GERMAN DATACENTER CONFERENCE

25

2024

DATACENTER OUTLOOK GERMANY

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DATACENTERS ARE NOT JUST THE BACKBONE OF THE DIGITAL WORLD — THEY ARE THE CORNERSTONE OF SUSTAINABLE INNOVATION AND RESPONSIBLE TECHNOLOGY

As we launch this year's Datacenter Outlook Germany alongside the German Datacenter Conference, we reflect on the impressive growth and resilience of our industry, which is being shaped by rapid technological advancements and a growing demand for sustainable solutions. This year's conference focuses on key themes like Artificial Intelligence (AI), sustainability, and evolving regulatory frameworks, topics that will define the future of datacenters in Germany and beyond.

AI, in particular, is no longer just a buzzword; it is a driving force pushing us towards unparalleled efficiency. However, it also requires us to rethink how we handle energy consumption, infrastructure, and long-term planning.

Sustainability remains at the heart of our discussions. As datacenters grow to meet increasing demand, we must align growth with environmental stewardship. This means adopting greener practices, energy-efficient technologies, and collaborating with policymakers to foster an environment that prioritizes long-term ecological health.

COLLABORATION WILL BE KEY TO OVERCOMING CHALLENGES

From city planners to policymakers, industry leaders to innovators, the success of our sector relies on a unified vision that incorporates diverse perspectives. Our role, as the German Datacenter Association, is to facilitate this dialogue, bringing stakeholders together to ensure that datacenters can thrive while contributing positively to society and the environment.

The next few years are pivotal for the European datacenter landscape. As AI, data demands, and sustainability converge, the challenges are vast, but so are the opportunities. Our responsibility is to lead with innovative solutions while driving sustainable growth.

As we gather for the conference, let's embrace the opportunity to exchange knowledge, inspire progress, and build partnerships that will shape the future of our industry. I encourage you to engage, collaborate, and help map out the next chapter of datacenter evolution.

ENJOY READING DATACENTER OUTLOOK GERMANY AND WELCOME TO THE GERMAN DATACENTER CONFERENCE 2024!

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GERMAN DATA CENTER MARKET

ADDRESSING RISING DEMAND WHILE NAVIGATING REGULATION, LOCATION AND ENERGY CHALLENGES

FACTS & FIGURES

FRANKFURT

IT Load: **745** MW

Under construction: **542** MW

IT-Load in planning: **383** MW

BERLIN

IT Load: **92** MW

Under construction: **76** MW

IT-Load in planning: **219** MW

- AI, ML, 5G, and Cloud services lead to a rapidly growing demand for Data Centers
- Frankfurt continues to be Europe's second-most important data center market
- Challenges like Regulations, Energy Supply, and Capacity Limits are changing the market
- Secondary markets like Berlin or the Rhineland region will benefit from challenges in the core markets

The increasing relevance and ubiquity of technologies such as AI, Machine Learning, 5G and Cloud services leads to a growing demand for data centers. These data centers will be needed soon since the amount of data transported will continue to grow significantly. The International Data Corporation (IDC) predicts that the annual volume of transported data will reach up to 284 zettabytes (ZB) by 2027. To put this into perspective, one zettabyte is approximately equivalent to a 500,000,000,000-hour-long high-definition movie.

This continuously increasing volume of data needs to be addressed with new, larger, and more powerful data centers. Today, Germany plays a crucial role in the European market, with Frankfurt being the second most important location on the continent and Berlin currently experiencing tremendous growth. While emerging and tertiary markets Munich and Hamburg may not currently have a significant presence, they contribute to Germany having four notable data center locations, soon to be complemented by the Rhineland Region.

INCOMING REGULATORY CHANGES

However, the rapidly increasing demand is leading to new requirements and regulations. Still, a local data center location is essential for companies operating in Europe, as they need to provide their customers with the shortest possible latency and compliance with local data protection requirements, such as the General Data Protection Regulation (GDPR), which are easier to achieve with a server location within Europe.

The dominant core markets are still the FLAP-D markets: With an IT load of 993 MW, London continues to be the largest location for data centers in Europe. Currently, there are construction activities underway for 508 MW, and an additional 251 MW is in the planning phase. Frankfurt (745 MW capacity, 542 MW under construction, 383 MW in the planning phase) is in second place.

Amsterdam follows as the third-largest market with 506 MW (205 MW under construction, 53 MW in planning), followed by Paris with 416 MW (173 MW under construction, 148 MW in planning), and Dublin with 271 MW (159 MW under construction, 134 MW in planning).

However, these markets will eventually reach their capacity limits as demand continues to grow and suitable land becomes increasingly scarce. Larger projects come with larger power requirements, which are limited. Thus, differentiation of data center locations and specifications are only a matter of time. Not only the secondary markets like Madrid (110 MW), Berlin (92 MW), and Warsaw (74 MW) are expected to benefit from this, but also smaller markets that have not yet seen significant development.

POWER, POWER, POWER

These challenges have led to temporary restrictions on data center construction and the introduction of energy management requirements in places like Amsterdam. In Dublin, due to additional threats of power outages, network connections for data centers are now only approved in exceptional cases.

While Germany benefits from a high level of power supply security, the Borderstep Institute estimates the annual total energy consumption of data centers in Germany to be 17.9 billion kilowatt-hours (kWh), which is expected to rise. To put this into perspective, the city of Berlin consumed approximately 12.1 billion kWh in 2022.

High power consumption has already led to consequences in Frankfurt. Given that data center operators are willing to pay significantly higher prices compared to other commercial users, the development of data centers has increased. However, in Frankfurt, land and power capacities are limited. Therefore, regulations aim to encourage a variety of different uses.

According to the Energy Efficiency Act (EnEfG), data centers in Germany have to derive more and more of their electricity consumption from renewable sources. Additionally, they will be responsible for the reuse of waste heat generated during operations, whereas a major part of this is intended to be fed into district heating networks in the future.

FRANKFURT

Frankfurt remains Germany's strongest data center market. It not only holds significant financial importance, but it is also home to DE-CIX, one of the world's largest internet exchange points, offering nearly lossless access to international networks. The high demand in Frankfurt is reflected in strong pre-leasing rates (47 MW in the first quarter) and the second-lowest vacancy rate (7%) among FLAP-D-markets after Dublin.

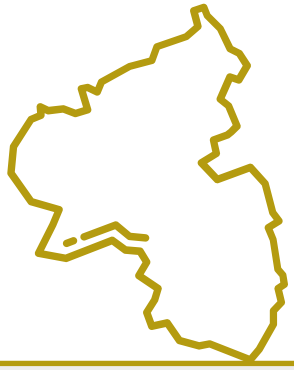
With a computing power of around 745 MW, the capacity in the financial metropolis has doubled over the past five years. Take-up saw 20 MW in the first quarter of 2024, more than any other data center metro, while 23 MW new supply was added. In 2023 alone, 134 MW were added, making it the strongest year ever for a European data center market – this record could potentially be surpassed in 2024. Currently, a total of 542 MW is under construction, with another 383 MW planned, putting Frankfurt on track to catch up significantly with Europe's market leader, London.

BERLIN

After Google announced the establishment of a new cloud region in Berlin-Brandenburg, Berlin experienced astonishing development. Colocation providers followed suit, offering their customers a fast path to cloud infrastructure. Berlin's digital savvy economy and the BCIX internet exchange make strong arguments for the German capital, as are the lower land prices compared to Frankfurt. Although power availability is also strained there, wind energy from Brandenburg can be sourced – a crucial factor for decarbonization.

As Europe's seventh-largest market, Berlin has a computing power of 92 MW, while no new supply was added in the first quarter and no take up was registered. However, the growth potential is enormous, with new developments achieving high to full pre-leasing rates. Despite being a relatively small market, there are 76 MW under construction and a notable 219 MW in planning. We forecast to see 36 MW to be added in 2024.

MARTINA WILLIAMS is Head of Work Dynamics DACH, CEE, Scandinavia and the Netherlands and also member of the Work Dynamics EMEA Board at JLL. The service portfolio of Work Dynamics includes specific Consulting Services, Portfolio Services, Project and Development Services and Integrated Facility Management.



