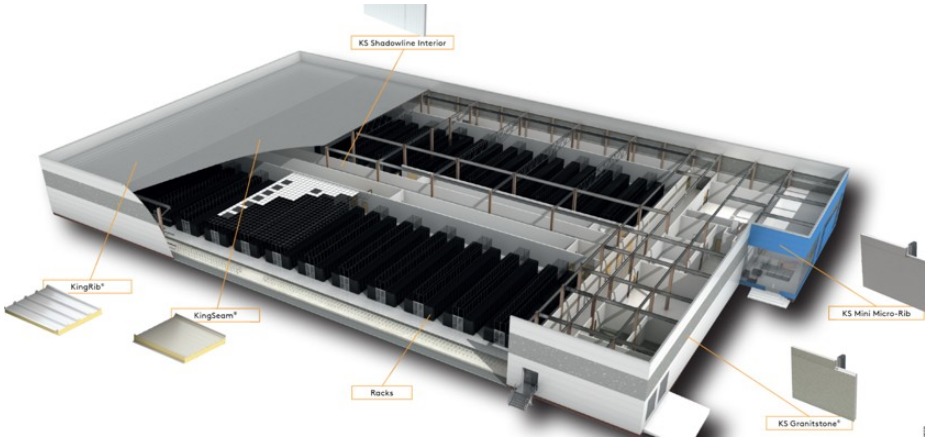
Source: Belimo Linkedin page

Among those DC operators we surveyed, Saint Gobain was the leading supplier for data center construction (materials), being used by 34% of DC owners / operators across five markets (US + four countries in Europe).

There were 10+ mid-tier suppliers used (share below Saint Gobain), with Kingspan (18%) and Etex (18%) at the top end, while Holcim (11%) and Soprema (11%) were less prevalent suppliers.

- **Saint Gobain's key products** for data center applications include fire resistant gypsum boards, Isover glasswool solutions, stone wool insulation, waterproofing membranes for water protection.
- **Kingspan's** products cover both insulation, raised access flooring systems, solutions for airflow management and containment.
- **Sika** provides solutions from the foundation to the roof and floors. Solutions look to reduce embodied CO2 and operational CO2, while also speeding up construction times.

Exhibit 106: Kingspan solutions for the facade



Source: Kingspan.com: https://www.kingspan.com/content/dam/kingspan/kip-na/us-ca/documents/kingspan-data-center-solutions-guide-us.pdf

Exhibit 107: Kingspan raised access flooring for data center projects

FDEB_H

HEAVY



FDEB_H is our heavy-grade system, capable of handling a 12kN/m2 uniformly distributed load. FDEB_H is suitable for data centre and server room use with heavy equipment.

Source: https://tateglobal.com/products/commercial-access-floors

Exhibit 108: Sika Electrostatic flooring solution



Source: https://phl.sika.com/en/construction/flooring/electrostatic-areas.html

Exhibit 109: Sika's flooring solutions



Source: https://phl.sika.com/en/construction/flooring/electrostatic-areas.html

Financials & Asset Managers (Mike Cyprys and Robert Kad in US, Bruce Hamilton in Europe)

US Asset Managers

We're increasingly bullish on the Alternative Asset Managers (Alts) given the significant capital deployment opportunity presented by data center / AI spend in the context of the views of our TMT colleagues that see continued signs of strength in AI infrastructure spend that skew to the upside.

Importance of:

- i) continuing to invest in next generation capabilities;
- ii) large production pipelines that require GPUs; *and*
- iii) sovereignty concerns given importance of US-led LLM offerings all support durability and strength of AI infrastructure spend, in the views of our TMT colleagues.

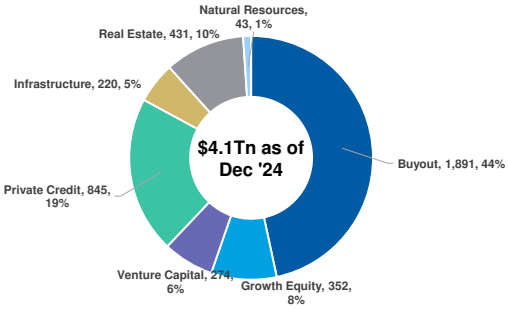
Further, energy remains a primary obstacle to building data centers, among other constraints, which private capital can help provide solutions. As a result, we see **scope for faster and larger deployment of private capital** into the AI/data center theme that could **pull forward successor fundraising cycles** for the Alts, supporting better management fee growth than expectations. Additionally, we see **scope for better performance fee revenue outlook** in the years ahead stemming from these investments relative to expectations, as our TMT colleagues do not foresee weaker data center/AI spend, nor do they see a data center bubble.

Alternative asset managers play a significant role in financing AI and data centers. The rise of AI presents a global investment theme that has triggered an immense need for capital. Private markets are increasingly playing a key role, investing in and alongside the AI theme, and providing capital with a long duration investment time horizon. Over the

past few years, leading alternative asset managers broadened their investment capabilities and expanded the aperture of their deployment themes to capture data center investments and the overall AI infrastructure build. Private market alternative asset managers are actively deploying capital into this theme, including data centers, semi fabrication, and renewable energy. This surge in investments highlights a $1tn+ opportunity, as firms position themselves to capitalize on expected growing demand for computing power and the required infrastructure it entails. Given the vast sums of capital required to support this secular theme in the coming years, we have increased confidence in private markets players deploying their ~$4.1tr cash pile into attractive investment opportunities across the space in support of power expanding AI needs.

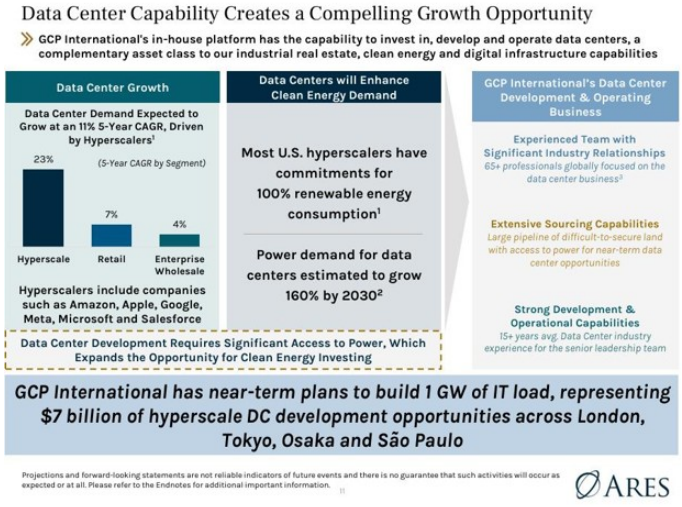
Sizable dry powder across the broader private markets industry to support the AI/data center investment theme, with a more diversified mix now than before. The private markets industry has amassed $4.1 trillion of dry powder. The composition of that has broadened out over the years and diversified across end markets with private equity comprising ~58% of dry powder, vs. ~80% in 2005, with growth in asset classes like Private Credit (est. ~$0.8tr dry powder) and Infrastructure (~$0.2tr). As context, private market funds today are a ~$13tr industry globally, that's grown at a 10% CAGR since 2020, and we see secular tailwinds to support a 11% CAGR over the next 5-yrs. Underpinning our outlook is stronger growth from infrastructure, which we see growing at a faster 15% CAGR through '28. We see the rise of digital infrastructure and AI as supportive to our industry outlook given the increased need and demand for data centers and computing capacity. Within infrastructure, energy and transport still possess large funding needs longer-term, but digital infrastructure is expanding its share.

Exhibit 110: $4tr of Private Markets Dry Powder, including $2tr of Private Equity and $220b of Infrastructure



Source: Cobalt data, Morgan Stanley Research as of December 2024. Note: Data excludes secondaries, fund-of-funds, and co-investment.

Exhibit 111: Data center Capabilities as Growth Opportunity for Ares



Source: Ares | GLP Capital Partners Transaction Overview October 2024

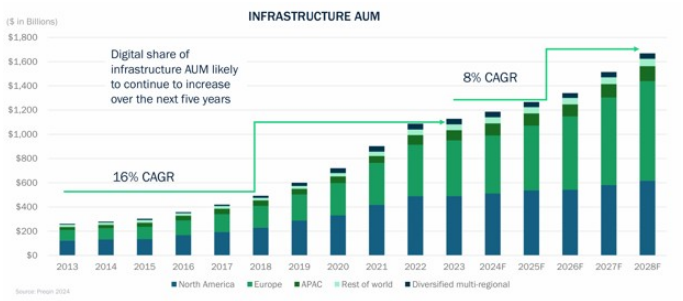
Across our coverage we see substantial infrastructure footprint at BN OW through it's 73% ownership in BAM EW ($214b AuM, 20% of AuM, $96b FPAuM), BLK OW ($169b AuM, 37% of Alts AuM, $108b FPAuM), KKR OW ($83b AuM, 13% of AuM), BX OW ($60b, 5% of AuM), ARES EW ($24b/5%), and APO EW ($14b/2%). We anticipate these AuM figures continuing to rise from a multitude of factors, not exclusive to AI-driven data center demand growth, but also inclusive of the defensibility and attractive secular

tailwinds behind the infrastructure asset class. Specific to data centers, alternative asset managers are increasing their investments in data centers by owning new developments through acquisitions and direct investments to capitalize on the growing demand for computation power for generative AI.

We see BX and KKR (both OWs) as leaders in the space with $80b and $50b in leased data centers, respectively, making them our top picks to capitalize on this opportunity. KKR (OW) has been one of the largest infrastructure investors with $88b in infrastructure AUM as of 1Q25 and holds $50b (enterprise value) in data center platforms in its portfolio. Notable deals/agreements include a $15b acqusition of CyrusOne, who owns 50 data centers worldwide, a $50b partnership with Energy Capital Partners to oversee ~100 data center facilities, and an adjacent deal to acquire CoolIT, a manufacturer of data center cooling solutions, for $270m. We think there is plenty room for KKR to opportunistically lean in with $115b of dry powder ($31b dedicated to Real Assets). **BX (OW)** has also been one of the front runners in the space, with $60b in infrastructure AuM of of 1Q25, and $80b in leased data centers in its portfolio. Notable deals/ agreements include Airtrunk, a $16b deal to acquire the largest data center operator in APAC, QTS ($10b), the largest individual data center asset they own, and the estimated $1b acquisition of Potomac, a 774 MW natural gas power plant in Virginia. Pairing this exposure in a rapidly growing space with BX's best in-class private markets franchise with significant brand power, we think the company is well positioned to benefit from the AI global theme.

