

Securing our digital future

Building the data centre capacity we need: challenges and opportunities for construction

June 2021

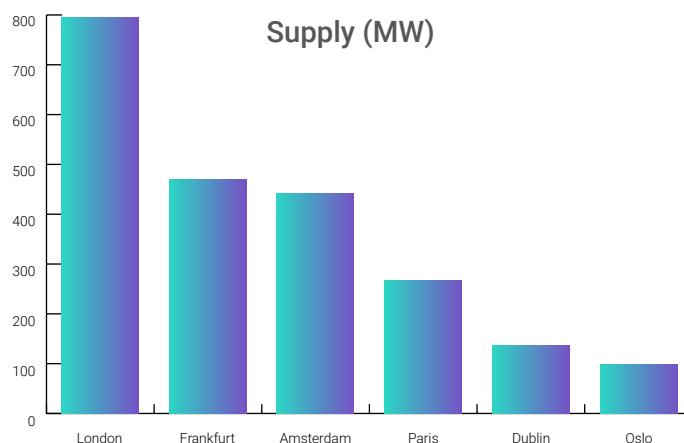
In association with **PROCORE**

Introduction

Data centres provide the digital infrastructure that underpins the internet and everything we do that depends upon it. Data centres are the physical manifestation of our digital economy, which does not float in a cloud but sits securely in servers.

Data centres are behind the UK's world class digital services market and allow us to punch well above our weight in exports, and they also quietly enable a vast range of economic and social activities: business processes and transactions, medical research, environmental monitoring and modelling, online learning, government service delivery, socialising and entertainment. And of course during the pandemic our dependence on data centres increased significantly as activity moved online. This was accompanied by growing recognition of the infrastructural and economic importance of this sector within government.

This acknowledgment from Whitehall is long overdue for a sector that is an outstanding success story: delivering year on year growth, the UK's data centre industry is ranked second globally and represents the largest commercial market in Europe by a significant margin. The UK is also a centre of excellence in terms of technology and expertise.



UK dominance over other EU markets (data centre supply, using MW of take-up as a proxy. Source: CBRE

The UK's productivity, competitiveness and strength as leader and net exporter of digital services depends on state-of-the-art infrastructure that is secure, efficient, reliable and cost effective. It also depends, now and in the future, on adequate capacity, both in terms of data infrastructure (data centres) and connectivity (telecommunications networks).

Fortunately, digital infrastructure is now a top priority for UK Government in terms of enabling recovery, growth, competitiveness - and of course positioning the UK post-Brexit as a global player and centre of excellence. And this is right: data centres provide the technical infrastructure for financial services, aerospace, transport, healthcare, retail, utilities, academic research and entertainment, and critically, will enable the UK to be world-leading in green technologies and services. Each new data centre contributes between £397 million and £436 million GVA per year to the UK economy¹ while the contribution of each existing data centre is estimated to lie between £291 million and £320 million per annum. Data centres are where our industrial strategy meets our digital strategy.

Adequate data centre capacity is therefore a prerequisite for the delivery of strategic Government priorities and more specific policy agendas – from the Plan for Growth and our National Data Strategy, to the Levelling Up agenda. In response, the UK market is growing actively and adding capacity with acquisition and refit, expansion of existing sites and plenty of new data centre developments.



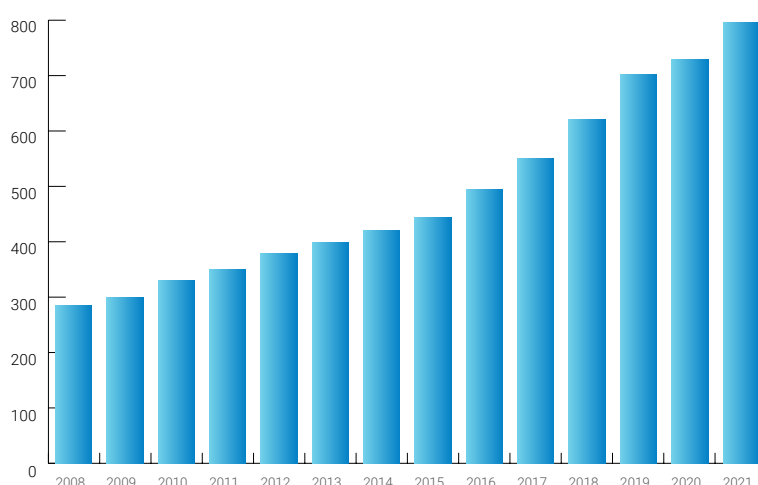
What is digital infrastructure?

