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Compound Semiconductor Applications

Advancing Data Centres: Key Trends and the Rise of Wide Bandgap Solutions

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Executive summary

Globally, there are over **10,500 data centres** in operation, including more than **1,000 hyperscale facilities**. The United States leads the charge, hosting over half of these data centres and adding 5,000 new ones in just seven years – an astonishing compound annual growth rate (CAGR) of 44%.

This rapid expansion of data centres, driven by **surging demand for cloud services, artificial intelligence, Industry 4.0** and **cryptocurrency mining**, is creating unprecedented opportunities and challenges in power efficiency and sustainability.

According to the International Energy Agency, **data centres consumed 460 terawatt hours (TWh) globally in 2022**, and the consumption could surpass **1,000 TWh by 2026**.

This report examines how wide bandgap (WBG) **compound semiconductors can improve the efficiency of power distribution networks in data centres** and help mitigate the anticipated surge in energy demand.

WBG compound semiconductors, such as silicon carbide (SiC) and gallium nitride (GaN), are emerging as transformative technologies, offering superior efficiency, better thermal management and compact designs.

It has been reported that adopting **GaN technology in data centres** can reduce electricity use by up to 10%, translating to **$1.9 billion in annual cost savings**, **over 15 TWh of energy savings**, and a **10-million-ton reduction in CO_2 emissions**.[1]

WBG adoption is critical for key systems within data centres, including server **power supply units** (PSUs), **uninterruptible power supplies** (UPSs) and **solid-state transformers** (SSTs). Embracing these advancements will enable sustainable growth in the data centre sector and contribute significantly to achieving global Net Zero goals.

Our analysis suggests that the **PSU market** in the four major data centre hubs – the US, China, the UK and Germany – has the potential **to exceed $7.5 billion** over the next seven years. Meanwhile, the **UPS market** is forecasted to reach a valuation of **over $4.2 billion** by 2030, highlighting significant growth opportunities in power infrastructure for data centres.[2]

The **UK data centre industry** has seen a consistent flow of investments. Since the current government took office, **total investments have surpassed £25 billion,** underscoring a strong partnership between the government and the technology sector.[3]

With **over 500 data centres** and robust engineering and compound semiconductor expertise, **the UK is well-positioned to lead in advancing WBG technologies**. CSA Catapult plays a pivotal

[1] Sustainability Report 2021, Navitas
[2] Frost and Sullivan
[3] Press Release, UK Government

role in this innovation landscape, providing world-class capabilities in advanced power electronics design, simulation, optimisation and rapid prototyping.

Data centres and energy demand

There are over 10,500 data centres operating worldwide.[4] These data centres can be categorised based on their size and capacity. Enterprise data centres typically house a dozen to a few hundred servers and support the needs of individual businesses or organisations. Hyperscale data centres are much larger, containing tens of thousands to hundreds of thousands of servers. These hyperscale centres support massive cloud service providers and handle large-scale data processing and storage needs. There are over 1,000 hyperscale data centres globally.[5]

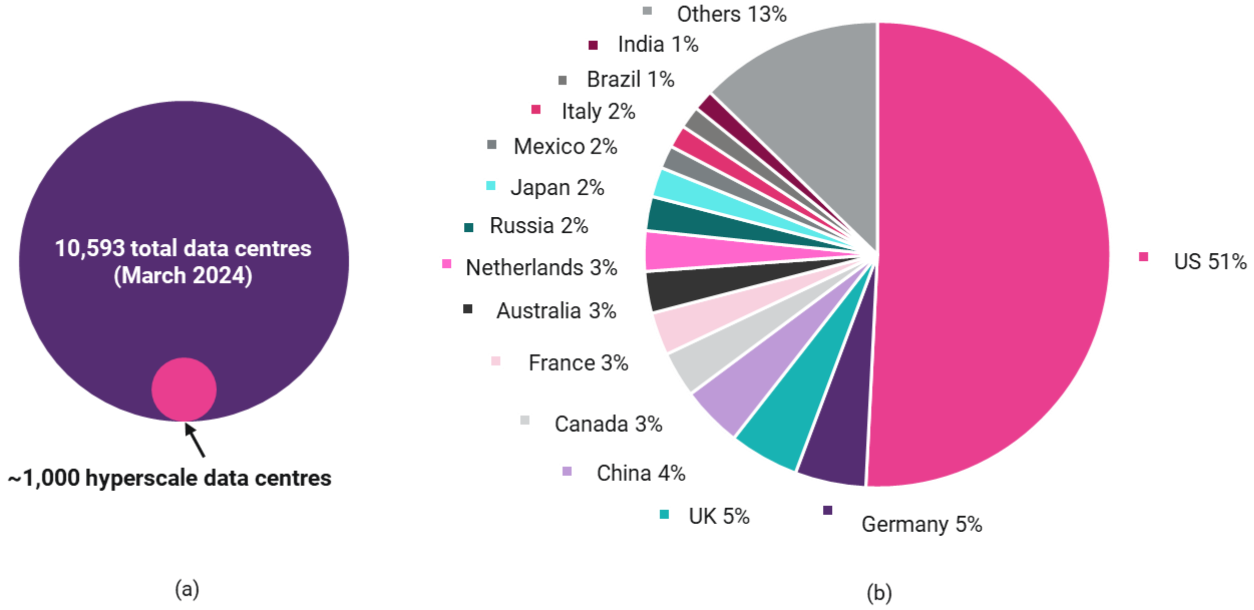


Figure 1:Data centres in 2024 (source: Statista).

Figure 1(b) illustrates the distribution of data centres by country. The US accounted for half of the global data centres, followed by Germany and the UK, each with 5%, and China with 4%. The Netherlands, Australia, Canada and France also each had 3% of the total data centres.

According to the International Energy Agency, data centres consumed 460 terawatt hours (TWh) globally in 2022, and the consumption could surpass 1,000 TWh by 2026.[6]

