Future-ready data centres

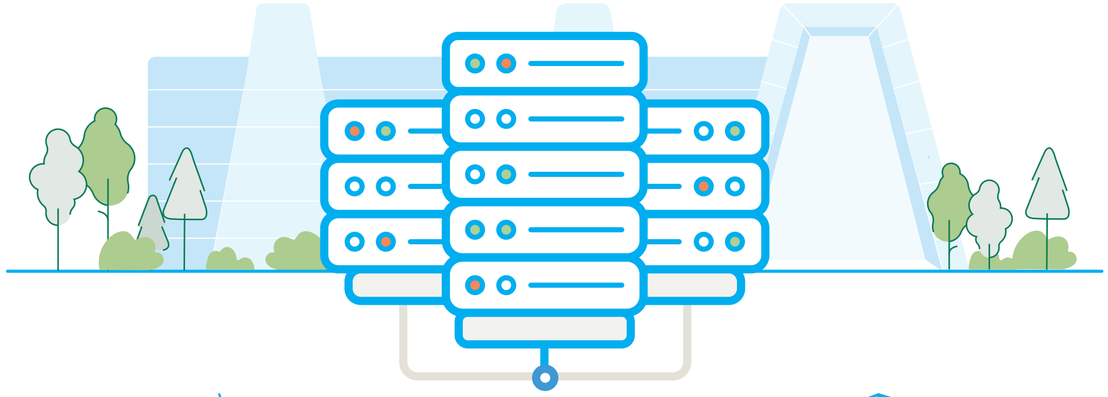
Engineering resilient and efficient facilities at pace

As the global demand for cloud, AI, and high-performance computing (HPC) increases at an unprecedented pace, data centres must do more than deliver on capacity. They must be designed to minimise environmental impact, meet community expectations, and adapt to changing regulations, technologies, and climate pressures. And that's before they are ever operational. Once commissioned, these facilities must be able to anticipate disruptions, optimise performance, and recover quickly, all while reducing energy intensity and water consumption. Ultimately, clients must balance these needs against the demand to develop at pace and scale.

Ramboll can help.

Site assessment and selection

Strategic planning



Design and permitting

Commissioning and operation

Construction

Transforming the future of data centres

Ramboll partners with clients throughout the entire project lifecycle to increase capacity at speed, de-risk programmes, and deliver operational reliability. The outcome is a resilient data centre – efficient, reliable, welcomed by its community, and able to scale when demand shifts – that can meet the needs of today and the challenges of tomorrow.

15+ GW
of space designed and tested

$60b+
due diligence transactions

1,000
studies completed globally

1,300
dedicated data centre specialists

Site assessment and selection

We leverage our extensive experience across hyperscale and colocation data centres to help enterprises, developers, landowners, and investors identify risks and opportunities throughout the due diligence process, ensuring the right decision is made as early as possible. We understand the critical factors that make a site suitable for a data centre – power, permitting, community, environment, infrastructure, and connectivity – and determine through master planning whether the site stacks up commercially in terms of capacity and time to market. Our experts combine a strategic global approach to technical and environmental due diligence with the local expertise needed to understand country-specific requirements.

- Site development strategy (entitlement/zoning/planning/permitting)
- Site risk matrix and development schedule
- Test fit/block diagram and conceptual master planning
- Utility access and availability (water, power, fibre, natural gas)
- Phase I environmental site assessments and Phase II subsurface investigations
- Geotechnical investigations and land surveys
- Air quality, noise, and vibration assessment and modelling
- Transportation, traffic impact, and security assessment
- Biodiversity and ecology assessment
- Flood, blast, and climate risk assessment and modelling, sustainability, and community impact assessment

Select project experience

Global site due diligence programme

Ramboll assisted one of the world's largest on-demand cloud computing platform providers across its global development programme with the planning, due diligence, feasibility analysis, and overall risk management of its site selection process.
We addressed critical site selection and development issues to ensure the successful launch and sustainable operation of the facilities. Our experts also provided a roadmap for future site development that was consistent with local, state, and federal laws as well as the client's requirements and strategy.

