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Data Centres: Animal, Vegetable or Mineral?

20 Questions for Planning Professionals

Emma Fryer, April 2021

Scope and Purpose of this document

Applications for new data centre developments are unlikely to have troubled most planning professionals, especially those located outside major conurbations. Data centres are not mentioned in the National Planning Policy Framework or in supporting guidance, and do not sit comfortably within any current land use classification. Despite this, data centres are of strategic importance regionally and nationally because they provide digital infrastructure. Data centres also have locational attributes that are not well understood outside the sector and make site selection challenging for developers.

The purpose of this document is to provide information on data centres to help planning professionals and local authorities make informed decisions and apply appropriate conditions to planning applications relating to data infrastructure projects. These notes explain what data centres are, what they do, how they contribute to our everyday lives and why they matter both to national and local economies. We will also take the opportunity to deconstruct some common myths and misconceptions that can disrupt the planning process from time to time.

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FAQs for planning professionals – Quickfire Round

1. How and where are data centre developments reflected in planning policy?
   They aren't but they should be included under section 10 of the NPPF, supporting communications

2. So, er, what IS a data centre? And what isn't it?
   A data centre is a secure, resilient building providing digital infrastructure. It is not affordable housing

3. What do data centres do and how do they do it?
   Data centres process, store, receive and transmit digital data. They are where the internet lives

4. Why do they matter?

Because everything we do relies on digital infrastructure

5. What do you mean by digital infrastructure?
   Comms networks and data centres enable data movement, like roads enable vehicle movements

6. So is a data centre just a big server room?
   Only most superficially: it is very different in terms of security, connectivity, efficiency and resilience

7. Surely data centres can be built anywhere. Why does this one have to be here?
   Data centres have locational attributes and suitable sites are rare

8. Why haven't I heard of this applicant? Aren't data centres all built by Google and Microsoft?
   The data centre market is business to business (B2B) so developers are not household names

9. What impact will data centres have on local traffic?
   None – they do not generate traffic

10. What about the contribution to our local or regional economy?
    Data centres can have a transformational impact locally. Look at Slough or Lulea

11. How many jobs does a data centre generate?
    Most direct jobs are in construction. As infrastructure data centres generate employment indirectly

12. I thought that data centres were ugly sheds. Won't they blight our urban landscape?
    No: although data centres have to accommodate technical functions they can be very stylish

13. Don't data centres run on huge diesel generators that will have a negative impact on air quality?
    No. Data centres run on electricity. Embedded emergency generation is installed but rarely used

14. Data centres use lots of power. Won't that compromise existing supply to homes and businesses?
    Electricity for data centres is contracted through power provisioning and may improve supply reliability

15. Don't data centres need broadband connectivity? Won't that compromise bandwidth for others?
    The opposite is more likely as connectivity may be upgraded – for example in Newcastle

16. What about water?
    Water use depends on the cooling technology being used. Worth a discussion with the developer

17. Don't data centres produce waste heat that can be re-used for homes?
    Red herring. This is low grade waste heat that cannot be reused unless there is an adjacent offtaker

18. Surely introducing a large energy user goes against sustainability and the green agenda?
    Energy intensity should not be confused with inefficiency. Consolidating IT radically improves efficiency

19. What planning challenges have data centres faced elsewhere?
    Delays, resistance and spurious conditions due to lack of understanding of function and criticality

20. How can data centres help us achieve the objectives of our Local Plan and other policies?
    They offer local digital capital, stimulate high value jobs and digitally enabled economic growth

FAQs for planning professionals – detailed answers

The UK's data centre sector quietly underpins an internet economy that contributes over 16% of domestic output, 10% of employment and 24% of total UK exports[i]. The UK's strength as leader and net exporter of digital services depends on state-of-the-art digital infrastructure that is secure, efficient, reliable and competitive. It also depends, now and in the future, on adequate capacity, both in terms of data infrastructure (data centres) and connectivity (telecommunications networks). From a policy perspective, the successful delivery of a multitude of initiatives, from the Digital Strategy to the Levelling Up agenda, are heavily reliant on world-class data infrastructure.

Q1 How and where are data centre developments reflected in planning policy?

At time of writing, neither data infrastructure (the term for data centres currently in use among policy makers) nor data centres are referenced in the latest iteration of the National Planning Policy Framework or in supporting guidance. However, data centres are directly relevant to section 10 (supporting high quality communications) so this is their home within these documents. From a strategic planning perspective, data centres, combined with fixed and mobile telecommunications networks, comprise digital infrastructure.