[4] Statista
[5] Data Centre Dynamics
[6] International Energy Agency

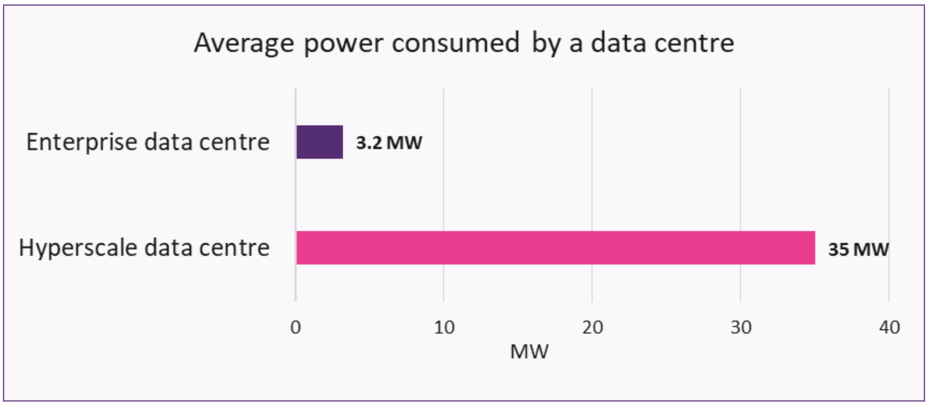


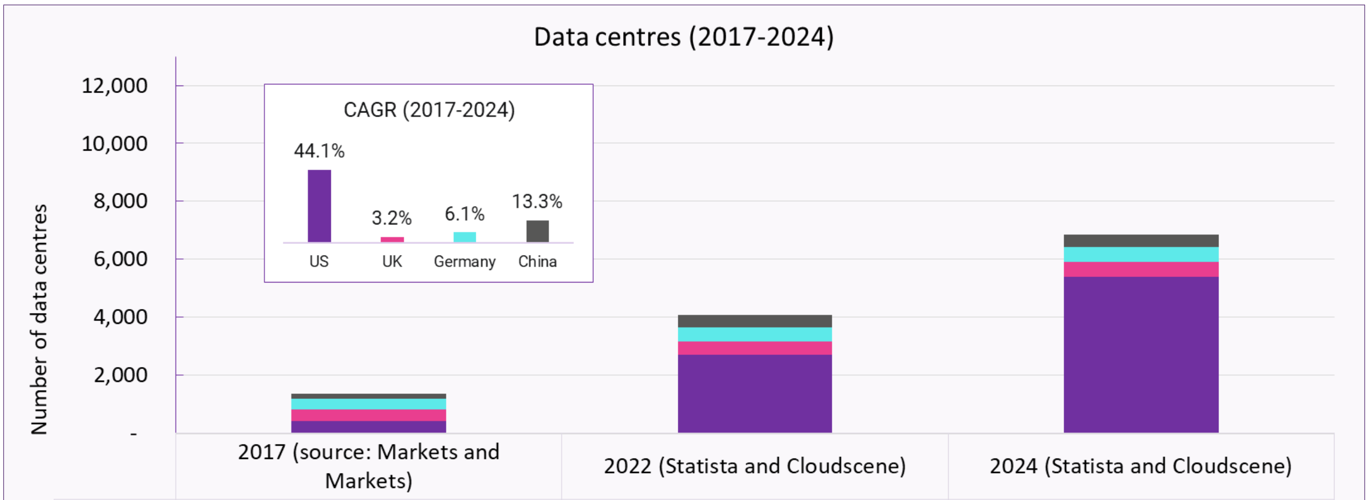
Figure 2: Estimated average power consumption in a data centre.

Data centre power consumption varies significantly based on their size and capacity. An average enterprise data centre typically consumes around 3 megawatts (MW) of electricity (estimated based on data on the number of data centres from Statista and data centre energy consumption from the International Energy Agency). In contrast, an average hyperscale data centre, which supports major cloud service providers and large-scale data processing, can require 20–50 MW.[7]

[7] What Makes Hyperscale, Hyperscale?, AFL

Data centre growth surge: forecast to 2031

Between 2017 and 2024, the number of data centres in the US expanded significantly, growing at a compound annual growth rate (CAGR) of 44% to exceed 5,300. This reflected significant investments in cloud infrastructure and the rising demand for data processing capabilities. In the US, there are several factors driving this growth, including the availability of vast expanses of land and resources, and tax incentives, making the country a favourable location for expansion.



	2017 (source: Markets and Markets)	2022 (Statista and Cloudscene)	2024 (Statista and Cloudscene)
China	187	443	449
Germany	345	487	521
UK	411	456	514
US	418	2,701	5,381

Figure 3: Growth in data centres during 2017 and 2024.

China also saw substantial growth, achieving a CAGR of approximately 13% and reaching 450 data centres, driven by its rapid digitalisation and extensive adoption of cloud services. In contrast, Germany and the UK experienced more moderate increases, with CAGRs of around 6% and 3%, respectively, during the same period, bringing their total number of data centres to over 500 each.

If the growth rates observed over the past seven years continue, the number of data centres in the US could increase tenfold by 2031. Similarly, China's data centre count could double in the next seven years. In Europe, Germany could see its number of data centres reach around 800, while the UK could reach more than 600 in the same period.

However, in a more realistic scenario, assuming a 10% CAGR for both the US and China during 2024–2031, the expansion would be more measured. Under these conditions, the US could approach approximately 10,500 data centres, reflecting a continued but more moderate increase in data infrastructure. China could see its data centre numbers grow to 875, maintaining strong but sustainable growth in response to ongoing digital trends and economic development. Germany and the UK, growing at modest CAGRs of 3% and 1.5% respectively, could see their numbers grow to around 600.

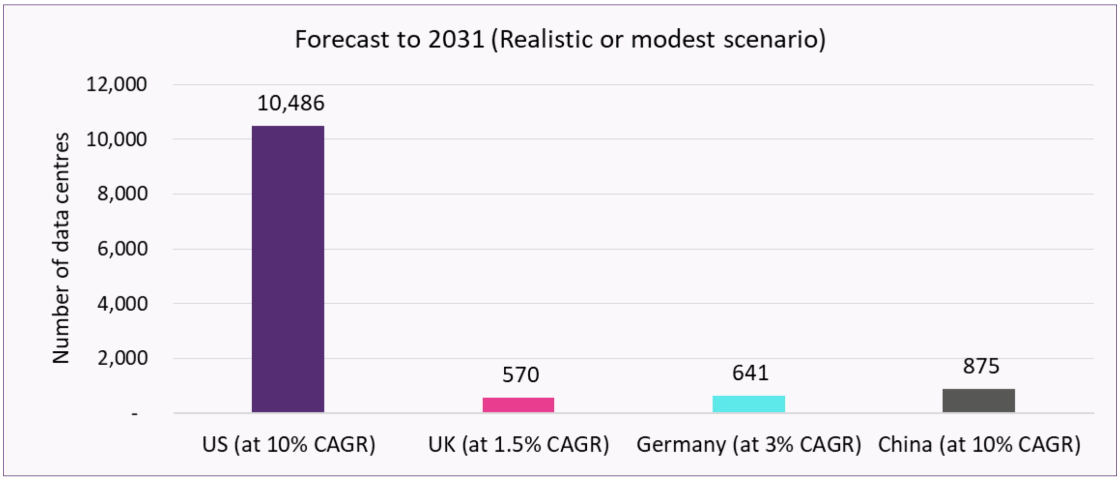


Figure 4: Data centre forecast to 2031 in the four major countries. The forecast is estimated based on data from Statista and Markets and Markets. The CAGRs (2024–2031) assumed in the realistic growth scenario are the US @ 10%, China @ 10%, Germany @ 3%, and the UK @ 1.5% CAGR.

