Savills Data Centre
Advisory EMEA

Website Social

REPORT
Savills Research

European Commercial – Nov 2022

European Data Centres

Deep dive in the data sphere

savills

Key points

98%

of international internet traffic flows undersea ...

...through 426 active submarine cables, transmitting data at 1.6 kms per second. close to 190 submarine cables are landing in Europe. Sixteen more submarine cables are planned in the next three years.

8 Mbps

Bandwidth per capita in 2022

The European bandwidth is expected to grow at an average annual growth rate of 34% until 2028, when 28.5 million Mbps of international bandwidth will be used, reflecting 46 Mbps per capita.

56

New data centres delivered in Europe in 2022

There are currently slightly more than 1,240 data centres in Europe, totalling 8.3 million sqm of space and a power capacity of approximately 8,300 Mw.

+3% YoY

Data centre construction costs

Data centre construction costs increased by 3% annually to $8.6 million per megawatt, with Zurich the most expensive market in Europe.

€23 BN

Global data centre M&A deals in H1 2022

The global data centre M&A value totalled $24 billion (€23.3 bn) during the first half of the year, an additional $18 billion (€17.5 bn) of deals is pending.

57%

European energy dependency ratio

In the light of the current threat of power cuts, some energy restrictions towards data centres have been implemented, notably in London, Frankfurt and Ireland.

European Data Centres : Deep dive in the data sphere

Introduction

Covid-19 definitely was a tipping point for the data centre sector. The pandemic propelled the world online whilst changing our way of living, consuming, working and learning for good. Consequently, the demand for data storage has been growing massively since 2020, and the data boom is expected to continue for the next five years (and beyond).

In the current lacklustre economic context, the industry stands out as a beacon of light, notably for investors and operators. That said, the sector is facing some significant challenges, of which securing power has recently become a critical one. Additionally, whilst data centre operators have generally been proactive in "greening" their portfolio, the gap to fully embracing ESG standards remains significant, most notably for older data centres. Finally, the undersupply of equipment due to supply chain disruption and the labour shortage is causing some extended lead time.

Summary

"With flourishing demand set to grow, long-term income streams and security, the fundamentals of the data centre sector are solid in the backdrop of global economic uncertainty. The sector, however, is not immune to the geopolitical upheaval. Highly energy intensive, access to power is fundamental to the operation of data centres but with the war in Ukraine causing havoc for the continent's energy supply, securing power is now becoming a critical challenge.

Scott Newcombe, Head of Data Centre Advisory EMEA

Infrastructure & technology

Strong infrastructure deployment expected

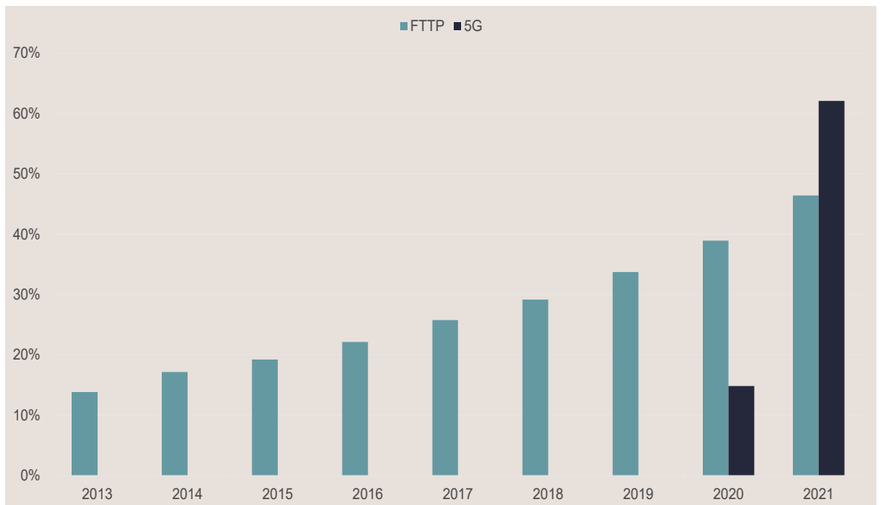
The total existing submarine cable length will increase by 22% in the next two years

Covid-19 led to a broader recognition of the importance of digital transformation and brought to the fore the necessity for improved connectivity and investment in IT infrastructure development. In June 2021, European Heads of State put together an impressive stimulus package with a total budget of €750 billion to combat the economic downturn stemming from the Covid-19 pandemic. Twenty per cent of this amount was earmarked for digital investments, providing a once-in-a-lifetime opportunity to accelerate the digital transformation of our society, with fibre and 5G infrastructure investments identified as one flagship area. Indeed, between 2020 and 2021, the share of the total EU 28 households covered by fibre (FTTP) increased by 7% (compared to an annual average of 4% during the five previous years). During the same period, 5G deployment was multiplied by more than four.

Submarine cables are the backbone of the internet. 98% of international internet traffic flows undersea through circa 430 active submarine cables around the world, which together span over 1.35 million kilometres, transmitting data at 1.6 kms per second. So any new submarine cable project is strategic for the future development of data centre facilities. Close to 190 submarine cables are landing in Europe and linking the continent to the Middle East, Africa, APAC and the American continent. This represents approximately 450,000 km of cables. Sixteen more submarine cables are planned in the next three years. This will add slightly more than 100,000 km of cables, representing more than 1/4th of the existing length of cables. France, Norway, Greece, the UK, Ireland, and Italy will likely be the direct beneficiaries of these new cables.

Similarly to terrestrial networks, submarine cables do not provide the shortest path between two continents. They follow designed routes that avoid major fishing areas, anchoring zones, sensitive environmental areas and earthquake-prone locations. Hence, the latency on submarine cables varies considerably. As shown in figure three, the intra-Europe latency can vary by almost 38 milliseconds, whilst the latency of trans-Atlantic cables can vary by nearly 32 milliseconds. Companies all want to lower the latency of long-haul data transmission. Reducing the delay by as little as a few milliseconds can impact the profitability of trading operations. Online search companies, including Google and Bing, have indicated that increased latency leads to decreased click-throughs and search result views. Amazon has claimed that every 100 milliseconds of latency reduces their sales by 1%.

