HI.

Future-proofed performance.
Competitive integrity.

HOARE LEA & DATA CENTRES

"The unprecedented pace of technological change has transformed the demands on data centres. Designing smart, flexible, and energy-efficient facilities requires a flawless mix of expertise, experience, and creativity."

Powering security, resilience & performance.

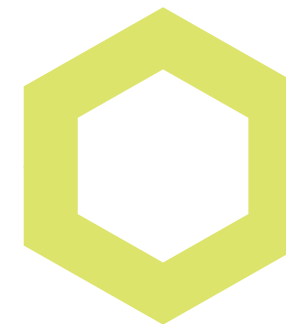## Meet Russel Greenwood and Mark Ryder, our data centre sector leaders.

Data centre and mission critical infrastructure is the backbone of business, often impacting daily life itself... for these buildings, failure is not an option. We never lose sight of how important designing resilient, efficient, high-performing solutions is to a project's success.

Our experience covers projects across the sector – from complex live plant upgrades, close-control data halls, financial-sector trading floor environments, critical engineering, and due diligence reviews of existing facilities.
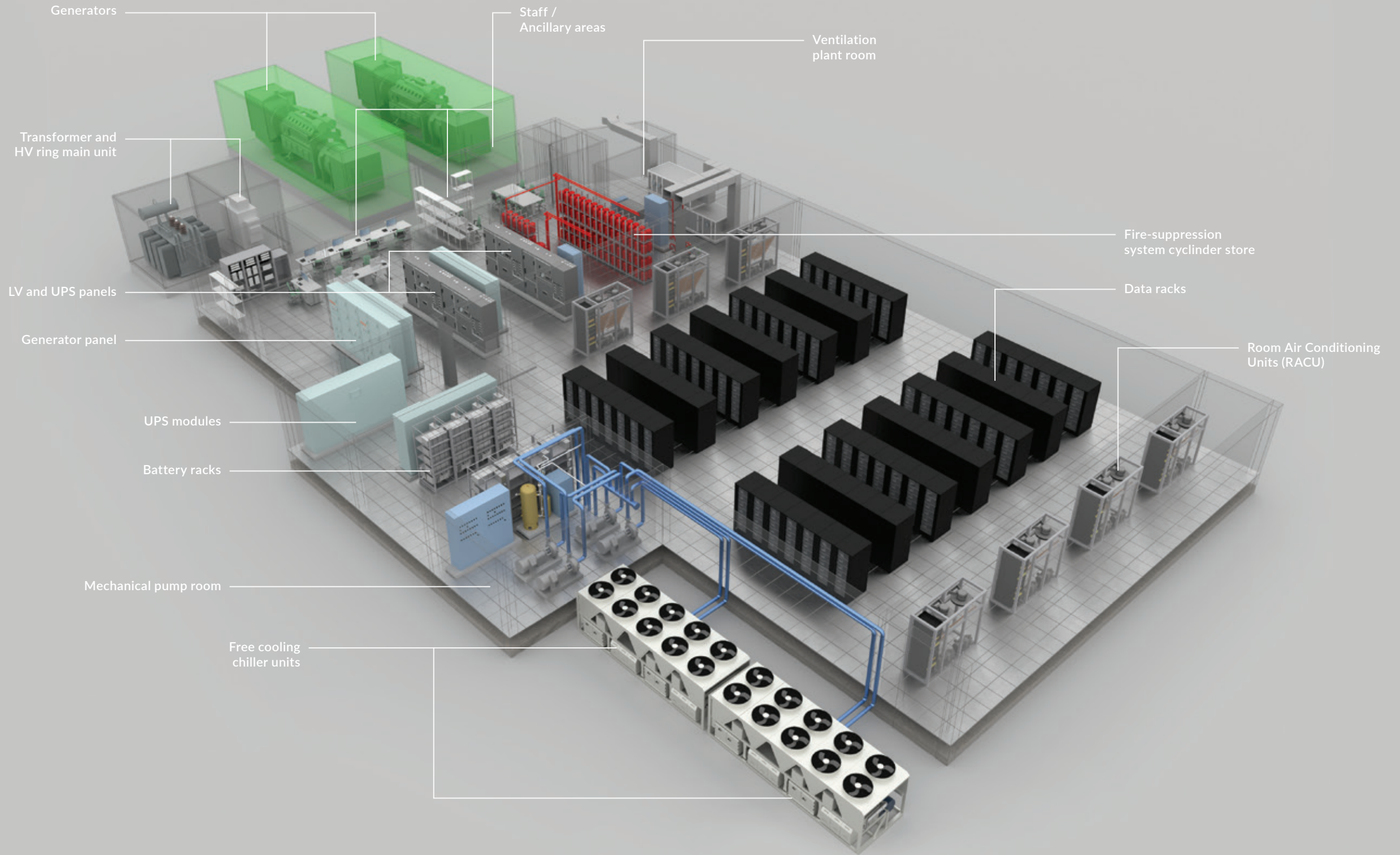
Our approach.