RHINELAND REGION

As expected, a new region has emerged as a significant location for data centers: the “Rheinisches Revier”. Microsoft’s announcement to build two data centers in Bergheim and Bedburg by 2026 for its own cloud infrastructure and AI applications has given the region a boost. It is possible that other operators will follow suit. While proximity to internet exchange points may not be essential for AI, the loca-tion between DE-CIX and Amsterdam’s AMS-IX is still advantageous.

RISING DEMAND FOR AI, 5G, AND CLOUD SERVICES ARE RESHAPING GERMANY’S DATA CENTER LANDSCAPE, PUSHING BOTH PRIMARY AND SECONDARY MARKETS TO ADAPT SWIFTLY TO NEW CHALLENGES

INVESTMENTS

3.3 GW

It can be assumed that the IT capacity of colocation data centers in Germany will increase from the current 1.3 GW to 3.3 GW by 2029.

24 billion euros

If the predicted growth in IT capacity is quantified with market values for the construction costs of the expanded data centers, estimated average land prices, and average space efficiency, investments of over 24 billion euros are expected for the expansion of colocation capacities by 2029.

Added to this are the billion-euro investment programmes of hyperscalers like Google and Microsoft, as well as the costly server infrastructure.

Illustration designed by stories / Freepik.
Source: German Datacenter Association. (2024). Data Center Impact Report Deutschland 2024.

HOW WILL DATA CENTERS CONTINUE TO RESPOND TO THE ACCELERATION OF AI?

Since the launch of ChatGPT in early 2023 – followed by a range of other privately developed and open-source models - businesses, governments, and regulators have been scrambling to keep pace. This includes the data center industry. In many ways AI is a double-edged sword for the sector. The increased workload driven by AI will undoubtedly contribute to the growth of the sector and further emphasize its critical nature. On the other hand, AI will place significant additional strain on an industry that is already grappling to keep pace with unprecedented demand and the availability of power and land is becoming an increasing challenge.

In other words, as the demand for AI increases, so does the need for data centers to adapt to the challenges posed by this technological revolution.

ACCELERATING AI ADOPTION CALLS FOR MORE STORAGE CAPACITY

As AI workloads grow in size and complexity, the need for data storage increases exponentially. For a start, AI-driven workloads are considerably higher than their "regular" counterparts. For example, AI search is said to require four or five times more computing power than traditional search, and the new IT equipment to handle those loads will have considerably different demands on data centers. Earlier this year, at the very well-attended Nvidia GTC conference, Jensen Huang revealed the Blackwell platform. Blackwell is capable of at least 2.5 times more performance than the previous Hopper platform which, it should be noted, was only released two years ago. It was immediately clear that the performance requirements data centers would need to meet in this new era had fundamentally changed.

In light of this, the industry is only just beginning to understand the resulting impact this will have on data centers. In fact, the growth of AI is largely, if not wholly, dependent upon the ability of data centers and power infrastructures to meet this demand by collaborating on finding new sustainable compromises to pursue innovation without causing more emissions and energy consumption.

SO WHAT DOES THIS MEAN FOR THE FUTURE OF THE DATA CENTER INDUSTRY?

Today, the acceleration of AI is being driven primarily from the US, with massive training models being housed predominantly in this market. However, it is likely that we will start to see a shift to Europe, driven by a variety of factors.

Firstly, a bulk of AI growth in Europe will be driven by inference, the early decision-making phases in an AI system where predictions are made from processed data. As a result, demand will be more localized and distributed in the European market. This will require a lot of additional compute which the region will need to address and solve for in the coming years, including, most critically, deciding where these campuses will be deployed to meet the demand. If it follows the US path, the deployment will happen in or close to a major metro environment, which will be a major shift for both the industry and wider society. We are already seeing an increasing number of cloud providers integrating these initial processing stages of AI workloads into their current capacity within traditional availability zones (AZs) to maximize the use of existing infrastructure. We believe this will be an ongoing priority as they seek to better understand future needs.

THE ANTICIPATED IMPACT OF DATA LOCALIZATION LAWS

The second factor driving the migration of training models from the US to Europe is data localization laws. Data localization requirements are typically regulatory mandates that enforce the storage and processing of data within the country or region where it was created. This legislation has been anticipated for some time. However, the rapid acceleration of AI and its impact on data centers were not previously accounted for in any meaningful way. When GDPR was put in place, CyrusOne experienced a significant demand from companies to store and process private data within EU borders. If new data localization regulations shift, requiring data to be processed in the local region or market, the industry will need to evaluate how it will accommodate this. Currently, there isn't sufficient power infrastructure in Europe to support training models of this size, so the industry will either need to reinforce existing locations, move to new locations clustered around areas where there is power or develop new technology that will reduce latency to make this feasible.

SOLVING THE POWER ISSUE

Even before the emergence of AI, concerns were arising that data center power demand was unlikely to be met by existing power grids in the short to medium term. The simultaneous surge in demand for grid connections from data centers, solar farms, battery storage, and wind farms pose a significant challenge to existing substations. CyrusOne anticipates the sector to go in one of two directions. The first scenario is a consolidation of the connections and colocation of data centers with the solar farms, battery storage and wind farms to reduce the total number of connections to the grid. The second scenario foresees an increase in self-generation, with the grid as a backup on flexible connection agreements.

There are other potential solutions, but constraints currently exist that mean that they are only viable in the

longer term. For example, we could see the advancement of green hydrogen generation from surplus wind farm power or excess energy. This would enable on-site generation schemes, or local micro grids in conjunction with other local consumers for both electricity and heat recovered from the servers in the data center. However, the power grid expansion, necessary for traditional utility grid connections, has an 8-10 year lead time. As a result, whilst we may not see hydrogen solutions fully deployed in 2024, we may yet see development in this area in the future.

Given these factors, it is likely we will start seeing training models on a large scale in Europe; however, it is unlikely that they will match the size of the US models and will remain dependent on the US market in the near future.

DATA CENTERS AND AI: SHAPING THE FUTURE

Given the competing pressures of increasing demand and the challenges facing the rapid development of supply, we are seeing AI companies and major technology businesses look to secure their AI future as a priority. We are at a crossroads, with many hurdles and opportunities facing the industry as we know it, and the conversations and actions taking place today are ultimately shaping the data center industry of tomorrow. This will require a continued evolution of the relationships customers have with their data center providers, working together to ensure alignment on priority markets, evolutions in compute and processor performance. For example, 'creativity' and 'data centers' are not words you would naturally expect to see in the same sentence, but it has now been a notable outcome of how the industry needs to operate and ensure its customers' needs are met.

As AI confirms its predominant role in the data center industry, the impact of issues including data storage, power, localisation, and customer relations will continue to emerge, alongside the need for more regulations that support these new applications. Overall, it will be exciting to see more evidence of how advanced AI, computing, and other emerging technologies will shape the next generation of data centers.

CARSTEN SCHNEIDER currently serves as Managing Director of the German business, which is one of the most important markets for CyrusOne's future growth in Europe. He is responsible for leading and overseeing the expansion and management of the organization in Germany.

EXPERT INSIGHTS

ARE THERE NEW DEVELOPMENTS / INITIATIVES THAT ARE EXCITING FOR YOUR ORGANIZATION IN 2025?

The use of artificial intelligence and digitalization in physical security offers enormous potential for improving the security of data centers and increasing operational efficiency. Thanks to powerful management systems, hazard incident management can also be controlled centrally across multiple locations and automated via workflows.

DR. TRISTAN HAAGE | CEO
e-shelter security Gruppe

The latest developments in AI and especially the promising progress being made in quantum computing are exciting for us due to new opportunities for cabling solutions as well as for service offerings. Ongoing digitization in all market segments and the trend to Smart Cities also offers new momentums for data center environments e.g.edge computing.

MATTHIAS REIDANS | Senior Project Manager
Rosenberger OSI

2024 was the year our sector stepped out of the shadows, 2025 will be our opportunity to underline the crucial role it plays in delivering the promises of the digital economy and digital society. Innovations in design, operations and sustainability must be matched with initiatives to position data centers as fundamental to a digital future.

MICHILLAY BROWN | Vice President, ESG
STACK Infrastructure EMEA

Operators are expanding into regional locations outside the core FLAPD markets. This geographic diversification was initially driven by hyperscalers expanding but now also smaller cloud service providers and AI-companies are moving to these locations, increasing demand but also competition.