Fig 1: EU28 FTTP & 5G coverage



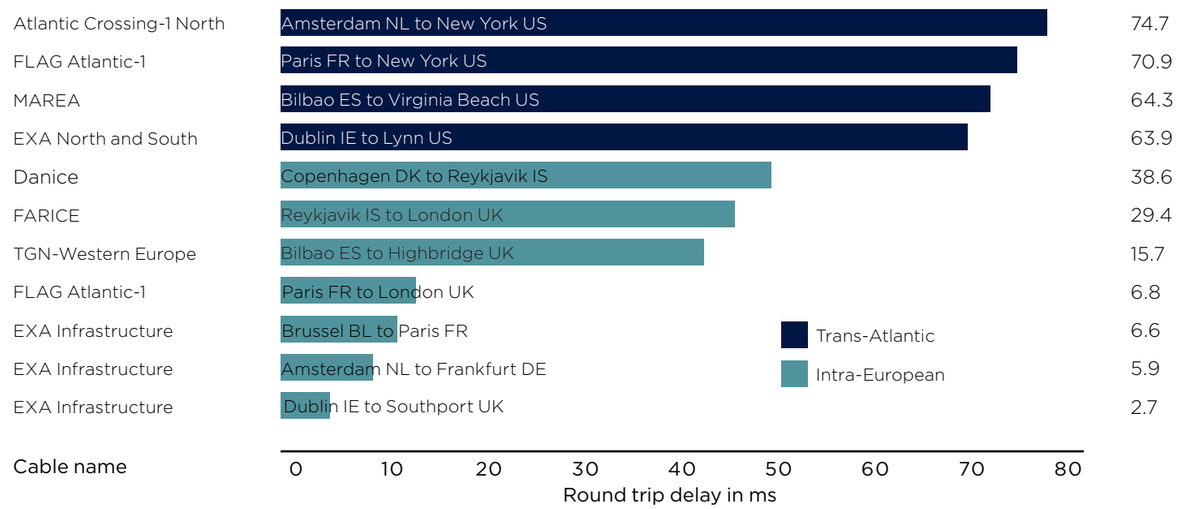
Source : European Commission

Fig 2: European submarine cables planned

Route	Cable name	Completion date	Length (km)	Capacity (Tbps)	European landing countries
Europe	Digital E4	2022 Q4	700	NA	Denmark, Germany, Sweden
Europe	N0r5ke Viking	2022 Q4	810	NA	Norway
Africa	2Africa	2023	45,000	180	France, Greece, Italy, Kenya, Portugal, Spain, UK
Europe	IRIS	2023	1,770	108	Iceland, Ireland
Europe	Trans Adriatic Express	2023	106	NA	Albania, Italy
Europe	Apollo East and West	2024	670	46	Greece
Europe	N0r5ke Viking 2	2024	900	NA	Norway
Europe	Olisipo	2024	110	4,300	Portugal
Europe-Asia	Africa-1	2024	10,000	NA	France
Europe-Asia	Blue	2024	4,696	500	Cyprus, France, Greece, Israel, Italy, Jordan
Europe-Asia	India Europe Xpress	2024	9,775	210	Greece, Italy
Trans-Atlantic	Amitie	2023	6,792	322	France, UK
Trans-Atlantic	Leif Erikson	2024	4,200	NA	Norway
Europe	Unitirreno Cable	2025	890	480	Italy
Europe-Asia	SeaMeWe-6	2025	19,200	126	France
Europe	Celtic Norse	2025	2,008	240	Ireland, Norway

Source: TeleGeography

Fig 3: Intra-European & Trans-Atlantic latency



Source: TeleGeography

Demand drivers

Data explosion is driving pent-up data centre demand

Bandwidth usage in Europe is forecasted to grow by 34% annually until 2028

It will not come as a surprise that the amount of used and generated data increased in the last years and accelerated during the pandemic, with many businesses and individuals switching to online channels. Individuals spend more time online, shown by, amongst others, the increase of users of streaming platforms and services, whilst businesses increased their usage of cloud services to facilitate more remote working.

In Europe, more than 750 million people are using the internet, reflecting that 90% of Europe's population is online, up from 65% in 2011. Although already close to 100%, the internet penetration rate for individuals is still forecasted to increase further. Especially streaming services and mobile data usage is predicted to grow further. In 2021, streaming services made up nearly 87% of European consumer internet traffic. Mobile internet usage has increased in the last years with the rollout of the 5G network. In 2021, more than 430 million people used internet services through their mobile devices, which is forecasted to increase by 20 million by 2025.

Furthermore, consumer spending through mobiles devices (i.e. m-commerce) is rising rapidly. According to Forrester, in 2022, in Europe's top five markets, 54% of all internet shopping is done through mobile devices (i.e. smartphones and tablets). This number is forecasted to reach 58% by 2024 when more than €265 million in retail sales are purchased through mobile devices.

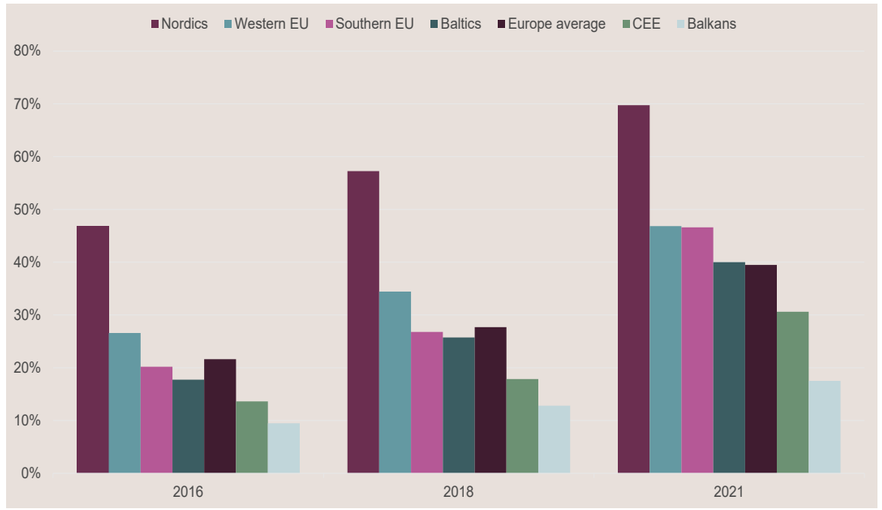
The number of European businesses that used cloud computing increased from 19% in 2014 to 39% in 2021, with Western Europe and Nordics increasing the most. Equinix forecast that this number will increase further and that roughly 72% of global businesses will use digital platforms by 2025. This is aligned with the findings from a survey conducted by Snow Software which showed that in 2021, three in five IT leaders saw increases in cloud services, communication software, video conferencing, and collaboration tools. Furthermore, almost all respondents said they are in the process of adopting cloud software in some form, with just 10% having no plans to do so, and 61% already increased their use of cloud services in the last year. This contributes to business growth rate as a study by Equinix showed that businesses not using cloud-based solutions show a two to three times slower growth rate in the last two years, highlighting the value of cloud computing.

Besides enterprises and individuals generating and consuming data, more and more data is used and generated by Machine to Machine (M2M) connections driven by a wider rollout of the 5G network and the further integration of the Internet of Things (IoT). Last year, there were 172 million cellular IoT connections in Europe which is forecasted to more than double to 406 million connections by 2025.

This resulted in the rapid growth of data generation and usage across Europe. In 2022, the total used bandwidth in Europe is expected to increase by 35% year on year, reaching more than 5 million Mbps, reflecting an average data consumption of 8 Mbps per capita. TeleGeography forecasts bandwidth will continue to grow at the same pace in the coming years, with an average annual growth rate of 34% expected in Europe until 2028, when 28.5 million Mbps of bandwidth will be used, reflecting 46 Mbps per capita - roughly sixfold of this year figure. This growth will be particularly pronounced in the Nordics and Western Europe, where the bandwidth per capita is forecasted to increase to nearly 141 Gbps and 78 Mbps per capita in 2028, respectively.

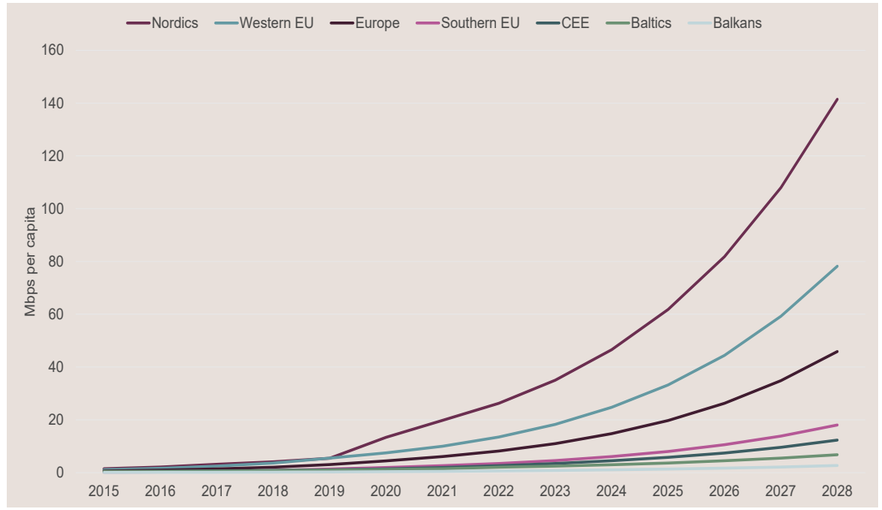
European Data Centres : European market fundamentals

Fig 4: Use of cloud computing by enterprises



Source : Eurostat

Fig 5: International bandwidth usage



Source: Oxford Economics, TeleGeography

Existing & prospective supply

High level of data centre deliveries expected for 2022

Yet the pipeline remains insufficient to meet expected demand

Currently, almost all of the world's IP traffic, the flow of data across the internet, goes through data centres and is not just captured once. According to the International Energy Agency (IEA), for every bit of data that travels the network from a data centre to end users, another five bits of data are transmitted within and among data centres. Data centres have, therefore, a vital role in facilitating the current and forecasted data usage and generation as data centres are used to host networked computer servers that store, process, and distribute large amounts of data.