Data centre energy efficiency

Power Usage Effectiveness (PUE) is a critical metric for assessing the energy efficiency of data centres. It represents the ratio of total facility energy consumption to the energy used specifically by IT equipment, such as servers, storage and networking gear. By highlighting how much energy is consumed by supporting systems like cooling, lighting and other non-IT infrastructure, PUE measures how effectively a data centre utilises energy to power its core operations.

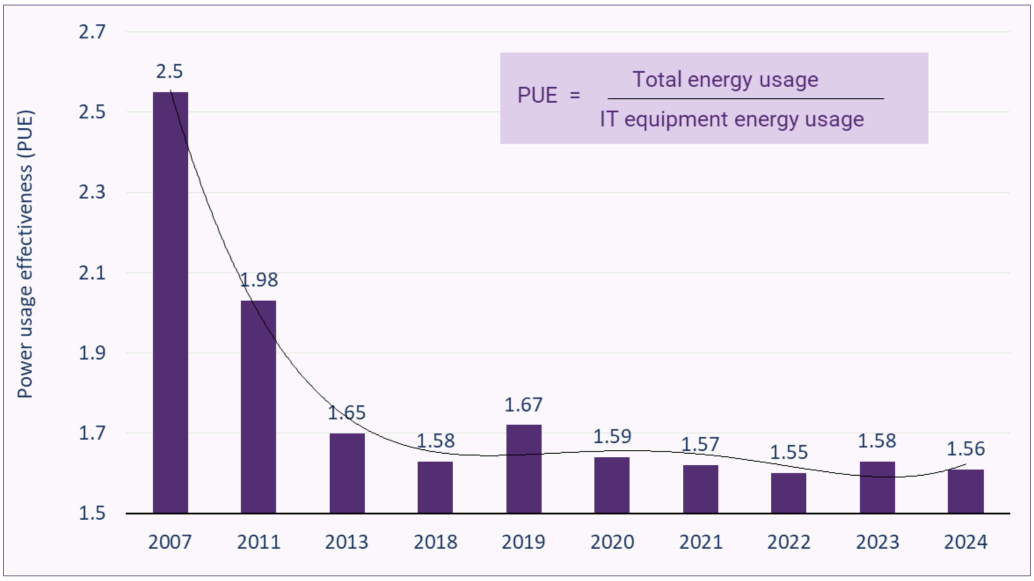


Figure 5: Power usage effectiveness trend (2007–2024).[8]

The PUE dropped significantly from 2.5 in 2007 to 1.65 in 2013, driven by advances in cooling methods like air containment and overall increased energy awareness in the data centre industry, leading to optimised operations.[9] However, progress stalled over the next decade, with the average PUE in large-scale data centres remaining around 1.6. This stagnation can be attributed to factors such as the high capital costs of further improvements and rising ambient temperatures that strain cooling systems.[10] Additionally, increased heat generation from higher server densities and ageing chips offset efficiency gains.[11]

Newer data centres are operating more efficiently, with some reaching an impressive PUE of 1.3. Industry leaders like Google and Meta are setting new standards for energy efficiency. Google reports an average PUE of 1.1 across its data centres, with its most efficient facility reaching a PUE of 1.06.[12] Similarly, Meta has achieved an average PUE of 1.09 in its data centres.[13]

[8] Statista
[9] Data center PUEs flat since 2013, Uptime Institute
[10] Why has PUE Remained Flat for So Long After Years of Progress?, Upsite
[11] Is PUE actually going UP?, Uptime Institute
[12] Efficiency, Google
[13] Data Centers, Meta

Optimising power efficiency: how WBG technology can transform data centres

Enhancing the efficiency of power electronics through the integration of WBG compound semiconductors in data centres will contribute to lowering the PUE. WBG semiconductors, such as silicon carbide (SiC) and gallium nitride (GaN), offer superior performance compared to traditional silicon-based electronics. They operate at higher voltages, frequencies and temperatures, which translates to reduced energy losses and improved power conversion efficiency. This can help reduce the overall PUE and support the sustainability goals by decreasing the environmental impact of data centre operations.

The adoption of WBG compound semiconductors in data centre power systems is expected to be driven by stringent regulations and the need for superior performance. Regulatory frameworks like the UK's Net Zero commitment and the EU's 'Lot 9' policies mandate higher energy efficiency, pushing data centres to adopt advanced technologies. Compound semiconductors offer significant benefits such as higher power density, faster switching and better thermal management, which enhance performance while reducing energy consumption and operational costs.

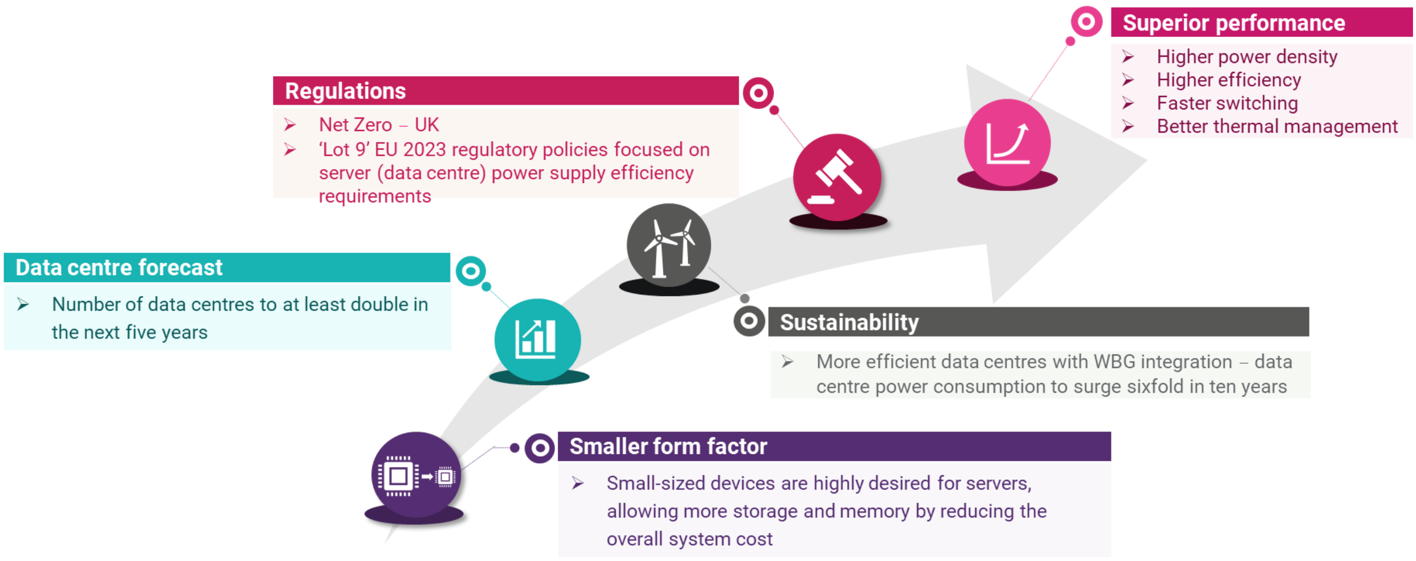


Figure 6: Growth drivers for wide bandgap semiconductor devices in data centre power electronics.