We all know what physical infrastructure is – roads, rail, bridges, ports, airports, utilities. We need infrastructure to support communities and for the economy to function. Digital infrastructure is the same, but instead of allowing the movement of lorries or trains or water or electricity, it facilitates the flow of data – on which everything else increasingly depends (including the operation of all those physical infrastructure sectors listed above!).

Digital infrastructure comprises data infrastructure (data centres) and multiple interlocking telecoms networks (communications), which provide connectivity. Economic growth depends on modern infrastructure, both digital and physical, but digital infrastructure is a far more powerful driver of growth than physical infrastructure.

Growth: Drivers and market response

The healthy growth we see in the data centre market is the result of several factors. Firstly, there is the growing demand for digital data, driven by policy agendas, efficiency and productivity drivers, widespread digitisation of government services and business processes from e-commerce to industrial design and consumer preferences. Growth in our commercial market is also driven by the consolidation and outsourcing of existing activity – the movement of distributed IT functions and the migration of on-premise data centres to third party cloud and colocation facilities.



Growth rates since 2008, London Colocation data centre market, using MW of take-up as a proxy. Note that this does not equate to energy consumption. Source CBRE

In recent years we have seen a strong trend towards the development of fewer, much larger facilities as the market matures and consolidates. The commercial sector is growing through a combination of acquisition, expansion and new development and it is worth looking at these drivers briefly in turn:

Acquisition: there is plenty of merger and acquisition activity within the commercial sector as it matures and while this creates opportunities for upgrading and expansion, the real driver of net growth through acquisition is the movement of assets from the enterprise to the commercial market. By this we mean data centres previously operated by businesses purely to support their own IT functions being divested because they are no longer needed; they may represent surplus capacity because of over-provisioning. However, most outsourcing of existing activity to third party providers is for reasons of resilience, cost, efficiency or a desire to change the financing model from capex (where you have to invest in the facility) to opex (where you lease space).

Expansion: data centres are usually built out incrementally to meet demand as existing customers grow and new ones take space. Many UK operators are still expanding capacity within existing sites or campuses. There are multiple expansion projects underway in the UK currently, ranging from internal reconfigurations to the design and construction of whole new data halls.

New development: This is where strong sector growth is most evident, with new facilities opening at frequent intervals and an impressive pipeline of projects at every stage of the development process. We are seeing a strong trend towards fewer but much larger sites. Larger sites can deliver economies of scale and enable elements like energy efficiency and security to be optimised. They are also what customers want: around 90%² of market growth is currently driven by large cloud service providers, for whom scale is critical. These companies need sufficient capacity in the UK to service their customers within the domestic market, whether business, government or consumer. This is not the whole story and we are also seeing buoyant demand from smaller players for colocation services.

Hyperscale operators rely on a mix of in-house data centres and wholesale colocation.³ Partnering with colocation providers enables them to scale operations up or down rapidly, quickly expand into new markets and keep pace with accelerating cloud demand. This new – or newish – hyperscale customer class has profound implications for the way that data centre capacity is being rolled out.



Changing customer demand

The growth of the hyperscale market, which now represents more than half of all installed data centre services and data centre traffic⁴, presents compelling new opportunities for data centre builders and operators, and new data centre developments have to meet the expectations of this new breed of customers. Highly sophisticated and already very experienced in developing and operating their own facilities all over the world, they are specific and demanding in their requirements. They also need capacity at a scale we haven't seen before in the UK - and quickly. All this has obvious implications for data centre construction in the UK.