There are currently slightly more than 1,240 data centres in Europe, totalling 8.3 million sqm of space and a power capacity of approximately 8,300 Mw. This represents about 18 watts per capita in Europe. Most of these data centres are located in Western Europe, accounting for 76% of the total power capacity in Europe, more specifically in the FLAP-D markets, named Frankfurt, London, Amsterdam, Paris and Dublin. There are over 300 data centre operators in Europe amongst all types of data centres (wholesalers, carrier-neutral colocation, bandwidth providers, proprietaries and resellers). The ten biggest operators account for 36% of the total data centre power capacity in Europe, with the biggest operator being Digital Realty (773 Mw), closely followed by Equinix (463 Mw).

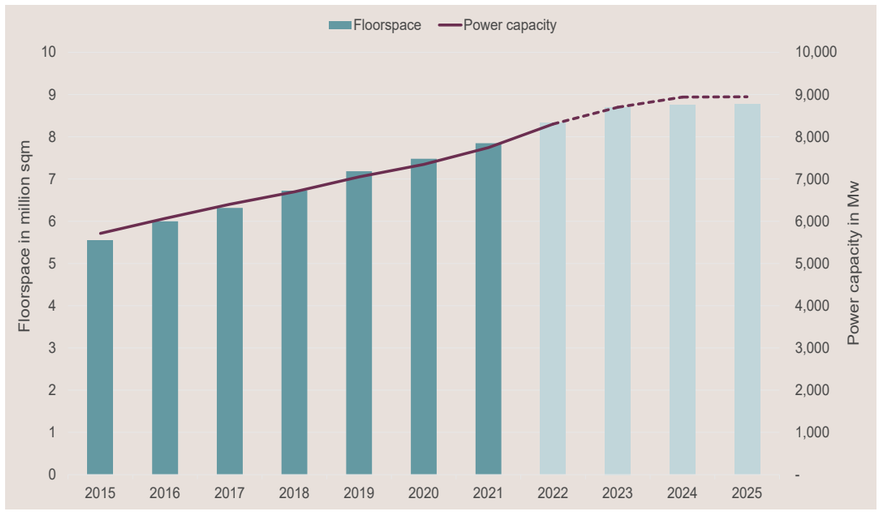
New data centre developments have been rapidly increasing over the past few years. In the last five years, slightly more than 240 data centres have been completed across Europe, adding a power capacity of more than 2,230 Mw. This year alone, 56 new data centres are expected to be delivered. We estimate this will add approximately 560 Mw to the market by the end of the year. According to TeleGeography, 32 new European data centre projects are in the pipeline until 2025, which will total approximately 600 Mw. Based on these projects, we expect the European data centre power capacity to reach about 9,000 Mw by 2025.

Based on the assumption that the current European bandwidth is fully accommodated within the existing data centre supply, we estimate that by 2025, the number of data centres in Europe needs to increase nearly 2.5 times to more than 3,000 data centres (approx. 20,750 Mw). This means that the currently planned data centre developments are far from sufficient to meet the forecasted increase in demand. That said, this assumption does not consider future technological developments that will likely increase the efficiency of data centres and increase their power capacity.

Data centre operators are investing more heavily in hyper-scale data centres' large and scalable computer architecture. The hyper-scale model provides nearly instantaneous database backups with no impact on computer resources; in other words, latency is limited whilst the power efficiency is optimised. It is also an efficient financial option for operators to increase their footprint and address the surge of digital transformation initiatives, which continues to accelerate across industries. The Sines 4.0 campus project in Portugal is a good example of the scale of future data centres. The campus will consist of nine sea-water-cooled buildings totalling 495 Mw on 60 hectares of land. The project is set to become the largest data centre across Europe.

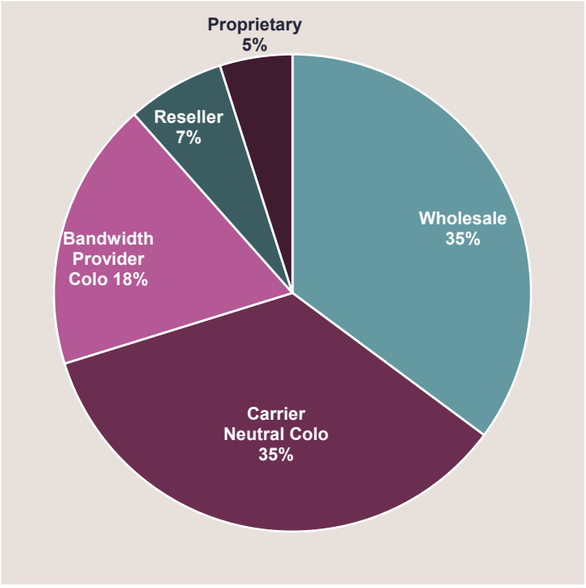
Separately, increased legislation in the more mature and interconnected markets (e.g. FLAP-D region) puts the supply of new data centres under pressure. New supply in these markets will be limited as new laws and policies regarding energy consumption, sustainability, and NIMBYism will make developing new data centres significantly challenging. However, the current data centre operators will use the limited development pipeline to adapt and improve their existing facilities to cope with increased demand levels. It is likely that new locations will be identified for the development of new data centres that are, for now, less challenged by law and policymaking.

Fig 6: European data centres power capacity and floor space



Source : Savills; TeleGeography

Fig 7: Power capacity by type of operators



Source: TeleGeography

Fig 8: Top ten largest operators in Europe

#	Name	Type of operator	Power capacity MW	% Total
1	Digital Realty	Wholesale	773	8.6%
2	Equinix	Carrier Neutral Colo	463	5.2%
3	NTT Global Data Centers	Bandwidth Provider Colo	441	4.9%
4	Global Switch	Wholesale	294	3.3%
5	CyrusOne	Wholesale	273	3.0%
6	Microsoft Azure	Proprietary	211	2.4%
7	DATA4 Group	Wholesale	211	2.4%
8	Vantage Data Centers	Wholesale	195	2.2%
9	Virtus	Wholesale	181	2.0%
10	Ark Data Centres	Wholesale	180	2.0%

Source: TeleGeography

Data centre pricing

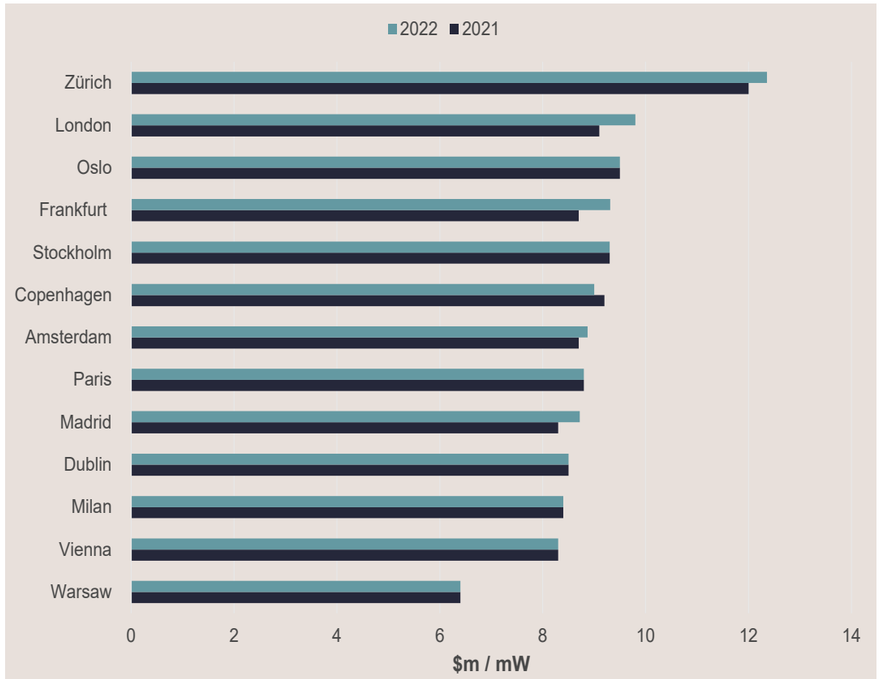
Data centre costs expected to rise significantly...