However, data centres are relevant to other provisions within the NPPF, such as Section 6 (building a strong and competitive economy). Together with the ecosystem of data-dependent companies that tend to develop around them, data centres underpin those high tech clusters that planners are urged to accommodate. The sector has also proved astonishingly resilient to the challenges of COVID-19: operators have been able to pay rent and rates on time and the sector is not associated with redundancies or furlough. Section 7 (Ensuring the vitality of town centres) is also pertinent to data centres which are usually located on trading estates and will not impact local traffic or draw consumer trade away from town centres. In this capacity data centres, typically brownfield development on post-industrial sites, also support the provisions of Section 11 (promoting effective use of land).

Q2 So, er, what IS a data centre? And what isn't it?

A data centre is a building (or self-contained unit within a building) that houses computing equipment (primarily servers) along with associated components such as telecommunications, network and storage systems. A data centre is equipped with a guaranteed power supply and high bandwidth connectivity. Resilience is critical, so redundancy (duplication) of networks, power and other infrastructure is common to ensure continuity. Building management controls such as air conditioning maintain the environmental conditions for the equipment within a specified envelope of temperature and humidity, and advanced security systems ensure that the facility and its data remain secure[1].

A data centre is not affordable housing, it does not manufacture a product, it is not a supermarket and, perhaps disappointingly for some, it is not there to spy on people, provide shelter in the event of a zombie apocalypse or generate Death Rays. In the simplest possible terms it houses computers to process data at industrial scale. The by-product is usually warm air.

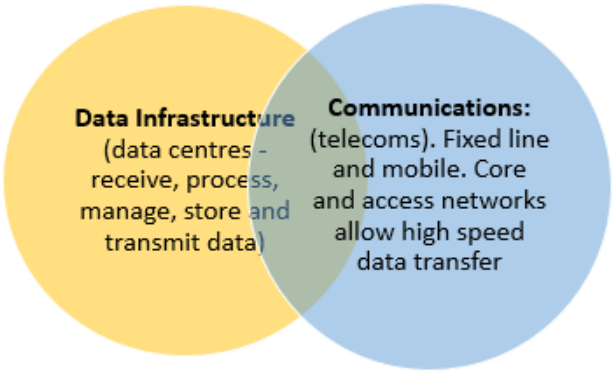
Q3 And what do data centres do?

Data centres receive, process, manage, store and transmit digital data and comprise part of our core digital infrastructure. Telecommunications rely on data centres and data centres rely on telecommunications. Every time we read a post on Facebook, order our shopping from Sainsbury's, get directions for a journey, download a film, send an email or check the weather forecast, a data centre is involved. In fact, a single transaction usually depends on many data centres interacting – not just one. The image in Endnote A sets

[1] See our publication Er, What IS A Data Centre?

out how data centres work as part of our communications infrastructure. It is data centres that enable supermarkets to resupply, retailers and banks to process financial payments, delivery companies to manage logistics and governments to deliver services. It is data centres that keep businesses running remotely and allowed us all to communicate during COVID-19 lockdowns. Data centres are the physical manifestation of our digital economy: we cannot lead connected lives without data centres.

Q4 What do you mean by 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[2].

Q5 And why do data centres matter?

The internet, and all the economic productivity of the digital economy, does not float in a cloud but sits securely on servers in data centres. Although most people have never heard of it, the UK's data centre sector is a real success story, is globally important and leading edge in terms of technology and expertise and delivers year on year growth. Data is as important to our economy as concrete or steel – and it is data centres that are the physical manifestation of our digital economy and enable the UK to punch well above its weight in digital exports and services. UK facilities provide the technical infrastructure for financial services, aerospace, transport, healthcare, retail, utilities, academic research and entertainment. Data centres are the critical infrastructure that will enable the UK to be world-leading in green technologies and services. Each new data centre contributes between £397 M and £436 M GVA per year to the UK economy[3] while the contribution of each existing data centre is estimated to lie between £291 M and £320 M per annum. Data centres are where our industrial strategy meets our digital strategy. You can find out more about the UK's data centre market from our Sector Overview[4].

Q6 So is a data centre just a big server room?

Er, yes and no. If you work for a local authority you may be familiar with what we call "on-premise IT" in the form of server cupboards and server rooms, some of which may be large enough to be described as data centres. At a superficial level, yes, a data centre is a larger version of one of these – an environment where the IT functions that support an organisation are housed. That's probably where the similarity ends, though. A commercial data centre is usually purpose-built and houses IT functions for any number of third party customers – sometimes for hundreds of different organisations, sometimes designed and built bespoke for a single large customer. It provides guaranteed levels of security, connectivity and, usually, operational efficiency. It benefits from economies of scale in terms of energy purchasing, energy stewardship and environmental controls like cooling systems. If you want to understand why people choose to outsource their core IT functions to data centres, have a look at Endnote B.