DR. DIRK TUREK | Senior Analyst
CBRE

Developments are emerging in the Rhenish mining area that will drive structural change over the next 10 years. The municipalities affected by the coal phase-out and the state of NRW are making positive use of the change. Microsoft's hyperscale data centers are just the beginning. Digital parks, edge data centers and digital business models will follow.

MATHIAS FRANKE | Divisional Director
Drees & Sommer SE

With an expanding digital economy and increased demand for cloud services, Germany has emerged as a strategic location for data center investments. JLL is excited to continue to help clients in leveraging our expertise in site selection, advisory services & project management to capitalize on the opportunities emerging in the German data center sector.

MARTINA WILLIAMS | Head of Work Dynamics Northern Europe
JLL

We will see dramatically changed requirements in Data Center Infrastructure caused by AI & ESG. This and the massive development of Tier 2 & 3 markets will require a deeper delivery of IT infrastructure services, enhanced with our recent acquisition of Direct Line.

THOMAS STEFFEN | Business Unit Director DCS CEE
CBRE GWS IFM Industrie GmbH

ARTIFICIAL INTELLIGENCE REVOLUTIONIZES DATA CENTERS

NEW REQUIREMENTS FOR INFRASTRUCTURE AND COOLING

NDCGARBE.

Artificial intelligence (AI) has become an integral part of everyday life. Chatbots such as ChatGPT and Google Gemini are turning computers and smartphones into all-rounders and changing the lives of millions of people worldwide. In companies, the use of AI promises a great economic advantage, because it increases efficiency and productivity. According to the McKinsey Global Institute (MGI), there is a lot of potential in generative AI in particular. According to the institute's forecast, corresponding tools theoretically enable an annual increase in productivity of 2.6 to 4.4 trillion US dollars worldwide. However, AI places new demands on the data centers in which the individual applications and services run. Developers and operators need to rethink and redesign the infrastructure of the buildings.

DIFFERENT APPROACH TO COOLING

First of all, AI solutions require significantly more computing power. To meet the demand, servers with faster processors are used. These AI computers offer more computing power in the whitespace, the server room, in a smaller footprint. But the compression of computing power generates enormous heat. This is why the cooling of the racks also plays a decisive role, because heat dissipation is not possible with traditional air cooling. The reason: air can only absorb a certain amount of heat and the new load exceeds its capacity. Data center operators therefore need a different solution, liquid cooling, where water or another contact fluid flows through the racks. Many professionals consider it an enabling technology for AI in data centers.

After the integration of liquid cooling, there is also potentially more usable space available in the whitespace. Because the technology takes up less space to distribute heat, operators can place additional racks and computing power.

Liquid cooling is also very convincing when it comes to sustainability. From the very beginning, the water always remains in the closed circuit. With Direct Liquid Cooling, the temperature of the waste heat rises as well. It can therefore be used even better. This makes heat transfer between the water and district heating more efficient than air cooling. Less energy is required, which reduces the CO_2 footprint of data centers.

TAILORING THE OVERALL ARCHITECTURE

The trend towards AI is fundamentally changing the design of data centers. Developers and operators must take liquid cooling of the servers into account as early as the building planning stage. As a rule, it requires its own, thus additional, water cycle. In short, the design of the cooling system in the whitespace will have a significant influence on the overall architecture in the future. Unlike before, IT infrastructure, cooling and supply technology will soon be closely linked in data centers. In addition, all racks must be prepared or converted in preparation for liquid cooling. Thus far, there is no standard for the construction of AI data centers. The industry still has to do a lot of testing and find a consensus. Currently, some companies in the industry are testing practical solutions for AI data centers to better understand the specific requirements. Standardization helps to accelerate the expansion of the necessary infrastructure through clear specifications.

NEW CONSTRUCTION VERSUS CONVERSION

In the future, it will not only be a matter of building completely new AI data centers. Alternatively, operators can also modernize existing buildings. If they already have a separate water circuit for cooling, this makes the change easier. Otherwise, the buildings must first be gutted before they receive further structural adjustments.

But this approach makes perfect sense. Building a new data center usually costs more time and money compared to a conversion. In the case of a conversion, on the other hand, some of the permits have already been oobtained, reducing the approval effort and time. The success of the project depends on whether developers and operators are able to make the changes easily and quickly. An overall architecture in the style of a hall offers plenty of space for free design after gutting. Overall, the effort must remain within reasonable limits compared to a new building. However, a conversion does not automatically lead to more computing power in data centers. The respective local power supply often limits this and slows

down further innovation. Operators can only equip a whitespace with AI servers and computing power to the extent that the power supply allows. However, obtaining more electricity via another connection often fails due to inadequate infrastructure. The feasibility depends primarily on the geographical location of the buildings and whether they can be connected to the electricity grid as needed. In the case of unsuitable initial conditions, conversion is not worthwhile.

AN EXAMPLE OF A PROVEN DESIGN

Representatives of the data center industry around the world are currently planning to modernize their infrastructure for AI applications and services. NDC-GARBE has been relying on its patented concept of the Green IT Cube for ten years. The concept for energy-efficient and environmentally friendly high-performance computing in data centers already provides a separate water cycle for cooling. Heat exchangers on the rear doors of the racks ensure temperature compensation. The hot air from the servers is fed directly through the aforementioned heat exchangers and cooled. The advantage is that no air distribution in the room is necessary. In addition to saving energy, this also saves height in the white space of the data center. Although the concept was developed at a time when AI was not yet a big topic, it is proving to be future-proof. In addition, preparations for direct liquid cooling have already been integrated into the Green IT Cube. For this reason, the existing concept requires only minor adjustments to meet the new requirements.

EMBARKING ON INNOVATION

Exciting times lie ahead for the data center industry. The development of AI data centers is still in its infancy and it remains to be seen exactly what the optimal solution for liquid cooling will look like. In principle, NDC-GARBE focuses on developing flexible buildings so that both air and liquid cooling can fit in. The adjustments to the infrastructure are challenging, but they also lay the foundation for the AI-supported digital future. In the coming years, the industry will work hard to meet the increasing demand for AI computing power.

HERBERT RADLINGER is Managing Director at NDC-GARBE. He is a mechanical engineer and holder of an MBA with more than 30 years of expertise in Business Development and Project Management. Herbert has been in the Datacenter industry for 23 years, with Managing Director roles in consulting, colocation, EPC, and development. He gained a lot of relevant experience in the conception and development of data centers in Germany and the Middle East, where he lived and worked for 10 years. Before joining NDC-GARBE in 2017, Herbert was Managing Director responsible for the business development of EXYTE in the United Arab Emirates.

SPACE FOR NOTES

EXPERT INSIGHTS

ARE THERE ANY DEVELOPMENTS WHICH ARE INHIBITING MARKET GROWTH TODAY? WHICH INNOVATIONS OR SOLUTIONS ADAPT TO SOLVE THAT PROBLEM?

Rising costs, extended timescales, supply chain disruptions, regulatory hurdles, and scarce renewable energy complicate efforts to meet demand and sustainability targets. AI-driven energy management systems, such as Ekkosense, and investments in renewable energy infrastructure help to navigate these challenges and drive sustainable growth.

PAUL LEWIS | Senior Vice President – Technical Services
Telehouse

Power is the core challenge from a operator/developer perspective. But staffing those facilities is also becoming a significant challenge when it comes to incident free operation. Recruiting and holding onto talent is crucial. Operators need to improve their recruting strategy and also optimise their operation to avoid downtime due to staff shortages.

DR. DIRK TUREK | Senior Analyst
CBRE

Increasing capacities lead to increasing demands of power and cooling of future data centers, driven through new technologies. Following these change of requirements will lead to new challenges, that need to be faced in strong collaborations. Direct Liquid Cooling is one of the latest.

PHILIPP MÜLLER | Head of Sales IT Germany, North
RITTAL GmbH & Co. KG

The growing demand for AI data center capacity faces challenges in finding scalable power and renewable energy sources. We address this by partnering in markets like India to deliver gigawatts of renewable energy. We also augment grid power with alternative sources and on-site generation, ensuring sustainability and meeting market needs while enhancing global efficiency and sustainability.