.. most notably due to the lack and cost of energy

Construction costs for new data centres have increased since last year due to supply chain constraints, inflation, labour shortages and availability. Globally, there has been an uplift in construction costs of more than 7%. In Europe, the average construction costs in 2022 increased by 3% yearly to $8.6 million per Mw (€8.3 million), according to the latest report from Turner & Townsend. Zurich is the most expensive market in Europe (and the world) to develop a new data centre facility, with average construction costs significantly higher than the second and third most expensive markets (Nordics and the FLAP-D cities).

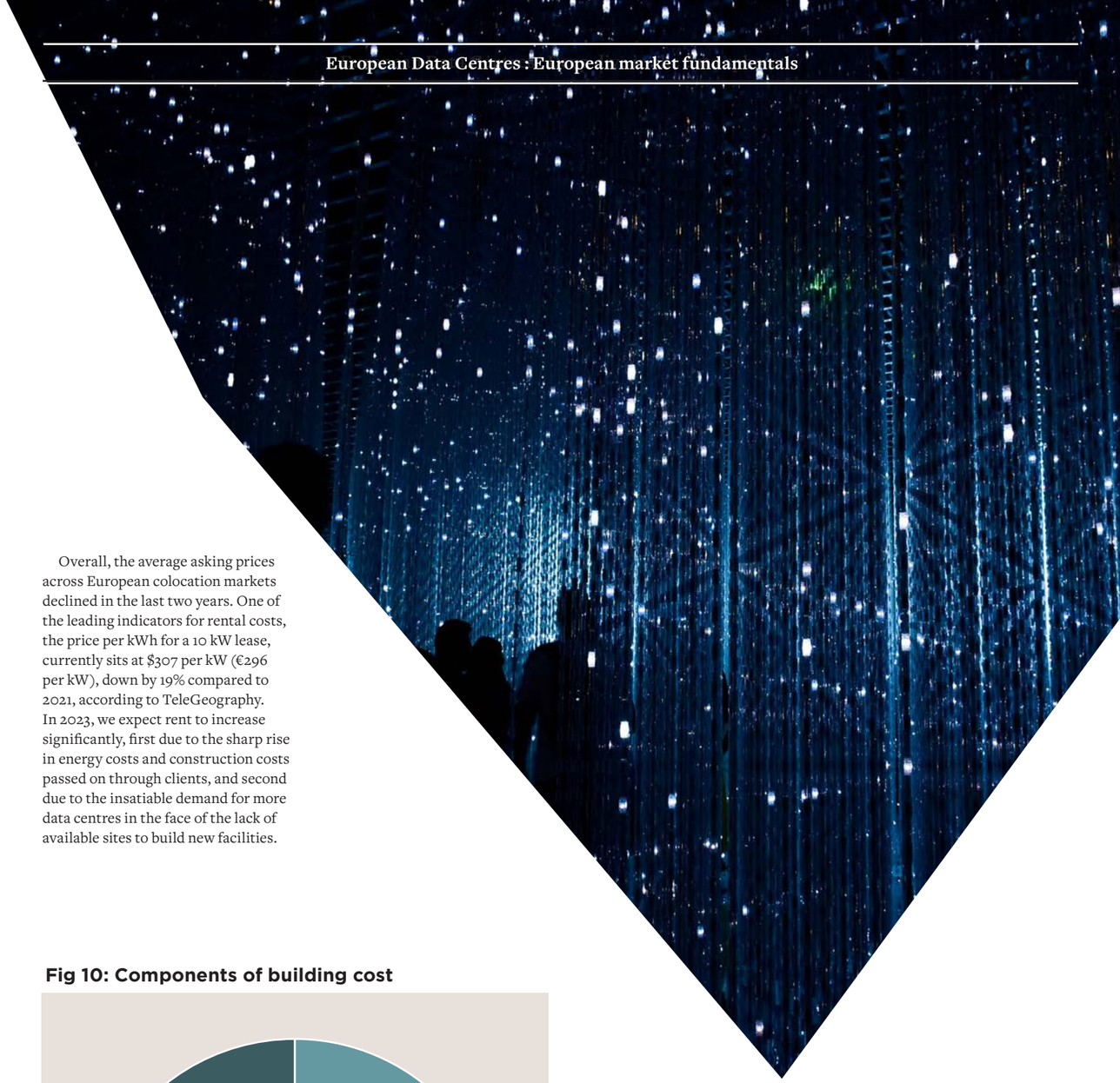
Colocation facility costs are more complicated than pricing for other property types as they are generally determined by space, power, connectivity, and any services broken out into an upfront fee and variable monthly fee. It typically includes anything from power fees and bandwidth service charges to connectivity expenses and support costs. The common elements of a colocation price quote include the price per kW at different density levels (i.e. 4, 10 and 100 kW leases), connectivity prices (i.e. fibre, ethernet, and copper), and cabinet installation prices.

Fig 9: Construction costs



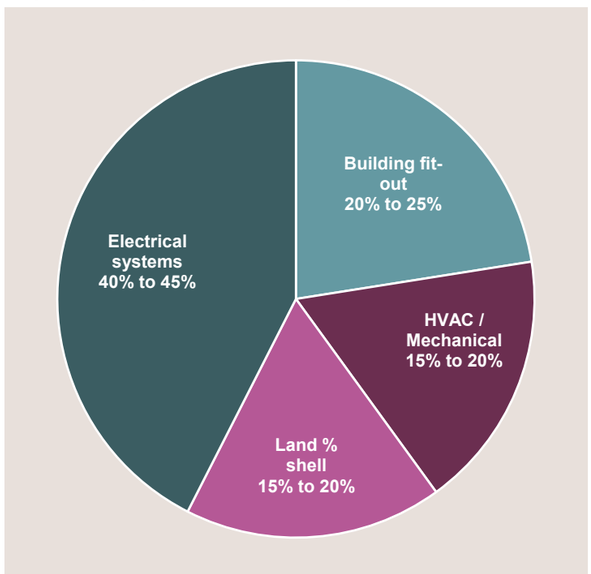
Source : Turner & Townsend

European Data Centres : European market fundamentals



Overall, the average asking prices across European colocation markets declined in the last two years. One of the leading indicators for rental costs, the price per kWh for a 10 kW lease, currently sits at $307 per kW (€296 per kW), down by 19% compared to 2021, according to TeleGeography. In 2023, we expect rent to increase significantly, first due to the sharp rise in energy costs and construction costs passed on through clients, and second due to the insatiable demand for more data centres in the face of the lack of available sites to build new facilities.