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[2] There is a plethora of reports on digital infrastructure as a driver of growth. Examples include: https://www.adlittle.com/en/digital-infrastructure-driver-competitiveness and http://reports.weforum.org/delivering-digital-infrastructure/

[3] See: https://www.digitalrealty.com/data-economy

[4] The Most Important Sector You've Never Heard of: UK Data Centre Sector Overview 2020

Q7 Surely data centres can be built anywhere. Why does this one have to be here?

Data centres are thought to be location agnostic but this only applies to certain types of operation, simplistically those that provide services like email that do not rely on very fast response speeds (fast response is termed "low latency" in the industry). So large cloud operators are developing sites in Scandinavia, where there is available land and cheap renewable power. In the UK the requirement tends to be much more specific. Data centres have locational attributes, with complex needs in terms of site characteristics. As a result, suitable plots for data centre development are extremely hard to find. UK operators and developers will therefore have invested significant time and resource in site selection before they start a planning application. Unlike residential developments, where planning permission may be sought more speculatively and plots with consent may never be developed, data centre applications are made from a position of immediate need.

Q8 Why haven't I heard of this applicant? Aren't data centres all built by Amazon and Google?

To date, no data centres in the UK have been developed by these large cloud providers, although this situation is likely to change soon. Until that happens, they represent a large and important customer base for commercial data centre operators that you won't have heard of like Vantage, VIRTUS, CyrusOne and Ark. See Endnote C for a data centre services map that shows what these and other operators do.

Q9 What impact will data centres have on local traffic?

Data centres have marginal impact on local traffic. Daily footfall to facilities is low compared to distribution warehouses, manufacturing or office developments and negligible compared to retail outlets. Shift patterns apply to most staff. Vendors, customers and operational staff will need to access the site and numbers will vary depending on the type of data centre, the number of customer organisations operating within it and the kind of activity it is supporting. Vehicles tend to be private cars or small vans. Occasional visits from tankers to top up storage tanks should be expected and very occasionally, large plant may turn up to be installed but the latter will be rare events. The commonly imposed requirement for large car parking capacity in anticipation of future change of use is therefore not appropriate. When we compiled footfall data about facilities numbers varied from about a dozen to around 100 individuals during a 24 hour period. However, we would anticipate more footfall for sites that share premises with corporate offices.

Q10 So data centres are good for the UK economy but what about our local or regional economy?

This is a good question and the answer is that data centres can have a transformational impact on local economies. Take Lulea in Sweden, a post-industrial area previously known for forestry and mining, that urgently needed to reinvent itself as traditional industries declined. The regional authority attracted data centre operators, most notably Facebook, whose large site generated 900 jobs, $225M in domestic spending and over $500M in overall economic impact[5]. Lulea also hosts a technical university and a research hub and has emerged as a world class centre of excellence – all within less than a decade. However, we don't need to go as far as Sweden to see what success looks like: Slough is the UK's example of how to do this right, and now hosts one of the world's larges clusters of data centres.

Q11 How many jobs does a data centre generate?

It depends on whether you mean construction or operation and direct or indirect. Data centres are advanced technical infrastructure with construction costs usually in hundreds of £M. These are high value projects providing employment for specialist construction and engineering teams. Once operational, data centres generate high value add jobs within the local area, primarily in STEM roles like engineering design, network engineering, IT, facility management, energy stewardship, regulatory compliance, business and technical operations management. Ancillary jobs include security, reception, cleaning and other familiar corporate support roles. While data centres generate hundreds of jobs directly in construction, and dozens

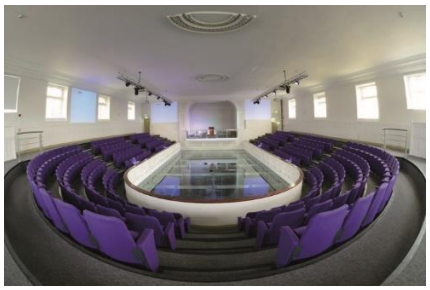
[5] Boston Consulting, 2014: https://image-src.bcg.com/Digital-Infrastructure-Economic-Development-Jun-2014-Nordics_tcm22-29049.pdf

in operation, they are far more powerful drivers of indirect employment and broader economic growth because the digital capacity they provide supports multiple layers of economic activity[6] and comprises part of our core digital infrastructure.[7]

Q12 I thought that data centres were ugly sheds. Won't they blight our urban landscape?

