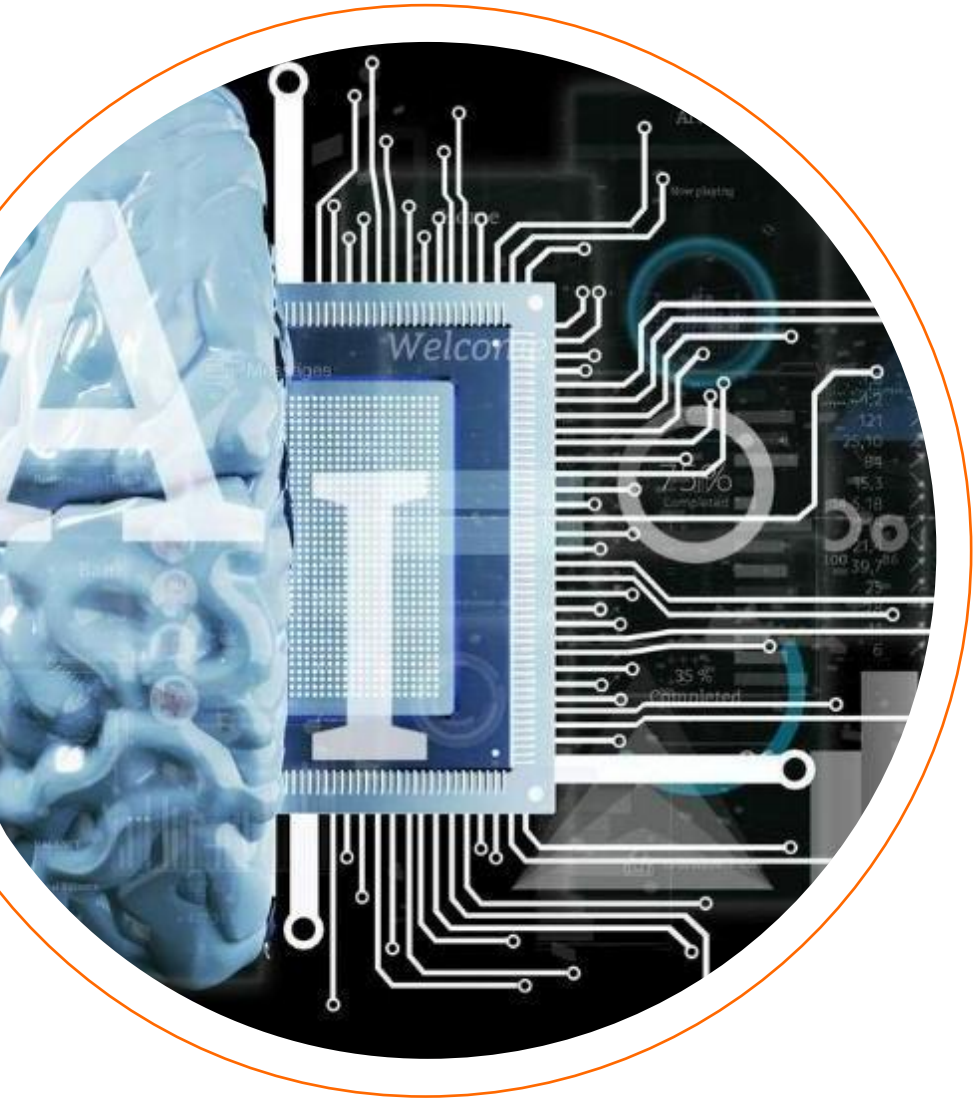
Engineering, QA/QC & Commissioning (Cx) Services for Data Centers





End-to-end services

Certified Energy-Efficient Data Center Award*

Tier ACC*

BREEAM ACC

LEED ACC

Well ACC

WiredScore ACC

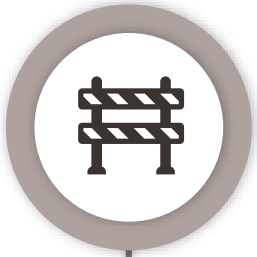
Services by Project Phase

Early-stage support
Test Fit & Pre-development
Reduce uncertainty



+ Geotechnical investigations
+ Permitting & regulatory support
+ Environmental assessment
+ Connectivity strategy
+ Energy efficiency consultancy
+ Power strategy & grid assessment
+ Renewable energy assessment
+ Vendor prequalification (TBE)
+ Commissioning strategy & planning
  OPR, BOD, Cx strategy and L0–L1 planning