Sustainability and the need for smaller form factors further boost the adoption of compound semiconductors. With data centre power consumption expected to surge and the number of data centres projected to double in the next seven years, these semiconductors enable more efficient and compact power systems. Their integration supports the construction of sustainable, space-efficient data centres, meeting growing demand without expanding physical infrastructure and aligning with global sustainability goals.

Impact of GaN Adoption in Data Centres

Navitas estimates that upgrading data centre power systems from conventional silicon-based components to advanced GaN-based technology can achieve significant savings, including:

Energy Savings: GaN technology can reduce electricity use by data centres by up to 10%.

Cost Savings: Applied in all data centres globally, this energy reduction translates to annual savings of $1.9 billion in electricity costs.

Environmental Impact: GaN adoption could reduce energy demand from data centres by over 15 TWh annually, leading to a reduction in CO_2 emissions of 10 million tons. This is equivalent to the annual emissions of over two million gasoline-powered passenger vehicles.

(Source: Navitas, Sustainability Report 2021)

WBG opportunities in data centre power distribution network

The power distribution network in a data centre is an intricate and essential system designed to ensure continuous and reliable operation of its IT infrastructure. The network begins with transformers, which step down high-voltage electricity from the utility grid to a lower voltage suitable for use within the data centre. The network usually has a backup, such as a diesel generator, which activates during power outages to maintain uninterrupted service.

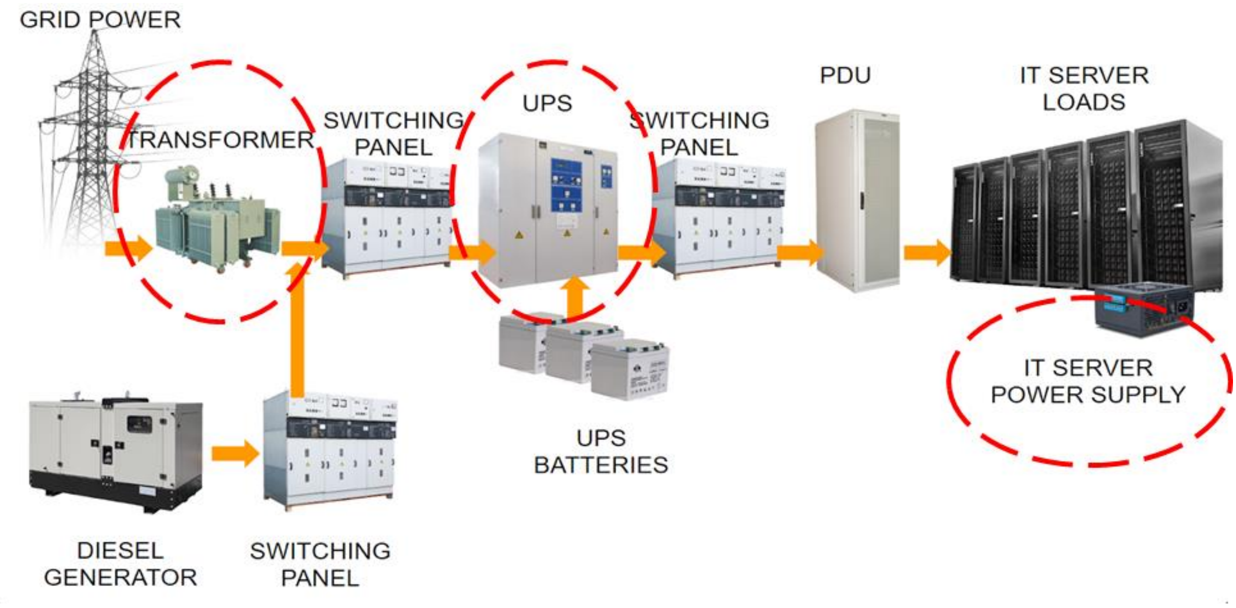


Figure 7: Typical power distribution network in a data centre (image credit: Dence Networks, LLC).

Once the power is at the appropriate voltage, it is distributed to various parts of the data centre by a network of switching panels and then directed to server power supply units (PSUs) through a power distribution unit (PDU). The PSUs convert the incoming alternating current (AC) into the direct current (DC) required by the servers. A critical component in this network is the uninterruptible power supply (UPS) system, which provides backup power in the event of a utility power failure or fluctuation.

WBG opportunities lie in solid-state transformers (SSTs), UPS systems and server-level power supply units. SSTs leverage WBG semiconductors to achieve higher efficiency and more compact designs compared to traditional transformers, making them ideal for modern data centres with space and energy efficiency constraints. In UPS systems, WBG semiconductors enhance power conversion efficiency and reduce thermal losses, ensuring more reliable backup power and improved overall system performance. At the server level, power supply units incorporating WBG technology can significantly increase power efficiency, reduce cooling requirements, and enhance the longevity and reliability of the servers.

The following sections will discuss the size of the opportunity for these power systems for data centres.

Server power supply units

Assuming a 5 kW PSU is used per rack, our analysis suggests that an average enterprise data centre would require about 400 PSUs, whereas a hyperscale data centre would require over 4,500 PSUs.[14] Thus, the demand for PSUs from hyperscale data centres is over ten times that of an average enterprise data centre.