It's true that data centres can be nondescript -they are after all, the modern equivalent of industrial facilities so they are primarily functional, built to deliver operational efficiency rather than aesthetic pleasure. In some cases it can also be helpful from a resilience perspective for these facilities to blend into the built environment and not stand out too much. However, while engineering design must lead, data centres come in many shapes and sizes: see the images below, from left, Equinix in Amsterdam, Switch in Michigan, and AQL in Leeds. Images sourced from DCD (DataCenterDynamics).





Data centres also tend to have large items of mechanical and engineering plant on site and it would be reasonable to request that this is screened from street view, in the interests of aesthetics. We are also starting to see green walls and roofs applied to statement buildings in city centres (see image of a data centre in Hong Kong- source Sempergreen). Outside city centres, initiatives are more likely to be aimed at biodiversity rather than aesthetics, for example in Ireland where developers have funded and implemented bee-friendly planting[8].

Q13 Don't data centres run on huge diesel generators that have a negative impact on air quality?

Data centres run exclusively on electricity but they do install emergency generating capacity to provide power in the event of grid failure. In the UK grid outages are fortunately very rare and the majority of facilities have never run their generators in anger. They do need to test them regularly (usually for about 30 minutes a month), but testing routines can be timed to minimise local impacts and generator operation is highly regulated through MCPD (Medium Combustion Plant Directive) and for larger sites, IED (Industrial Emissions Directive), both of which are implemented through EPR (Environmental Permitting Regulations) in the UK. These regulations effectively prevent elective operation (which means that the generators cannot be used other than for testing or emergency). Data centre contribution to national NOx levels is negligible but facilities do have the potential to affect local air quality for short periods in the unlikely event that the grid is compromised.[9] Hence the very tight controls that already apply. The current development trend is towards larger sites that are likely to be obliged under IED and so planners (and of course developers!) should check at the earliest possible stage that the Environment Agency is engaged. This should also enable requirements to be aligned and avoid conditions that are spurious or contradictory.

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[6] See Data Centre: Engines of Growth

[7] World Economic Forum on digital infrastructure: http://www3.weforum.org/docs/WEF_TC_DeliveringDigitalInfrastructure_InternetEconomy_Report_2014.pdf

[8] See: https://www.hostinireland.com/news/categories/dc-s-for-bees

[9] For more information see: NOX: Implications for Data Centres and Emergency Generation in Data Centres

Q14 Data centres use lots of power. Won't that compromise existing supply to homes and businesses?
Data centres do indeed use lots of power (commercial facilities in the UK collectively use 3TWh a year) and data centre developments can only proceed where there is adequate electricity supply for their needs. Developers and operators have to provision power on the basis of maximum predicted demand that they can impose on the electricity supply in future - once the site is fully developed and working at full capacity. Since data centres are built incrementally they may never reach this threshold. This provisioning takes the form of a formal agreement with the electricity provider and means that properly planned data centres cannot encroach on existing supply to homes and businesses. It is not uncommon for data centres to fund or co-fund additional power infrastructure like electricity sub-stations to guarantee resilience and it is fair to say that by so doing they are also improving the local power infrastructure. Data centres also have relatively stable and predictable power requirements and peak demand is likely to occur on hot days, well out of synch with national peak demand cycles. There is also potential for data centres to be anchor customers of local low carbon generation - for instance energy from waste.[10]

Q15 Don't data centres need broadband connectivity? Won't that compromise bandwidth for others?
Data centres need very high connectivity, and usually from multiple sources, but this is contracted directly from service providers. Rather like electricity, such moves to upgrade connectivity to meet the needs of operators are more likely to improve local infrastructure than consume capacity - particularly if there is a regional drive to attract data centre inward investment or a large scale development proposed. The improvements to local connectivity in and around Newcastle provide a good example.

Q16 What about water?
Data centres commonly use water for cooling and water usage effectiveness (WUE) is a performance metric deployed increasingly within the industry. Newspapers occasionally report high water usage associated with data centres but this is usually related to the USA where approaches differ. High water consumption is not usually associated with data centres based in the UK but water use tends to depend on the cooling methodology deployed. Nevertheless, modern design options may recirculate water, collect and use rainwater, or deploy different types of cooling that minimise water consumption. The way that water is consumed and managed in a new data centre development is therefore worth discussing with the applicant.