A data centre build is an exceptionally high capex operation and the larger the build, the bigger the bill, so investors are usually on the scene. In fact, with the sector showing exceptional growth over the last decade⁵, this asset class is attracting attention from a much wider range of investors than hitherto; technical infrastructure specialists have been joined by private equity, pension funds and sovereign wealth funds among others, so investment capital is not currently a problem.⁶ Speed to market is a challenge though - timeframes for these projects tend to be very short which leaves little room for manoeuvre - and no scope for error or supply chain hitches- during construction. In view of the nature of construction projects this is a real challenge.

In the past, data centre builds have tended to be more speculative; well positioned sites with the right connectivity and a competitive offering were unlikely to remain empty for long, and would add capacity incrementally to meet customer demand. While this is still a familiar model, much of the current demand is coming from customers contracting for capacity in advance – known as “pre-lets”. This essentially means leasing space within data centres, whether new sites or on existing campuses, that are still under construction. This imposes a new set of challenges for data centre developers as speed of deployment is usually critical and penalties for late delivery are likely to be punitive.



Another related and relatively recent change influencing data centre construction is the degree of customer involvement in defining specifications, culminating in the practice of “build to suit” where a large customer essentially commissions an entire data centre to be built bespoke to their own requirements.

In the UK, at present, large cloud providers tend to lease space within existing colocation facilities, or seek capacity in new developments through pre-let space or build-to-suit (as described above). This approach differs from some other markets, for instance that in Ireland, where the preference is to self-build large scale campus developments. This looks set to change in the UK to a more hybrid approach, where we anticipate large CSPs like Google and Amazon will opt for some degree of self-build in the medium term. Indeed, several large hyperscale operators have procured, or are in the process of purchasing, development sites with this in mind.

Construction technology: Challenges and opportunities

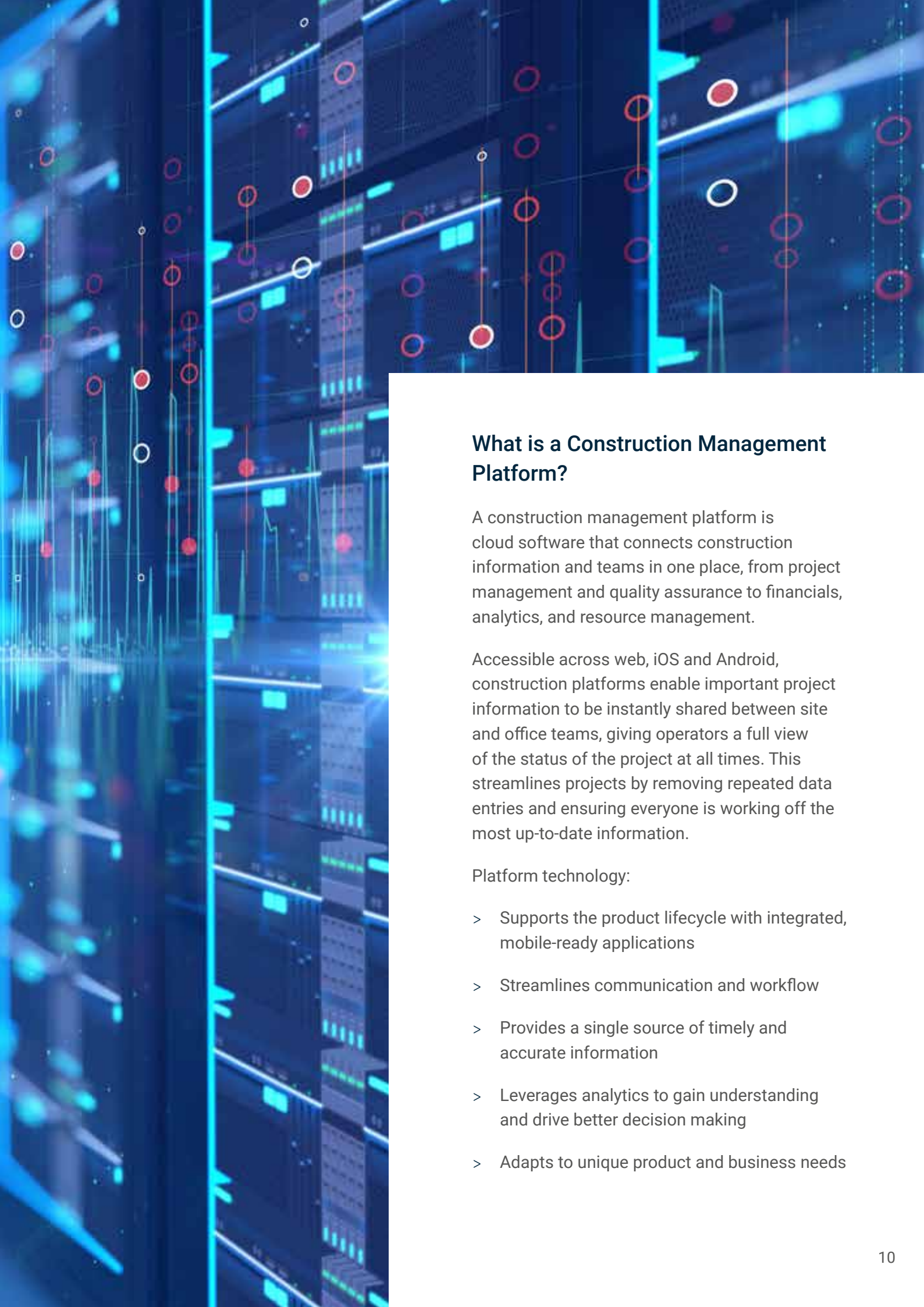
It is clear that large cloud providers offer high value contracts to the data centre construction sector with opportunities for repeat business as their requirement unfolds over time. Unsurprisingly, there is fierce competition among data centre developers and operators for this business, which can affect pricing and add pressure for suppliers to agree to more challenging programmes and terms of engagement than they might consider in a more traditional business environment.