Fig 10: Components of building cost



Source: DgtlInfra

Fig 11: Average European rental costs in H1 2022

USD per kW	2018	2019	2020	2021	2022	2018-2022 CAGR
Price per kW at 4 kW	381	403	427	396	366	-4%
Price per kW at 10 kW	344	383	416	377	307	-11%
Price per kW at 100 kW	348	368	382	356	285	-18%

Source: TeleGeography

Investment market

Another investment high is expected for the end of the year

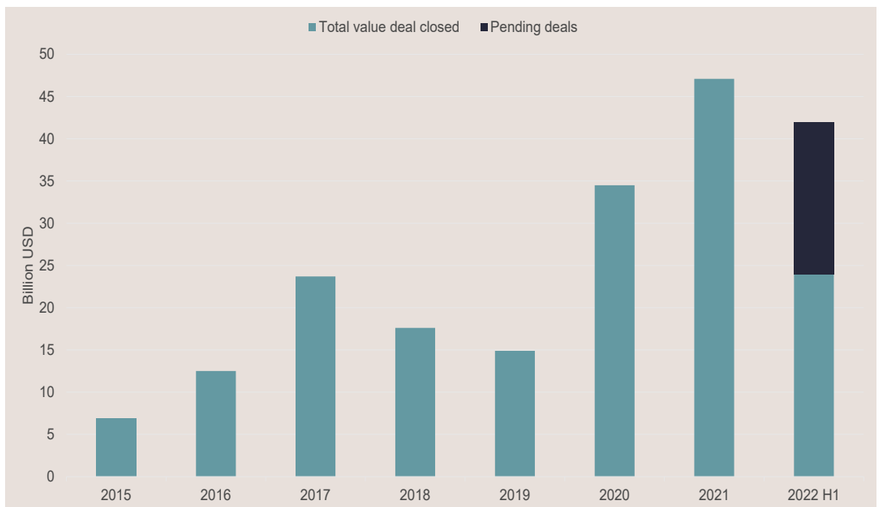
Significant private equity entry in the data centre investment arena

Despite economic headwinds, generally affecting business investments downwards, the amount of global data centre mergers and acquisitions (M&A) has not been impacted so far. During the first half of the year, some $24 billion of data centre M&A deals were closed (€23 billion), with an additional $18 billion of pending deals in the pipeline (€17 billion), according to Synergy Research Group. So far, the two major acquisitions of the year include KKR Global Investment Partners buying CyrusOne for $15 billion, privatising the company and the acquisition of Switch by DigitalBridge for $11 billion (€11.6 billion), also taking the company private in an all-cash transaction. These deals represent the two highest-value acquisitions the industry has ever seen. In 2021, the acquisitions of CoreSite and QTS, each for around $10 billion (€9.6 billion), were the previous records.

Hence 2022 marks a sharp entry of private equity in the industry, accounting for 90% of the global data centre M&A value. Between 2015 and 2018, private equity buyers accounted for 42% of deal value and increased to 65% between 2019 and 2021, when the overall M&A activity boomed. Data centres are expensive to build and manage. They also require scale to achieve profitability, meaning that data centre fleets need to be expanded to keep up with the ever-growing need for data storage. This explains the massive entry of private equity in the industry.

Looking ahead, we expect to see more operators seeking external capital. As of today, most of the existing data centre stock remains owner-occupied, predominantly by a few specialised public REITs, which have been dominating the European market. This intense concentration of market players has had a catalyst impact on market liquidity and transparency.

Fig 12: Global data centre M&A activity



Source : Synergy Research Group

Sale and leaseback opportunities likely to grow further as the industry is increasingly capital-intensive

In Europe, the past two years marked a step towards improved liquidity for the data centre asset class, clearly attracting large infrastructure funds and sovereign wealth funds, both seeking sustainable growth and relatively low risk whilst bringing affordable long-term capital. As the industry is currently focusing its Capex on expanding and improving its fleet to meet the demand, some operators are selling their data centres. As anticipated in our last report, the volume of sales and leaseback transactions has increased significantly since 2020. In September, Principal Global Investors acquired the first asset of the Principal European Data Centre Fund I for €22.6 million. Located in Barcelona, the data centre (10,502 sq m – 6 Mw) is leased to AtlasEdge until August 2033. In February this year, the developer and operator Kao Data bought and leased back two prime data centres in West London, totalling 300,000 sq ft, for €119.6 million. Whilst last year, Ascendas REIT purchased and leased back from Digital Reality the Fairway portfolio for €249.4 million. The deal comprises 11 facilities; four in the UK, three each in France and the Netherlands, and one in Switzerland. The portfolio was 97.9% occupied by 14 customers, including HSBC, Equinix, BT, and Bouygues Telecom.

Over the past year, fierce competition between investors has put strong upward pressure on pricing. This month Iron Mountain bought a data centre campus development project in Madrid for €80 million. Xdata Properties bought it last year for a reported value of €40 million- half the price.

Prime European yields currently range between 3.6% and 4.5% in the FLAP-D markets and between 4.0% and 5.5% in other western European locations. We expect prime yields will start to stabilise next year as a result of the high cost of debt.

According to the last Emerging Trends in Real Estate Europe, data centres were in the top three sectors to invest in 2023, following new energy infrastructure and life sciences. For reference, the industry was ranked top 10 in the 2021 survey. The fundamentals of the sectors are solid, with flourishing demand set to grow significantly in the next five years. The industry offers a long-term income stream and security. Generally, data centres have long-term contracts with some of the most creditworthy tech counterparties. Once a facility becomes part of an end user's computing infrastructure, relocating those occupancies is difficult. Additionally, there are elements of inflation protection within contracts, either through fixed annual uplifts or CPI/RPI links.

Fig 13: Global data centre REITs

Operator	Data centres	Power capacity in Mz	Market cap in bn USD	Annualised 3-year total returns
Equinix	227	1350	61.13	9.03%
Digital Realty	291	1847	32.09	1.94%
Coresite	25	256	7.48	NA
QTS	28	315	6.01	NA
Digital Bridge	76	288	4.14	-7.8%
Iron Montain	15	130	14.29	25.17%

Source: Savills based on various sources

Hot spots

To identify the best places in Europe where to develop, operate and ultimately invest in data centres, Savills conducted a benchmark based on various metrics gathered in six categories.

Infrastructure & technology

The infrastructure & technology category reflects the current FTTP and 5G coverage and the planned development of submarine cables entering a country. The results show that the Southern Europe markets score amongst the highest, with Paris, Marseille, Rome, and Milan ranking the highest. On the lower end of the ranking, we find Brussels and Budapest having the lowest scores.

Demand drivers

Demand reflects the forecasted growth in population, GVA, and bandwidth and indicates where to expect the most important data centre needs in the future. The ranking shows that the UK and German markets, especially and unsurprisingly, London and Frankfurt score the highest with a relatively high forecasted population growth combined with current high bandwidth usage plus forecasted bandwidth usage. Amongst the lower scores, we see markets such as Zurich, Bucharest and some cities in France mainly driven by current and forecasted low levels of bandwidth usage.

Existing & prospective supply

This category reflects existing data centres and the development of new data centre sites, production capacity, and floor space. The results highlight the cities in the FLAP-D markets as these are the most mature markets in Europe, hence a high scoring for the existing data centres. Besides these top markets, we see that Helsinki and Rome are coming up. At the bottom of the list, we find cities such as Budapest, Bucharest, Lyon and Bordeaux, where a limited number of new data centres are planned combined with a minimum of existing data centres.

Natural resources & energy

As the name suggests, this category reflects metrics related to powering data centres, such as the availability of renewable resources. Unsurprisingly, the ranking shows that the Nordic markets such as Oslo, Stockholm, and Helsinki are on top of the list. The less-performing markets are found in CEE, (i.e. Prague and Warsaw), and German cities, which currently rely more on energy from fossil fuels.

Costs

The cost category reflects metrics related to energy prices to keep the data centres operational and costs related to renting servers in data centres as costs associated with new data centre developments. The results show that the FLAP-D markets benefit from relatively low costs, mainly rental, as the markets are most mature and competitive, driving lower prices. However, they are challenged by higher construction and energy costs. Besides the FLAP-D markets, we find German and Nordic cities such as Berlin, Munich, Copenhagen, and Stockholm at the top of the list.