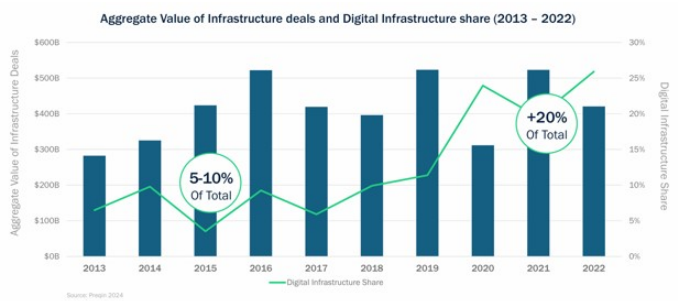
We also see BAM as a key player in the space, with 140+ managed data centers ($ value of leased facilities not given), as well as a strong pipeline from Data4 and projects in France and Sweden. This year, Brookfield has committed a $10b investment in AI infrastructure development in Sweden, focused on an AI center build in Strängnäs, as well as a €20b investment to support France's AI infrastructure through 2030. Brookfield's portfolio company, Data4, will utilize €15b to build over 500 MW of data center capacity with the goal to triple that in 2030. The remaining €5b is planned by Brookfield to be used for AI infrastructure such as data, chip storage, and energy. Moving on to other peers, we do not have information on BLK's data center footprint outside of a DC in Amherst, NY. Nonetheless, we expect BLK to be a major player in the space given its AI fund partnership with MSFT and MGX that is targeting $30b in private equity capital (up to $100b with leverage), as well as the company's already large infrastructure footprint. Data center demand is projected to grow at an 11% CAGR over the next five years. This presents a $4Tr-$7Tr opportunity (stated by Ares during their Q4'24 earnings call) as firms scale their portfolios to help meet capacity needs.

Exhibit 112: Infrastructure has been a fast growing alternative asset class



Source: Digital Bridge (screenshot of slide 44 of May 2024 Investor Day Presentation), in turn highlighting Preqin 2024 as a source

Exhibit 113: Within Infrastructure, Digital Infrastructure is expanding its share



Source: Digital Bridge (screenshot of slide 32 of May 2024 Investor Day Presentation), in turn highlighting Preqin 2024 as a source

US Infrastructure (Midstream & Renewable Energy Infrastructure)

We look at two equities in particular, Brookfield Infrastructure Partners & East Daley.

1. BIP. Brookfield Infrastructure Partners (BIP), a globally diversified infrastructure company, has recently said that it expects its Data segment – currently its smallest segment, but fastest growing with the largest capital budget (40% of BIP's nearly $8bn backlog over the next three years) – to grow to be its largest segment within five years (Transportation, which is currently its largest, is ~3.5x bigger than Data). Data centers and an Intel joint venture will be the most significant contributors to this growth, but complementary data center services such as towers and fiber optic systems will also be important drivers. Management aims to make its data center platform self-funding through ongoing capital recycling, establishing mature pools of data centers and then bringing in institutional investors to invest in those stabilized assets (a programmatic sale of stabilized cash flows). Proceeds from the sale of developed data centers will then be rotated into new project investment. BIP's current data center portfolio includes over 140 operational data centers, with ~905 MW installed critical load capacity and an additional ~600 MW contracted capacity operating in the US, Asia Pacific, Latin America, India, and Europe.

- **Land bank.** BIP sees data centers as a real estate play as much as a tech play, aiming to secure land, permitting, and grid interconnection for most of what it is building. It takes a laddered approach to land banking, buying land for data centers at different stages of development that it expects to align with when the capacity will be required. The company structures these purchases with low upfront capital outlays and effective put options if the land is not developed. BIP looks to build an 18-24 month land bank, although does not have much excess land today. Proactively acquiring land and securing power helps position BIP for future growth. Timing of the subsequent structuring of the data center contract after the land has been acquired varies, but could be a matter of months to typically not much longer than a year to secure.
- **Location.** Customer steer BIP to where they look to buy land, with a focus on Tier 1 locations offering proximity to GDP/population centers, fiber and water. Today, over 90% of BIP's development is centered on building capacity in Tier 1 data center locations, providing flexibility to support multiple use cases such as cloud, training, inference and content, given that they benefit from the lowest latency.

Management expects Tier 2-3 sites to be at risk over time and ultimately rationalized given the latency challenges that more remote locations face (latency is currently an important issue for cloud and expected to be one for inference once training is further advanced), with Tier 1 locations either continuing to host data centers or repurposed for their highest and best use once the lease term is up. All BIP data center development to date has been tied to cloud computing, with no inference investment at this point and no single-use or non-IG exposure. While there is demand from startup AI companies, BIP has not been willing to take that risk, focusing instead on hyperscaler, corporate, and government data center demand. BIP noted that most recent data center development has been occurring in the US.

- **Contract profile.** BIP's data center investments are governed by 15-year availability-based contractual frameworks (roughly double the duration of operating contracts in the past) with 2-3% fixed inflation escalators (previously not included) and pass through of costs (of which power is the largest). The contract will cover construction of the shell, diesel backup, cooling, fiber, substation and grid interconnect, with the customer responsible for everything inside the shell. BIP structures its investment for payback within the 15-year contract and full return with the second contract, assuming similar to lower terms relative to the first contract (the typical useful life of the data center is ~30 years). BIP's platform benefits from significant contracted or reserved growth. Over the long term, densification of rack space and retrofitting of new chips offer opportunities to extend/expand these assets.
- **Returns.** BIP aims to invest in data center projects at 17-19% project returns (gross levered IRR), selling mature assets at returns closer to 9-11%. Management noted that land and power have been two big differentiators that have helped it outperform the underwriting assumptions for its two data center platform investments (US: Compass / Europe: Data4) with respect to the overall pace of lease-up across its existing land bank.
- **Competitors.** Management has discussed how hyperscalers have shown a preference to work with a small number of data center developers that can execute at scale globally. While development was roughly 50% in-house / 50% outsourced five years ago, hyperscalers have now moved to 60% outsourced given speed to market considerations and the size of their development needs. Relationships matter a great deal as well, with hyperscalers looking to work with developers where there is past history and trust. BIP's geographic and capital scale have positioned it to be on the short-list of 3-4 data center developers that meet this criteria, with the market opportunity so large that there should be plenty of projects for each of them to be significant beneficiaries (primary data center competitors to BIP include Digital Bridge (Switch), Digital Realty, Equinix, Iron Mountain and QTS).
- **Microsoft and the current AI landscape.** Management noted the recent slowing of AI-focused data center development from Microsoft, which has looked to defer/reconsider the 30% of data center build that it manages in house. The slower pace of development has been a response to sensitivity that it might be overextended in the near-term on needed capacity, with the pullback focused more on fringe Tier2/3 sites to refocus on core markets. In addition to Microsoft project rationalization, developments around DeepSeek, have contributed to investor

concern that other hyperscalers might more closely scrutinize AI investment. However, BIP indicated that it has seen Google and Meta step up development to fill the gap created by the recent Microsoft slowing (building for cloud more than for inference). BIP noted that powered land in Tier 1 markets are still obtaining the same contractual terms as before.

- **Longer-term AI outlook.** Using a hypothetical 100 GW addressable market for data center demand by 2030 (studies from McKinsey have contemplated growth at these levels), BIP expects that this would translate to (1) $1-2 trillion ($10-12mm/MW) for the infrastructure of the data centers, including the shell, cooling and interconnect and (2) $4-5 trillion ($40-50mm/MW) for the racks/chips inside the shell. It expects 60% of the spend to be allocated to AI and 40% to cloud. Management did not endorse this specific forecast and did not express a numerical view of potential market scale, but offered this to support its view that the AI infrastructure spend is likely to be significant even if only a fraction of this particular estimate. Management acknowledged that the data center arms race has softened of late from the pace of the past two years (and with greater sensitivity to power and other project costs), a non-linear progression that they had expected as a normal step in the advancement of a new technology. As more advanced use cases for AI are developed (eg, robotics, autonomous driving), it expects more visibility into the bull case to emerge.
- **Coordination with other BIP segments.** BIP should see significant investment opportunities across its data centers, fiber optic lines and tower footprints as well as in natural gas-driven power demand growth through its electric utility and natural gas midstream infrastructure assets. BIP expects its utility and midstream platforms to be additional digitalization touchpoints, less as an integrated solution but more as individual beneficiaries in addressing data center power needs. BIP noted that hyperscalers have prioritized availability and cost of power primarily, and renewable generation as a secondary consideration. The need for compute is requiring that new energy-intensive data centers use natural gas for at least a period of time until other options such as nuclear are developed.
- **Coordination with sister company Brookfield Renewable Partners (BEP).** Management sees its relationship with BEP as another key differentiator, offering multi-technology renewable power solutions under turnkey contracts. BEP will look to participate in data center projects on a case by case basis.

2. East Daley. East Daley is tracking 360+ US data center projects totaling over 113 GW of potential electricity demand. Natural gas is expected to be the main source of power generation to meet this growing demand. East Daley is tracking 18 projects by Microsoft totaling over 5 GW of potential electric demand, with proposals across 10 states (including Georgia, North Carolina, Ohio, Texas, Virginia and Washington). Microsoft plans to spend $80bn in 2025 on data centers to deploy AI and train language models.

- **East Daley estimates that hyperscale data center load will drive 4.2–6.1 Bcf/d of additional natural gas demand by 2030 to support 81 GW of new power capacity.** Midstream companies are pursuing projects with different risk profiles and timelines, with TRP and KMI focused on long-term, utility-backed pipeline contracts that insulate from project-specific load risk and WMB also looking to take a behind-the-meter generation + pipeline approach.