Construction
Independent control of critical systems



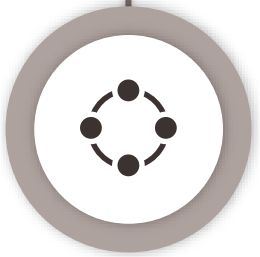
+ Project Management & Consultancy (PMC)
+ Independent QA/QC
+ HSE supervision
+ NDT services – in-house laboratory
+ Welding control (WPS/PQR)
+ Environmental monitoring
+ Vendor inspection & surveillance
+ Energy Marshal (energisation safety & LOTO control)
+ Commissioning (L2–L3, FAT/SAT, pre-tests)

Commissioning
Integrated validation

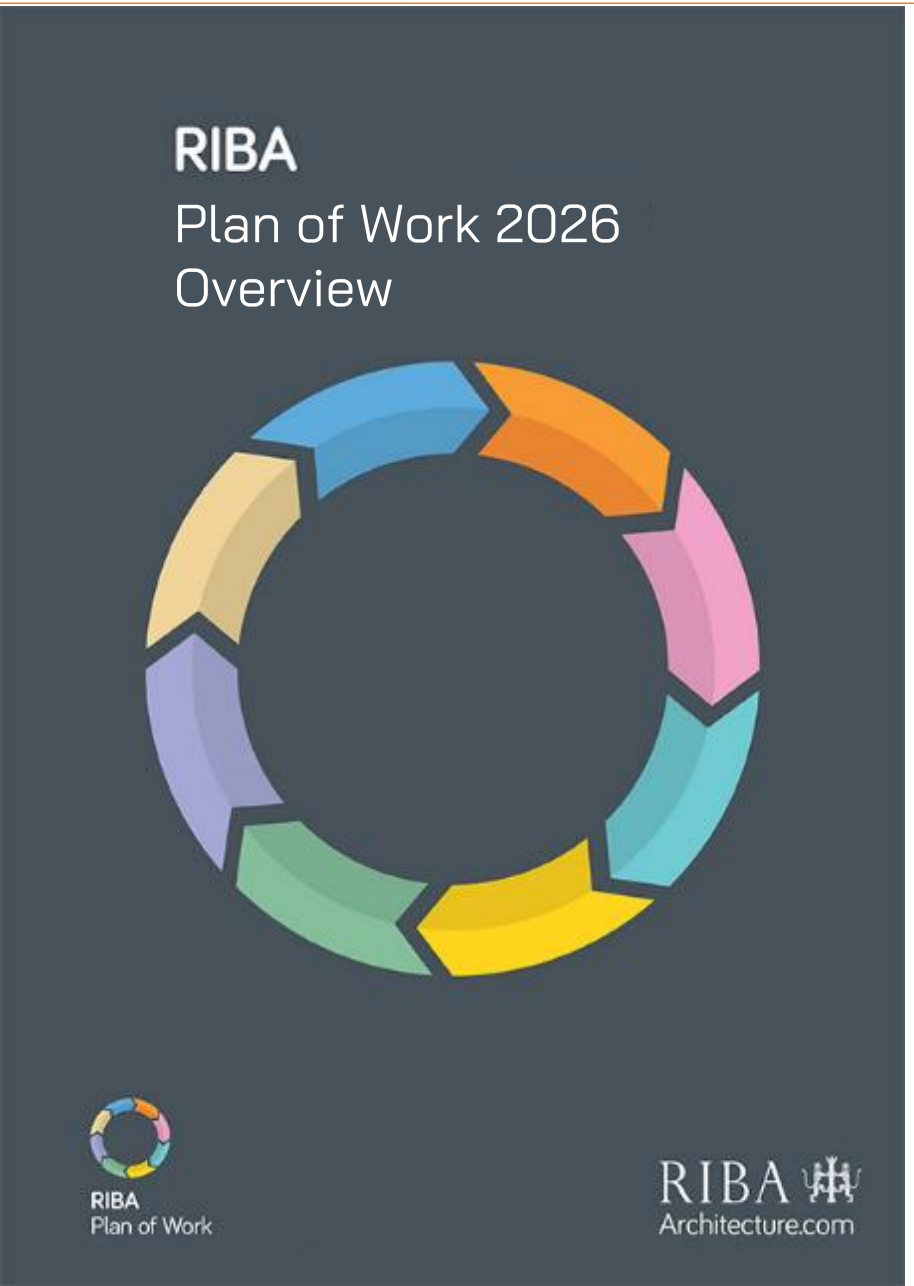


+ Commissioning Authority (CxA, From L1 to L5)
+ BECx - Building Enclosure Commissioning
+ Third-Party Inspection (TPI)
+ Integrated Systems Testing (IST)
+ Electrical, Mechanical and Plumbing (MEP)
+ Energy Marshal support during live testing
  (safe switching & energisation control)
+ LEED and BREEAM certification
+ Handover documentation
+ Code & standard compliance checks

Operations
Performance & Profitability



+ Ongoing Cx & seasonal testing (L6–L8)
+ Operational & Technical Due Diligence (OTDD)
+ Regulatory & periodic inspections
+ Asset digitisation
+ Energy & sustainability KPIs tracking:
  PUE, WUE, CUE
+ Carbon footprint