HR

Finally, the human resources category reflects the available (IT) labour force that can support current and future data centres. Top of the list, we find more emerging IT markets such as Budapest, Prague and Bucharest with relatively high working-age populations in the coming years. Whilst German cities such as Frankfurt, Berlin and Munich are ranked lower given lower available labour forecasted.

European Data Centres : European market fundamentals

Rank	City	I&T	Demand drivers	Supply	Natural resources & energy	Costs	HR
1	Frankfurt	27.8	95.1	86.4	7.6	81.2	98.4
2	London	46.9	83.3	100.0	4.7	56.7	99.6
3	Paris	89.5	40.7	28.2	6.9	70.8	98.7
4	Oslo	19.6	38.6	4.8	100.0	71.6	99.0
5	Berlin	27.8	95.1	14.9	7.6	82.7	98.8
6	Hamburg	27.8	95.2	8.8	7.6	82.7	98.7
7	Munich	27.8	95.1	7.6	7.6	82.7	98.8
8	Düsseldorf	27.8	95.2	3.4	7.6	82.7	98.3
9	Helsinki	26.0	58.2	25.5	34.3	71.1	99.1
10	Cologne	27.8	95.2	2.1	7.6	82.7	98.4
11	Stuttgart	27.8	95.2	1.9	7.6	82.7	98.4
12	Marseille	89.5	40.6	4.2	6.9	69.8	98.7
13	Amsterdam	35.0	59.7	38.5	7.9	69.5	98.7
14	Bordeaux	89.5	40.5	1.0	6.9	71.0	99.2
15	Lyon	89.5	40.5	0.8	6.9	71.0	99.0
16	Milan	78.4	44.8	11.1	7.3	63.7	98.4
17	Manchester	46.9	83.4	5.0	4.7	60.2	99.1
18	Rome	78.4	44.9	6.8	7.3	61.8	98.5
19	Madrid	61.9	56.5	7.0	6.4	66.6	98.8
20	Birmingham	46.9	83.4	1.9	4.7	60.2	98.9
21	Edinburgh	46.9	83.4	0.5	4.7	60.2	99.2
22	Barcelona	61.9	56.5	1.3	6.4	66.5	98.7
23	Copenhagen	37.8	54.4	3.1	9.2	74.2	99.4
24	Stockholm	14.6	44.4	10.3	32.7	73.1	99.5
25	Dublin	31.1	42.0	21.6	10.0	62.2	98.7
26	Vienna	26.1	37.1	5.0	18.0	74.9	98.8
27	Lisbon	44.1	36.1	0.2	11.7	67.4	98.6
28	Warsaw	16.1	39.5	10.9	5.1	87.3	98.9
29	Prague	18.9	36.8	3.3	6.5	89.3	99.3
30	Bucharest	17.3	32.6	0.8	9.8	80.9	98.1
31	Budapest	12.5	34.7	0.6	9.9	82.2	99.2
32	Zürich	33.0	31.8	10.5	3.4	59.7	98.9
33	Brussels	2.4	44.4	12.1	5.2	71.1	99.3
34	Athens	65.9	33.9	2.3	7.4	NA	97.4

METHODOLOGY

This research covers 34 European cities. The analysis draws on 18 different indicators gathered into six matrices: Infrastructure and Technology, Demand, Supply, Natural resources & energy, Costs and HR. The data is collected at the city and national levels. Where possible, these indicators use the latest annual data available and five-year forecasts to ensure the index incorporates a forward-looking view. The various indicators have been ranked and weighted across the 34 cities. The results of the index do not determine the exclusive attractiveness of a given city to prospective data centre market players, it purely provides a macro guide to incorporate as part of their specific strategy.

Energy

Energy security and cost became critical

Operators are increasingly considering on-site power generation

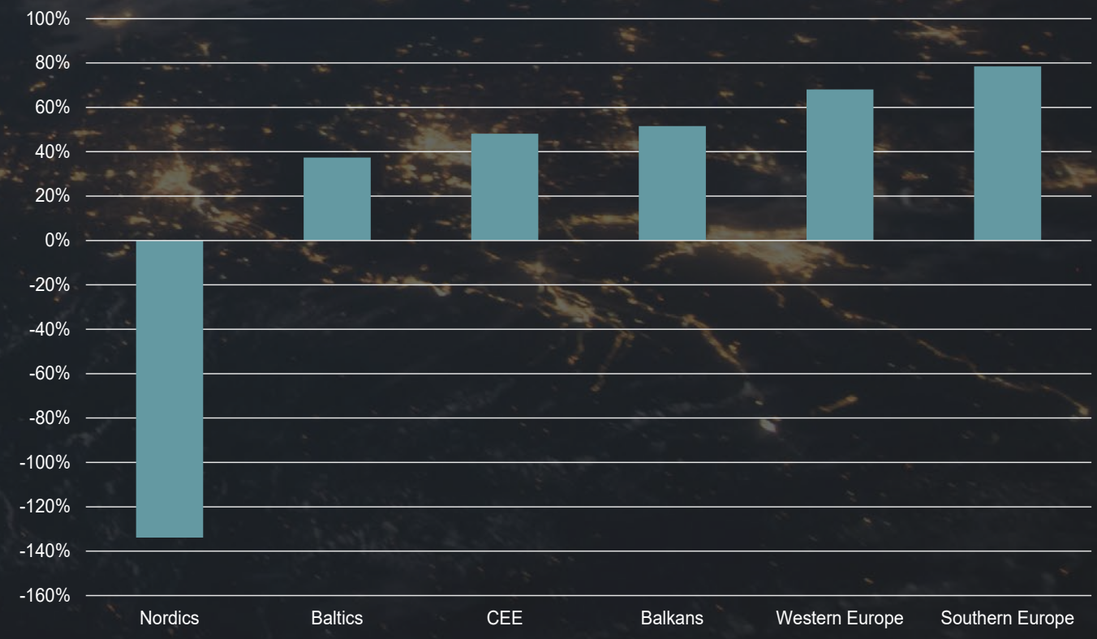
The energy demand from global data centres accounted for roughly 1% of the worldwide electricity usage, excluding crypto mining, and has increased since 2015 by 10 to 60%, depending on the region. This high energy consumption of data centres is mainly due to the energy needed to cool their servers so they can stay operational.

Energy availability, security, and costs have long been crucial factors in the sector. However, they have become even more paramount over the past 12 months following the start of the Russia/Ukraine conflict and the seismic impact it has on global energy markets and prices. Indeed, the conflict highlighted the need for independent, reliable, and affordable energy in Europe. The latest Eurostat data highlights the relatively high energy dependency in Europe. In 2020, a total of 573 Kote energy (or 1.28 per capita) was produced in Europe, whilst the energy demand was 1,300 Kote (or 2.96 per capita), reflecting an energy dependency ratio in Europe of 57% (i.e. 57% of energy needs to be imported). The Nordic region is self-sufficient and acts as a large energy provider to the rest of Europe.

Whilst in the face of the current threat of power cuts, every effort to reduce energy dependency is made by European governments, for some operators, it has become clear they will increasingly need on-site power generation to guarantee supply. Examples of energy restrictions are worryingly multiplying; new schemes in London and Frankfurt are being told that there will be no power supply until 2026-27. In Ireland, some power contracts only guarantee a proportion of the fixed supply. At the same time, the industry continues to be pinpointed for its voracious energy appetite. According to Ireland's public energy company, data centres will make up 30% of energy demand in 2028. In the Netherlands, the government has restricted the development of new hyperscale data centres, more than 70Mw capacity, to just two locations in the country because "The Netherlands is too small and the scarcity of space and energy is too great to deal with the data centre development requirements". In Denmark, where the Foreign Ministry advertises the country as a perfect destination to do business for data centres, another study by the Danish Council on Climate Change says that data centres will make up 17% of the country's energy demands in the next ten years.