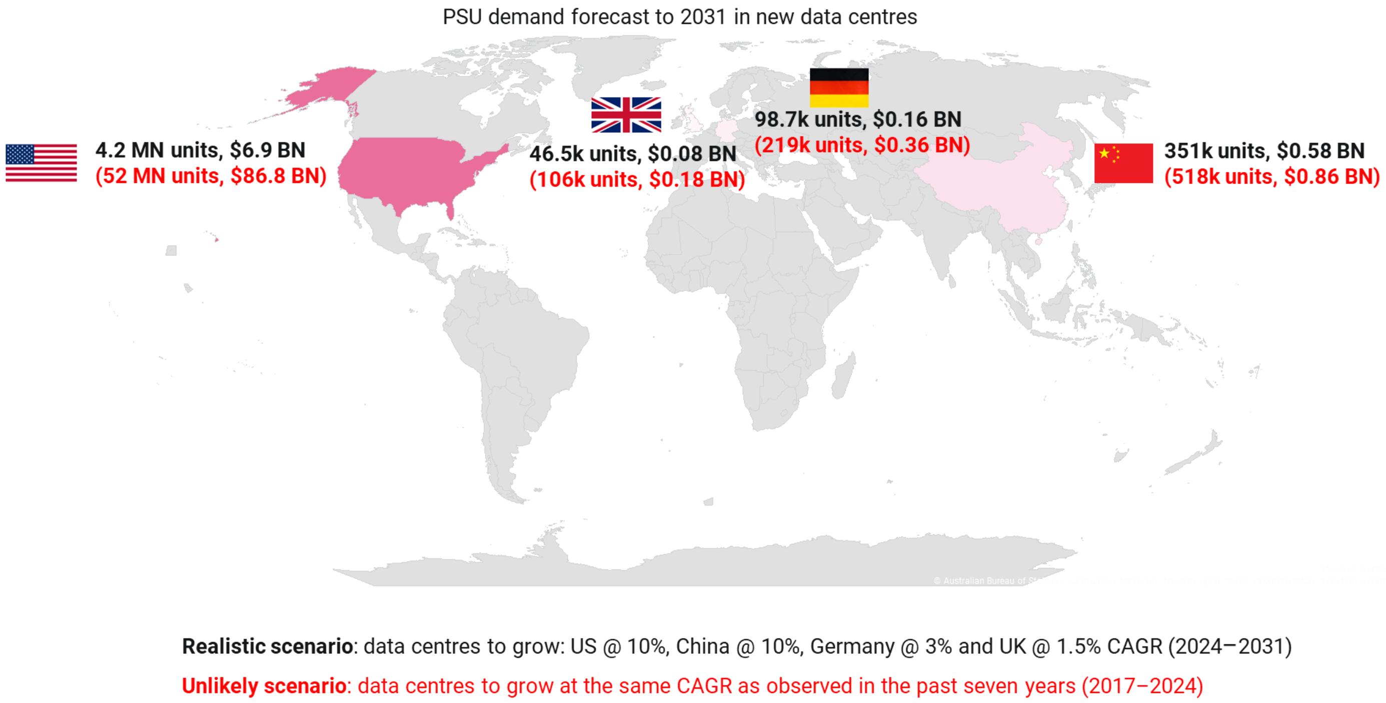


Figure 8: Estimated demand for power supply units from new data centres in the US, China, Germany and the UK. It is imperative to emphasise that these figures are intended solely for indicative purposes. The accuracy and realisation of this projection rely on an array of assumptions, market dynamics, regulatory changes, etc.

According to CSA Catapult's analysis, the combined demand for PSUs from new data centres in the US, China, Germany and the UK over the next seven years (2024–2031) is projected to range between 4.5 million units under a moderate growth scenario to over 50 million units in the unlikely event that the US achieves a 44% CAGR in data centre development during this period.

With each 5 kW PSU costing an average of $1,650, projected revenues could exceed $7.5 billion in the likely scenario or surpass $80 billion in the less probable scenario.

[14] CSA Catapult estimation, based on annual data centre energy usage and the number of data centres in 2022; PUE 1.55 and power losses are excluded.

Figure 9 illustrates the status of SiC implementation in PSUs, highlighting key market players. SiC diodes have been incorporated into PSUs since 2001, with Infineon pioneering this technology. UnitedSiC is noted for being one of the earliest adopters of SiC transistors in these units, marking a significant advancement in the field.

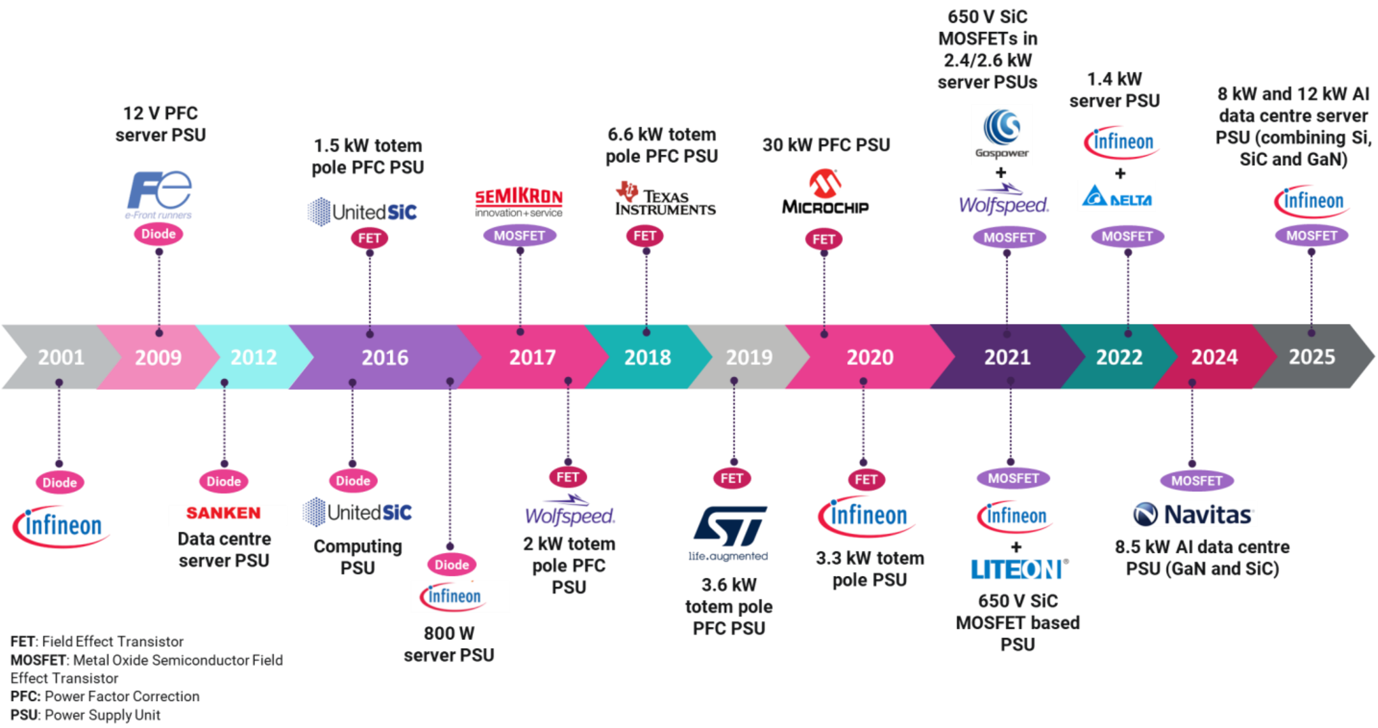


Figure 9: Overview of SiC adoption in power supply units and leading market players in the sector (non-exhaustive).[15]

Several notable collaborations in the SiC market include Infineon's partnership with LITEON[16] and Wolfspeed teaming up with Gospower, both leveraging 650 V MOSFETs.[17] Recent advancements feature Infineon and Delta Electronics developing a 1.4 kW server power supply unit[18], while Navitas introduced an 8.5 kW power supply specifically designed for data centres supporting AI workloads.[19] Additionally, Infineon has announced plans for 8 kW and 12 kW power supplies tailored for AI-driven data centres, with the 8 kW version scheduled for release in 2025 and the 12 kW timeline yet to be confirmed.[20]

There is also evidence of the adoption of GaN in PSUs; for instance, GaN Systems and xFusion Digital Technologies have developed a 3 kW power supply for data centres.[21] The UK-based Cambridge GaN Devices has partnered with Chicony Power Technology (Taiwan) and Cambridge University Technical Services to develop GaN-based 'Switched Mode Power Supply' systems.[22] Infineon offers GaN-based power supply solutions for 3.3 kW and above systems.[23]

[15] Yole and CSA Catapult
[16] Market News, Infineon
[17] Wolfspeed
[18] Market News, Infineon
[19] Press Release, Navitas
[20] Business and Financial Press, Infineon
[21] GaN Systems
[22] Cambridge GaN Devices
[23] Infineon

CSA Catapult has excellent capabilities in the design, simulation and optimisation of power electronics for PSUs, including magnetic component design and high-frequency converters. We have a world-class team of engineers with expertise in electrical and thermal characterisation, and the testing and validation of advanced power electronics.