+ M&V (IPMVP) & energy performance
+ ESG compliance
+ Outsourced ISO audits and assessments



RIBA 0>1 — Feasibility Go / No-Go

1. Definition of OPR, including redundancy, resilience and efficiency targets under ISO/IEC 30134 and EN 50600 (PUE, WUE, etc.).
2. Definition of the Cx Plan and early identification of critical risks.

RIBA 2>3 — Design phase Reduce uncertainty

1. QA/QC design reviews
2. Technical coordination (BIM)
3. Validation against the OPR
4. Specification development
5. Test planning (FAT, SAT, IST)
6. Vendor selection (TBE)

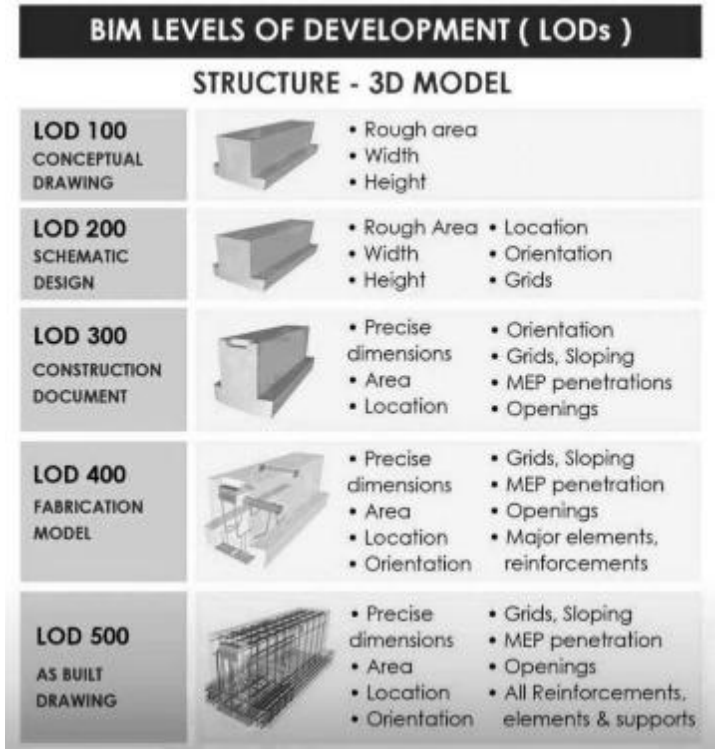
RIBA 4>5 — Construction Independent control

1. Site inspections, quality control and document tracking.
2. Execution of key FAT, SAT and IST activities to validate integrated system performance under real operating conditions.

RIBA 6>7 — Commissioning and handover Integrated validation

1. Delivery of a fully validated installation, with continuous and seasonal Cx to ensure performance, energy efficiency and SLA compliance during operations.
2. O&M: training programme and ongoing audits.
3. OTDD support for scalability, M&A and other processes.