The Ukraine/Russia conflict also caused energy prices to soar for individuals and businesses, with many governments stepping in with energy support schemes. The conflict also resulted in most countries accelerating their objectives to reduce their country's energy dependency ratio by investing in more (renewable) energy sources and topping up on gas stock levels. This will have a positive long-term effect as countries will become more independent and in better conditions to manage energy costs, demand, and supply. Consequently, all data centre owners and operators will need to either pass on costs to their end users or alter existing contracts to reflect these price increases. The impact (if any) will be for consumers to demand higher efficiencies, meaning that ultimately they will favour data centres with greater regard for green principles.

Fig 14: Energy dependency ratio*



Source : Savills based on Eurostat, *energy produced over energy imported

Sustainability

Different shades of green

Data centres are getting less power-hungry, yet more efforts will be needed to "green" the industry

Last year, global data centre electricity used was 220-320 TWh, excluding energy used for cryptocurrency mining, which was 100-140 TWh, according to the International Energy Agency (IEA). While global internet traffic has increased 15-fold since 2010, data centre energy usage remained relatively unchanged, estimated to represent between 0.9% and 1.3% of global electricity use. Many improvements have been made within the industry, and with that, lower Power Usage Effectiveness* (PUE) ratings are being achieved. On average, in Europe, the PUE is currently at 1.25, down from 1.74 in 2005. There is a continuous cycle of technology refresh in existing data centre facilities, with operators investing in the deployment and utilisation of the latest and most efficient technology.

With the growth of renewable sources, there is a large increase in the use of geothermal, wind, solar, hydrogen and nuclear power in proximity and powering new data centres – increasingly generated on-site. These innovative projects are helping the industry with its energy consumption credentials. Some of the major colocation operators are striving to attain green data centre credentials and using various methods within the construction process to achieve this. Some of these methods include the use of adaptive control systems, LED lighting, fuel cell deployment, temperature differential aisle containment, solar deployment and heat waste utilisation. All of these changes to the operation of a data centre help to reduce the negative environmental impacts created. Another common theme in new design proposals is to use waste heat from data centres to warm nearby buildings such as offices or residential developments. This approach can help these secondary use classes in local proximity to attain accreditations, such as BREEAM or LEED, by repurposing the waste heat from the data centre into a practical application.

Some accreditations being attained by developers in the space are Green Star, ISO 50001, BCA Green mark and Green-e. These accreditations all measure various environmental constraints on data centre design and development, ensuring the buildings reach certain requirements, with a goal to help reach net zero industry-wide targets. Whilst due diligence surrounding ESG issues increased significantly over the past two years, the lack of widely agreed-upon ESG standards remains challenging. In spite of the lack of a common regulatory framework, commitment within the industry is increasing. Operators are motivated because being the most energy-efficient feeds through to their bottom line, their returns. Whilst, energy efficiency metrics are multiplying because fund managers need to be able to report to their investors.

European Data Centres : Challenges & opportunities

Policies and commitments

2030

CLIMATE NEUTRAL DATA CENTER

Several key players in the market, notably the largest hyperscalers are focused on the importance of building a sustainable model, with over 60 signatories to the Climate Neutral Data Centre Pact pledging to achieve climate neutrality by 2030 and deliver ambitious targets in the five areas of Energy Efficiency, Clean Energy, Water, Circular Economy and Circular Energy System.

2030

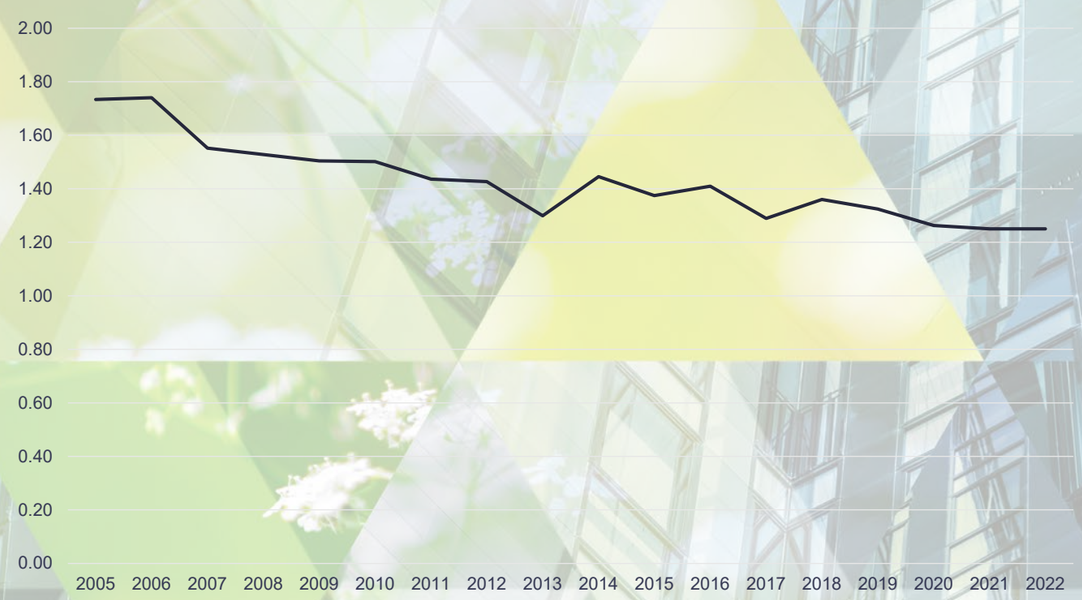
GREEN DEAL

EU Green Deal under which, the whole data centre industry should be carbon neutral by 2050.

Power Usage Effectiveness (PUE)*

PUE is the relation between the amount of power entering a data centre and the power used to run the computer infrastructure (including cooling, heating, ventilation, power conversion/distribution, lighting and utility plug systems). The hypothetic optimum PUE is 1.0, meaning that 100% energy is efficiently used.

Fig 15: Average PUE in Europe



Source : Savills based on TeleGeography

Web3, quantum computing, VR, AR, MR...

The pros & cons

The coming years are promising, with multiple new technological innovations and solutions lining up to be implemented in society. These technological innovations are expected to have game-changing effects on how data is being generated and used by individuals and businesses, impacting data centres.

Quantum & cloud

First, the (increased) usage of new computing technologies such as quantum, cloud, and edge computing will have game-changing effects on data usage. Especially quantum computing is expected to have a significant impact. It is already used but in limited amounts since it requires expensive state-of-the-art hardware. However, quantum computing has significant potential since it makes computations exponentially faster than traditional computers. By 2027, the forecasted market size for quantum computing will be approximately $10 billion (€9,6 billion) globally, up from $400 million (€385 million) today, showing an average CAGR of 50%. More usage of these computing services (both quantum and cloud) requires higher production capacities of data centres in the coming years.

However, the impact on the data centre market is subject to adaptation, availability, and affordability since quantum computing is currently used by a limited number of people and organisations. Given the high costs of quantum computing, we expect that quantum computing will have a lower impact on the data centre market in the coming five years. Especially since technological innovations can result in improvements in the production capacity of data centres, enabling more data centres to facilitate increased usage of quantum computing.

Web3

Secondly, the introduction of Web3, this latest version of 'the internet' refers to a decentralised internet with open standards and protocols that protect digital ownership rights, providing users greater data ownership and control over how their data is monetised, catalysing new business models. This differs from the current Web2, which allows users to interact with web pages, communicate with each other and create content. Still, these web pages are developed and monitored by large corporations such as Google, Microsoft and Amazon.

Web3 thus comes down to decentralisation of the internet and users enabling to transact business peer-to-peer, cutting out intermediaries and removing power from controlling entities with a greater focus on user privacy, transparency and ownership. This is especially favourable for the upcoming blockchain technologies and cryptocurrencies since these innovations support the decentralisation model.