– Achieving the highest quality in safety, security, and resilience.

– Energy-efficient carbon-management solutions for lower operating costs and improved environmental credentials via a stringent focus on Power Usage Effectiveness (PUE).

– A focus on flexible design that allows for changing mission critical technologies, innovation, and scalability.

– Maintaining services on live facilities to maximise infrastructure uptime via detailed Single Point of Failure (SPoF) and Failure Mode Effect Analysis (FMEA).

– International and UK CIBSE and ASHRAE design standards and, when appropriate, the application of the Uptime Institute guides via our Uptime Accredited Tier Designers.

– Working with end-users, investor/funders, co-location providers and contractors to create exceptional environments tailored to their current and future needs.

– A focus on divergence, whether assessing existing facilities or reviewing our own designs.

DECADES OF EXPERIENCE

Generators

Staff / Ancillary areas

Ventilation plant room

Transformer and HV ring main unit

Fire-suppression system cyclinder store

LV and UPS panels

Data racks

Generator panel

Room Air Conditioning Units (RACU)

UPS modules

Battery racks

Mechanical pump room

Free cooling chiller units

Transforming
the traditional.
Hoare Lea & live upgrades.

DATA CENTRE TREND – 1
REFURBISHMENT

Prime opportunity.

Brand-new purpose-built data centres are only part of the story. We are seeing a growing trend towards adaptation or retrofit of existing buildings. It presents a prime opportunity to boost capacity, increase efficiencies, and improve optimisation. Often, refurbishments take place in a live environment, making them the most critical of projects, where risk mitigation is paramount. Assessing the availability, reliability and maintainability (ARM) of existing facilities or undertaking due diligence reviews or gap analysis, can establish the best approach to creating a safe, secure, and resilient environment.