DICK THEUNISSEN | Managing Director
EdgeConneX

Availability of (green) power and capable grid. The existing grid cannot do without extensive upgrading often massively affecting the project timeline. Germany at the same time is strongly progressing its energy transformation, which poses significant challenges for the existing grid designed for centralized, stable power generation and consumption.

ISABEL STRECKER | Partner
Eversheds Sutherland

The increasingly scarce local capacities of the power supply and communication infrastructure as well as the increasing power density of servers in particular can be limiting growth factors. Energy efficiency, local storage options and hybrid systems with air and liquid cooling as well as in-house power generation can adequately meet this challenge.

PROF. ADRIAN ALTENBURGER | Chairman
J. Willers Engineering AG

EU taxonomy, part of the Green Deal, aims to demonstrate the environmental sustainability of investments and promotes the reuse of building materials. In line with this goal, the share of modular data center designed to comply with the principles of circular construction by relying on recyclable materials and avoiding concrete will increase.

BJÖRN OELLRICH | Managing Director
ADK Modulraum

Attracting and retaining the right talent to meet the significant demand for data center capacity in Europe will be a significant challenge. Our initiatives at STACK to promote the industry and attract the best and brightest from high-school age right through technical college and university are spearheading industry efforts to secure skilled recruits.

MICHILLAY BROWN | Vice President, ESG
STACK Infrastructure EMEA

AI BRINGS WATER INTO THE DATA CENTER

HOW DIRECT SINGLE-PHASE LIQUID COOLING CAN BECOME A PRACTICAL REALITY FOR AI

Artificial intelligence (AI) promises revolutionary benefits. Is the IT infrastructure ready? Data center operators are breaking new technological ground with their technology partners. The power density for AI applications, such as the training and operation of large language models (LLMs) or high-performance computing, will rapidly push current conventional air cooling to its physical and economic limits. Above 30 kW of power per rack, only liquid cooling, preferably applied directly to the processor, will be effective.

We are already talking about rack capacities of more than 150 kW. The new, ultra-fast graphics processing units (GPUs) produce so much heat that OEMs are designing them with direct liquid cooling as standard. The Nvidia GPUs are one such example: While 80 percent of the Nvidia chips sold in the first quarter of 2024 were designed for air cooling, 85 percent are expected to be ready for liquid cooling in the first quarter of 2025.

Hence, cooling is about to undergo a radical technology change that will affect the entire data center as a system. In close cooperation with hyperscalers and server OEMs, we came to the conclusion: direct liquid cooling based on water has to be the enabling technology for AI. So we developed a modular cooling distribution unit (CDU) that delivers a cooling capacity of over 1 MW based on that approach.

NEW TECHNOLOGY, FAMILIAR HANDLING?

To put the technology into practice, it is not enough to simply provide the cooling capacity and integrate the solution into the facility, which also still poses challenges. Despite the new technology, the solutions must remain manageable by the data center team as part of the usual service. Ideally, this should be considered from the design stage onward.

How does this work? For instance with modularization and the design advantages of the Open Rack V3. The Open Compute Project (OCP) already offers standardization approaches that can be used as a basis: Following the example of the power supply, the server in the rack can be connected to the central inlets and outlets of the water circuit via standardized connections at the mani-

fold. Power can be supplied via the rack's standardized DC busbar. With this set-up, functional units of the CDU such as the central controller unit and several coolant conveying units (CCUs), depending on performance requirements, can be completely modular and easily slid into the rack. Feedback from users has shown: The service should be as close as possible to familiar procedures. Components such as controllers, sensors or the pump units should be maintained during operation and easily replaced via "hot swap". At best, the structure should be designed in such a way that the modules can be moved in a similar way to the usual handling of servers.

Despite the clear long-term relevance of liquid-to-liquid solutions in open OCP racks, the data center industry also needs versions in classic 19-inch racks. Especially liquid-to-air solutions that do not require a water connection at the facility are relevant in the transition phase.

LIQUID-TO-AIR VERSION FOR TESTING AND GETTING STARTED QUICKLY

Powerful liquid-to-liquid solutions were a crowd-puller at trade shows like Data Centre World. This kind of installation will be used mainly by hyperscalers and operators of large data centres as technology drivers and in large quantities. But first, they will test the solutions extensively. Many other technological and structural questions about the data center as a complete system still need to be clarified. What must be considered when laying the pipes for the building's primary circuit? How will the high power density change the power distribution? How does DLC affect operational service and, ultimately, the entire data center? IT infrastructure suppliers, planners and operators of data centres should share their experience regarding data centres as a complete system.

The approaches taken by international hyperscalers will probably set the standards in the medium term. But the agile colocation sector cannot wait that long. Most co-locators, being highly customer-focused, want to rapidly offer their customers good conditions for AI and HPC.

This is where the liquid-to-air versions come into play: these cool the processors with water but dissipate the heat into the air through the rear door of the rack or a side cooler. They do not achieve the same cooling output and efficiency as liquid-to-liquid solutions, but they can be deployed more quickly in data centres without water connection. Thus, they enable colocators to perform their tests with less effort and investment. Furthermore, they can create individual "HPC islands" in air-cooled data centres for their customers. Thus, these versions have a leverage function, bringing direct liquid cooling into data centres as an enabling technology for AI.

MORE OPPORTUNITIES FOR WASTE HEAT UTILISATION

With liquid-to-liquid solutions, on the other hand, heat can be more easily transferred to the building's primary water circuit or to waste heat users due to the far higher waste heat temperatures. This further improves the efficiency of the data center and ensures regulatory compliance. In Germany, the use of waste heat in data centers will soon be required by the Energy Efficiency Act. This is one of the reasons why we will see more solutions like this in the medium term, even though they necessitate significant changes in the overall infrastructure. IT infrastructure providers, along with planners, project developers, and users, must now quickly pool their expertise to streamline the necessary changes in the overall data center system through 'best practices'. They should also share information about appropriate facility contractors and arrange contact as required.

For the benefit of the data center industry, we need to overcome the technological, practical and structural hurdles as quickly as possible: We have to bring DLC into data centers as an 'enabling technology' for AI. To this end, we are closely cooperating with a number of large data center developers and are quickly installing a test facility under real conditions for use by a physics research institute.

MICHAEL NICOLAI is Vice President Sales IT Germany at RITTAL. His team provides customers with holistic advice on IT infrastructure, utilizing platform modules for rack, cooling, power, monitoring, and security levels. A physicist by training, he has been involved in IT cooling for two decades and was a driving force behind the development of water cooling for IT.

RENEWABLE ENERGIES

88%

of the electricity used in colocation data centers originates from renewable sources.

69%

of the colocation data center operators surveyed have concluded one or more power purchase agreements.

Illustration designed by stories / Freepik.
Source: German Datacenter Association. (2024). Data Center Impact Report Deutschland 2024.

EXPERT INSIGHTS

ARE THERE ANY TRENDS YOU EXPECT TO SEE HAPPENING IN 2024 THAT ARE RELEVANT FOR YOUR ORGANIZATION?

One trend we see this year is the prioritisation of CAPEX on chipsets, not construction, thus promoting the lease model for the next evolution of the data centre. This approach secures stock, whilst offering the ability to flex with demand, by ensuring that our shell and core stock is flexible in design to a range of future power density solutions.

DOMINIC LEES | Chief Development Officer
NDC-GARBE

The challenge for the rest of 2024 is to supply the rapidly growing market reliably and in sufficient quantities without any compromises on quality.

HEIKO EBERMANN | Global Offering Manager Liquid Cooling
Vertiv

Data Centers power demand continues to grow. That will put pressure to all the parties. We expect that trend to continue and trigger new technologies development.

DANEL TURK | Data Center Solutions Portfolio Manager
ABB

The entire data centre industry, as well as local authorities, is rapidly learning how to use waste heat. We expect the waste heat concept to become less of an issue for future DC developments.

MICHAEL DADA | Managing Director Germany
VIRTUS Data Centres

We expect the industry to require increased funding to support further growth, leading to alternative financing solutions. Additionally, we anticipate more large-scale projects and, due to power constraints, the rise of on-site and multi-fuel power generation solutions.