Applus+ Services by Project Phase



Project phase	Before LOD 400 (Test Fit – Design & Pre-construction)	After LOD 400 (Construction, Commissioning & Operations)
Applus+ role	**Technical risk reduction and decision support**	**Assurance of quality, reliability and compliance**
Primary focus	**Feasibility, constructability and design robustness**	**Design-compliant execution and actual performance**
Geotechnical & Civil Works	Geotechnical and geophysical studies, ground-risk assessment, foundation and civil-design reviews	Civil-works QA/QC, foundation control, structural inspection and execution monitoring
Buildings & Structures	Technical review of technical buildings and structural solutions	Inspection of steel and concrete structures; installation quality control
MEP Systems	Independent MEP design review, interface coordination and maintainability validation	Installation inspection, on-site QA/QC and verification against design
Power & Electrical Systems	Review of redundancy schemes, TIER criteria and service continuity	HV/MV/LV inspections, functional testing and power-quality checks (THD, transients, etc.)
Telecom & IT	Review of telecom architecture and supporting systems	Inspection of communications infrastructure and operational validation
Critical equipment & suppliers	Specification review, supplier qualification and factory FAT	SAT, installation supervision and field validation
Commissioning Cx / OPR	Definition of strategy, test plan and acceptance criteria	Cx aligned with the OPR, resilience testing and failure scenarios (From L1 to L5)
Energy efficiency	Definition of PUE/WUE targets and efficient-design criteria	Actual PUE/WUE validation and operational optimisation
Environment & ESG	Technical support for permits, environmental assessment and ESG requirements	Environmental monitoring, ESG/CSRD reporting and EU Taxonomy alignment
Operations & Assets		In-service inspections, predictive maintenance, RCA and OPEX optimisation

Core Services

End-to-end services across the full project lifecycle

1 Development / Pre-construction

Ground and power engineering

- Concept design and campus masterplan
- Geotechnical investigations and instrumentation
- Geophysical surveys and topography
- Electrical strategy (capacity, redundancy, scalability)
- Cooling strategy and thermal architecture
- Resilient, low-latency dark-fibre connectivity
- Technical, regulatory and delivery risks

Target PUE modelling and power supply risk analysis

- Realistic PUE targets by phase
- Benchmarking against hyperscalers / peer campuses
- Early identification of avoidable energy cost overruns

Environment & Quality

- Community outreach and engagement campaigns
- Environmental constraints (water, noise, biodiversity, soil) and EIA
- Technical support for permits, approvals and environmental studies (ESIA)
- Technical liaison with authorities, where applicable
- Project quality framework
- Quality requirements for EPC contractors and suppliers
- Basis for future audits

2 Construction

QA/QC

Infrastructure and buildings

- Project Management & Consultancy (PMC)
- Technical assistance – site management, construction supervision and H&S coordination
- Independent inspection of buildings, structures and civil works
- NDT testing – in-house laboratory

Electrical

- Transformers, MV switchgear and LV boards
- UPS systems (topology, redundancy, bypass, selectivity)
- Generators (UPS interface, starting and synchronisation)
- Grounding and protection systems
- Power quality (harmonics and transients)

Mechanical / HVAC

- Chillers, dry coolers, cooling towers and free cooling
- CRAH / CRAC and air distribution
- Hydronic and air balancing
- Insulation, losses and condensation control
- Design-to-installation alignment for energy efficiency
- Welding controls and WPS/PQR procedures
- Corrosion, coating and cathodic protection control

FAT/SAT of critical equipment (UPS, HVAC, electrical)

FAT

- Manufacturer test protocol review
- Factory witness testing
- Verification of:
  - Actual vs rated capacity
  - Redundancy
  - Failure sequences
  - Alarms and protection systems
  - Documented result validation
  - Approval or conditions before shipment

SAT

- Definition or validation of SAT protocols
- On-site test supervision
- Results verified against acceptance criteria
- Issue detection before overall Cx / OPR validation
- Technical acceptance records

Environment & Quality

- Environmental monitoring plans (EMP)
- Construction waste, discharges, emissions and noise management
- Environmental audits of contractors
- Water stewardship
- QA/QC documentation and processes
- Quality audits of EPC contractors and suppliers
- Commissioning readiness

MEP: Mechanical, Electrical & Plumbing; UPS: Uninterruptible Power Supply
FAT: Factory Acceptance Test – off-site
SAT: Site Acceptance Test – on-site
CRAC / CRAH: Computer-room cooling units

3 Commissioning

End-to-end Cx aligned with the OPR From L1 to L5

Electrical commissioning

- Verification of normal and emergency operating sequences
- Utility–UPS–generator transfer testing
- Redundancy validation (N, N+1, 2N as designed)