Q17 Don't data centres produce waste heat that can be re-used for homes?
Yes and no. The re-use of waste heat from data centres is one of the red herrings that constantly pops up in planning conditions and its inclusion usually demonstrates a lack of understanding of the current state of heat network infrastructure in the UK. Data centres do produce waste heat in the form of warm air. Yes, for a new build it may be possible to implement systems that collect this and deliver it to edge of site, but planners need to bear in mind that this adds cost and reduces operational efficiency. If there is no heat network infrastructure or any receiving customers, then this heat cannot be used productively. Moreover, warm air does not concentrate heat enough to be an attractive source of thermal energy. In countries with existing heat network infrastructure, for instance Sweden, data centre waste heat is already being used and in other countries like the Netherlands policy incentives have been introduced (such as classing that heat as zero carbon) to encourage customer adoption. UK incentives to encourage heat re-use are only having a marginal impact to date, largely because an existing customer is a pre-requisite for grant funding. For a longer discussion see our blog[11] and our energy routemap[12]. Looking ahead, immersive cooling in data centres is capable of generating heat in a much more useful (higher temperature) form. When mature, and widely adopted, this technology could be a game changer.

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[10] For more about data centres and energy see our Data Centre Energy Routemap

[11] Article on Heat Reuse in Data Centres

[12] See our energy routemap: Data Centre Energy Routemap

Q18 Surely introducing a large energy user goes against sustainability and the green agenda?
Being energy intensive is not the same as being inefficient. By moving on-premises IT function out of traditional server rooms and cupboards and consolidating it in purpose-built facilities, data centres reduce energy consumption by at least two thirds (see Endnote C). Data centres also underpin all those carbon saving digital technologies like smart grid, intelligent transport and teleworking that will assist our transition to net zero. Besides being anchor customers of renewables, with predictable demand, data centres are also well positioned to fund additional, utility scale renewable generation through power purchase agreements and are leading research into more novel approaches like fuel cells[13].

Q19 What planning challenges have operators faced elsewhere?
Understandably, local authorities struggle to keep abreast of the location requirements and operational characteristics of data centres. Planning conditions often conflict with legal obligations imposed by the Environment Agency, operators have been required to collect waste heat that has never been used, and have been asked to provide hundreds of unnecessary parking spaces. There has also been confusion over land use classes, with data centres falling within B8 or *Sui Generis,* which has complicated decision making at times. techUK is working with operators and Government to try to improve the understanding of data centres and address some of these issues.

Q20 How can data centres help us achieve the objectives of our local plan and broader policy goals?
Data centres may not be affordable housing, but they do contribute positively to local infrastructure, provide high value jobs and stimulate the kind of digitally enabled economic growth that will be critical in levelling up regions that lag behind London and the South East. Data centres are an essential prerequisite for the successful development of local digital capital. On a broader scale, data centres underpin national policy objectives like the Digital Strategy, the Industrial Strategy and the National Data Strategy.

Further Information
Everyone knows what a supermarket is - both from the inside and the outside - but few people have visited a data centre. There is no harm in asking your applicant to show you an existing facility, or if that fails, talk to us at techUK. We organise data centre tours for public sector officials from time to time and would be happy to help you see one for yourself.

- techUK: Ten Myths About Data Centres
- techUK Local Public Services programme: https://www.techuk.org/local-public-services-programme.html
- For more on our data centre programme see: techUK data centre programme Directory: https://www.techuk.org/data-centres-programme/data-centres-resource-index.html
- Data centre programme overviews: 2020 Overview, 2019 Overview and 2018 Overview