LJUDMILA POPOVA | Director Digital Infrastructure Finance
NIBC

In 2024, we expect to see a shift towards colocation data centers as companies aim for improved scalability, efficiency and cost effectiveness. This trend is in alignment with a growing need for flexible IT infrastructure, driven by the increasing use of AI and the demand for robust, secure and sustainable data center solutions.

MICHAEL NICOLAI | Vice President Sales IT Germany
RITTAL

Global politics and supply chain challenges amplify data center market growth scenarios: complex regulations and energy consumption issues. BIM and advanced energy modeling optimize layout, streamline planning, boost efficiency, and enable truly climate-neutral, innovative data centers. The key is early collaboration at an early design stage.

DR. JOHANNES WALL | Sustainability Management
Ed. Züblin AG

The DC sector has its own, deeply rooted commitment to becoming and remaining as efficient and sustainable as possible. Legislator and sector need to come closer together to work on progressing the Green Deal targets - with sector insight and fit for purpose.

ISABEL STRECKER | Partner
Eversheds Sutherland

In Germany and Switzerland, as well as in some other countries, there are increasing normative or regulatory requirements for energy efficiency and waste heat recovery for new and existing data centers. Strategically, this will also make thermodynamically and exergetically intelligent and cost-effective concepts much more relevant.

PROF. ADRIAN ALTENBURGER | Chairman
J. Willers Engineering AG

LIQUID COOLING IN THE DATA CENTER

MORE EFFICIENCY FOR HIGH POWER DENSITIES

The use of liquid cooling is currently a hot topic among data center operators. According to the Uptime Institute's 2024 Cooling System Survey, this is largely triggered by rising power densities in IT racks due to the increased use of GPU-based high-performance infrastructures in the fields of AI, autonomous driving, medicine, and science. As interest in these systems continues to rise, the market for liquid cooling in data center environments could grow by up to 300 percent in the next five years, according to current forecasts by leading market research firms.

Above all, liquid cooling benefits from the simple physical fact that liquid can absorb considerably more heat than air. In addition, in liquid cooling systems the heat transfer largely takes place in a closed system, so that scarcely any heat from components such as CPUs and GPUs get into the server room. From an energy perspective, liquid cooling generally already makes sense from power densities of 20 to 25 kW, and above this, up to 250 kW per rack is possible. Where waste heat recovery is concerned, liquid cooling also has an advantage over air cooling, because the higher temperature level facilitates a direct link to a transfer heat exchanger.

WHICH TYPE OF LIQUID COOLING CAN BE USED FOR NEW INSTALLATIONS AND RETROFITTING?

Basically, there are currently two types of liquid cooling. In direct-to-chip cooling, the CPUs or GPUs are equipped with a heat sink with cooling liquid flowing through it. In immersion cooling, the CPUs or GPUs that need cooling are fully immersed in the cooling liquid. However, currently most data centers that use liquid cooling prefer direct-to-chip cooling.

One reason for this is that a certain amount of expenditure is required for retrofitting immersion cooling in existing, air-cooled data centers. Usually, the existing hardware must be completely replaced with servers that have been specially developed for immersion cooling, which are then operated in trays or tanks of dielectric fluid. Due to the large quantities of fluid and the higher

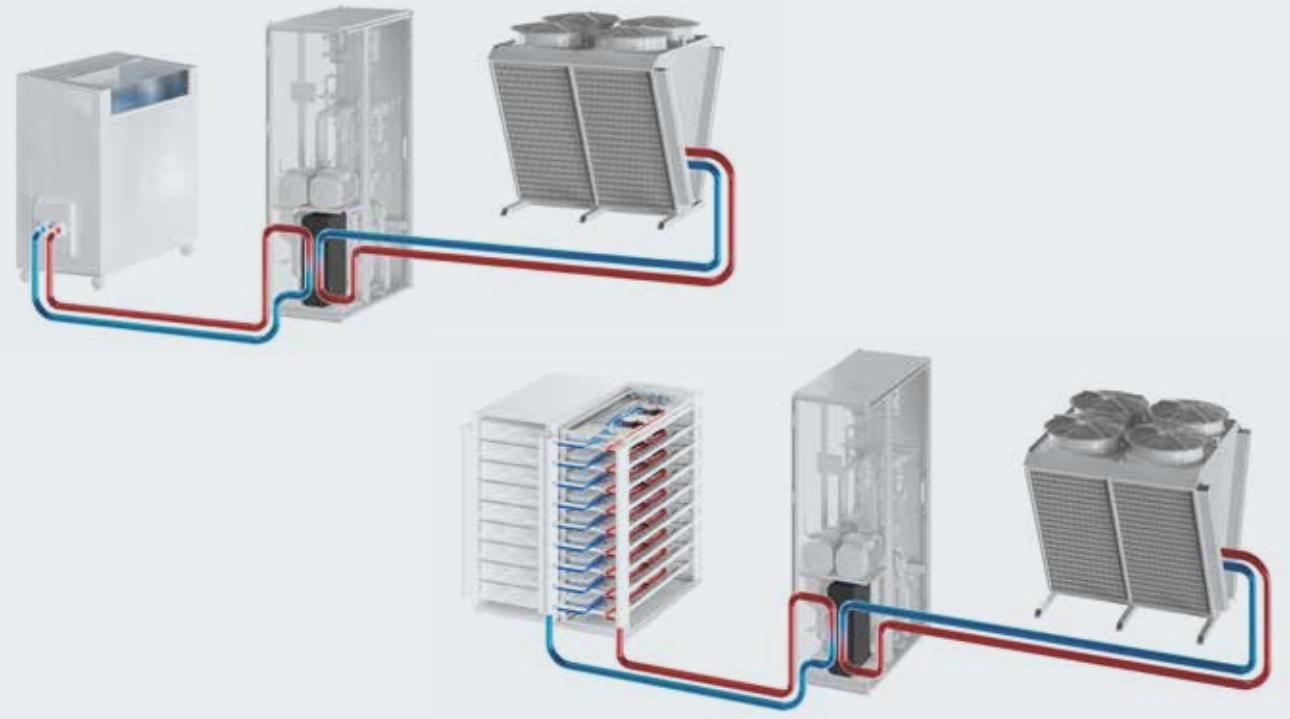
server density, the point load on the ceiling can be much higher than with rack installation. Therefore, it is essential to check the structure of the building before installation to make sure that it can withstand this load. Direct-to-chip cooling, on the other hand, is far easier to implement and is therefore ideal for retrofits. In most cases, all that is needed is to equip the existing servers with new heat sinks and the rack with a distribution system, followed by connecting the pipes connect the pipes of the individual servers to this. This distribution system is then connected to a coolant distribution unit (CDU), which connects the system to the facility water.

COOLANT DISTRIBUTION UNIT (CDU): THE BASIS FOR EFFICIENT LIQUID COOLING

Coolant distribution units are crucial components in liquid cooling environments. They supply the cooling circuits of the servers or GPUs (TCS, Technology Cooling System) with cold water from the Facility Water System (FWS) via heat exchangers, therefore enabling independent flow and temperature control for each circuit. To ensure compliance with the purity requirements for the fluid in the cooling circuits, CDUs also have special filters and the parts that are in contact with fluid are made of extremely high-quality materials.

To ensure that a CDU operates with maximum efficiency, heat losses between the TCS and FWS must be minimized. This can be achieved using particularly large-surface heat exchangers.

The pumps that control the flow in the individual circuits also influence efficiency. If they are speed-controlled, they can operate much more energy-efficiently, especially in partial load conditions. When a CDU operates within the ASHRAE temperature ranges W32 to W+, it can, in



conjunction with suitable chillers, rely on free cooling almost year-round, even in moderate climates.

Such a combination of CDU and chillers allows for especially energy-efficient cooling of servers or GPUs with high power densities. Additionally, the separated circuits make it possible to implement hybrid solutions with both air and liquid cooling via a single facility water loop. Climate cabinets, row cooling units, or cooling doors can continue to be used in parallel and can remove the 20 to 30 percent of residual heat that non-liquid-cooled components like server power supplies release into the room or rack.

