

Data structures

UK data centre operators need to boost capacity quickly, while meeting user requirements for greater reliability, lower costs and a smaller environmental footprint.

First the world went digital, then it moved to cloud. The growth of connected, digitised services has driven huge expansion in demand for the data centre infrastructure that delivers those services. In the UK, the digital economy now accounts for around 8 percent of GDP and an estimated 5.5 million businesses rely on cloud services for core activities.

While digitisation is a multi-decade trend, growth in the UK data centre sector has been turbocharged in recent years by multiple factors. The COVID19 pandemic forced millions of people to shift more of their work and social lives online, for example. And regulatory changes require digital service providers to conduct more of their data processing and storage activities locally.



By 2022, the UK was home to more than 460 data centres, making it the world's third largest market, behind the US and Germany and ahead of China. Within the country, the largest concentration of data centres is in London, which hosts around 70 large facilities, supporting the city's population and its globally significant financial services sector.¹

Continued growth

The end of the pandemic may have slowed the social and business transition to digital platforms, but many of the underlying drivers for data centre demand remain in place. The use of Internet of Things (IoT) technologies will continue to extend the number of data-generating devices, for example, facilitated by the ongoing rollout of 5G and other wireless network technologies.

The emergence of large-scale mainstream artificial intelligence (AI) applications, from autonomous driving systems and healthcare analytics to smart virtual assistants, will increase the need for the specialised infrastructure used to train and the run sophisticated models. And, as stakeholders become acutely aware of the strategic importance of the country's data resources, pressure to ensure availability, security and compliance will further increase demand for processing and storage resources.

Analyst Mordor Intelligence expects the market for data centres and related services to grow at an average rate of 5.5 percent per annum over the next five years.

¹ <https://www.mordorintelligence.com/industry-reports/united-kingdom-data-center-market>

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More, but different

While demand for data centres is increasing, customer requirements are changing. These changes have significant implications for data centre providers, affecting decisions on where centres are located, and how they are designed and equipped.

Sustainability

The International Energy Agency (IEA) estimates that data centres account for around 1 percent of global final energy use, and a similar fraction of global carbon emissions.² The industry has taken significant steps to improve the energy efficiency of its operations in recent years, meaning that power consumption has grown much more slowly than data centre capacity over the past decade.

Despite those efforts, data centres place a growing burden on the UK's energy infrastructure. Research by the National Grid estimates that annual energy consumption by data centres in Great Britain is between 5TWh and 10TWh today. By 2050, it is forecast to grow to at least 12TWh and potentially

as high as 35TWh, depending on future changes in demand and technology.³ For comparison, the high end of that estimate is equivalent to around 10 percent of the UK's total current annual electricity consumption, and around 50 percent of the country's current combined wind, solar and hydroelectric power production.⁴

The UK Net Zero Strategy, which aims to decarbonise the country's energy system by 2050, combined with high and volatile power prices driven by geopolitical events, is putting increasing pressure on energy-intensive industries to make further efficiency improvements.

Data centre operators are pursuing several strategies to achieve that end, including investing in less energy-hungry computer equipment, optimising data centre operations to reduce power consumption, and improving the efficiency of cooling systems. The last of those is an important step since energy for cooling can account for around 40 percent of total data centre consumption.

² <https://www.iea.org/reports/data-centres-and-data-transmission-networks>

³ <https://www.nationalgrideso.com/document/246446/download>

⁴ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1094628/DUKES_2022_Chapter_5.pdf

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Energy might be the biggest component of the data centre industry's environmental footprint, but it is far from the only concern. Operators are under pressure to reduce the consumption of water, which evaporative cooling systems require in large quantities, for example, and to ensure that their installations do not disturb neighbours with excessive noise.

Connectivity

As the world becomes more digital, the role of the data centre is evolving. Companies once relied on their data infrastructure to do the heavy lifting in the background, today it is front and centre, playing a central role in almost every task employees undertake and every interaction with customers. In this new environment, speed and connectivity are key. Data centre users need low-latency, high bandwidth connections within their IT infrastructure and with the outside world.

The need for speed has implications for data centre design, for example with increased use of fibre network technologies. And it has implications for the physical location of critical assets. Where latency is critical, users may want to place IT assets closer to data sources or end users, for example, or to split the digital workload between assets in the centre of the network and at its edge.

In a densely populated country like the UK, this trend creates tension: spacious, cost-effective accommodation may be in short supply at the most favourable, well connected locations. As a result, data centre operators are under pressure to squeeze more capacity into less space.