Site due diligence for three hyperscale developments

Ramboll performed site due diligence for three hyperscale data centre developments located in northern Italy (two of which were located in a greater metropolitan area). Our team was tasked with identifying risks and opportunities associated with the development of 80 MW, 90 MW, and 279 MW data centres, varying in size from approximately 105,000 to 440,000 square metres.
Our work included test fit development and conceptual master planning, including high-level utilities layout that was informed by topographic and land title survey; desk assessment (permitting, utilities, transport, traffic, security, archaeological, and sustainability), modelling studies (blast risk, air quality, noise and flood risk); Phase I and II environmental investigations, and Phase I and II geotechnical investigations.

Power due diligence for data center client

Ramboll conducted a comprehensive due diligence assessment on power and natural gas availability for four new gigawatt data centre sites across the USA. Our analysis included identifying potential red flags, evaluating prime power availability, and conducting technical due diligence. We also assessed the feasibility of colocation with nearby power-generating assets, reviewed the grid interconnection process, and identified permitting and regulatory challenges.
Our experts provided a risk matrix for the sites, including required permits and relevant regulations.

Design and permitting

With our multidisciplinary expertise, we can assist clients with whole-campus design, including substations; power generation; water; mechanical, electrical, and plumbing (MEP) design; and the latest technology. In each of our designs, we focus on resiliency, scalability, reliability, and sustainability, with an aim to reduce embodied and operational carbon, improve power and water usage effectiveness (PUE/WUE), and help clients with corporate and ESG reporting commitments.

Our experts understand the unique sector and geographical challenges facing data centre clients and provide turnkey support for zoning, permitting, and entitlement. We proactively address any challenges to ensure each project runs to time, while keeping risk management and quality at the forefront.

- MEP/FP design engineering
- Civil, structural, and architectural engineering
- Security and telecommunications engineering
- Substation, onsite power generation, and microgrid design
- Water and wastewater treatment design
- Utility or cooling water system design and management
- Permit application and environmental impact assessment
- Computational fluid dynamics (CFD)
- Owner’s engineer/trusted advisor
- Reliability availability (PRA) and MTBF (meantime between failure) studies
- Sustainable design and BREEAM/LEED
- Stakeholder and community engagement

Select project experience

Transforming a coal-fired power plant site into a low-carbon digital hub

Ramboll has been retained to provide complete mechanical and electrical engineering design and EPCM services for multiple new buildings at Terawulf's Lake Mariner data centre campus in Western New York, USA. As a core delivery partner, we will guide efficient, environmentally responsible deployment and operation of advanced technologies and manage compliance within strict community standards, including noise limits and water stewardship.

This project will bring the site's total contracted capacity to over 360 MW. The site features dual 345 kV transmission lines and low-latency fibre. By repurposing existing transmission lines and industrial infrastructure at the former coal plant, the project eliminates the need for new greenfield development. The site operates on a low-carbon grid, primarily powered by nuclear and hydropower, with ongoing efforts to further integrate renewable energy sources. Advanced cooling technologies – including direct-liquid-cooled graphics processing unit (GPU) servers and closed-loop glycol systems – are implemented throughout the campus to significantly reduce both energy and water consumption.

Seven-storey campus design

Ramboll was selected to design a seven-storey data centre building situated within a two-building campus in Singapore. It was designed to be concurrently maintainable, energy efficient, and highly scalable for future expansion. The design adhered to the TIA-942B Rated 3 requirement, ensuring robust and reliable operation.

The building featured a 22 kV utility incoming power supply with provisions for upgrading to 66 kV, which would support the campus's total IT power capacity of approximately 54 MW. The design used a distributed redundant configuration for IT loads, which enhanced reliability and ensured uninterrupted performance. To improve maintainability and uncompromised redundancy during maintenance, a catcher generator was provisioned. Ramboll proposed optimised cooling efficiency with two separate water-cooled chiller plant systems configured in an N + 1 arrangement. Thermal buffer tanks were included to provide continuous cooling. Finally, to reduce embodied carbon, we designed the facility without raised floors.

The building achieved the BCA-IMDA Green Mark for New Data Centre Platinum Rating.

Design for sustainable water supply and treatment

Ramboll supported a global data centre leader with master plans for a sustainable water supply to efficiently cool its new mega data centres in eastern USA. The project aim was to operate with a "water neutral" footprint.

We developed water master plans with strategies to blend wastewater effluent with harvested rainwater and repurpose a river intake from a former power plant. Ongoing water treatment plant design used advanced membrane-based filtration and rainwater harvesting to supply 4.3 MGD (16,300 cubic metres/day) of cooling water. Our team facilitated public-private partnerships with municipalities to construct county-wide reclaim water systems to supply several other mega data centres.