With state-of-the-art facilities for 3D printing of metals and ceramics, the Catapult also supports rapid prototyping and innovative manufacturing processes, accelerating the development of next-generation technologies.

Project Highlight: ELIPS – Enhanced Liquid Immersion Power Systems

Partners: Supply Design, Custom Interconnect, GSPK Circuits, Iceotope Technologies and CSA Catapult

ELIPS (Enhanced Liquid Immersion Power Systems) is a design-for-manufacture project aiming to build a UK supply-chain to deliver immersion and GaN-based technology across the power electronics, machines and drives (PEMD) sectors.

Bringing together Supply Design, Custom Interconnect, GSPK Circuits, Iceotope Technologies and CSA Catapult, the project aims to create a collaborative value chain capable of delivering power modules, bespoke immersion components and sub-assemblies, services and IP for the future.

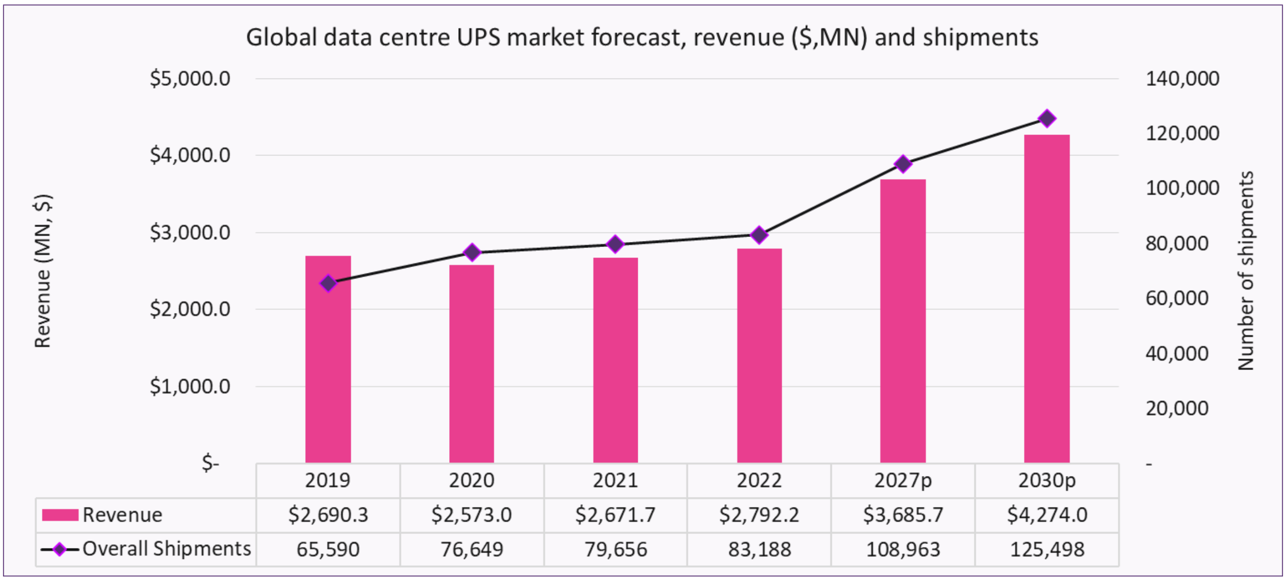
As well as addressing challenges in the automotive, aerospace and renewable energy sectors, the ELIPS project will firstly focus on energy saving systems for data centres.

Data centres use a huge amount of energy to continuously run and to prevent the equipment from overheating. It is estimated that data centres account for around 1% of all energy-related greenhouse gas emissions.

The project will look to develop immersion-cooled power modules for data centre applications that will support sustainable growth in IoT, smart cities and industrial automation.

Uninterruptible power supply (UPS) systems

Between 2019 and 2022, one in five organisations faced a severe outage, with power-related issues driving 43% of these disruptions. A significant portion of these power issues stemmed from UPS failures, leading to substantial financial losses. Over 60% of such incidents incurred damages exceeding $100,000, and 15% resulted in costs of over $1 million.[24] Therefore, improving the performance and reliability of UPS systems is essential, and compound semiconductors offer a promising solution to drive these advancements.



	2019	2020	2021	2022	2027p	2030p
Revenue	$2,690.3	$2,573.0	$2,671.7	$2,792.2	$3,685.7	$4,274.0
Overall Shipments	65,590	76,649	79,656	83,188	108,963	125,498

Figure 10: Data centre UPS forecast.

In 2022, UPS shipments to data centres exceeded 80,000 units, generating over $2.7 billion in revenue. By 2030, shipments are projected to surpass 125,000 units, driving revenues beyond $4.2 billion, with a steady CAGR of approximately 5%.[25] The demand is largely driven by the expanding presence of hyperscale data centres, which play a pivotal role in supporting the IT and telecommunications industries. These sectors rely heavily on steady power backup solutions to guarantee uninterrupted operations.

[24] Key Points from the Uptime Institute Global Data Center Survey 2022, Kohler
[25] Global data centre power and cooling opportunities, Frost and Sullivan