Another challenge is that data centre projects, which are already complex, are becoming even more so, involving multiple stakeholders and a high value and multi-level supply chain that extends beyond the traditional teams of designers, contractors, suppliers, consultants and professional services. Managing all this complexity in a transparent and coordinated way is a real challenge.

For this reason, operators are paying renewed attention to efficiencies that can be made during the build phase. Data centre projects are construction projects like no other – the planning and building of a data centre is a highly intricate and involved process. And because data centre facilities are very valuable facilities, with enterprise customers, even being slightly late on a project can have serious consequences.

Technology can play a key role by enabling stakeholders to reduce risks by providing real-time visibility, transparency and valuable insights on a project through a construction platform. Traditionally, construction has been managed through a mix of paper and manual processes, point solutions and on premise solutions. As projects become more complex, this approach is hard to sustain.

Platform technology solutions are a solution to this challenge. Platform solutions provide access to a single source of accurate and timely data reducing miscommunication, errors and rework; eliminating delays; and maintaining history for future projects and dispute resolution, with a real-time, consolidated view of the entire project - so project collaborators know if projects are on-time, on-budget, and course correct quickly.



What is a Construction Management Platform?

A construction management platform is cloud software that connects construction information and teams in one place, from project management and quality assurance to financials, analytics, and resource management.

Accessible across web, iOS and Android, construction platforms enable important project information to be instantly shared between site and office teams, giving operators a full view of the status of the project at all times. This streamlines projects by removing repeated data entries and ensuring everyone is working off the most up-to-date information.

Platform technology:

- > Supports the product lifecycle with integrated, mobile-ready applications
- > Streamlines communication and workflow
- > Provides a single source of timely and accurate information
- > Leverages analytics to gain understanding and drive better decision making
- > Adapts to unique product and business needs

Other challenges to data centre capacity

Power Provisioning

Data centres are electro intensive.⁷ Developments can therefore only proceed where there is adequate power supply, but data centres have other locational attributes and suitable sites are relatively rare. Lack of power in such locations will therefore limit or delay development.⁸ While our grid is one of the most reliable in the world, and generating capacity is adequate to meet overall demand⁹ there are power constraints in specific areas, in particular the West London corridor which is a prime location for data centre developments.

There are several contributing factors: the highly clustered nature of data centre operations, a period of buoyant growth for the sector and the move towards larger individual developments have pushed up demand in certain locations. This has been predicted for some time and is part of a long term trend, but the highly regulated nature of our electricity grid prevents speculative or proactive capacity improvements without clear indication of demand. The rationale is that it is uneconomic to maintain unused capacity.