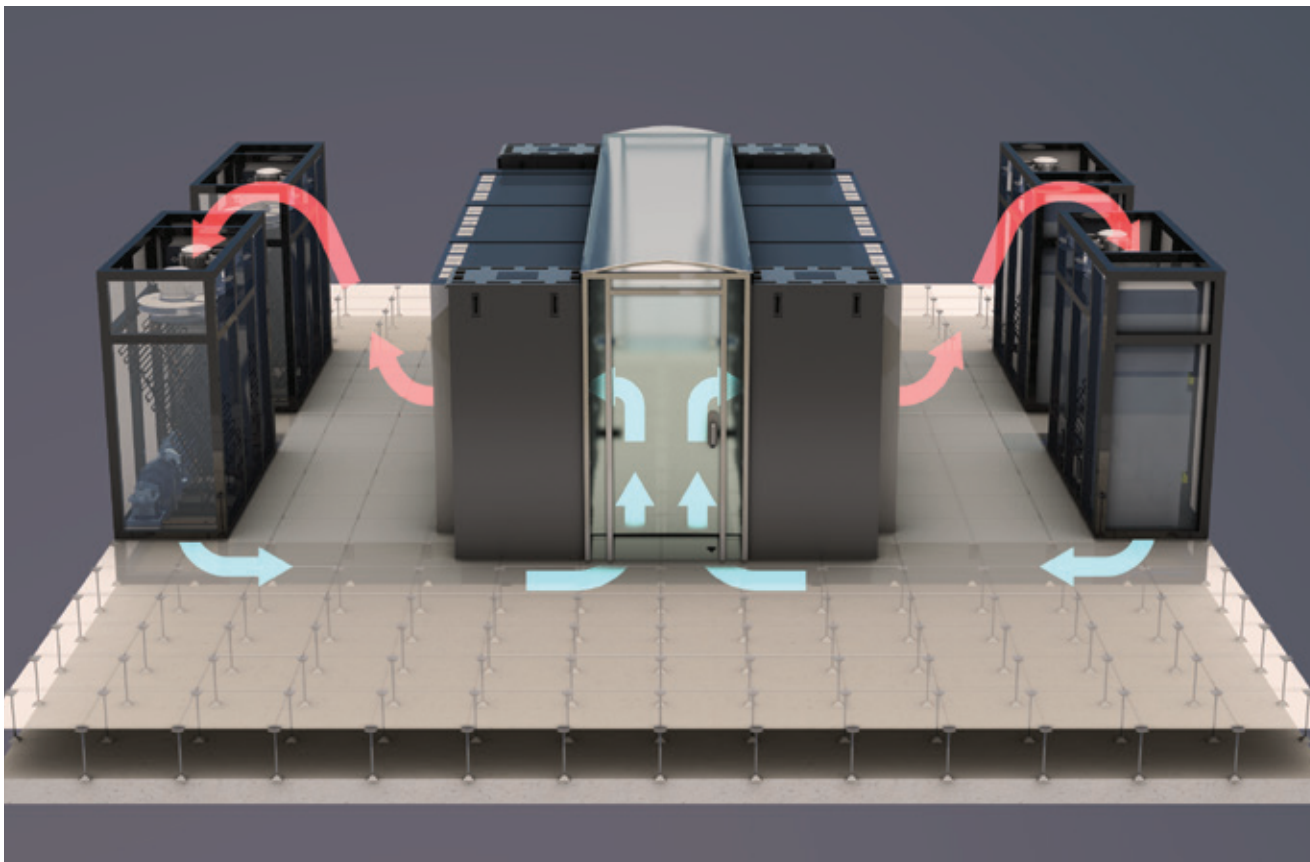**Live upgrades at a leading financial firm.**

As the consultant of choice for a leading global financial services firm, we worked on this project for six years. The fit-out of the purpose-built data centre comprised an entire overhaul of the existing base-build electrical infrastructure. This meant we had to redevelop and completely upgrade the Uninterruptible Power Supply (UPS) generator and cooling systems, in a live critical environment. The project also entailed extending the facility. We were able to design solutions for six new additional data centre rooms and supporting services – everything from a new chilled water plant, megavolt (MV) generators, to UPS systems and MV transformers. This was a project that required meticulous attention to detail: we looked after the installation, testing, and commissioning of all the mechanical and electrical services. The result? We achieved a significant increase in resilience and reduction in energy costs – all without disruption to the business-as-usual operation.

> **"The M&E design has exceeded our expectations. Hoare Lea has delivered a high-quality, secure, flexible, sustainable building... We score the project 10 out of 10."**

PROJECT MANAGER, GOVERNMENT MINISTERIAL DEPARTMENT

The rise of real-time data.
Hoare Lea & edge data centres.
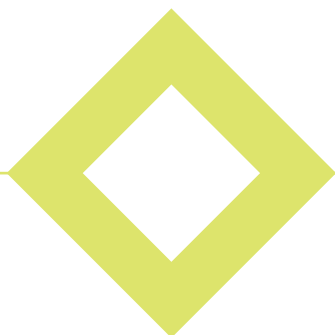
DATA CENTRE TREND – 2
EDGE PROCESSING

Demand for data.