Our suggested strategies helped the client avoid impact on drinking water supplies and enabled $35 billion USD of private investments.

Construction

Ramboll offers comprehensive project and construction management services to ensure our clients' data centre projects are delivered efficiently, on time, and within budget. With extensive experience in managing complex projects involving multiple subcontractors and other stakeholders, we excel at coordinating diverse teams to meet client critical milestones and requirements while maintaining cost control and operational efficiency.

Our project management office (PMO) and engineering, procurement, and construction management (EPCM) teams provide full lifecycle support, ensuring precision in every aspect, from preconstruction planning to risk mitigation, construction oversight, and commissioning.

- Preconstruction and cost estimating services
- Project planning, management, and controls
- Design coordination and technical integration
- Procurement interface and supply chain coordination
- Construction management and field supervision
- Safety, environmental, and permit compliance management
- Stakeholder management

Select project experience

PMO services for a 10x50 MWit data centre

Ramboll was selected to provide client-side PMO services for a hyperscale facility located in Sweden. Our scope included lead project management, EHS management, commissioning management, QA/QC management, critical environment management, ITIM infrastructure management, administration and planning, and local code compliance.

Ramboll was responsible for permitting coordination, communication with local authorities, and managing project stakeholders. The international project involved several contractors all coordinated to meet high safety standards and ensure that project targets were achieved.

Project management for a 24 MW data centre with LEED and CEEDA targets

Ramboll was selected to provide project management and lead consultant services for the construction of a new data centre facility, the largest of its kind in Finland. Our services spanned from feasibility through final handover. The facility, designed to deliver up to 24 MW of IT power, incorporates advanced sustainability measures, including a target PUE of 1.12 and the potential to recycle energy through heat pumps to supply district heating for thousands of homes.

The data centre, built over multiple floors, was designed to be concurrently maintainable and house up to 200,000 servers, with the intention to achieve LEED Gold and CEEDA (Certified Energy Efficient Datacentre Award) certification. Ramboll provided project management, design management, site monitoring, and safety coordination services throughout the project.

Project and construction management services for a 7 MWit brownfield data centre

Ramboll provided services for the expansion of an existing data centre facility on the outskirts of Copenhagen. Our team provided: project management, feasibility studies, design from RIBA-1 through RIBA-4, permitting (§8, EIA, and BP), procurement management construction management including scheduling, site supervision, quality surveying, assurance, and control, and health and safety. The facility, designed to deliver 7 MWit and to be concurrently maintainable, is built over two floors (one of which is underground) and incorporates advanced sustainability measures, including a target PUE of 1.2, a modular design suitable for disassembly, and a cooling system capable of rejecting heat to supply district heating for neighbouring homes through heat pumps.

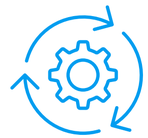
Commissioning and operation

Commissioning ensures that every system in a data centre operates as intended, with maximum efficiency and reliability. Our approach spans from initial system testing to integrated operational assessments, ensuring seamless functionality across all components. We focus on optimising system performance, minimising energy consumption, and ensuring compliance with both design specifications and industry standards.

Our comprehensive commissioning services provide a thorough evaluation of critical infrastructure as well as compliance with performance, EHS, and sustainability requirements. Through detailed documentation and expert analysis, we ensure the facility operates efficiently, supports continuity, and is ready for future challenges.

- Level 1–5 commissioning
- Infrared inspections
- Policies, practices, and procedures (MOP/SOP)
- Power quality analysis
- Root cause failure analysis
- Operational EHS compliance, management systems, and sustainability

Select project experience



Advanced data centre campus commissioning for a 264 MW high-performance colocation

Ramboll conducted comprehensive commissioning for a state-of-the-art data centre campus, supporting 264 MW of critical infrastructure. The facility is designed for both air-cooled and liquid-cooled IT equipment, with up to 80% utilising liquid cooling for optimised energy efficiency. Our scope included design review, commissioning of MEP systems, and owner training. We also managed the commissioning of the tenant fitout, including the testing of water-cooled load banks on the ultra-clean server side of the heat exchangers.