CONCLUSION

Increasing heat loads in the rack require new approaches to the air conditioning of data centers. With power densities of more than 20 to 25 kW, liquid cooling is currently the best alternative. With direct-to-chip cooling, existing servers and racks can be easily retrofitted. Direct-to-chip therefore offers the best price-to-performance ratio for existing data centers. Immersion cooling should also be considered when planning a completely new high-performance data center and both systems should be compared. Regardless of which option data center operators ultimately choose, high-performance CDUs are the foundation of any liquid cooling environment.

THE CDU SEPARATES THE TECHNOLOGY COOLING SYSTEM (TCS) FROM THE FACILITY WATER SYSTEM (FWS) AND CAN BE USED FOR BOTH DIRECT CHIP LIQUID COOLING AND IMMERSION COOLING.

MIRKO HOFFMANN, a certified engineer for energy and environmental technology, is Sales Director for STULZ Germany and has been with the company since 2003. He has significantly contributed to the company's growth in Germany and serves as one of STULZ's key national and international experts when it comes to the air conditioning of large data centers.

DATA CENTERS
THE HIDDEN OPPORTUNITY FOR SUSTAINABLE URBAN GROWTH

Currently, there is much speculation in many political committees at the municipal level, as well as in the regional press, about how many data centers a municipality or region can support. Concerns are often raised regarding land consumption, high energy demand, noise emissions, and resource consumption. However, it is often overlooked that data centers typically put less strain on the existing infrastructure of a municipality compared to other commercial enterprises. For example, the power and fiber optic supply are generally constructed as completely independent infrastructures that do not negatively impact municipal supply but rather offer opportunities for the development of adjacent supply areas. The demand for drinking water is very low due to the relatively small number of jobs, as is the amount of wastewater.

Contrary to popular belief, the use of drinking water for cooling is no longer a state-of-the-art measure – while it can increase energy efficiency, it is not necessary, and would involve significant costs and have negative effects on the local drinking water supply and the appropriate use of this resource. A data center campus can also be designed so that rainwater is absorbed on-site. From the perspective of municipal infrastructure, therefore, there is no reason against the (further) establishment of data centers.

The relatively small number of jobs mentioned in the previous section, as well as the generally low volume of heavy traffic, make data centers ideal commercial enterprises in municipalities with high traffic congestion or in commercial areas where the road infrastructure is already at its limits.

Experience shows that noise protection is usually not a barrier to the establishment of data centers. Compared to many other commercial enterprises, data centers are relatively quiet – especially when considering traffic movements as well. In several cases, data centers have been approved in direct proximity to residential areas (WA), meaning that the noise limits according to the Technical Instructions on Noise Protection (TA-Lärm) must be demonstrably met. Noise emissions from data centers typically originate from the cooling systems, which can be equipped with noise protection measures and, due to climatic conditions, operate at reduced capacity during the particularly sensitive nighttime hours, thereby reducing noise emissions. Noise emissions from diesel generators generally occur only during test runs, which take place exclusively during the day and, with around 10-15 hours per year spread over several test runs, have a very low impact.

Regarding land consumption, large campus projects with plot sizes of 50,000 square meters or more intended for data center use have been the main focus in recent years. The availability of such plots are, of course, limited. However, in addition to these large campus projects, there are also numerous smaller projects that make

plots as small as 10,000 square meters usable, which are likely to be more available in many municipalities. This means that data centers can also be established in smaller commercial areas or even be an explicit part of neighborhood development.

In principle, data centers have a positive interaction effect due to the inevitable generation of waste heat. If this waste heat cannot be used, it is released into the atmosphere. Technically, this waste heat can be relatively easily extracted and delivered – the prerequisite is the existence of a so-called heat sink, i.e., a demand carrier for this waste heat. Demand carriers can be municipal or regional district heating network operators, who can achieve their goals of reducing the CO_2 balance and thus the goals of municipal heat planning more quickly by using the waste heat.

In the context of a decarbonized neighborhood development, the establishment of a corresponding local heating network can contribute to lowering the costs of waste heat utilization, and also to lowering the temperature level accordingly, to reduce or completely avoid the need for temperature increase of the waste heat through heat pumps.

Since the costs for the establishment of heating networks are very high, a spatial integration of a data center is economically very sensible. Due to the energy density in data centers, plot sizes of around 10,000 square meters are sufficient to supply a neighborhood of several hundred thousand square meters with green waste heat generated from non-fossil electricity, even in winter.

From an urban planning perspective, data centers can also be designed in such a way that they optimally integrate into neighborhood development. Although the facades of data centers have an important technical functionality, they can be designed in such a way that data centers can even give positive urban development impulses. This is not limited to the greening of facades but also extends to the sophisticated architecture of the buildings and the overall campus. The unsealing of the outdoor areas supports the formation of so-called “sponge cities.”

CONCLUSION

The debate should not be about how many data centers a municipality or region can accommodate, but rather about how data centers can be optimally integrated into existing or future planned structures. Data centers are very flexible in this regard and can be adapted in planning and design to achieve this integration. The vast majority of data center operators are very open to engaging in a dialogue with municipalities to facilitate this process.

ALEXANDER HAUSER has been Managing Director at TTSP HWP and at various subsidiaries within the corporate group since 2016. For many years, he has been a sought-after industry expert. Alexander Hauser is convinced that digitalization and sustainability can go hand in hand, and he promotes this approach among clients, partners, and the public.

HOW CAN WE MEET THE GROWING DEMAND FOR HIGHLY QUALIFIED TALENT IN THE DATA CENTER INDUSTRY?

The recently published German Datacenter Association (GDA) Data Center Impact Report 2024 confirms the ongoing growth of the data center industry with compelling numbers: In Germany alone, there are 1,994 data centers with an IT-load of more than 50 kW. Over 309 of these are colocation data centers, consolidating 1.3 GW IT load – more than two-thirds of the total amount of almost 2 GW.

By 2029, the installed IT load in Germany is expected to reach 3.3 GW. Planning, constructing, and operating these data centers requires skilled personnel in multiple disciplines. As many other industries, we are facing the challenge of staffing our data centers. Initiatives are required at different levels to meet these challenges and enable future growth.

BRANDING AN INDUSTRY

Streaming, social media, gaming, even IoT devices are omnipresent for most of us. However, only a few people are aware of the technology behind the application. The infrastructure that transfers data from one device to another in just a fraction of a second is hidden to most users. Taking that into account, it is hardly surprising that the data center industry is not widely known yet as an attractive employer.

The joint effort of industry associations such as the GDA is just as important as the commitment of individual companies. We have already initiated and supported many projects to enhance the visibility of our industry in recent years. The first “Open Data Center Day” has been a great success, and we are eager to continue this success on November 8, 2024 at several locations across Germany.

ATTRACTING MULTIPLE PROFESSIONS

Enhancing the general visibility of the data center sector itself is only the first step when it comes to attracting talent for colocation providers. There is a strong need to outline the diversity of job functions within the industry as well. Investor and real estate specialists focus on market opportunities and property, pre-construction and project management, construction and commissioning – all of them are focused on successfully implementing a new data center site.

Data center technicians, electrical and mechanical engineers, power and sustainability specialists, sales and

commercial team members, general administration teams, and many more – everybody contributes to the overall success. We have many advantages to present to experts as well as to young professionals. Our industry can be seen as one of the most future-proof markets; we are at the forefront of technological innovation, which allows employees to continuously develop their skills.

FOCUS ON ONBOARDING AND DEVELOPMENT PROGRAMS

The Data Center Impact Report 2024 assumes there are around 65,000 direct, indirect, and induced jobs within the German data center sector. The continuously growing demand for skilled personnel leads to a focus shift in terms of requirements. As employers in the data center sector, we need to carefully consider which skill set we are looking for. As we need to hire from other industries or directly from universities and colleges, we cannot always expect dedicated experience in the data center industry. At NTT Global Data Centers, this is why we focus on in-depth onboarding and training programs.

Investing in technical as well as personal development is equally important. The Gallup State of the Art Global Workplace 2024 Report recently confirmed that employees in Europe have the lowest emotional attachment to their workplace compared to all ten global regions that have been analyzed. Working in a critical infrastructure business, we can recognize the data center industry as a meaningful industry to work in. Creating leadership development programs and working on individual career paths across the business helps us to minimize turnover.

ESTABLISHING APPRENTICESHIP PROGRAMS

Equally important as branding our industry is anchoring its attractiveness among emerging target groups.