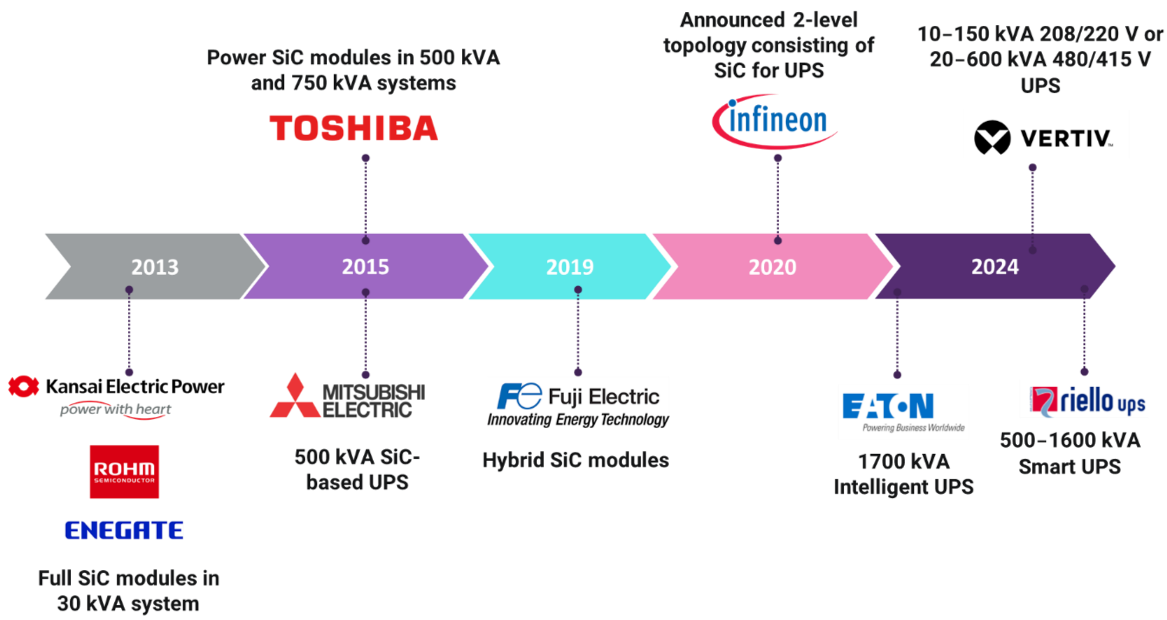


Figure 11: Overview of SiC implementation in UPS systems and key players (non-exhaustive).[26]

Figure 11 presents some examples of SiC implementation in UPS systems. Full SiC modules have been reported to be used in a UPS designed by Kansai Electric Power, ROHM and Enegate in collaboration. Toshiba and Mitsubishi are also noted for using SiC modules in 500 kVA-rated UPS systems, with Toshiba also implementing them in a 750 kVA system. In the past five years, Fuji Electric and Infineon have been active in this space, with Fuji Electric using hybrid SiC modules and Infineon announcing a 2-level topology utilising SiC specifically for UPS applications. Some recent market developments include Eaton's 1700 kVA intelligent UPS[27], Vertiv's flexible power range UPS offerings[28] and Riello's 500–1600 kVA smart UPS solutions.[29]

[26] Yole and CSA Catapult
[27] Eaton
[28] Vertiv™ Liebert® APM2, Vertiv
[29] Data Centre Dynamics

Solid-state transformers (SSTs)

SSTs have the potential to revolutionise power distribution in data centres by enhancing efficiency, reliability and flexibility. Unlike traditional transformers, SSTs use power electronics to manage voltage and frequency, enabling precise control over power flow. This can result in significant energy savings, reduced heat generation and the ability to quickly adapt to changing load conditions, which are common in dynamic data centre environments. The compact size of SSTs also allows for better space utilisation, a critical factor in data centres where every square metre is valuable.

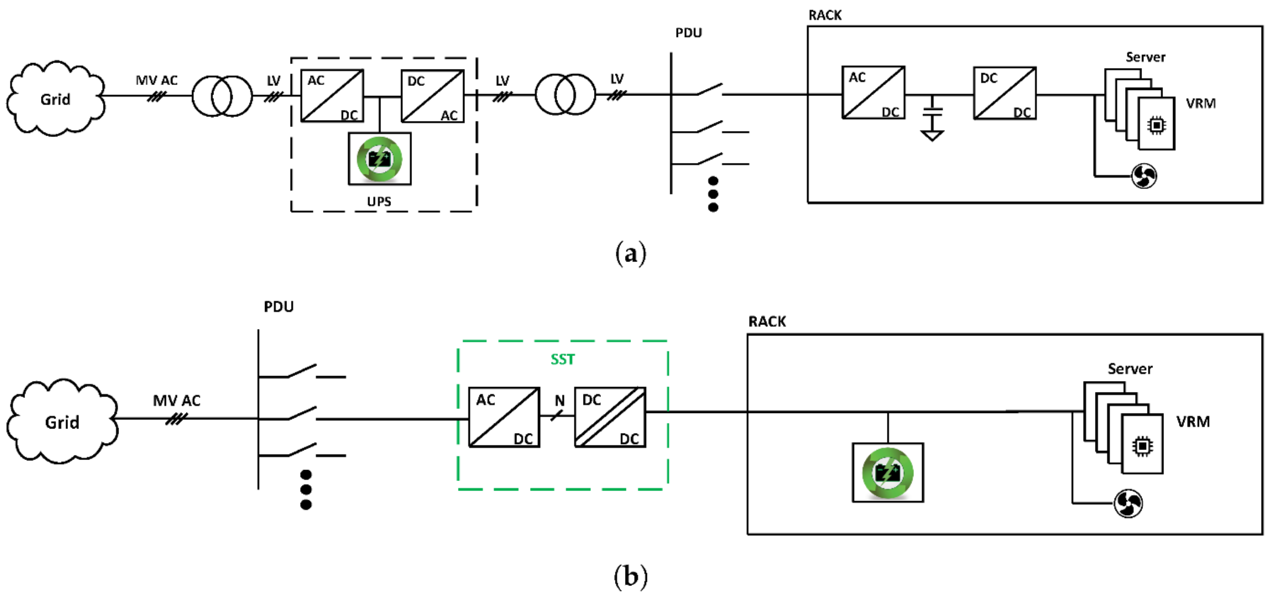


Figure 12: An illustration of (a) Classical approach and (b) SST configuration in a data centre power supply network. The introduction of an SST reduces the number of power electronics stages, as reported by Cervero, D et al., 2023.[30]

Moreover, SSTs facilitate the integration of renewable energy sources and energy storage systems into data centre power architectures. Their advanced control capabilities allow seamless switching between different power sources, optimising solar or wind energy use and enhancing overall grid stability. The ability of SSTs to handle bidirectional power flow supports the adoption of distributed energy resources and contributes to the creation of more sustainable and self-sufficient data centre operations.

The commercialisation of SSTs is still in its early stages. Major industrial players such as Hitachi ABB, Siemens, GE, Bombardier, Delta Electronics and Eaton have been demonstrating in this space. Research institutes such as ETH Zurich and Electric Power Research Institute (EPRI) have also played a crucial role in developing SSTs.

Technological advancements in WBG compound semiconductors are expected to be crucial in developing and commercialising SSTs for various applications. SiC can operate at higher voltages and have faster switching speeds, which makes them suitable for SSTs.

[30] https://doi.org/10.3390/electronics12040931

The in-house CSA Catapult capability includes the evaluation of SST topologies through simulation as well as experimental studies, busbar and high-frequency magnetics design and analysis, efficiency or power loss analysis, and prototype validation testing. Our engineers have expertise in detailed technical design and parameter selection in terms of component selection, switching frequency and power rating optimisation, design and optimisation of gate drivers and control circuitry, and thermal design.