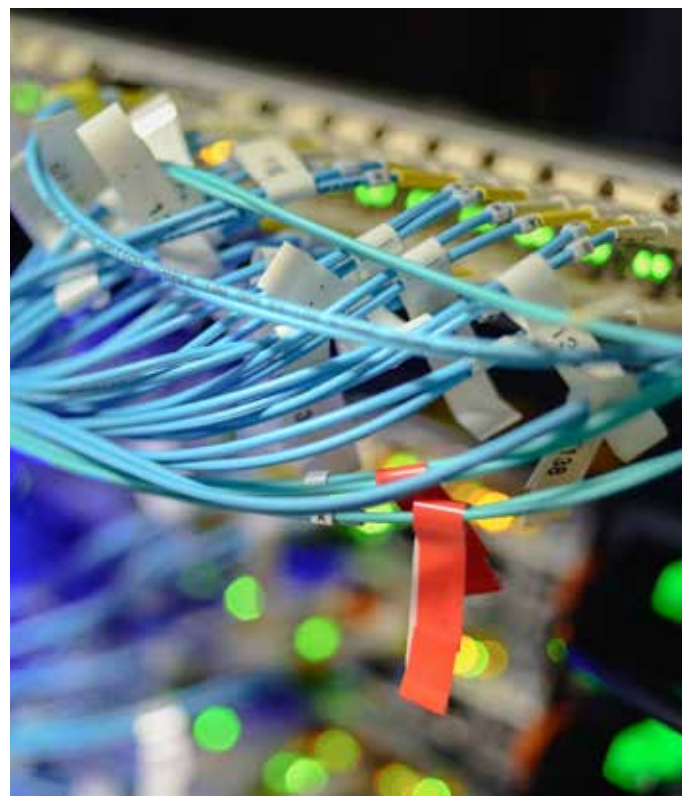
Flexibility

Recent years have reinforced the message that the digital world is changing more quickly than ever. Data centre

operators know that their infrastructure needs to adapt with equal speed, to keep pace with the ever-evolving requirements of their customers and users.

That requirement for adaptability can take many forms, from the need to add more capacity in packed facilities, through periodic upgrades to introduce new generations of equipment, to the growing requirements for specialised assets for AI, high-end graphics processing and other emerging tasks.

Ensuring that today's data centre can meet tomorrow's needs calls for designs created with flexibility in mind. Operators are increasingly adopting modular approaches, for example, which allow parts of a facility to be selectively adapted with minimal cost and disruption.



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The role of racking

As owners strive to make data centres that are more sustainable, better connected and more flexible, the selection of cabinets and racking systems becomes ever more critical.

As a major UK-based designer of enclosures for data centres and a wide range of indoor and outdoor IT, control, and telecommunications applications, Rainford has decades of experience solving the real-world problems that infrastructure providers face every day.

Our engineering teams understand that the details matter. Standard cabinet designs might do the job most of the time, but when owners are looking to optimise data centre performance, there is always a point where off-the-shelf solutions reach their limits. That might involve squeezing extra capacity into limited space or fine-tuning the performance and energy-efficiency of an advanced cooling system.

We take a consultative approach to every project. Our aim is to understand what our client needs, then design the best possible solution using the optimum selection of standard and bespoke components. And because we manufacture in the UK, we can ensure tight control over every project from end-to-end.

Rainford solutions for data centres include a few innovations developed to address the industry's critical needs. Our modular range of Vanquish indoor racks and cabinets is available in a wide range of sizes and configurations, allowing customers to optimise the use of space, with the freedom to adapt or extend their installations as their needs change.

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For ultra-high density hyper scale applications, our new 60U rack design is both taller and narrower than a standard rack, while maintaining compatibility with standard servers, switches and power supplies. Compared to standard 43U racks, that allows users to fit 43 percent more capacity onto the same floor area.

Where extra protection is required, Rainford applies knowhow from our experience providing solutions for the most demanding outdoor environments. The Vanquish E-series, for example has been developed to provide high levels of EMC performance for sensitive equipment. The Vanquish S series of cabinets are designed to offer high levels of physical protection for installations in earthquake prone regions. Our range of screens and security enclosures offers an extra layer of physical protection for sensitive assets.



Cabling and cooling

Beyond racks and enclosures, efficient data centre designs require equal attention to physical connectivity. Rainford systems include a comprehensive range of cable management solutions for power, data, and fibre. And for simple, speedy on-site installation, cabinets can be pre-wired in the factory prior to delivery on site.

We supply bespoke cable management systems to run from point of entry through to white space, securely and safely, designed and adapted to meet every customer's requirement from the hyperscale sites to the smaller more intricate build or refit. With experience in the most complex and unique installations, we view your project from your perspective.

We help customers manage their cooling challenges with pre-installed fan units or an air flow guides. And, at a larger scale, we design and manufacture custom containment systems for hot aisle or cold aisle thermal management approaches.

Our customers are critical infrastructure operators, system integrators, and global OEMs from a wide variety of markets. Rainford's approach to protection means your equipment will perform at its best, achieving high levels of reliability and minimum in-life maintenance costs. Directly and indirectly, we serve the operators of data centers, fixed and mobile telecom networks, road and rail transportation systems, defence platforms, and utilities like water and energy. Whether you need to design and install a new facility or optimise an existing site, our expert team is here to help and provide you with the best solution for your business.

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