This is particularly problematic because these shortages cannot be solved overnight: even where upgrades have been agreed, a two year wait is standard and that new capacity has already been pre-allocated. Data centre development timescales cannot accommodate long delays so there is a growing risk that hundreds of millions of pounds of investment will be deployed elsewhere. We are currently working to address this disconnect with relevant stakeholders. The sector is well placed to provide granular data on electricity consumption and valuable intelligence on the scale, location and characteristics of future demand so we look forward to a more strategic dialogue.

Policy

Despite their criticality, data centres have been absent from strategic government policies over the last decade: the last Digital Strategy and Industrial Strategy do not mention data centres, and the National Infrastructure Commission does not have a data centre remit. However, things are changing.

On the plus side, DCMS (the Department for Digital, Culture, Media and Sport) established a dedicated team back in 2020 to support the sector and is already having an effect: data centres are now explicitly included in the National Data Strategy, for instance, and those working within the sector are now officially designated key workers.

With this new recognition comes greater scrutiny and data centres are now obliged to notify relevant transactions to the Secretary of State for Business under the National Security and Investment Act. While not all mergers and acquisitions are in scope, this new power to scrutinise and intervene has the potential to hamper development and delay investment flows. Intelligent implementation and good guidance will be key.

Skills

Skills shortages in the data centre sector are well known. The sector is working to address short term needs by outreach to other engineering-rich industries and disciplines. Longer term shortages can only be addressed by increasing the number of STEM students to provide a future pipeline of technical talent and again we are working with education providers and other stakeholders to build awareness and position our sector as a career destination of choice. However, this is too large a topic to address fully in this paper and will be the subject of a separate publication.

Supply Chain Resilience

UK operators will be aware that the dedicated team within the DCMS appointed to support the UK data centre sector has identified supply chain resilience as a key priority for the UK sector and explored supply chain risks relating to both construction and operation.

In terms of construction the issues they identified that could delay rollout of data centre capacity included supply bottlenecks, customer competition, over provision and stockpiling, single points of failure, geographical clusters, lack of supplier diversity (i.e. limited options in terms of supplier or location) and delivery delays due to complex manufacturing supply chains where multiple component or sub-contractor delays have the potential to accumulate. Work is ongoing within the Department to explore and evaluate these risks.

Using platform technology, operators can achieve greater visibility over the construction supply chain through real-time insights on their projects. By being able to access supply chain information in real time, operators can react more quickly and effectively to unforeseen risks, as well as changing customer expectations and market demands, and can make more informed business decisions.

Planning

Obtaining planning permission for data centres projects can be problematic. Data centre projects often encounter delays at the planning stage or suffer inappropriate conditions because planning professionals are unfamiliar with this type of development.¹⁰ This is at least partly attributable to the absence of any mention of data centres in the National Planning Policy Framework or the accompanying Guidance. Current planning policy confuses infrastructure and housing: levies like the CIL (Community Infrastructure Levy) are being directed away from digital infrastructure investment, and the London Plan's Carbon Offset Levy looks set to discourage digital infrastructure projects in the capital by adding millions of pounds to development costs at the planning stage.

Data centres should be included under digital infrastructure in the next National Planning Policy Framework and guidance developed to ensure planners understand the characteristics of this type of land use. Meanwhile we are working with the Ministry for Housing, Communities and Local Government (MHCLG) and with local authorities to improve awareness of the role that data centres play in providing local digital capacity.

Regulation

Everyone accepts that regulation has a role to correct market failure, but unnecessary regulatory constraints should be challenged. Because of the complexity of these environments, data centres tend to be captured, sometimes inadvertently, by legislation for which they are not the intended target. A reappraisal of the more problematic instruments would be welcome and a submission has been made to the Taskforce for Regulatory Reform to this effect.

Other barriers to investment and development include fibre tax, albeit under a temporary moratorium, and environmental permitting, where long response times for permit applications can impact project delivery.