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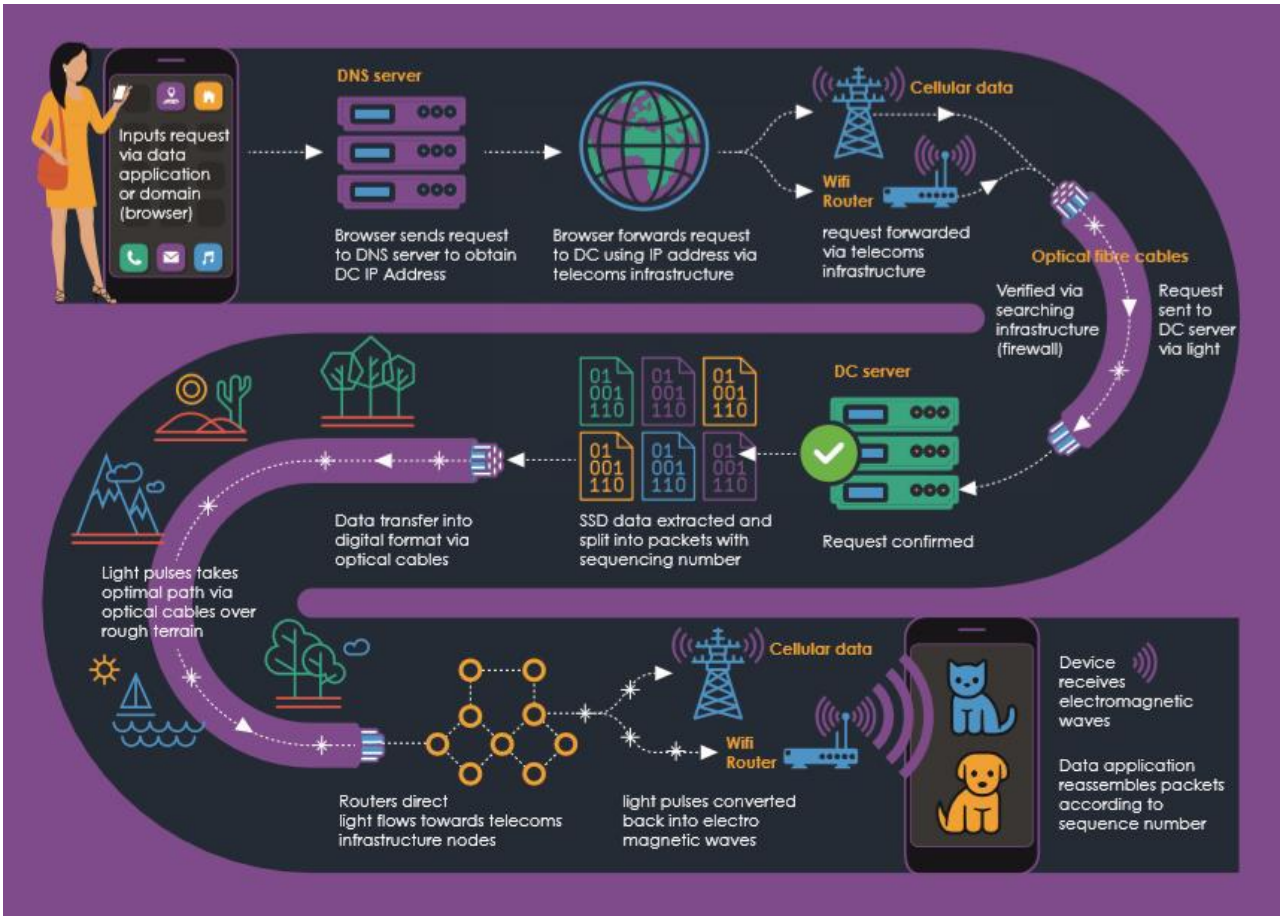
techUK is the UK's leading technology membership organisation, with more than 850 members spread across the UK. We are a network that enables our members to learn from each other and grow in a way which contributes to the country both socially and economically. www.techuk.org

[13] See our Energy Routemap: Data Centre Energy Routemap

ENDNOTES

Endnote A How the Internet Works

This simplified infographic explains how information is transmitted. You can also find it, along with other explanatory material, in our Data Centre Resources Directory.



Other useful explanations include:

- This animated video from EURO-IX, which provides a very good explanation of how the internet works in principle, in particular internet protocols: https://www.youtube.com/watch?v=QuBde4Sn3f0&feature=youtu.be .

- 60 Seconds on the Internet from UK data centre provider VIRTUS, which looks at data movements by minute

Endnote B: Why Outsource IT?

Reasons for outsourcing core IT – why third party data centres exist.
Organisations outsource their IT functions for many reasons: security, resilience, specialist expertise, energy efficiency and cost. Third party providers compete on their ability to protect customers' business continuity and provide guaranteed power, connectivity and security.

Many organisations like supermarkets outsource their data centre functions because running a data centres doesn't represent core business and needs a lot of specialist expertise.