- **WMB's Power Express expansion on Transco will add 950 MMcf/d by 3Q30 to serve Northern Virginia's Data Center Alley, where developers have announced over 20 GW of IT load.** The project was underwritten at a <4.0x build multiple and is backed by 20– to 30-year contracts with utilities.
- **TRP's Northwoods project on ANR Pipeline takes a similarly conservative approach, adding 400 MMcf/d in late 2029.** The $900mm expansion – with a 6.0x build multiple and a $1.25/Mcf/d tariff as estimated by East Daley (based on ANR's 82% EBITDA margin) – is underpinned by 20– to 30-year contracts with municipal and investor-owned utilities planning combined-cycle and peaking plants. Of note, Microsoft is also the anchor for the Wisconsin Reliability project on ANR Pipeline to supply a new data center in Mount Pleasant, WI.
- **WMB's Project Socrates in Ohio adopts a faster, integrated model.** Pairing 400 MW of gas-fired generation with an intrastate pipeline, it targets in-service in 2H26 (just 18 months after FID). With a $1.6bn investment at a 5.0x build multiple, Socrates is underpinned by 10– to 15-year contracts that capture margins across gathering, transport and generation and insulate against commodity price volatility. Shorter contract tenor with a single customer raises renewal risk post-expiration, although we see this risk as manageable given the variety of options available to WMB (backup or merchant power, transfer or turbines to interstate gas transmission rate base given interchangeability).
- **Gas turbine outlook.** According to Wood Mackenzie, gas turbine orders rose 32% y/y in 2024, driven by anticipated load growth from electrification, AI, and hydrogen production. Gas turbine manufacturer GE Vernova has noted that data center customers account for about ⅓ of its 21-GW reservation pipeline. Manufacturing constraints could limit near-term growth, with current capacity utilization around ~90% and delivery timelines subject to delays. Rising capital costs and power market prices below the cost of new gas generation pose challenges, particularly in the US.

European Asset Managers

Data center and associated energy needs a key investment focus for our European Alt coverage. Data center growth and associated power needs are a key investment theme across a number of Infrastructure investors across our European coverage. Partner's Group at its recent Capital Markets Day pointed to an expected $94tr global infrastructure investment need 2024-40 across the broader infrastructure space encompassing energy, water, transport and communication. Partners invest across high conviction themes including Digitization and Automation (within which hyperscale data centers a key focus), and Decarbonization & Sustainability (including energy efficiency linked to data centers). The group recently announced an investment in PowerTransitions for example - a utility-scale power developer in the US which transforms legacy or retiring thermal power assets with existing grid connections through the addition of renewable energy projects, aiming to benefit from thematic tailwinds including rising power demand due to the expansion of data center capacity. Other investments in the data center space have included EdgeCore (US), and atnorth (Pan-Nordic).

>€110bn Infrastructure fee paying AuM across our European coverage with dry powder to deploy. Across our coverage we see scaled Infrastructure investment across

EQT EW (~€42bn fee paying AuM, ~29% of Group AuM), **Partners Group EW** (~€26bn or ~18% of group), **Antin EW** (~€21bn, 100% of group), **CVC OW** (~€14bn ~10% of group) and **Bridgepoint EW** (~€11bn or ~26% of group), with substantial available dry powder to deploy (e.g. EQT recently raised €21.5bn flagship fund VI, Antin recently closed €10.2bn Fund V, CVC currently in fund raising for €8bn across their two Infrastructure funds). We see substantial run-way for growth in Infrastucture AuM linked to both the investment opportunities related to digital and energy transition and the demand from institutional and increasingly wealthy clients for exposure to the attractive growth opportunities and attractive cashflows linked to infrastructure as an asset class.

Thematic investment approach with significant focus on digital/AI and energy transition. EQT's thematic investment approach focuses heavily on the energy transition and digital and AI transition themes, including opportunities linked to data centers and related energy needs. Notable investments include EdgeConneX (a global data center provider, operating high-powered digital infrastucture for customers, with >50 data centers located in more than 40 markets). Bridgepoint acquired ECP (completed August 2024), a US based investor across energy transition, electrification and decarbonisation assets and the largest private equity owner of US power generation assets with a key focus on power including data center needs. ECP has also announced a strategic partnership with KKR to support AI growth. CVC's Infrastucture investment approach is similarly focused on digital and energy transition themes. Notable investments include Tonaquint a US-based data center provider based in Utah, which has subsequently acquired EdgeX Data Centers in Oklahoma. Antin invests across 4 themes - (i) energy & environment, (ii) digital, (iii) transport and (iv) social infrastructure, with investments in data centers via Pulsant a leading regionally focused data center platform in the UK for example.

US Software (Keith Weiss and Josh Baer)

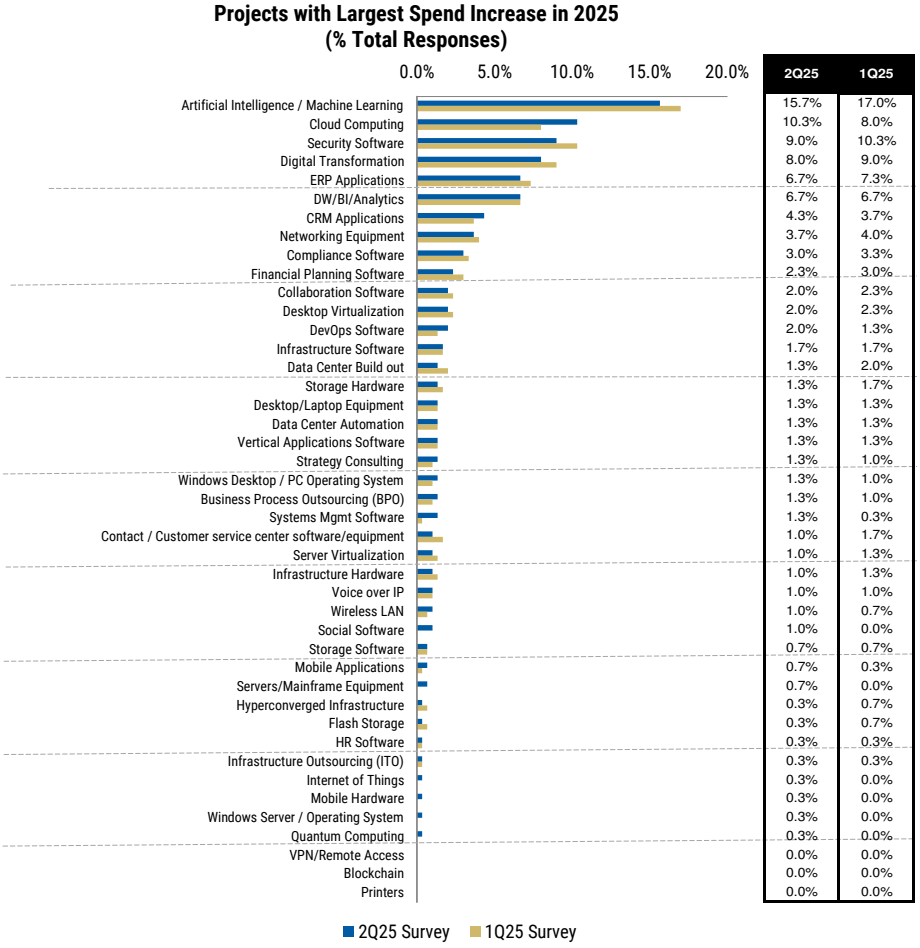
The significant investment in and expansion of data center capacity ultimately supports Software workloads. Companies and investors spending on data center related capex believe in the return on those investments. In our GenAI Monetization Blue Paper (Global Technology: GenAI Monetization – Assessing The ROI Equation (25 Feb 2025)) we present our analysis surrounding the ROI on GenAI for Enterprise Software and Consumer Internet which builds conviction in the attractive future yields on GenAI investments for Software vendors.

Across Software, we see >$400 billion in GenAI Software spending accruing to a long tail of public and private vendors, many of which are still early stage, by 2028. Within our coverage, Microsoft's (MSFT) monetization of GenAI will lead that of the broader Software ecosystem, as the company stands best positioned to capture the opportunity with products and a GenAI platform which have already garnered a >$13 billion revenue run rate as of December 2024, and which we expect to grow to >$75 billion in 2028. Within that, the largest opportunity exists within Azure AI Services, followed by Microsoft 365 Copilot. Another early beneficiary is Oracle (ORCL), as the company positions amongst the arms dealers of AI cloud services, driving the company's OCI segment. The company is also involved in the Stargate project, involving OpenAI, SoftBank, and MGX,

which puts the company at the core of the AI training-related infrastructure buildout for OpenAI.

Our quarterly Morgan Stanley/AlphaWise CIO (Chief Information Officer) Survey illustrates some of the Software categories and Software vendors expected to benefit from these underlying technology investments: US Tech: 2Q25 CIO Survey – Not Completely Unscathed (9 Jul 2025). Software themes like Artificial Intelligence / Machine Learning, Cloud Computing, Security Software & Digital Transformation top the CIO priority list (see Exhibit 114). Microsoft remains best positioned to gain incremental share of IT budgets as workloads shift to the cloud (Exhibit 115) and is also expected to gain the most share of GenAI spend (Exhibit 116) – both in the next year and over the next three years.