The traditional approach to data processing – of one large centralised core – is under pressure from mobility, technological advancements and economic demand. In today's fourth industrial revolution – in which we're seeing more and more data analysed in real time – 'edge processing' is a vital way of supporting the essential core. An edge data centre is positioned close to either end-users or the source of data. As such, it has to be equipped to support applications that demand a significant amount of bandwidth, require rapid response times, are latency-sensitive, or a combination of all three.

Edge processing for a multinational finance corporation.

The newly constructed European campus headquarters for an American multinational financial services corporation combines a contemporary workplace with a separate data centre. Sat adjacent to the new building, the data centre hosts the European network hub and communication centre. This is designed in principle as a Tier 3 building with redundant utilities and elements of fault tolerant services. As well as the MEP engineering design, we undertook a computational fluid dynamics (CFD) thermal study in order to simulate the thermal conditions. This allowed us to determine whether the level of ventilation and cooling performance required was met, and to assess the flow and temperature distributions.

"The project involved upgrading the resilience of the data centre's electrical infrastructure, all during operation. A complex project with a protracted construction phase and an excellent design team, always on hand."

PROJECT MANAGER, GLOBAL CONSULTANCY AND CONSTRUCTION FIRM

Intelligent environments.
Hoare Lea & optimised operations.
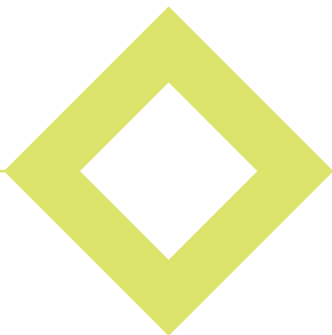
Smart technology.

The use of AI and real-time analytics is opening up an unparalleled opportunity to optimise data centre servicing, capacity management, performance management, and cooling. Analytics-powered management tools – especially those enabled with the self-improving nature of AI technologies – can cut down a data centre's energy usage (in particular for cooling), reduce costs, and make facilities more environmentally sustainable. With an environment and its servers managed by predictive analytic algorithms, there is even the possibility of anticipating everything from server demand to upgrade/maintenance requirements before they even happen.