Conclusion

Data infrastructure, in the form of data centres, provides the core digital capacity for the UK's data economy and our trade in digital services, from financial services to medical research. The UK has a globally important data centre sector, is a centre of excellence and hosts the world's largest cluster of commercial third party providers in and around Slough, which provides a compelling example of how to do this right. We can and should build on our success: identify what we do well, platform our capabilities and promote best practice so that the UK can build on its strengths. Policymakers should also conduct a systematic review of good practice in other international markets, especially those that compete with the UK for trade in digital services, and learn from them.

The infrastructural and economic importance of data centres should be acknowledged in strategic policy agendas: planning, industrial and digital, and progress is now being made thanks to DCMS, whose dedicated team is now working closely with the sector.

Within the sector, data centre developers, builders and operators can and should adopt best-in-class approaches: construction technology software platforms can ensure that complex projects are fully coordinated, with real time oversight of multiple activity streams. Sophisticated AI enabled tools and technologies help minimise delay and risk in the construction process.

Ensuring that the UK's data centre capacity continues to be adequate for our future needs is an ongoing challenge. It is critical that unnecessary constraints and risks are not placed on this market. Regulation must be fit for purpose: policies should be correctly scoped, be proportional and deliver meaningful outcomes. National and local levies must be more closely scrutinised to ensure that they are correctly targeted and do not hamper the rollout of digital infrastructure. Levy income must be used for its stated purpose, expenditures must be accountable and outcomes must be audited. In particular, a more strategic dialogue on power provisioning is needed between the sector and energy providers so we can plan for future energy needs and avoid local power supply constraints.

These actions will enable the UK to capitalise on its world class data infrastructure and on its leadership position as a globally important digital economy.

References

1. See: <https://www.digitalrealty.com/data-economy> or <https://www.adlittle.com/en/digital-infrastructure-driver-competitiveness>
2. Statistics from CBRE - 2021 Q1 MarketView. NB, wholesale customers lease whole halls, either unfitted or fitted bespoke to customer specifications. Retail customers tend to take racks or part racks in fully fitted halls.
3. According to Synergy Research, more than 70% of all hyperscale data centres are located in facilities that are leased from data centre operators or are owned by partners of hyperscale operators
4. Cisco Global Cloud Index forecasts that hyperscale accounts for 54% of installed servers and 55% of data centre traffic
5. Cowen and Company have [published detailed analysis of data centre market stock performance, transaction patterns and investors](#).
6. See this [short discussion on investor appetite for data centre assets](#) by VIPA Digital.
7. The UK's commercial data centre sector collectively consumes 3.6TWh of power a year (2020 data from the Climate Change Agreement) about 1% of our electricity demand which equates to about 0.3% of the UK's primary (total) energy consumption.
8. For more about data centres and energy see our [Data Centre Energy Routemap](#)
9. Electricity consumption has fallen almost continuously since the 1990s -See DUKES – Digest of UK Energy Statistics, 2019 or 2020
10. For more information about planning and data centres see our [FAQ for planning professionals](#)

Further information

[The UK Data Centre Sector: The Most Important Industry You've Never Heard of](#)

[CBRE data centre market overview 2020](#)

[Cowen and Company: Data Centre Metro Market Financial Analysis and Update](#)

[Vipa Digital: Data Centre Investment: No Brainer or Buyer Beware?](#)

[techUK: Data Centres: Animal, Vegetable or Mineral? FAQ for Planning Professionals](#)

[techUK: Data Centre Energy Routemap](#)

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About techUK

techUK is a membership organisation that brings together people, companies and organisations to realise the positive outcomes of what digital technology can achieve. We collaborate across business, Government and stakeholders to fulfil the potential of technology to deliver a stronger society and more sustainable future. By providing expertise and insight, we support our members, partners and stakeholders as they prepare the UK for what comes next in a constantly changing world.



About Procore

Procore is a leading provider of construction management software. Over 1 million projects and more than \$1 trillion USD in construction volume have run on Procore's platform. Procore's platform connects key project stakeholders to solutions Procore has built specifically for the construction industry—for the owner, the main contractor, and the subcontractor. Procore's Marketplace has a multitude of partner solutions that integrate seamlessly with Procore's platform, giving construction professionals the freedom to connect with what works best for them. Headquartered in Carpinteria, California, Procore has offices around the globe. Learn more at <https://www.procore.com/en-gb>



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