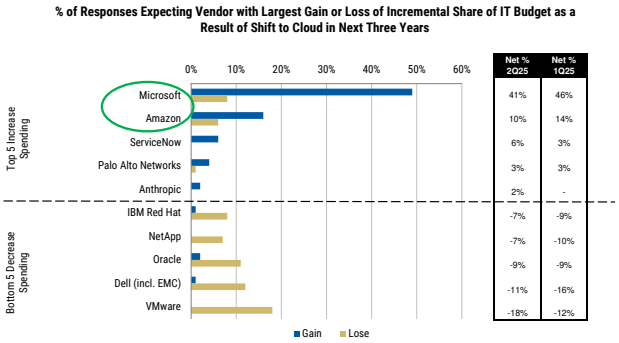
Exhibit 114: AI/ML Remains Atop the CIO Priority List



	2Q25	1Q25
Artificial Intelligence / Machine Learning	15.7%	17.0%
Cloud Computing	10.3%	8.0%
Security Software	9.0%	10.3%
Digital Transformation	8.0%	9.0%
ERP Applications	6.7%	7.3%
DW/BI/Analytics	6.7%	6.7%
CRM Applications	4.3%	3.7%
Networking Equipment	3.7%	4.0%
Compliance Software	3.0%	3.3%
Financial Planning Software	2.3%	3.0%
Collaboration Software	2.0%	2.3%
Desktop Virtualization	2.0%	2.3%
DevOps Software	2.0%	1.3%
Infrastructure Software	1.7%	1.7%
Data Center Build out	1.3%	2.0%
Storage Hardware	1.3%	1.7%
Desktop/Laptop Equipment	1.3%	1.3%
Data Center Automation	1.3%	1.3%
Vertical Applications Software	1.3%	1.3%
Strategy Consulting	1.3%	1.0%
Windows Desktop / PC Operating System	1.3%	1.0%
Business Process Outsourcing (BPO)	1.3%	1.0%
Systems Mgmt Software	1.3%	0.3%
Contact / Customer service center software/equipment	1.0%	1.7%
Server Virtualization	1.0%	1.3%
Infrastructure Hardware	1.0%	1.3%
Voice over IP	1.0%	1.0%
Wireless LAN	1.0%	0.7%
Social Software	1.0%	0.0%
Storage Software	0.7%	0.7%
Mobile Applications	0.7%	0.3%
Servers/Mainframe Equipment	0.7%	0.0%
Hyperconverged Infrastructure	0.3%	0.7%
Flash Storage	0.3%	0.7%
HR Software	0.3%	0.3%
Infrastructure Outsourcing (ITO)	0.3%	0.3%
Internet of Things	0.3%	0.0%
Mobile Hardware	0.3%	0.0%
Windows Server / Operating System	0.3%	0.0%
Quantum Computing	0.3%	0.0%
VPN/Remote Access	0.0%	0.0%
Blockchain	0.0%	0.0%
Printers	0.0%	0.0%

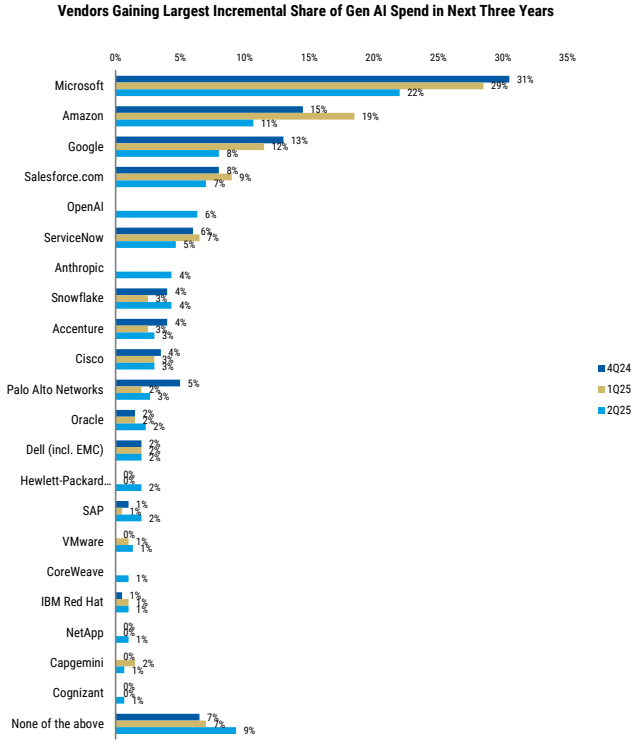
Source: AlphaWise, Morgan Stanley Research. n=100 (US and EU data)

Exhibit 115: Microsoft and Amazon Continue to Lead as the Top Incremental Share Gainers due to Cloud Shift Over Next 3 Years



Source: AlphaWise, Morgan Stanley Research. n=100 (US and EU data)

Exhibit 116: Over the Next Three Years, CIOs Note Expectations for Microsoft, Amazon, and Google to Gain Share of GenAI Spend



Source: AlphaWise, Morgan Stanley Research. n= 100 (US and EU data). ***Of note, the following changes made to this question in our 2Q25 Survey makes QoQ comparability less relevant: 1) CIOs instructed to choose the top three GenAI budget share gainers relative to the historical two; 2) OpenAI and Anthropic added to the vendor list.*

European Hardware (Lee Simpson)

With several sovereigns in Europe looking to buy Nvidia made racks, we assume much of the demand will centre on the fast-growing GB200/300 architecture given much of the is capacity is built anew and there are no legacy x86 CPUs to be reused. This will mean a high attach of the Grace CPU chip and thus will serve as a small boost to **Arm**'s infrastructure royalties over the next couple of years or as capacity is grown.

Further, large European data center build outs we will see a growing use again of **Infineon**'s (IFX) power semis. This will range across new power supply units (PSUs) at data center entry and new DC/DC converters at the edge of rack (new VR boards). The former will likely pull-in demand for silicon (e.g., IGBTs), silicon carbide (SiC) and even gallium nitride (GaN) based power semis in what will be the biggest use of Infineon's content with PSUs used for AC/DC conversion.

We think IFX will hold a good share in this rollout – typically 50-70% globally. The latter will be another area where Infineon does well with solutions this time mainly in silicon and some in SiC made devices.

Q6. What are the Implications for DCs from Recent Developments in Tech - Stargate, Supercomputers, DeepSeek?

Overview

A number of Big Tech AI initiatives will likely significantly increase DC capacity / infrastructure needs. These projects include:

- Stargate - a $500bn / ca 15GW supercomputer project;
- InvestAI - a European Commission-led project that could potential stimulate a €200bn investment;
- Fluidstack - a ca 1 GW AI supercomputer in France;
- DeepSeek - a Chinese AI startup, released two AI models in January 2025;
- evroc - potential for 300MW of AI computing power (again in France);
- DCs being built by other Tech players (Meta, TikTok, Apple, Alibaba etc); *and*
- Others.

Stargate: A $500bn AI / DC project (US-centric) - potential for mirror projects in China & Europe

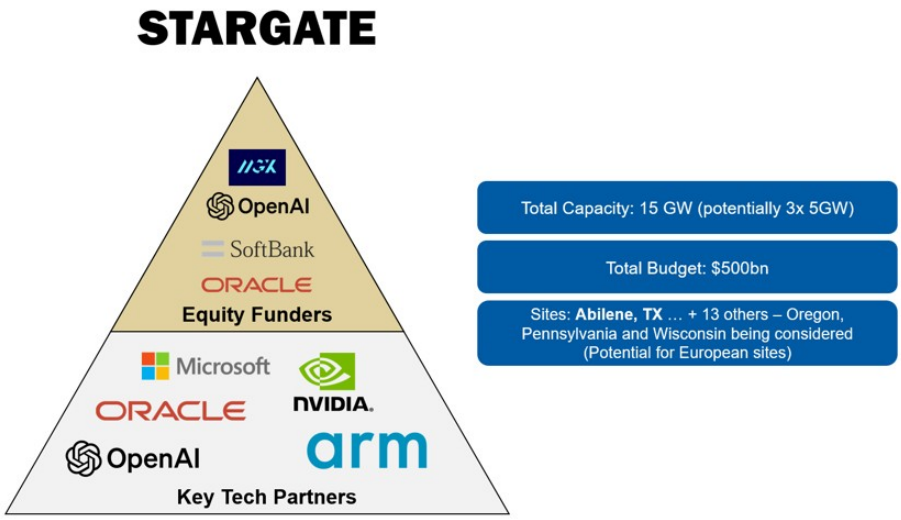
Overview

In January 2025, a consortium of OpenAI, SoftBank, Oracle, and MGX announced funding plans for an AI computing system called 'Stargate'.

In terms of Stargate's key characteristics:

- Stargate's total projected capex will be $500bn - with some $100bn deployed almost immediately;
- Power demand would be ~15GW (MSe, see calculation below). This equates roughly to ~5x the power used by the City of Philadelphia;
- The initial equity funders in Stargate are OpenAI, SoftBank, Oracle, and MGX;
- SoftBank will have financial responsibility for the project - while OpenAI will have operational responsibility;
- Meanwhile, Arm, Microsoft, NVIDIA, Oracle, and OpenAI have also been cited as key technology partners;
- The Stargate consortium does not include any of the three Cloud Hyperscalers (Amazon, Microsoft, Google);
- According to the press release: "*This project will not only support the re-industrialization of the United States but also provide a strategic capability to protect the national security of America and its allies*";
- Big picture, we view this project as a particularly bullish signal for AI infrastructure demand. However, the Stargate announcement does not alter our data center projections, which remain somewhat constrained by the availability of both chips and power.

Exhibit 117: Stargate: An Overview



Source: Company data, Morgan Stanley Research

In terms of potential geographic locations in the US:

- The first Stargate site will likely be in Abilene, Texas. Indeed, the State of Texas has been earmarked as the '*flagship*' State for the new infrastructure venture, according to Chris Lehane (OpenAI's vice president of global affairs); *while*
- Stargate is also examining potential sites in 13 more US States - including Pennsylvania, Wisconsin, Oregon, among others etc.

A look inside the Abilene (Texas) site

Journalist Emily Chang recently took a visit to Stargate's first site in Abilene, Texas; below we highlight key takeaways from the video (watch Bloomberg video here):

- Sam Altman has dubbed Stargate as "the most important project of this era" – OpenAI and Softbank ultimately joined forces on the project due to their shared vision of Artificial General Intelligence (AGI) on the horizon – but there was a gap in the amount of compute needed to get there.
- Crusoe is the DC startup overseeing the project – they broke ground in June 2024 and expect to have the 1.2GW (across 8 buildings and up to 400k chips) completed by mid-2026.
- As we discuss throughout this note, energy is commonly cited as a limiting factor in the growth of AI:
  - To put it into perspective, in a data center 20 years ago, an individual rack would consume 2-4 kW, today that figure it closer to 130kW per rack; *and*
  - Asking ChatGPT a question uses 10x the energy as a Google search; *however*
  - West Texas is rich in low cost and clean energy (wind power) but lacked demand, which ultimately created an opportunity for the Stargate development.
- Risks remain, of course, such as if people decide they no longer want to pay for AI services, but Chase Lochmiller (founder of Crusoe) believes that as long as AI delivers value to society then the money will be there to continue to build

infrastructure.