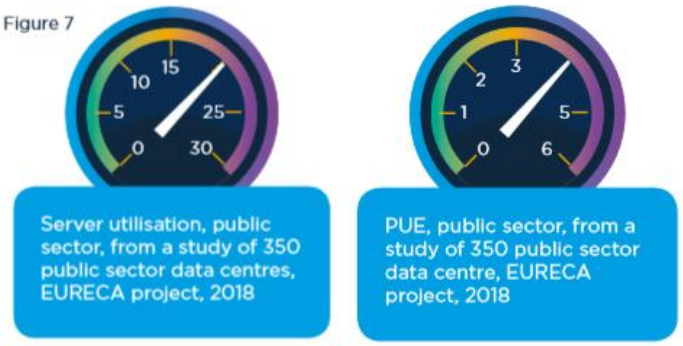
In terms of energy, outsourcing traditional on-premises IT usually reduces energy demand by at least two thirds, and in some cases by over 90%.

Then there is cost – on-premises IT, especially within public sector, is notoriously expensive – a recent study[14] calculated that each server costs 14,000 Euros a year to own, support and manage and identified typically poor levels of energy efficiency (see box below and footnote)[15].

Outsourcing also changes the business model from capex to opex: building a data centre is eye-wateringly expensive. For public sector bodies there is also the option to use Crown Hosting (see box), pre-negotiated and exceptionally flexible and efficient.

Crown Hosting: A joint venture between Cabinet Office and Ark data centres, public sector bodies can outsource, consolidate or simply lift and shift their data centre functions. Pre-tendered, flexible and with no lock-in, this approach removes the need for procurement exercises. State of the art efficiency guarantees Power Usage Effectiveness (PUE: the ratio of energy delivered to the site to that used by the IT) between 1.15 and 1.2, down from the 2013 government average of over 2.5. Result: in the first four years the volume of business was nine-fold what was expected and £1.5Bn in savings was achieved, dwarfing the £105M that had been anticipated for the 7 year life. Crown Hosting has now been extended for a further four years.

Figure 7



Server utilisation, public sector, from a study of 350 public sector data centres, EURECA project, 2018

PUE, public sector, from a study of 350 public sector data centre, EURECA project, 2018

Ignore the figure 7 and 9 numbers on the images to the left and below. Images were extracted from our *Lost in Migration* paper (see below) where we quoted these findings from the EURECA project in 2018.