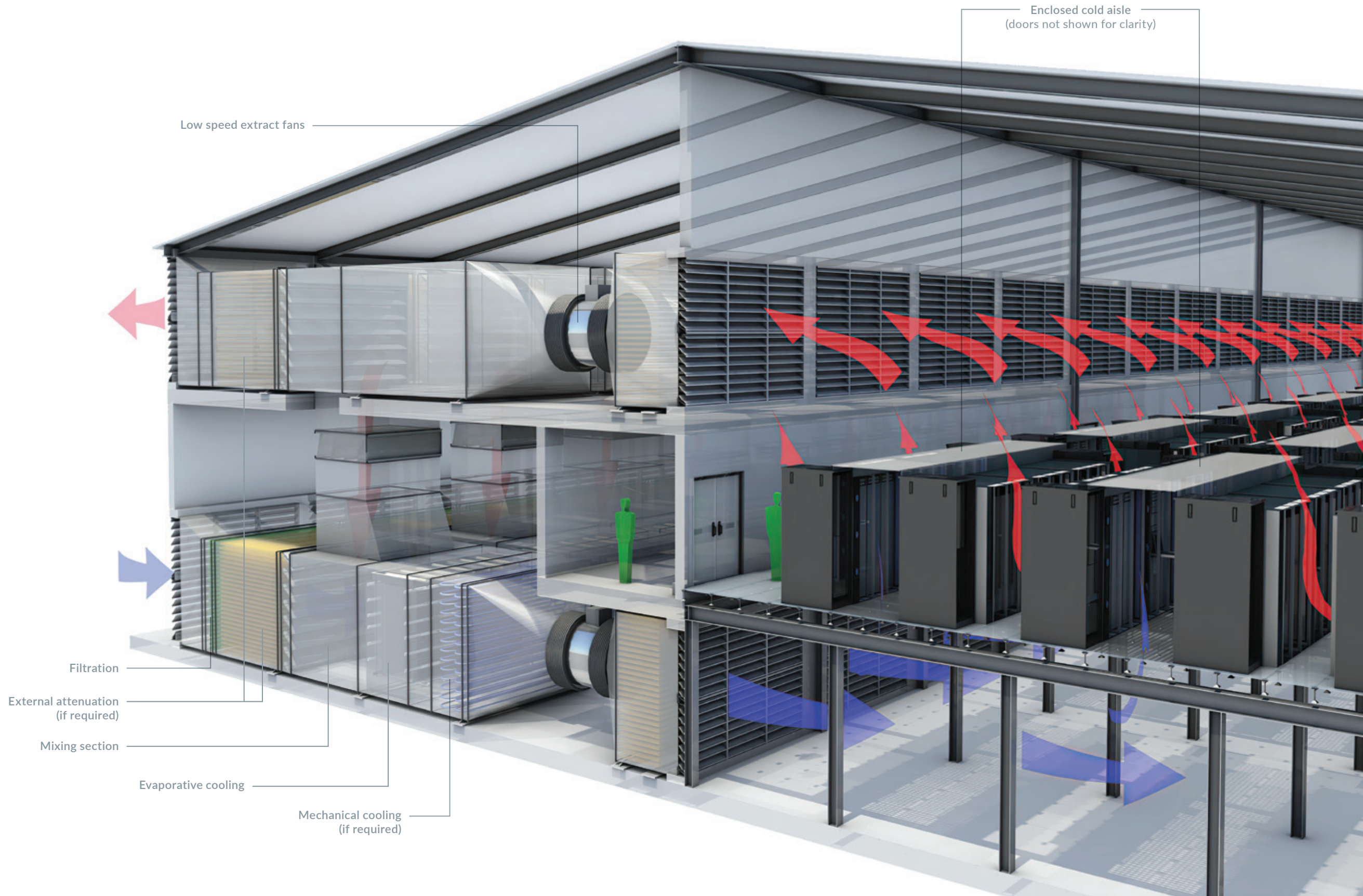**Innovative environmental monitoring.**

A world-renowned data centre operator needed a flagship data centre in the UK to meet the growing demand for scalable, reliable, on-demand colocation services. The facility, designed to deliver high-quality customer solutions, has six data halls. These are all capable of being subdivided, which means clients can have anything from a cabinet in a shared space, to their own suite or data hall with dedicated power and cooling.

We acted as MEP consultants for the project, providing the detailed design for all critical mechanical, electrical and public health, BMS and EMS systems. As well as designing for N+N redundancy on Uninterruptable Power Source, and N+1 on all other critical services, we also deployed a fresh-air, evaporative cooling solution that makes the data centre the first in the city to utilise this technology. Most significantly, by incorporating innovative data monitoring, we allowed the operator to offer clients the ability to remotely access online real-time monitoring dashboards and self-service tools.

Enclosed cold aisle
(doors not shown for clarity)

Low speed extract fans

Filtration

External attenuation
(if required)

Mixing section

Evaporative cooling

Mechanical cooling
(if required)

Future focus.
Hoare Lea & the value of sustainable solutions.

A lighter environmental footprint.