- Meanwhile, some cities are forgoing significant tax revenues and control to have these big companies come in, as they don't want to miss out on the potential boom – in Abilene, for example, Stargate will be getting an 85% break on property taxes, over two decades of operation.

Stargate will be composed of multiple 5GW data centers, using 1-3mn GPUs (MSe)

We expect that Stargate will be a 15GW data centers project:

- Our Powering GenAI model assumes fully-loaded US data center costs of ~$31bn per GW (including real estate, construction, electrical cap goods, HVAC, servers, chips etc). We project this cost will drop to ~$23bn per GW within a few post-Blackwell generations. However, in addition, a natural gas-fired power plant would cost ~$2bn per GW. Assuming $500bn total spend, this would therefore imply total power demand of ~15 GW;
- This 15GW number is consistent with media reports indicating that Sam Altman would like to construct three AI data center facilities, with each having ca 5GW of power usage.

The computational power of Stargate, at 26 billion teraFLOPS, or 26,000 exaFLOPS, using Blackwell chips (or much more if the data center uses future generation NVIDIA GPUs), is extraordinary.

- As illustration, the US government supercomputer known as *Frontier* has computational power of slightly above 1 exaFLOPS - this Stargate data center would have computational power 16,000x that of Frontier;
- Such a data center would require 2.6 million Blackwell GPUs, but closer to (just) 1 million GPUs if the data center uses a future generation of NVIDIA GPU.

A Key Question: How would these mega data centers be powered?

The first site to be used by Stargate - Abilene - is connected to the Texas grid. However, the Texas regulator has previously stated that new data centers need to bring new natural gas fired generation online (BYOP). We expect much of the power used to fuel *Stargate* will be natural gas. We also see potential for nuclear and renewables to also play a meaningful role.

Potential for up to 5GW of the Stargate project to be based in the UAE

According to unconfirmed media reports, some 5GW of the Stargate project could be based in Abu Dhabi (UAE) (see here and here).

- A first 1GW installment - *Stargate UAE* - has already been unveiled;
- This UAE part of the Stargate project is being developed in association with G42, an Abu Dhabi Tech conglomerate. G42 is chaired by Sheikh Tahnoon bin Zayed Al Nahyan, the national security advisor for the UAE. Microsoft (a core shareholder in OpenAI) has made a $1.5bn investment in G42, while Microsoft's President (Brad Smith) sits on G42's board of directors;

- The choice of the UAE is perhaps not surprising, given the country's low energy cost and emerging Tech hub. Indeed, in 2023, the CEO of OpenAI Sam Altman recommended the UAE, saying it "*has been talking about AI since before it was cool*";
- The DC campus will operate in the recently-established UAE–US AI Campus.

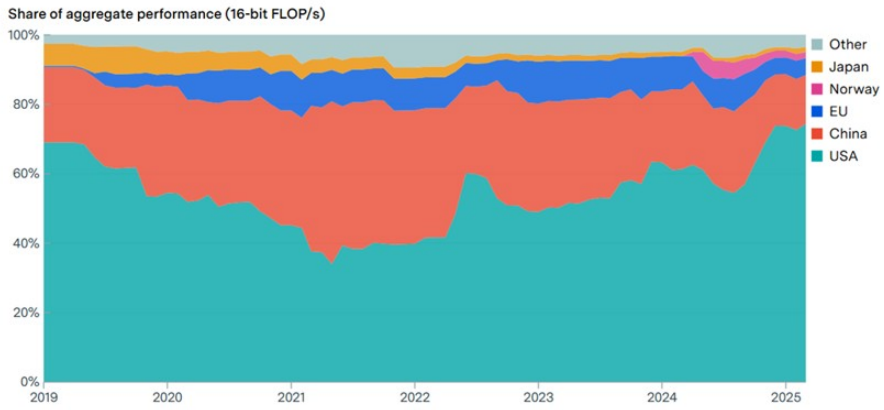
Supercomputers: A number of projects across the globe

Supercomputers - the US leads an increasingly private sector industry, where performance has been doubling every 9 months

We have noted a surge in the number of supercomputer announcements - notably in the US, but also (to a lesser extent) in Asia and in Europe. In terms of key industry dynamics:

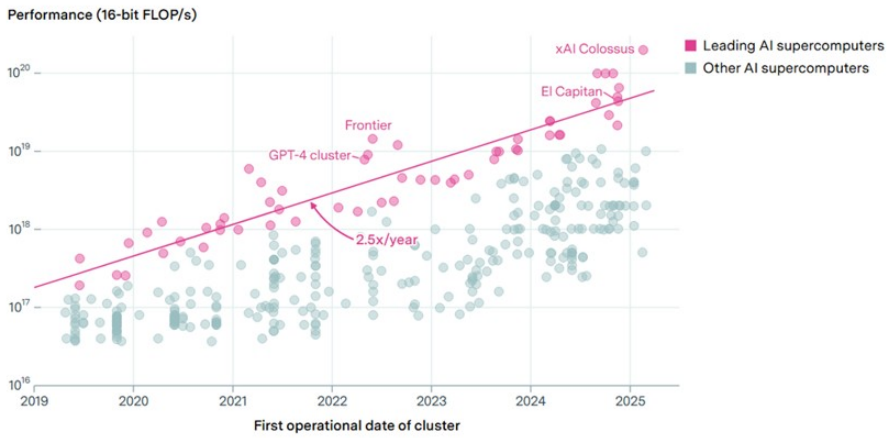
- Perhaps slightly surprisingly, private sector companies (and not governments) control the lion's share of AI supercomputer power - increasing from <40% (2019) to ca 75% (today), according to Epoch AI;
- The US leads in total computational performance, followed by China, while (unsurprisingly) Europe lags, as per Exhibit 118 , below;
- The computational performance of top AI supercomputers has been doubling every 9 months; *while*
- The power capacity of supercomputers has been (almost) doubling every year.

Exhibit 118: The US leads in total computational performance, followed by China - Europe lags



Source: Epoch AI

Exhibit 119: The computational performance of top AI supercomputers has been doubling every 9 months



Source: Epoch AI

Exhibit 120: The power capacity of supercomputers has been (almost) doubling every year



Source: Epoch AI

Does Europe have an answer to Stargate? *Yes and No … focus on France's Artificial Intelligence Action Summit (Feb 2025)*

We believe the Stargate announcement begs the question - *could similar projects be announced in Europe or China?*

We believe that the answer is *Yes* - however, we would note the following caveats:

- Any European projects are likely to be of smaller scale vs the US (eg Fluidstack is just 1GW vs Stargate at 15GW);
- Energy remains a critical obstacle to constructing large DC/AI projects in Europe - unless nuclear is accessed;
- We believe that planing permission / bureaucracy are greater obstacles in Europe;
- *Capital* could prove a greater constraint in Europe - note that Stargate is backed by global Tech players OpenAI, SoftBank and Oracle. We would expect that private equity could play a key role.

France hosted *The Artificial Intelligence Action Summit* - at the Grand Palais in Paris - on 10-11 February 2025. The summit was co-chaired by French President Macron and Indian Prime Minister Modi. The gathering saw two main sperate announcements:

- The European Commission announced the launch of InvestAI, an initiative to mobilise €200bn of investments in AI (see below); *and*
- The French government announced €109bn of AI-related investments - with the majority deriving from the UAE, Brookfield and Fluidstack.

Fluidstack - The France-based AI supercomputer

Fluidstack - a UK Tech company - has announced a partnership with the French government (Ministry of Economy) to deploy an AI supercomputer in France:

- Capacity is scheduled to reach 1 GW. The project is scalable, with potential to grow beyond 1GW (>2028);
- The initial / Phase 1 investment will be €10bn. *We estimate the project will ultimately cost ca €30bn (MS DC calculation: $30m per MW of an AI-capable DC, thus 1GW = c €30bn)*;
- The project envisions using ca 500,000 next gen AI processors;
- The facility plans to leverage France's nuclear power;
- The super-computer is scheduled for launch during 2026;
- '*Strengthening France's digital sovereignty*' is cited as a core pillar for the project.

evroc - potential for 300MW of AI computing power (again in France)

The Swedish Cloud company is building its first AI factory in Mougins, France. This will be a 96MW Hyperscale DC, housing up to 50,000 GPUs.

- evroc plans to build two additional 100+ MW DC facilities in France;
- Total investments could be up to €4bn (when at full capacity);
- The maintenance of strict EU data sovereignty is a key pillar of the project; *while*
- The project is expected to be completed by the end of 2025.

Overview of InvestAI - EC-led, potential €200bn investment, but a '*show me*' story (MS opinion)

The French AI Action Summit saw the launch of *InvestAI - this* is an EC-led initiative to mobilise €200bn for European investment in AI:

- This includes a new European fund of €20 billion (from existing EU funding programmes, including Digital Europe Programme, Horizon Europe, and InvestEU), with support from the European Investment Bank (EIB);
- According to the EC, InvestAI will be '*the largest public-private partnership in the world for the development of trustworthy AI*';
- The EC estimates that these gigafactories will have around 100,000 last-generation AI chips.