Project Highlight: ASSIST – Advanced SiC for Solid-State Transformer

Partners: Turbo Power Systems, Clas-SiC Wafer Fab, Alter Technology UK and CSA Catapult

ASSIST aims to establish a sovereign UK supply chain for high voltage silicon carbide (SiC) devices at voltage and current ratings that are significantly different to devices currently available on the market.

Bringing together Turbo Power Systems, Clas-SiC Wafer Fab, Alter Technology UK and CSA Catapult, the project will establish manufacturing readiness across three levels of the supply chain. It creates end-to-end capability that covers wafer fabrication, device packaging and power electronic converter manufacture. The high voltage and high current SiC MOSFETs developed through the project will transform the proposition for solid-state transformers (SSTs). It will realise a cost-effective and highly efficient compact solution to help meet future electricity demands.

With the widespread adoption of heat pumps and electric vehicles in the UK, power electronics will play a central role in delivering solutions that provide the necessary flexibility for the electricity distribution network to meet the increased demand.

UK data centres: investment, sustainability and innovation

Investments

The UK data centre industry has witnessed a consistent flow of investments, underlining its importance in the country's digital and economic growth. Since the current government took office, total investment in data centres has exceeded £25 billion, showcasing a robust partnership between the government and the tech sector. [31] These investments are not only driving job creation but also positioning the UK as a leading global hub for AI innovation.

A notable development came in October 2024, when the Secretary of State for Science, Innovation and Technology announced a £6.3 billion commitment from four major US technology firms – CyrusOne, ServiceNow, CloudHQ, and CoreWeave. This funding will significantly enhance the UK's digital infrastructure, further solidifying the country's leadership in the field.

Building on this momentum, the recently published government's AI Opportunities Action Plan outlines the establishment of AI Growth Zones (AIGZs) to accelerate AI-related infrastructure. The first proposed zone at Culham will host one of the largest AI data centres in the UK, starting with a capacity of 100 MW and scaling up to 500 MW.[32] This initiative reflects the government's focus on fostering strategic collaborations and expanding the AI ecosystem.

Sustainability

The UK is already home to over 500 data centres, collectively consuming approximately 2.5% of the nation's total electricity in 2022.[33] This share is projected to increase to 6% by 2030, highlighting the need for sustainable solutions.[34]

To address this, the Department for Environment, Food & Rural Affairs (DEFRA) has introduced an ICT sustainability strategy aimed at reducing energy consumption and carbon emissions while promoting resource efficiency. This strategy prioritises cloud migration, renewable energy adoption and smart facilities management. DEFRA has also partnered with leading IT companies through the DEFRA E Sustainability Alliance (DESA) to implement innovative solutions and share best practices.[35]

Further, the government's AI Action Plan established the AI Energy Council, co-chaired by the Science and Technology Secretary of State and the Energy Secretary. The council brings together industry leaders to explore renewable energy solutions, foster investment in

[31] Press Release. UK Government
[32] AI Opportunities Action Plan: government response, UK Government
[33] Statista
[34] National Grid Electricity Systems Operator
[35] Data Centres and Sustainability, UK Government

technologies like Small Modular Reactors (SMRs), and leverage AI to create a sustainable and efficient energy system.[36]

Innovation

The UK is recognised for its exceptional research capabilities in high-frequency electronics. The country's strength lies in its ability to lead cutting-edge research and development, particularly in areas requiring specialised knowledge and advanced technological skills. The UK's advantage is further supported by a strong foundation in materials research, which is crucial for advancing the next generation of data centre technologies.

The UK hosts some of the world's leading research institutions and universities pioneering materials science advancements, including semiconductors and wide bandgap materials like GaN and SiC. These innovations are critical to enhancing energy efficiency, improving performance, and supporting the growing demands of the data centre industry.

Collaboration has been key to driving innovation in the sector. For instance, the UKRI-funded ELIPS project brought together industry leaders to develop immersion cooling systems and GaN-based technologies, creating a robust supply chain for these solutions across various sectors, including data centres.[37]

The government's focus on innovation extends to sustainability initiatives, such as a £36 million investment in district heating projects utilising waste heat from data centres. This initiative aims to deliver 95 GWh of heat, connect 9,000 homes, and support commercial developments in West London, creating 22,000 new jobs in the process.[38]

With substantial investments, a strong emphasis on sustainable practices, and a culture of innovation, the UK is well-positioned to lead the global data centre market.

[36] AI Opportunities Action Plan: government response, UK Government
[37] CSA Catapult
[38] News story, UK Government

Conclusion

Data centres grew significantly from 2017 to 2024, reaching over 10,000 globally. The US, hosting over half of global data centres, saw an astonishing ~44% CAGR during this period. China, Germany and the UK followed with substantial numbers of data centres. According to our estimates, the number of data centres is expected to at least double in the next seven years, with the US continuing to dominate in new data centre construction.

With the massive growth of data centres, their energy consumption is expected to increase over sixfold in the next ten years. Therefore, it is imperative to enhance the efficiency of power distribution networks within data centres, and WBG compound semiconductors can play a crucial role in this.

The present analysis explored this potential in server-level power supply units, UPS systems and solid-state transformers. The primary market drivers for integrating compound semiconductors into these systems include better efficiency to meet strict regulations, significant performance improvements, and the potential for smaller form factors.

CSA Catapult estimates that at least 4.5 million power supply units will be required in new data centres across the US, the UK, China and Germany alone over the next seven years. This demand is expected to generate approximately $7.5 billion in revenue. The demand for UPS units from data centres is projected to exceed over 120,000 units by 2030, generating more than $4.2 billion in revenue. These estimations indicate that the market opportunity for WBG power devices is quite substantial.

The UK data centre industry is experiencing significant growth, driven by over £25 billion in investments, including £6.3 billion from major US firms, positioning the UK as a global hub for data centres. With over 500 data centres consuming a growing share of electricity, sustainability efforts, including DEFRA's ICT strategy, the AI Opportunities Action Plan and investments in renewable energy, are central to meeting future demands.

The UK currently has the third highest number of data centres in the world, behind the US and Germany.

To capitalise on this opportunity, the UK must:

- **Leverage compound semiconductors** for data centre power electronics, as they offer unmatched speed, efficiency, and thermal stability. With the publication of the AI Opportunities Plan, there is significant potential to develop the UK's power electronics capability.
- **Engage with Tier 1 organisations** to build strategic relationships and gain a deeper understanding of their future technology requirements.
- **Assess the supply chain** for data centre technologies in the UK, identifying key areas that offer the most value.
- **Strengthen existing supply chains** by bringing together industry players through publicly funded collaborative R&D programmes.

- **Draw lessons from the UK's electric vehicle industry**, applying successful strategies to accelerate growth in this sector.

CSA Catapult's power electronics laboratory is one the most advanced and comprehensive centres in the UK, providing you with access to some of the most sophisticated tools and equipment, overseen by world-class expertise. To learn more about how we can work together, get in touch with a member of our team today.

CATAPULT Compound Semiconductor Applications

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We work with Innovate UK

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