Ramboll provided oversight for coordination between two general contractors, ensuring timely delivery and high QA/QC standards. Our team of commissioning agents worked onsite over two years, with staffing increasing to 18 agents during peak periods.

Commissioning through design, construction, start-up, initial period of operation and warranty phase

Ramboll acted as commissioning authority (CxA) for the phased buildout for a colocation provider. The data centre campus has two 36 MW prototype buildings for a total campus IT capacity of 72 MW. We provided commissioning services for the project throughout design, construction, start-up, the initial period of operation, and warranty phase.

Our primary role was to act as the owner's advocate to ensure that all parties adhere to the design intent and contract documents. To achieve this objective, the CxA role assisted with defining and documenting the owner's criteria for system function, performance and maintainability in addition to developing and coordinating the execution of a testing plan and observing and documenting performance of installed systems.

Compliance assistance and environmental management system (EMS) development for large hyperscaler

Ramboll has provided ongoing advice and support to a large global technology company and hyperscale data centre operator regarding compliance with environmental legislation across Europe during the operation of their data centres. As the central project management team, we not only assist with obtaining and maintaining compliance but also keep the client abreast of any relevant updates. Additionally, we have developed EMS guidelines to aid in a structured roll-out at the site level. Ramboll is also facilitating the development of an EMEA regional approach for ISO 14001 certification, simplifying and unifying the certification process into a single regional certificate. This approach not only streamlines compliance but also demonstrates the company's dedication to environmental excellence.

Strategic planning and consulting

Whether entering a new region, buying an existing asset, or considering a global data centre strategy, Ramboll offers tailored strategic planning services to help clients navigate the evolving data centre landscape.

Our comprehensive approach to technical due diligence and transaction risk assessments ensures that every aspect of a data centre acquisition is carefully evaluated, including site feasibility, infrastructure integrity, operational efficiency, and long-term scalability. Our experts guide investment-grade decisions with scenario analysis and business case development, sustainability goal setting, ESG due diligence, and lifecycle assessments.

- Evaluation of all electrical, mechanical, cooling, fire protection, fuel storage, grid strategy and power supply, monitoring and control systems
- ESG due diligence
- Hybrid IT and AI strategy
- On-premise and/or colocation source selection
- Colocation RFI development
- Market segmentation analysis
- Application cloud readiness assessment
- Renewable energy project financial modelling
- CapEx forecasting
- Lenders technical advisory (LTA)
- Corporate sustainability strategy and reporting

Select project experience

Supporting global data centre portfolio acquisition

DigitalBridge sought to acquire Yondr Group, a leading global developer and operator of hyperscale data centres through one of its managed investment funds. The transaction involved assessing 12 data centres across the Americas, Europe, and Asia-Pacific, including operational, under-construction, and proposed sites. Ramboll was retained to deliver comprehensive due diligence across technical, ESG, and EHS domains within tight timelines for a high-value global deal.

Our team also conducted technical evaluations of MEP systems, infrastructure performance, and construction risks. The process included vendor data room reviews, Q&A sessions, site visits, and interim reporting to ensure transparency and informed decision-making.

Reporting strategy development including EU Taxonomy

Ramboll supported a major hyperscaler with the development of data protocols and reporting strategies for several European regulations, including EU Taxonomy, Energy Efficiency Directive, Public Procurement and the EU Code of Conduct (CoC).
We helped the client to understand any compliance issues by identifying gaps between current- and future states across functions, integration across overlapping initiatives, and by providing a clear collective direction.