Internships, working student positions, and close cooperation with universities and schools offer excellent opportunities to provide insights and spark interest. Over the past few years, we have established successful apprenticeship programs across Europe. In parallel, we cooperate with several universities and offer internships at many of our locations.

Special interest is given to candidates who want to switch careers; maybe they have dropped out of university, are interested in joining our apprenticeship program, or have worked in a completely different industry. We strongly believe you always need to understand their story and reasons behind it. Especially in our fast-paced industry, a process-driven mindset with experience in growth environments and technical background will most likely bring transferable skills for the data center sector.

ENFORCE AND COMMUNICATE OUR EFFORTS IN SUSTAINABILITY

Data centers are the backbone of our digitalization and thus a must-have for all of us. However, candidates may raise critical questions about energy consumption and sustainability. Besides the huge efforts made to become more energy efficient and reach our operational Net Zero goal in 2040, we show our commitment through details such as home office or hybrid arrangements. As mobile working is not possible for all job functions, job bikes or public transportation allowances are alternatives here. Emotional attachment can also be enhanced with attractive benefits. Offering team events locally or across a larger region can significantly improve communication between teams. Particularly the younger generation values a positive work-life balance and is very receptive to options for job rotation, job shadowing, mobility and well-being programs.

BROADEN THE VIEW

Let us continue to promote the data center industry in general while being more open to diverse talent. There is a strong need to foster the individual development of our employees to ensure their emotional attachment and to support them in leveraging new technologies such as AI. Focus more on attitude and mindset, look at transferable skills, and invest in training someone for a few months if needed. Skills can be developed, and experience comes over time, but if we aren't attracting and hiring people from outside of the industry, the talent crisis will turn into an operational one.

SVEA MEIER is leading the Talent Acquisition, Learning & Development teams at NTT Global Data Centers EMEA. She is a Global Talent Management professional with experience across different industries.

JOB MARKET

The data center sector provides

65,000

jobs in Germany.

65%

of the surveyed operators of colocation data centers outside the Frankfurt am Main metropolitan region stated that the shortage of skilled workers is the biggest challenge for their company.

Illustration designed by stories / Freepik.
Source: German Datacenter Association. (2024). Data Center Impact Report Deutschland 2024.

SAFELY POWERED
EMERGENCY POWER INSTALLATIONS IN DATA CENTERS

NTC
NOTSTROM
TECHNIK CLASEN

The power demand for data centers in Germany has steadily increased over the past ten years. In the pandemic year of 2020, it reached an impressive 16 terawatt-hours. But what actually happens in the event of a blackout when the power supply fails, whether for milliseconds or hours? The modern world depends on data and its associated infrastructure to an unprecedented degree. Data centers form the backbone of this digital infrastructure by storing, processing, and transmitting vast amounts of data. These centers operate a variety of critical services, including cloud applications, financial transactions, e-commerce, and social networks. Additionally, the energy demand is exponentially increased by the current and future use of AI. Given the central role of data centers, emergency power supply is a crucial element to ensure continuous operation.

The reliability and availability of the power supply are essential to maintain uninterrupted operations and absolutely prevent the worst-case scenario of data loss. When installing emergency power systems in data centers, many critical aspects and challenges must be considered, as they are part of the same critical infrastructure as emergency services. The systems must be able to take over the full load of the data center in real-time without interruption. Furthermore, the emergency power supply must remain stable and reliable over extended periods, especially in scenarios in which the restoration of regular power supply may take hours or even days.

Another important aspect is the scalability of emergency power systems. As data centers continuously grow and evolve, emergency power solutions must be adaptable to meet the increasing demands. The integration of renewable energy into the emergency power supply is also becoming increasingly important to enhance the sustainability of the entire infrastructure and minimize the CO_2 footprint.

POWER SIZES AND SCALABILITY

Emergency power systems are installed in data centers in various power sizes to meet specific requirements. The range extends from smaller units of 100 kW as a single unit to large installations of up to 300 MW in parallel configurations with multiple units. Frequently, UPS systems of 500 kW or backup power systems in 3 MW blocks are connected in parallel to ensure the necessary redundancy and scalability. By linking multiple units, redundancy is created, thereby increasing availability. In large data centers, any number of backup power systems can be installed to ensure a secure power supply.

INFRASTRUCTURE AND REDUNDANCY

For fueling the backup power systems, underground tanks and tank containers are often installed, serving as central energy reserves accessible to multiple units. These units are housed in multiple rooms to minimize the risk of complete failure. Belly tanks (sub-base tanks), particularly used in container solutions, are also utilized.

SAFETY AND CERTIFICATION REQUIREMENTS

To meet the high standards of safety and data protection, emergency power installations must comply with various certifications, often according to customer specifications, such as TÜV IT and the standard 50600. Additionally, compliance with GDPR and other security-relevant certifications is essential for data center operators to ensure the protection of sensitive data. All of this must be considered in the design and planning of the emergency power system.

PLANNING AND INSTALLATION PROCESS

The installation of emergency power systems, both as stationary units and in containers, always presents a special challenge. Integrating emergency power systems into the existing building infrastructure is a key component of the installation services. This is achieved through precise planning and innovative solutions. The process begins with a detailed analysis of the data center's energy requirements through specific network analyses. These analyses help determine the specific needs and, based on them, develop individual concepts. With the help of 3D designs, the planned solutions can be visualized and optimized early on for the customer.

From planning through installation to commissioning, the entire process should be accompanied by experienced site managers, project managers, and technicians who have electrical engineering expertise in the field of backup power systems and UPS systems.

MAINTENANCE AND SUSTAINABILITY

After installation, regular maintenance is necessary to ensure the reliability and functionality of the emergency power systems. This includes annual maintenance of the UPS and backup power systems, as well as monthly test runs of the backup power systems on-site at the customer's location. By using alternative fuels such as HVO or GTL, it is also possible to minimize the environmental impact of the backup power systems. HVO (Hydrotreated Vegetable Oil) and GTL (Gas-to-Liquid) are alternative or synthetic fuels considered more environmentally friendly because they emit fewer pollutants such as nitrogen oxides and particulate matter than conventional diesel during combustion. Additionally, HVO, which is produced from renewable raw materials, significantly reduces CO_2 emissions compared to fossil diesel. Furthermore, soot particle filters and SCR catalysts contribute to reducing emissions and achieving higher sustainability. The challenges in implementation often require the interaction among the Federal Immission Control Act (Bundes-Immissionsschutzgesetz, BImSchG), the EU Green Deal, and the EU Taxonomy. These interactions are often complex and can create competing requirements that need to be considered and planned for.

OCCUPATIONAL SAFETY AND INTEGRATION

When working with live voltage and installing heavy components, the highest occupational safety conditions must always be observed to ensure that all installations meet current safety standards and that the health and safety of employees are guaranteed. Auditing according to occupational health and safety management system such as ISO 45001 should be mandatory.

CONCLUSION

The installation of emergency power systems in data centers requires careful planning, comprehensive analyses, and adherence to high technical and safety-related standards. By using efficient and sustainable technologies, as well as through regular maintenance and service support, customized solutions can be offered that take into account all the mentioned aspects to ensure a reliable and continuous power supply.

JÖRG BÖHME has been the CEO of Notstromtechnik-Clasen GmbH since 2019, a system integrator for independent, highly available emergency power systems. Since 1996, the company's guiding principle has been to securely equip companies with emergency power, ensuring worry-free, independent operation, especially for customers in critical infrastructure.

CONTRIBUTORS

NDC GARBE.

Formed in 2019, NDC-GARBE Data Centers Europe is a German developer of data centers with offices in Frankfurt, Hamburg, Munich and London. The company's international team combines decades of experience in the development of European real estate locations with in-depth knowledge of data center technologies and a thorough understanding of the market.