Exhibit 121: InvestAI: An EC-led initiative to mobilise €200 billion for European investment in AI



" AI will improve our healthcare, spur our research and innovation and boost our competitiveness. We want AI to be a force for good and for growth. We are doing this through our own European approach – based on openness, cooperation and excellent talent. But our approach still needs to be supercharged. This is why, together with our Member States and with our partners, we will mobilise unprecedented capital through InvestAI for European AI gigafactories. This unique public-private partnership, akin to a CERN for AI, will enable all our scientists and companies – not just the biggest - to develop the most advanced very large models needed to make Europe an AI continent. "

Ursula von der Leyen, President of the European Commission

Source: EC, February 2025 (link here)

The first AI Factories, and their locations, have already been announced in late 2024 - these AI technology hubs across Europe include:

- Barcelona (Spain): "BSC AIF" at the Barcelona Supercomputing Centre;
- Bologna (Italy): "IT4LIA" at CINECA - Bologna Tecnopolo;
- Kajaani (Finland): "LUMI AIF" at CSC;
- Bissen (Luxembourg): "Meluxina-AI" at LuxProvide;
- Linköping (Sweden): "MIMER" at the University of Linköping;
- Stuttgart (Germany): "HammerHAI" at the University of Stuttgart;
- Athens (Greece): "Pharos" at GRNET.

These hubs will be built - via €1.5bn of investments - and will combine national and EU funding.

However, we would remain cautious on the outlook for this project, seeing it as a '*show me*' story.

- First, we estimate that a very significant €150bn of funds will need to be pledged by the private sector, to complete the scope of this project. The origins of (commitments behind) this are, as yet, unclear;
- Second, as precedent, we note the EC's European Recovery Fund - a €700bn+ fund focused on post-covid recovery (including significant improvements in infrastructure) - has yielded little concrete evidence of delivery, in the form of higher infrastructure investments.

Potential for German AI Gigafactory

According to unconfirmed reports on Bloomberg (27 May), a consortium of German companies - including SAP, Deutsche Telekom, Ionos, Schwarz and Siemens - are considering applying as a joint venture to build an AI gigafactory in the EU:

- According to the article: "Intensive talks are underway, but some important details are still open";

- The potential location of the DCs has not been decided.

What does DeepSeek mean for Global DCs?

Overview of DeepSeek

DeepSeek is a Chinese AI startup - which, in January 2025, released two AI models (DeepSeek-R1-zero and DeepSeek-R1). These models explored the potential for LLMs to develop reasoning capabilities without any supervised data, focusing on self-evolution through a pure reinforcement learning process.

- DeepSeek-R1-zero has reached performance levels comparable to OpenAI-o1 - while DeepSeek's V3 model was trained in just 2 months;
- DeepSeek-V3 is a Mixture-of-Experts (MoE) language model with 671bn total parameters with 37bn activated for each token;
- DeepSeek uses distillation - essentially demonstrating that the reasoning of larger models can be distilled into smaller models, resulting in better performance;
- DeepSeek used META's open-source model Llama3. Essentially, DeepSeek is built on other TechCos' foundations / billions of dollars of Hyperscale capex;
- The models compute was based on 2.8mn H800 GPU hours (substantially lower than the ~30.8mn H100 GPU hours required to train Meta's Llama 3 405B).

DeepSeek - Built on the shoulders of giants - Jevons Paradox

When DeepSeek was introduced, this triggered investor concerns regarding the *very* low cost and *very* high speed at which a competitor to OpenAI had been developed - notably relative to the huge capex deployments made by the Hyperscalers. However, our research views the DeepSeek episode *positively*, reinforcing our view of the benefits / growing penetration / falling cost of AI applications:

- We believe the DeepSeek development embodies *The Jevons Paradox* (1865) which states that as technological advancements reduce the cost of using a resource, overall demand increases, causing total resource consumption to rise;
- Moreover, we believe the likes of DeepSeek's model will enable AI to transition from innovators to more generalized adoption, open the door to faster LLM-enabled product innovation, with wider consumer and enterprise adoption. Over time, this should result in greater increases in productivity across the broader economy.

DeepSeek R2 may be coming

A SCMP article (here) suggests that DeepSeek's new R2 model could soon be released. The key improvements of R2 (vs R1) could be: **i.** Long text processing capability; *and* **ii.** Multi-modal capability.

The new technology is reportedly developed using:

- A hybrid Mixture-of-Experts (MoE) design - according to the South China Morning

Post (SCMP). This divides an AI model into separate sub-networks that activate selectively based on the input and jointly perform tasks;
- This architecture could reduce compute costs further, and enable faster inference performance;
- The model may have a total of up to 1.2 trillion parameters - and may be trained on 5.2 petabytes of data.

A key question is what chip technology DeepSeek R2 may use. Recall that DeepSeek R1 used Nvidia's H100 and H200 GPUs. R2 may use (Chinese-made) Huawei Ascend 910B chips, rather than GPUs - although this has not been confirmed.

Other Tech companies DC plans (beyond the Big 3)?

Meta owns and rents data centers

At present, Meta runs (and owns) its own data centers, while also renting AI servers from cloud providers including AWS and Oracle.

- At its FY 2024 results, Meta disclosed that it would raise capex by +70%, to $60bn-$65bn this year (guidance has since been upgraded). Indeed, Meta Founder Mark Zuckerberg stated that the company plans to invest "hundreds of billions … over the long term" on AI infrastructure;
- Subsequently, upon its Q1 results print, Meta issued new capex guidance of $64bn-$72bn, a rise of +9% at the mid-point;
- Meta plans to bring 1 GW of compute / data center capacity online this year;
- On the Q2 2024 earnings call, Meta Founder Mark Zuckerberg stated he "*would rather risk building capacity before it is needed rather than too late, given the long lead times for spinning up new [infrastructure] projects*";
- In late June 2025, the FT reported that Meta was seeking to raise up to $29bn - from private credit - to fund the construction of its AI data centers (link to article here). Meta did not comment.

In early April 2025, Bloomberg reported that Meta was planning to spend $1bn on building a new DC facility in the US State of Wisconsin, underscoring a greater effort to ramp up capital investments in AI & Cloud infrastructure (link here, unconfirmed).

Meta Platforms is also reported to be in discussions to build a new blue-chip DC campus, in the United States, to fuel its AI efforts (link here, unconfirmed). According to the article:

- Total capacity could be between 5GW and 7GW;
- Cumulative capital outlay could be >$200bn;
- The bigger campus could be located in US States, including Louisiana, Wyoming or Texas;
- The new AI facility would be supplementary to the AI facility that Meta is building in Louisiana (potential cost of $10bn).

In mid-July, Meta CEO Mark Zuckerberg announced the company's first AI supercluster would come online in 2026 (link here).

- The first supercluster will be called *Prometheus*;

- Several further multi-GW clusters will be built;
- The *Hyperion* cluster will be able to scale up to 5GW (over a number of years);
- The company unveiled *Meta Superintelligence Labs* in June, and have subsequently hired a number of researchers and engineers;
- According to Mr Zuckerberg "*Meta Superintelligence Labs will have industry-leading levels of compute and by far the greatest compute per researcher … I'm looking forward to working with the top researchers to advance the frontier*".

Meta currently operates a number of European data centers including Clonee (Ireland), Odense (Denmark) and Luleå (Sweden):

- **Ireland.** The County Meath facility (just West of capital city, Dublin) covers almost 1mn sq ft;
- **Denmark.** Facebook's large Danish facility will recover 100,000 MWh of energy pa, via DC heat recover technology, generating enough secondary energy to warm ca 7K homes;
- **Sweden.** Meta currently operates a DC in Luleå (Sweden). This 290,000sq ft facility is among the largest DC facilities anywhere in Europe, and is based in Lapland. The site is powered by hydroelectricity;
- **Spain (under construction).** Meta Platforms Inc. is building a data center near the city of Talavera de la Reina (Spain).
- **NL (cancelled).** The Group's plan for a large hyperscale DC facility in Zeewolde (NL) was ultimately cancelled.

In March 2025, Meta started rolling out its AI chatbot across Europe:

- As background, Meta AI launched in the US in 2023;
- However, roll-out in Europe was delayed, when Ireland's data privacy watchdog ruled that Facebook should delay training content that had been posted by users on Facebook and Instagram;
- Now, Meta AI will roll out its chatbot across multiple apps - WhatsApp, Facebook, Instagram, and Facebook Messenger - in 41 European countries;
- According to Meta spokesperson Ellie Heatrick at the Meta AI launch in Europe in March 2025: "*This launch follows almost a year of intensive engagement with various European regulators and for now, we are only offering a text-only model in the region which wasn't trained on first-party data from users in the EU … We will continue to work collaboratively with regulators so that people in Europe have access to and are properly served by Meta's AI innovations that are already available to the rest of the world*";
- However, the functionality will be limited to text-based features (eg asking web-based questions, planning travel schedules etc);
- The AI assistant is not trained on EU user data. Functionality will not include editing or asking questions about photos;
- Meta has delayed the launch of its Llama AI model across the EU, on the back of regulatory concerns.

TikTok - growing US and European DC presence, albeit a shift to Oracle in the US

TikTok has a growing US data center presence:

- The social media giant - which is owned by China-headquartered Bytedance - has been storing US user data in its own two data centers, located in North Virginia and Hillsboro (Oregon), albeit now largely for backup purposes;
- Most of TikTok's DCs are rented from third-party / co-location service providers e.g. Digital Realty (TikTok is a Top3 customer for Digital Realty), Compass Datacenters, Green Mountain etc;
- More recently, TikTok has also been shifting US user data to Oracle Cloud Infrastructure. This initiative is part of *Project Texas*, which seeks to address data security issues. The contract includes Cloud services, IT requirements, compute, storage, and networking. TikTok will progressively delete all US user data from its own DCs, and transition 100% to Oracle. The social media company's commitment as per Project Texas is for all American data to be physically stored in the USA, and to be hosted by a US-HQed company.

Our previous research has covered TikTok's growing DC presence in Europe (see here). In late April 2025, TikTok disclosed plans to build a third European data center, in Finland.