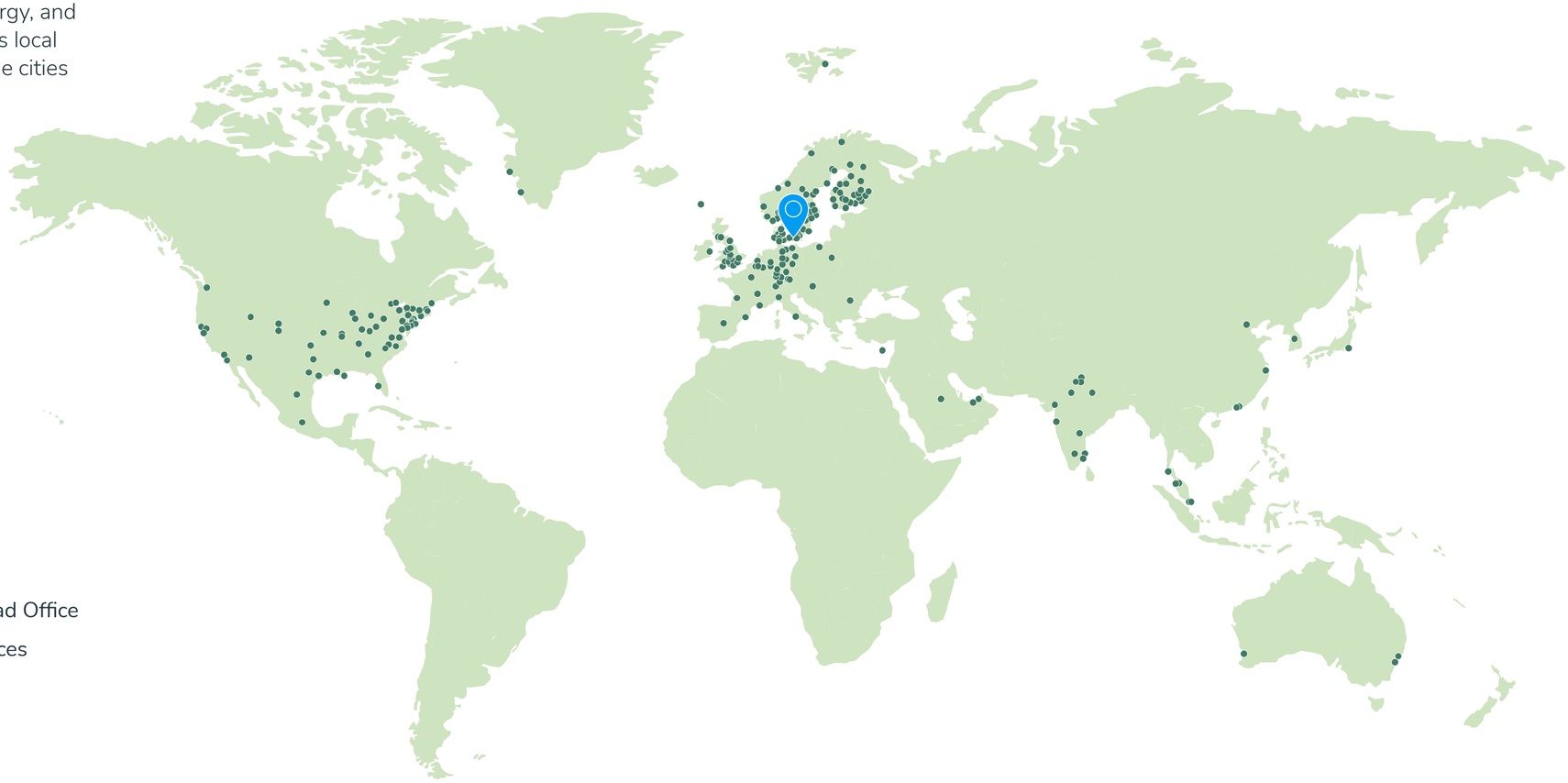
Our approach enabled the client to respond promptly to sustainability-related customer requests by mapping legal green procurement requirements and streamlining ESG data collection. Additionally, the client was able to improve data management and disclosure efficiency through targeted workshops and gap analyses. Finally, Ramboll created governance frameworks and operational procedures aligned with EU CoC best practices, ensuring efficient and compliant operations.

Data centre market segmentation analysis

Ramboll provided a site suitability assessment for a data centre campus, along with a market segmentation analysis to evaluate competition in the area. We assessed available power sources, capacity levels, and relevant incentives for development and evaluated the proximity and availability of fibre networks for connectivity needs. Our experts then identified any potential concerns or limitations regarding the suitability of the site for a data centre. Finally, we analysed current market trends, competition, and projected entries, complete with timelines and contract values. This data helped the client define the regional market, estimate growth, and identify target customer segments

About Ramboll

Ramboll is a global architecture, engineering and consultancy company founded in Denmark in 1945. Ramboll's more than 18,000 employees create sustainable solutions across Buildings, Transport, Architecture & Landscape, Water, Environment & Health, Energy, and Management Consulting. Across the world, Ramboll combines local experience with a global knowledge base to create sustainable cities and societies. Read more on ramboll.com.



Bright ideas. Sustainable change.

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