The growth in data centre facilities requires a truly collaborative, rather than siloed, approach to sustainability. As one of the largest consumers of energy, the need for a greener data centre industry is stronger than ever before. Whether adopting sustainable energy sources and battery storage solutions, utilising new cooling and power methods, or creating energy loss and waste reduction strategies, there are a myriad of added-value opportunities. Ultimately, a facility designed to minimise its impact on the environment and adapt to future trends will benefit from reduced operational costs and a much longer lifespan.
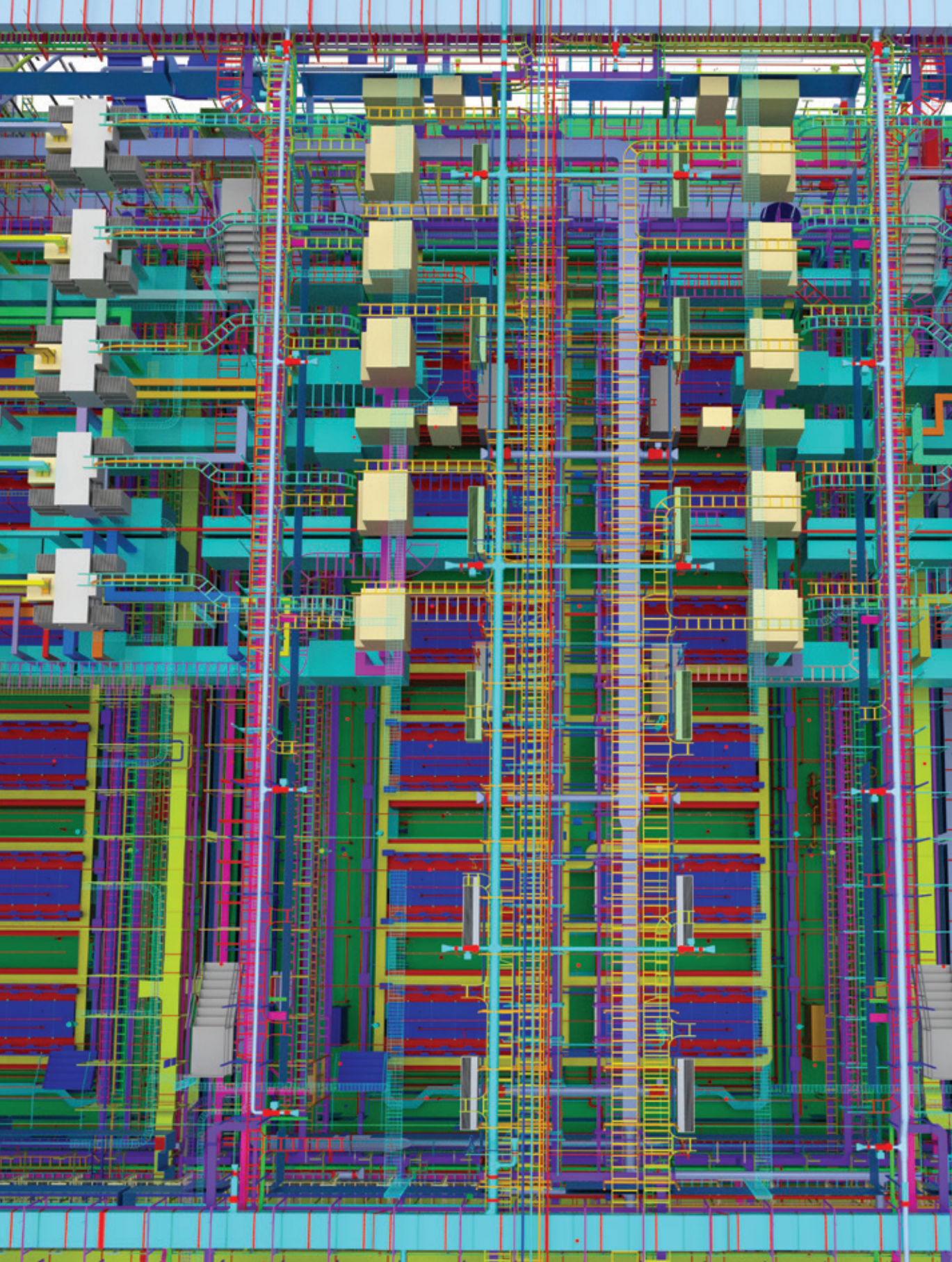
Lasting lifespan for a ministerial department.