NDC-GARBE focuses on bespoke development solutions for customer projects in markets where the local knowledge and development expertise can de-risk the acquisition, design and shell and core delivery process for the clients. Whether the requirement is based on the patented "Green Cube" HPC AI-ready water-cooled model, a standardized air-cooled or hybrid solution, or a customer reference designed data center; partnering with the NDC-GARBE team assures a smoother process from Acquisition through to Operation

WWW.NDC-GARBE.COM

JLL

For over 200 years, JLL, a leading global commercial real estate and investment management company, has helped clients buy, build, occupy, manage and invest in a variety of commercial, industrial, hotel, residential and retail properties. A Fortune 500 company with annual revenue of $20.8 billion and operations in over 80 countries around the world, our more than 110,000 employees bring the power of a global platform combined with local expertise. Driven by our purpose to shape the future of real estate for a better world, we help our clients, people and communities.

WWW.JLL.DE

TTSP HWP designs integrated data centers for its international clients, advises on their conception, oversees their realization, and has been engaged as a general planner in over 40 data center projects nationwide, providing more than 2 gigawatts of IT capacity over the past 17 years. The range of services includes advising on the analysis of potential locations, providing commercial consultation to potential investors and operators, as well as the construction and handover of data centers. This includes planning, managing the approval and tendering processes, as well as general planning and construction supervision.

WWW.TTSP-HWP.DE

Stulz is one of the world's leading suppliers of air conditioning technology. For over 50 years, the company has been developing air-conditioning technology at the highest level: whether data center, industrial application or communication technology, the company offers tailor-made cooling solutions with highest precision and energy efficiency worldwide and from one single source. Stulz products also make a significant contribution to efficient and environmentally friendly data center operation: the company is one of the leading manufacturers of particularly energy-saving cooling and air conditioning technologies.

WWW.STULZ.COM

CyrusOne is a leading global data center developer and operator specializing in delivering state-of-the-art digital infrastructure solutions across the globe. With more than 50 high-performance mission-critical facilities worldwide, the company ensures the continued operation of digital infrastructure for nearly 800 customers, including approximately 200 Fortune 1000 companies.

CyrusOne's leading global platform of hybrid-cloud and multi-cloud deployments offers customers colocation, hyperscale, and build-to-suit environments, which help enhance the strategic connections of their essential data infrastructure and support the achievement of sustainability goals. CyrusOne's data centers offer world-class flexibility, enabling clients to modernize, simplify, and rapidly respond to changing demands. Combining exceptional financial strength, a broad global footprint, and continued investment in key digital gateway markets, CyrusOne provides the world's largest companies with long-term stability and strategic advantage at scale.

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Rittal is a leading global supplier of enclosure systems, automation, and infrastructure with its industrial, IT, energy and power, cooling and service units. Rittal solutions are used in over 90% of global industries. IT solutions include RiMatrix modules for rack, cooling, power, monitoring and security levels up to complete turnkey container and modular data centers, and service for the whole lifecycle. Founded in 1961, Rittal is the largest company in the owner-operated Friedhelm Loh Group with 12 production sites and 95 international subsidiaries. The group has 12,100 employees and posted revenues of 3 billion euros in the fiscal year 2023.

WWW.RITTAL.COM

NTT DATA operates one of the largest global platforms, covering more than 20 countries and regions, including the Americas, Asia Pacific, EMEA, and India. The company is routinely recognized as a leader by top analysts in networking and data centers.

As a neutral operator, NTT DATA provides access to various cloud providers, internet exchanges, and telecom networks, including its own IPv6-compliant Tier 1 Global IP Network. NTT DATA has made a net-zero commitment in alignment with the science-based target initiative across its operations by 2030 and the whole value chain until 2040. In addition, NTT DATA drives towards powering our data centers with 100% renewable energy by 2030.

SERVICES.GLOBAL.NTT

Notstromtechnik-Clasen GmbH (NTC) has been a leading system integrator in emergency power design and installation for over 28 years. As an independent company, NTC specializes in integrating customized emergency power solutions into existing infrastructures and realizing full emergency power supply according to customer and legal requirements. Extensive experience spanning from early server rooms to modern data centers (DCs) of all sizes, including installations up to 300 MW. The integration of intelligent battery storage systems is another key focus, supporting control of energy and renewable energy applications.

WWW.NTC-GMBH.COM

ABOUT GDA

GERMAN DATACENTER CONFERENCE

The German Datacenter Conference is an initiative of the German Datacenter Association. With the conference, we offer all stakeholders of the data center ecosystem a platform to make contacts and exchange professional ideas with renowned experts and new faces of the German and European market.

GERMAN DATACENTER ASSOCIATION

The German Datacenter Association (GDA) unites all Players in the value chain of digital infrastructures throughout Germany: More than 170 companies in the data center ecosystem are among GDA's members, including the majority of operators and owners of data centers of all sizes. This network promotes synergies across traditional industry boundaries.

Founded in Frankfurt am Main in 2018, GDA offers data center operators in Germany a platform to jointly promote the industry's growth. Its declared goal is to sustainably improve framework conditions for data center operations in Germany, the public's perception of the industry, and to enhance the appeal of German locations in the eyes of investors.

The German Datacenter Conference (GDACon) is an initiative of the German Datacenter Association. With the conference, GDA offers all stakeholders of the data center ecosystem a platform to make contacts and exchange professional ideas with renowned experts and new faces of the German and European market.

INTERESTED IN BECOMING A MEMBER OF GDA OR PARTNER OF THE GERMAN DATACENTER CONFERENCE 2025? CONTACT US VIA OFFICE@GERMANDATACENTERS.COM

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GDA YOUNG TALENT AWARD

TALENTS SHARE THEIR SMART IDEAS

With the GDA Young Talent Award, the German Datacenter Association is explicitly looking for talents who want to contribute to the digitalization of tomorrow: Outstanding bachelor's, master's, and diploma theses in data centers and digital infrastructures are each awarded 1,500 EUR or 2,500 EUR.

Since the first edition in 2022, Prof. Dr. Kristina Sinemus, Hessian Minister for Digitalisation and Innovation, has taken over the patronage and will present the awards again on 3 September 2024.

Be there when outstanding young IT talents share their smart ideas for the future of data centers with us!

GDA YOUNG TALENT AWARD CEREMONY

3 September, 7 pm

OPEN DATA CENTER DAY

NATIONWIDE AWARENESS CAMPAIGN ON THE TOPIC „WHERE DOES THE INTERNET ACTUALLY LIVE?!" – 8 NOVEMBER 2024

To give the public a concrete answer to this question, the GDA has once again recruited many data center operators throughout the country to open their doors and offer guided tours on this day.

It is the ideal opportunity to educate the direct neighbourhood, but also representatives of the municipalities & local politicians, citizens' initiatives and pupils about the great importance of data centers for modern life and work. With this event, GDA aims to create more acceptance for our industry and understanding for the data center business model in broad sections of society.

TdoRZ

TAG DER OFFENEN RECHENZENTREN

Wo wohnt eigentlich das Internet?!

GDA EVENTS IN 2024

SEPTEMBER

10 - 12.09.2024	**PLATFORM GLOBAL** | Antibes
17./18.09.2024	**DCD CONNECT** | London
25.09.2024	**GDA NET[T]WORK LUNCH BY RITTAL** | Frankfurt

OCTOBER

09./10.10.2024	**DATA CENTRE WORLD ASIA** | Singapur
10.10.2024	**GDA NET[T]WORK LUNCH BY CYRUSONE** | Frankfurt
21./22.10.2024	**DIGITAL-GIPFEL DER BUNDESREGIERUNG** | Frankfurt
24.10.2024	**GDA NET[T]WORK LUNCH BY DANFOSS** | Hamburg

NOVEMBER

08.11.2024	**OPEN DATA CENTER DAY** (Tag der offenen Rechenzentren – TdoRZ)
26./27.11.2024	**TOUCHDOWN MIDDLE EAST** | Bahrain
27.11.2024	**GDA NET[T]WORK LUNCH BY TAYLOR WESSING** | Frankfurt

EVENTS IN 2025

JANUARY
29.01.2025
GDA New Year's Reception

FEBRUARY
04./05.02.2025
KICKSTART EUROPE
Amsterdam

JUNI
04./05.06.2025
GDA goes DATACLOUD GLOBAL
Cannes

04./05.06.2025
GDA goes DATA CENTRE WORLD
Frankfurt

JULY
GDA Summer Party

SEPTEMBER
17.09.2025
GDA General Assembly

17./18.09.2025
GERMAN DATACENTER CONFERENCE

NOVEMBER
OPEN DATACENTER DAY

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