- TikTok opened its first data center in Dublin (Ireland) in 2023. The facility in Clondalkin (Dublin) cost ca €600mn, and has capacity of ca 100MW (ca 65,000 sq ft). A second DC with a further 100MW of capacity is being considered for Co Wicklow (south of Dublin);
- In 2024, the Group's second data center - located in Hamar, Norway (80 miles north of Oslo) - became operational. Green Mountain is constructing (and will own) the building, while TikTok is the anchor tenant. Energy derives largely from local hydropower sources, and is 100%-renewable;
- TikTok plans to invest €1bn in its third / Finnish data center;
- More DCs are planned across Europe. This is not surprising, given its 175mn active user base across the European continent. We believe that N Europe & Scandinavia will continue to be preferred locations for TikTok infrastructure, due to the cool climate and the availability of (cheaper & carbon-free) energy;
- TikTok has been implementing *Project Clover* in Europe (similar to Project Texas in the US).

Apple

Apple predominantly rents Cloud & data storage capacity off 3rd parties - indeed, we believe that Apple is likely a Top 3 customer of Google Cloud (for data storage & processing, as well as for developing foundation AI models, MS view), and also a significant client of AWS.

Apple owns and operates ca 10 DCs in a number of locations across the globe - accounting for <1GW of capacity (MSe). However, we believe that Apple has plans to more than double its DC capacity - as indicated by the number of DCs / new buildings they have under construction (see below). Indeed, in H1 2024, Apple hired Sumit Gupta (previously of Nvidia, IBM and Google) to lead its Cloud infrastructure team.

In the United States, Apple has DCs in:

- North Carolina - five facilities in Maiden, with one under construction;
- Nevada - four buildings in Reno;
- Oregon - four sites in Prineville;
- Arizona - a single facility in Mesa / Phoenix;
- California - one site in Newark / Fremont);
- Iowa - two existing DCs, with five being built at present; *while*
- A new AI center is also being built in Houston.

Apple has invested >$2bn in its Reno data center, which is powered by 100% solar. Apple has continued to invest in renewable energy in the area with a $60m solar farm – the Turquoise Solar Project near Reno – delivering 50MW to the Reno DC alongside the company's three other Nevada projects that provide 270MW (source here).

Internationally, outside of the US, Apple owns DC facilities in:

- Denmark - a single campus in Randers; *and*
- China - one building in Nanming, and a second in Ulanqab.

Exhibit 122: Turquoise solar farm in Washoe County, Apple's fourth solar project in Nevada



Source: Apple

Oracle - Ambitions to be the #1 Builder and Operator of Cloud Infrastructure Data Centers

On Oracle's 4Q25 earnings call, co-founder and CTO of Oracle, Larry Ellison, detailed Oracle's goal of being the top builder and operator of cloud infrastructure data centers (*"we will build and operate more cloud infrastructure data centers than all of our cloud infrastructure competitors combined").*

- In FY26, Oracle Cloud Infrastructure is expected to accelerate from 50% to >70% YoY. Management guided FY26 RPO to grow >100% in the year ahead, which would put backlog close to $280bn by end of FY26
- In FY26, Oracle expects to allocate $25bn to capital expenditures, up 18% YoY and ahead of consensus of $19.8bn. However, given the strength in demand that the company is seeing, management also noted that this target could prove

conservative. Additionally, we also expect debate as to whether this degree of incremental investment can support the degree of backlog growth contemplated in FY26.

- Direct involvement in the Stargate joint venture (OpenAI, SoftBank, Oracle) makes Stargate a key driver of Oracle's financials and stock (see: Oracle Corporation: A Stargate to $104B FY29 Revenue? (17 Feb 2025)

CoreWeave – Leading 'Neocloud' Growing to AI Hyperscaler

CoreWeave provides quick and reliable access to latest AI chipsets, better price performance and expanding set of software to build, manage and monitor models. AI labs, hyperscalers and enterprises contract with CoreWeave for more reliable and performant AI infrastructure to support model training and application inference.

- In just one quarter's results as a public company, the capex expectation for FY25 was already raised to $20-23 billion vs. consensus estimates at $18-19 billion prior due to ramping GenAI demand accelerating CoreWeave's build-out plans.
- CoreWeave recently signed another hyperscaler – Google – joining large customers Microsoft, Meta, Nvidia and OpenAI. OpenAI has already expanded its $11.55 billion original 5-year contract with a $4 billion expansion.
- As of May 2025, CoreWeave had a network of 33 purpose-built AI data centers across the US and Europe, which are specifically engineered to support high intensity AI workloads with features including enhanced power, liquid cooling, and networking component. CoreWeave leases data center space and pays its share of rent, real estate taxes, building insurance, maintenance, water and power expenses.
- CoreWeave's data centers are supported by 420 megawatts of active power, with total contracted power extending to approximately 1.6 gigawatts as of 1Q25.
- As of December 31, 2024, CoreWeave was running more than 250,000 GPUs in total, which MS expects to more than double by end of 2025.

Other Independent Cloud Service Providers

- **OVH Groupe - France-HQ'd leading European CSP**
    - OVH pivoted its equity story towards one of a greater balance between its growth aspirations and free cash flow generations during the course of 2024. In the near-term, they expect to be able to leverage infrastructure investments made in prior years and utilisation of existing facilities.
    - Despite this, the company continues to expand its datacenter footprint. In late May 2025, OVH announced the opening of a new datacenter in Milan, Italy strengthening the group's Southern Europe exposure and representing OVH's 44th datacenter in the world. Today, their footprint is Europe-centric with 26 datacenters, but also with exposure to the North America and APAC markets.
    - *"With 28 Local Zones now open around the world, the group has invested €1 billion in growth capex for products and infrastructure since its initial public offering in 2021." "OVHcloud will continue to open additional Local Zones and 3-AZ regions around the world, including presence in Europe, North America and the Asia Pacific region. In 2026, OVHcloud will open new Local Zones in*

cities in Bogota, Tallinn and Johannesburg."

- **IONOS Group - Germany-HQ'd Webhosting business with a Cloud Segment (c. 11% of FY24 revenues)**
  - IONOS' cloud exposure was primarily bought in via its 2017 acquisition of ProfitBricks
  - IONOS' approach to data center expansion generally follows a co-location-first model. During their FY24 earnings call, CFO Britta Schmidt stated *"[...] we will expand our data center network, but as always, in a very cost efficient manner, starting with co-location and only if we see enough demand, will we build a data center ourselves."* CEO Achim Weiss added that they are not planning for any [new] larger data centers in the next few years, with focus more likely on colocations and (potentially) expansions of existing ones.
  - However, and separately, in June 2025, IONOS co-submitted (with German construction company HOCHTIEF) an Expression of Interest to the European Commission for the construction and operation of an AI Gigafactory. The proposal expects the data center to be running as early as 2027 and scalable to more than 100K GPUs.

Other AI Neoclouds

A 'new' host of AI infrastructure players are attracting investment, GPU allocation, and customers, who value the Neoclouds' singular focus on GPU infrastructure, time to market, flexibility, and attractive pricing in a supply constrained environment.

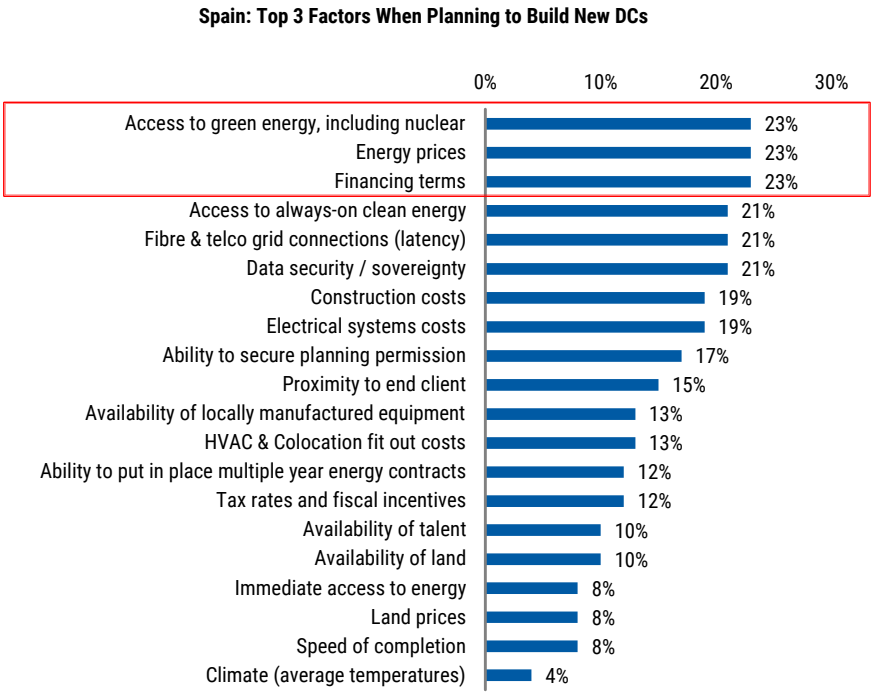
- Leading Neoclouds in addition to CoreWeave include: Crusoe, Nebius, and Lambda Labs. In the last few months, we have seen frequent press releases on capital raises, data center announcements and power contracts from this group of Neoclouds.
  - 'Neocloud' Crusoe to buy $400 million worth of AMD chips for AI data centers
  - 'Neocloud' Crusoe secures $11.6 billion funding for Texas data center
  - Neocloud Nebius raises $1bn in debt financing
  - Lambda Raises $480M to Expand AI Cloud Platform
- Other Neoclouds include: Together AI, Paperspace/DigitalOcean, Vultr, Jarvislabs and FluidStack
- From a data center perspective, Neoclouds typical enter into long-term operating lease agreements for data center shells, with capex centered around the purchase and deployment of GPU's and other equipment within the data centers

Appendices

Appendix 1: AlphaWise Survey #1 - DC Operators

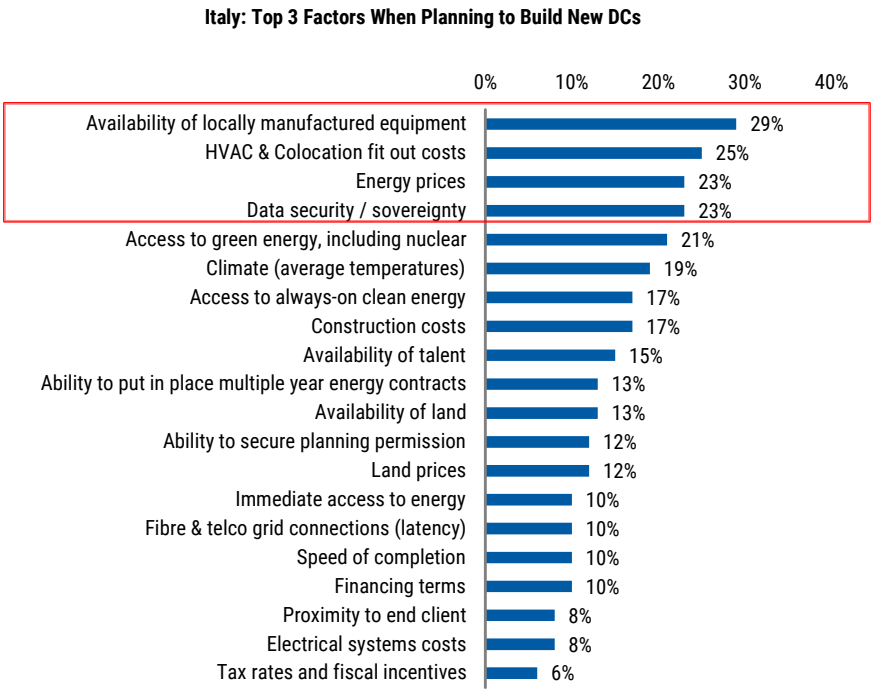
Planning Considerations: Top considerations in DC planning beyond the US and UK, show quite a divergence among geographies.