We worked on the design of a government ministerial department's state-of-the-art facility at its southern campus. The key challenge of the project was to provide an effective and stimulating workplace in a high-security campus setting, while accommodating the site constraints such as underground services. The aim was to create a building with at least a 50-year life and achieve a 50 percent increase in the data centre load capacity. Added to this, was the requirement to bring the building's carbon emissions to 25 percent lower than the dictates of the Part L Regulations applying to it.

One of the most significant solutions we proposed exploited the proximity of the adjoining office building to recycle the surplus heat produced by the data centre's electrical energy usage. A dual-mode central refrigeration plant allowed this heat to be fed into the return leg of the building heating system during colder conditions. This means the elevation of fluid temperature offsets the oil consumption of the building's boilers. It effectively ensures that 50 percent of all building heating is provided from 'carbon free' waste heat that would otherwise be rejected by the data centre. Efficient controls helped to reduce operational energy consumption and CO_2 emissions even further, and ultimately meet the government department's ambitious targets for energy efficiency and truly sustainable design.

Longevity and live environments.
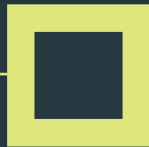## Hoare Lea & rigorous uptime requirements.

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This vast development for a large-scale global bank consisted of two new data centres. The project was completed in two primary phases: the main build and fit-out of three of the six data halls in each data centre, and the fit-out of a further hall within each centre.

We had a primary brief – to achieve Uptime Institute Tier IV and to meet the exacting standards of IBM, the technical authority. We worked with the bank at stakeholder level to ensure all requirements were fully understood. The main challenge was to ensure the existing live services were kept fully operational with no reduction in resilience during the works. We carried out extensive surveys to validate the existing installation, adapting our designs to suit. Detailed analysis of the switching required to complete the works also supported our approach and meant we could advise on method statements to meet the bank's needs. Ultimately, it was our significant depth of knowledge in live data centre working, as well as current innovations, that meant we could fully meet the Tier IV needs.
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"Hoare Lea's service has been excellent. Communication and interaction with the whole team has been a specifically strong point. Great support in managing client expectations."

HEAD OF CAPITAL PROJECTS, MULTINATIONAL INVESTMENT BANK AND FINANCIAL SERVICES

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HOARE LEA H.

Engineers of human experiences.

Hoare Lea is an award-winning engineering consultancy with a creative team of engineers, designers, and technical specialists. We provide innovative solutions to complex engineering and design challenges for buildings.

Irrespective of the scale or complexity of a project, we provide a full range of MEP, environmental, and sustainability services, bringing buildings to life and ensuring that they perform in operation as well as they look.

HOARELEA.COM

Our clients include:

Amazon	HM Land Registry
Accenture	Leeds Building Society
AIG EMEA	Liverpool University
Airbus	Lloyds Banking Group
Alliance and Leicester	Logica
AMEX	Manchester Airport
Bank of America	Manx Telecom
Bank of Australia	Maven Securities
Bank of Ireland	Medical Research Council
Bank One	Morgan Stanley
CAE	Motorola
CBRE	Microsoft
Central Government	MMC
CERN	Mizuho Bank
CME	NATS
Daisy	New York University
Deutsche Bank	Orange
Digital Reality	Rabo Bank
EDF	RAC
Edge Connex	Rackspace
Equinix	Santander
Global Switch	Telehouse
Goldman Sachs	UBS
Google	UCL
Hi3G	Unilever
Hewlett Packard	Verizon
Hutchinson 3G	Viatel
Imperial College	Virtus
Infinity	Woolwich
KPMG	