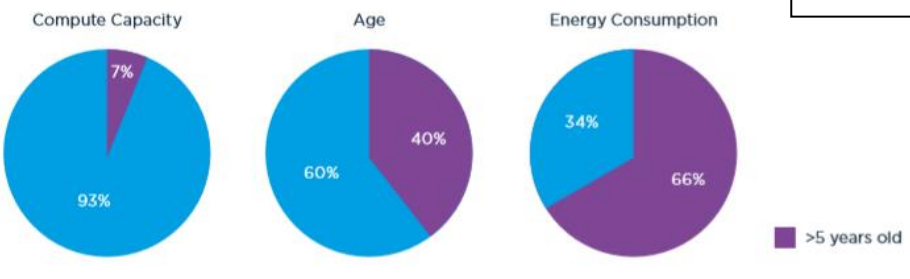


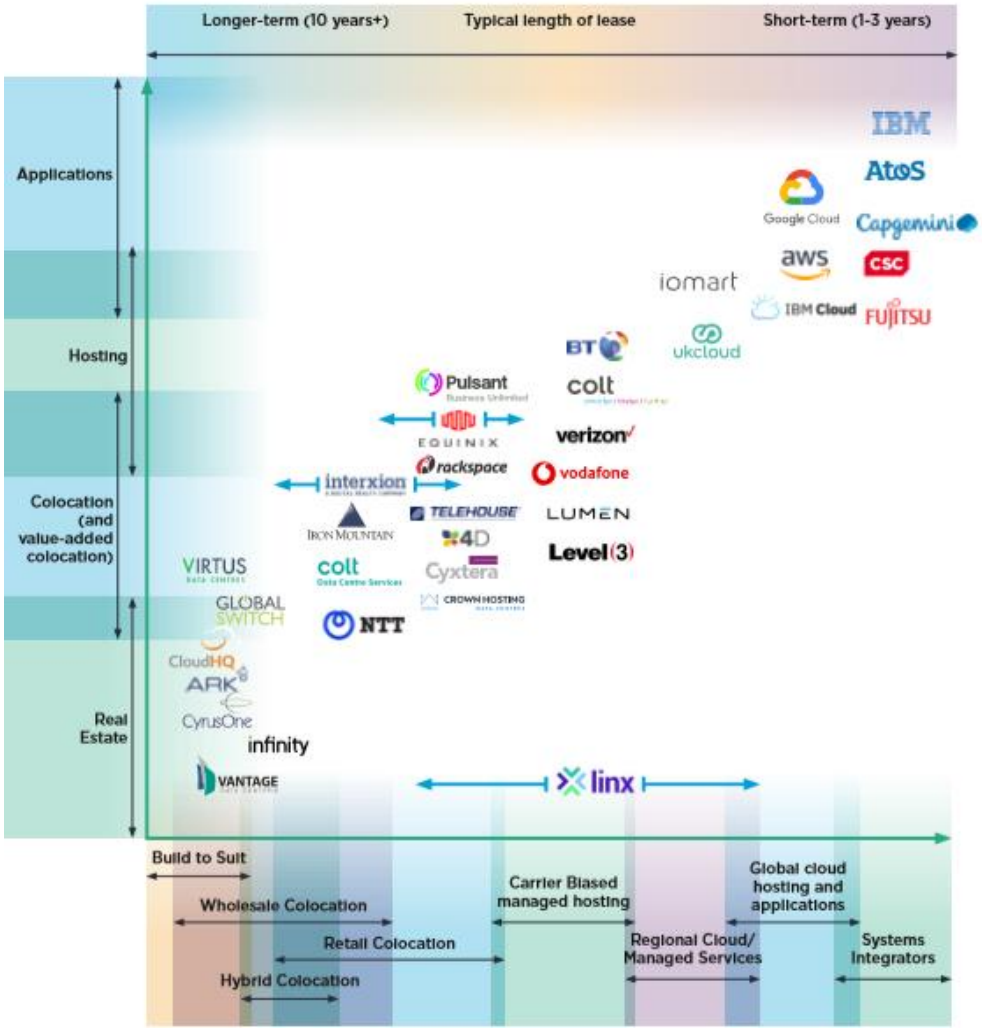
Figure 9: Server age and performance
More figures extracted from the EURECA project, 2018. 40% of servers in public sector data centres were over 5 years old. These performed 7% of compute but used 66% of power.

[14] See the Eureca project, 2018: https://www.dceureca.eu/ and https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8263130

[15] Results reproduced in our discussion paper: Lost in Migration: Attributing Carbon to Cloud

Endnote C: Data Centre Services Landscape: Who Does What?

This diagram identifies some of the operators active in the UK at present, and where they fit – very approximately- within the spectrum of data centre services. This is only indicative: the intention is just to present the range of activity and demonstrate that data centres don't all do the same thing.



NOTES

- Many data centre operators, for example Pulsant, Iomart and Crown Hosting, offer a broader range of services than implied here. Pulsant for example has a cloud offering as well as providing colocation services. There is a strong trend for operators to broaden their service offerings. In reality, therefore, the boundaries between data centre services are already blurred and likely to become less easy to define over time. Some operators, like Equinix, are actively expanding their service offerings across the board and others, like Interxion: A Digital Realty Company (the product of a merger between (predictably) Interxion and Digital Realty) are doing this by acquisition and merger.
- Large (global) cloud service providers (CSPs) may operate their own data centres or take space in third parties, particularly within wholesale colocation. CSPs will often use colo facilities to scale initial operations and then look to build their own facilities over time or utilise a third party operator to enable a built to suit solution.
- Broadly speaking many of the cloud, hosting and application service providers on the right hand side of the chart will be customers of the colocation providers on the left hand side.
- The importance of the global CSPs in our market is understated within this diagram. They are driving much of the growth we are seeing in the UK market at the moment and this is happening predominantly in wholesale colocation (the left hand side).
- This landscape tends to change rapidly so must only be regarded as a snapshot in time.
- This chart is not comprehensive and only represents a sample of operators. There are many providers who are not represented here.
- LINX (London Internet Exchange) provides interconnection services across multiple business models, hence is not allocated to a particular service.

What is this telling us about the UK market?

This mapping exercise, although not comprehensive, reveals some interesting market characteristics:

1. Competition and choice: The most important thing this map tells us is that there are multiple providers in the UK for every type of data centre related service or combination of services. From a customer perspective that is a good thing because it demonstrates that a competitive market exists with plenty of choice. The structure of the UK market is such that the pricing power of individual providers is checked.
2. Dynamic change: The UK data centre market is self-disruptive and constantly changing to meet new types of customer and new forms of demand. We conducted a similar exercise several years ago and it is clear that the market is changing rapidly. There is strong M&A activity – some operators have merged, others have been acquired. This has not, however, consolidated the market into an oligarchy. Although names once prominent in this landscape like Telecity have disappeared, at the same time new entrants like CloudHQ, CyrusOne and other smaller players have emerged on the scene, disrupting the type of services being offered e.g. build to suit for CSPs requiring scale operations, in a short timeframe.