Exhibit 123: Spain



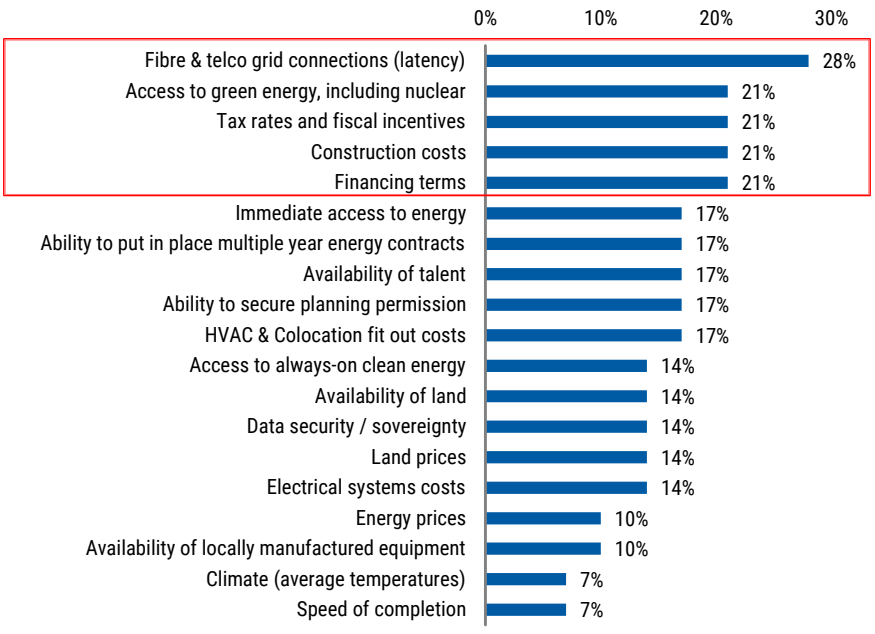
Source: AlphaWise, Morgan Stanley Research

Exhibit 124: Italy



Source: AlphaWise, Morgan Stanley Research

Exhibit 125: Norway



Source: AlphaWise, Morgan Stanley Research

Bottlenecks: Responses also vary by geography, for what the key bottlenecks DC operators are facing.

Exhibit 126: Bottlenecks by geography

Top 3 Bottlenecks	Country				
	US	UK	Italy	Spain	Norway
Securing server equipment	23%	9%	13%	8%	14%
Securing fibre/telco connectivity	31%	11%	13%	13%	17%
Securing 'white space', such as, racks, PDUs	4%	9%	12%	15%	24%
Securing 'grey space', such as, switchgear, UPS, aircooling & transformers	13%	15%	8%	8%	14%
Securing power grid connection	21%	30%	13%	25%	21%
Securing green (including nuclear) electricity (wind, solar or hydro)	17%	15%	15%	13%	10%
Securing land at affordable price	17%	17%	17%	15%	7%
Securing demand/offtake contract	12%	17%	6%	21%	14%
Securing cost of electricity	15%	31%	19%	13%	14%
Securing low carbon building materials	23%	13%	19%	19%	24%
Securing primary or back up power generation solutions	15%	28%	15%	21%	34%
Availability of chips/ GPUs	15%	19%	8%	13%	31%
Delays from real estate providers	10%	19%	17%	12%	7%
Securing planning permission	17%	11%	19%	31%	7%
Delays in cooling technology provision, such as chillers	17%	11%	23%	29%	24%
Access to water	12%	11%	10%	12%	14%
Engineering labour shortages	13%	13%	25%	13%	7%
Speed of access to electricity	23%	22%	12%	17%	17%
Base	52	54	52	52	29

Source: AlphaWise, Morgan Stanley Research

Sustainability: As DC operators consider expansion, there is a divergence in ESG focuses, by geography.

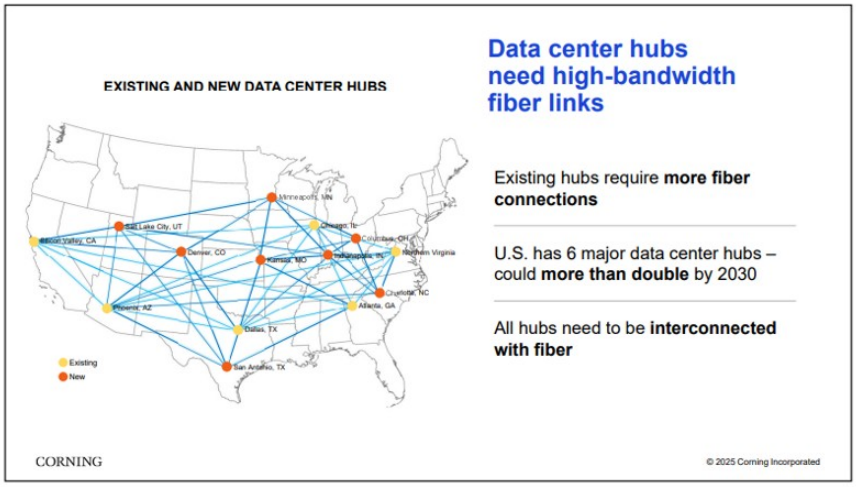
Exhibit 127: Top ESG considerations for data center expansion by geography

Top 3	Country				
	US	UK	Italy	Spain	Norway
Green energy (including nuclear) as % of total energy use	33%	44%	33%	29%	38%
Ability to match energy consumption with clean energy purchases 24/7	40%	52%	35%	40%	21%
Volume of energy needed	27%	30%	31%	27%	34%
Water recycling	13%	11%	17%	13%	24%
GHG emissions	12%	17%	6%	23%	17%
Data privacy	46%	41%	37%	23%	14%
Operational GHG emissions (emitted during construction)	27%	28%	31%	31%	34%
Embodied GHG emissions: Carbon footprint of materials used during construction (e.g. cement / steel)	35%	33%	38%	38%	45%
Social impact	33%	26%	23%	35%	17%
Potential energy consumption as % of total local / regional	35%	19%	50%	40%	55%
Base	52	54	52	52	29

Source: AlphaWise, Morgan Stanley Research

Other Exhibits

Exhibit 128: Fiber needed to connect DCs



Source: Corning (Q1 2025, link here)

Disclosure Section

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(as of June 30, 2025)
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	Coverage Universe		Investment Banking Clients (IBC)			Other Material Investment Services Clients (MISC)	
Stock Rating Category	Count	% of Total	Count	% of Total IBC	% of Rating Category	Count	% of Total Other MISC
Overweight/Buy	1497	40%	372	45%	25%	702	41%
Equal-weight/Hold	1632	44%	380	46%	23%	776	45%
Not-Rated/Hold	4	0%	0	0%	0%	2	0%
Underweight/Sell	593	16%	79	10%	13%	233	14%
Total	3,726		831			1713	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

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INDUSTRY COVERAGE: Telecommunications Services

COMPANY (TICKER)	RATING (AS OF)	PRICE* (07/15/2025)
Emmet B Kelly		
Cellnex Telecom SA (CLNX.MC)	E (12/06/2022)	€32.04
Deutsche Telekom (DTEGn.DE)	O (04/08/2022)	€30.21
Helios Towers Plc (HTWS.L)	O (12/16/2022)	118p

Infrastrutture Wireless Italiane SpA (INWT.MI)	E (07/13/2021)	€10.25
KPN (KPN.AS)	E (11/30/2023)	€4.07
Orange SA (ORAN.PA)	E (12/04/2024)	€13.07
Rai Way SpA (RWAY.MI)	E (05/18/2017)	€5.97
Swisscom AG (SCMN.S)	O (02/10/2022)	SFr 559.00
Telefonica (TEF.MC)	E (10/18/2019)	€4.49
Vodafone Group (VOD.L)	E (07/02/2025)	81p
Nicolas J Mora		
Bouygues SA (BOUY.PA)	U (01/13/2023)	€38.64
Terence Tsui		
BT Group plc (BT.L)	O (03/29/2021)	195p
Elisa Oyj (ELISA.HE)	O (10/28/2024)	€46.42
Eutelsat Communications (ETL.PA)	E (10/12/2021)	€3.58
Liberty Global (LBTYA.O)	E (01/29/2021)	US$10.13
Nos SGPS SA (NOS.LS)	U (12/16/2021)	€3.79
SES (SESFd.PA)	++	€6.24
Tele2 (TEL2b.ST)	E (04/12/2022)	SKr 136.75
Telenor (TEL.OL)	E (01/12/2023)	NKr 157.80
Telia Company AB (TELIA.ST)	E (09/20/2023)	SKr 33.14

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