When Web3 is implemented and used in society, it will result in greater consumption and generation of data which data centres will mainly facilitate. According to McKinsey, the first and main industries that most likely will adopt and start using Web3 are:

- Media and entertainment; gaming and digital art
- Retail; online shopping & marketing
- Financial services; blockchain technologies

However, some hurdles cause uncertainty about the implementation of Web3. The main limitations of Web3 are the evolving internet regulations and policies, consumer protection, sustainability concerns, and the reliability and functionality of the Web3 coding and infrastructure design and ecosystem. Nevertheless, the interest in and development of Web3 has increased rapidly in the last few years, with more than 34,000 developers contributing to Web3 projects in 2021 and a high growth rate of private equity and venture capital investments in Web3 deals.

The challenges facing the full implementation of Web3 cause us to view the impact on the data centre market as a minimum in the coming few years as the first industries are just starting to incorporate Web3. However, if Web3 can overcome the hurdles and will be incorporated by the whole society, data usage will increase significantly. Therefore, the long-term impact on the data centre market is game-changing but with a low likelihood of happening.

VR, AR & MR

Thirdly, the integration and implementation of the different kinds of new online realities, such as virtual (VR), augmented (AR), mixed realities (MR), and the Metaverse, will increase data usage and generation. Currently, the improvements and developments within these online realities follow each other rapidly but are not yet accepted and used by today's society. The potential, however, is there but pending the mass incorporation of these new technologies. The continuous and rapid improvements in these technologies cause us to state that these technologies will be realised in the coming few years and will then have a moderate to high impact on the data centre market, given the increased usage and generation of data.

AI, ML & IoT

Fourth and finally, increased implementation and usage of Artificial Intelligence, Machine Learning, and the Internet of Things (IoT) will result in increased data centre usage. Especially more automatisation and robotisation, including self-driving vehicles and more drone usage, will lead to increased data usage with more devices and sensors communicating with each other, i.e. machine to machine. Especially when the 5G network is further rolled out and adopted in today's society, and eventually, the introduction and implementation of 6G networks will soar data usage and generation.

Fig 16: Impact of technical innovations

Technological innovation	Likelihood of happening	Realisation	Impact on data centre sector
Quantum computing	Low	5-10 years	High
Web3	Moderate	0-5 years	Moderate
VR, AR, MR	High	0-5 years	Moderate
AI, ML IoT	High	0-5 years	High

Source: Savills

Human resources

Specialists labour shortage

A rising concern expected to further exacerbate in the next three years

People are essential in the data centre market for not only keeping the data centres running and operational but also for developing new data centres. With the rapid increase in data consumption and the related demand for data centre capacity, it is essential to have qualified specialists that can improve existing data centres and develop new data centres to facilitate the growth in data consumption.

However, the global data centre market is challenged by a lack of available and qualified people. According to a study by Uptime Institute, global data centre staff requirements are forecasted to grow by approximately 300,000 to 2.3 million people in 2025, up from 2 million in 2019. This is especially prevalent in the US and EMEA, Western Europe specifically, with a lack of available qualified staff concerned about the so-called "silver tsunami", a wave of retirements in the coming years, leaving fewer experienced and qualified staff to train new talent.

The slowly declining working-age population also reflects this wave of retirements in Europe. Currently, 64.2% of Europe is within working age. Based on forecast data from Oxford Economics, this percentage will shrink to 63.7% by 2025, reflecting a loss of nearly 1.5 million working-age people. However, this number reflects all workforce across all industries and sectors. For data centres, a better indicator of the availability of inflow of new talent is the people with ICT education and/or background.

Although the total working-age population is set to decline, the share of people employed in the ICT sector and with an ICT education and/or background in Europe has been growing steadily since 2015. The share of ICT employment as % of the total working-age population is forecasted to remain stable or slightly increase in the coming years. All in all, the findings from Uptime Institute show that by 2025 there is a need for 80,000 new data centre staff in Europe.

European Data Centres : Challenges & opportunities

Data sovereignty

GDPR & DPA implications

Data centre operators' obligations and liabilities are increasingly engaged

It has been four years since General Data Protection Regulation (GDPR) came into force (May 2018). The main goal of the law was to protect the EU's citizens' privacy and information. Hence, GDPR rules apply to all companies (including non-European ones) with data from organisations or people residing in the EU. Additionally, the GDPR provides for the free flow of non-personal data within the European Union to enhance the competitiveness of its digital economy. Importantly, it also allows data flow to third-party countries if the receiving country's laws comply with the GDPR's rules. Since May 2018, there has been a massive uptake in policy revisions and updates.

Data processing under GDPR covers a wide range of considerations to be addressed, notably storage security, erasure and decommissioning to permanently remove data from drives, LUNs, servers and virtual machines. The regulation has, therefore, a heavy impact on data centre operators' business models and added responsibility and an onus on the data processor to work closely with the controller. This mainly resulted in increased legal costs as contracts between data processors and data owners have become more elaborate and strict, and complex data management often requires auditing. On a positive note, GDPR rules brought cohesion and clarity within the European Union.

Post-Brexit UK-GDPR, DPDI on hold

In January 2021, the UK became "a third country" under the EU's GDPR, with provisional agreements between the UK and EU. In anticipation of Brexit, a new domestic data privacy law called the UK-GDPR took effect in January 2020. It is almost word for word, completely identical to the EU's GDPR. Alongside the Data Protection Act of 2018 (DPA), UK-GDPR governs all processing of personal data from individuals located inside the UK. The DPA also governs data processing for local law enforcement authorities and intelligence services. In June 2021, the EU agreed on an adequacy decision for the UK, ensuring the free flow of personal data between the two blocs for four years until June 2025.

However, during the same month, the UK government announced some reforms to the data protection framework to ease and simplify some regulations. This new regulation will likely create a dual regime for most companies with differing rules for personal data in the scope of the UK regime and personal data in the scope of EU law. Indeed, any data on people in the EU will still need to comply with the EU GDPR. Compliance with these two regimes will likely lead to increased complexities and additional legal investments for data centre operators. That said, early this month, the UK government confirmed another pause to draft the Data Protection and Digital Information Bill (DPDI), opening a period of uncertainty and transition for businesses.

Conclusion & outlook

With e-commerce, homeworking, e-learning and telemedicine now a part of our routine, the demand for data storage (expected to increase significantly before the pandemic) is booming.

Development in infrastructure has grown in the last two years to accommodate the surging amount of data traffic. This is anticipated to continue, as witnessed by the significant submarine cable projects and data centre schemes in the pipeline for the next three years.

For this energy-hungry industry, access to power has always been centre stage. Yet, since the start of the Russia/Ukraine conflict, the subsequent European energy shortage in Europe has had some critical impact on the sector, with some restrictions starting to be implemented. Data centre operators will (increasingly) have to deploy on-site energy in the future to circumnavigate the increasing number of moratoriums.

Large data consumption regions will continue to attract developer and operator attention. However, in the short term, new development projects are more likely to flourish in locations where energy is secured (such as the Nordic region), largely self-efficient and green.

Whilst data centre efficiencies have improved significantly over the past ten years; much more will be needed to make the industry truly “green”, not least in light of the expected digital surge expected for the next 5-10 years. To actively embrace ESG credentials and secure energy sources, operators will have to raise large amounts of investment.

In the current gloomy economic context, the highly positive fundamental of the market will continue to exacerbate consolidation and M&A strategies and attract an increasing range of investors. We expect rising private equity flows in the market as the industry needs to invest in its core business.

Private investors will increasingly use JV and entity acquisitions to enter the data centre market to circumvent the lack of transparency and the high level of specialism required in this niche market. Consolidation strategies amongst the major market players will increasingly lead towards more sale and leaseback opportunities.

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