Mechanical / HVAC commissioning

- Thermal capacity testing at different IT loads
- Verification of free-cooling and efficiency modes
- Response to partial equipment loss

Controls commissioning (BMS / EPMS)

End-to-end validation of critical signals

- Alarms, interlocks and protection logic
- Operational visibility and traceability

BECx – Building Enclosure Commissioning

Commissioning of the building envelope

Resilience and availability testing

Controlled simulation of real failures—not laboratory conditions:

- Loss of utility power
- UPS or critical-branch failure
- Chiller, CRAH or hydronic-loop shutdown
- Communication or control failures
- Simultaneous starts under adverse conditions

Certification and resilience-test support

- Certification requirement review
- Technical and documentation readiness
- Support during audits and tests
- Objective evidence of compliance
- Technical resolution of findings

Environment & Quality

- Environmental compliance verification against applicable AAI / AAU approvals
- Readiness for initial inspections
- Definition of environmental KPIs
- Management-system audit
- Certification support

4 O&M

Energy monitoring and M&V (IPMVP®)

Multi-level electrical metering

- Grid intake, MV/LV, UPS, critical branches, rooms and racks (as applicable)

BMS / EPMS integration

- Electrical and thermal data consistency
- Elimination of blind spots

Power quality

- Harmonics, transients and events; impact on reliability and asset life

Operational KPIs

- PUE (overall and partial)
- Cooling efficiency
- Consumption by client / room / MW IT
- Efficiency and OPEX optimisation programmes
- Define the M&V plan for each initiative
- Select the appropriate IPMVP® option (A, B, C or D)
- Establish the energy baseline
- Measure, verify and certify actual savings

Energy-efficiency and OPEX optimisation programmes

- Continuous energy diagnostics
- Identification of savings levers
- Risk/benefit impact assessment
- Controlled implementation
- Savings verification (IPMVP®)
- Sustained reduction in energy cost per MW
- Improved operating margin
- Objective justification of future investment
- Stronger ESG metrics without greenwashing

Environment & Quality

- Periodic environmental audits and EIA compliance
- Annual Scope 1 and 2 carbon footprint
- ESG reporting support
- Annual waste reports and selection of authorised contractors
- Management-system maintenance
- Audits of suppliers and maintenance providers
- Standardisation for future phases

5 Outcome

Applus+'s involvement throughout the data center lifecycle directly reduces uncertainty on large-scale projects, bringing technical clarity and confidence to every critical decision.

Independent oversight at critical stages—construction, commissioning and operations—identifies issues before they become incidents and helps ensure the infrastructure meets its target availability, resilience and efficiency from day one.

The result is consistent improvement in key indicators such as PUE, operational reliability and energy cost per MW, with measurable and sustainable outcomes over time.

This approach also enables the campus model to scale coherently and under control, maintaining consistent technical criteria across phases and sites.

Standardised processes, metrics and verification methods allow initial success to be replicated without losing control as installed capacity grows.

"The result is infrastructure that is more predictable, efficient and attractive to investors and clients."





Some References

In data centers from the start

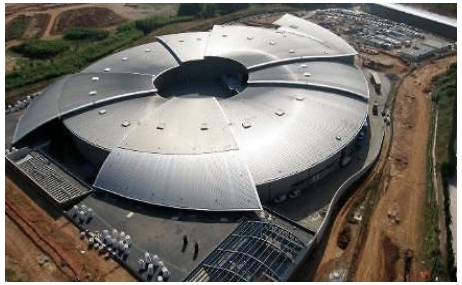
From the first supercomputing and corporate data centers in Spain to today's hyperscale and colocation campuses



Commissioning

Barcelona Supercomputing Center

Installations testing and commissioning of the supercomputing data center



Commissioning

Synchrotron data center

Installations testing and commissioning of the scientific data center



Design · Commissioning

Government of Asturias

Design review and commissioning technical audit of the regional data center



Operation · Due diligence

Telefónica

Facilities due diligence of 3 HQ and technical buildings: Madrid, Barcelona and Terrassa



Pre-development

Hyperscale and colocation campuses

Geotechnical engineering for 7+ new data center campuses in Spain

Applus+ in Spain
Data Centers

14
projects awarded

+450 MW
in first phase · +1,300 MW in project

+45
projects in pipeline in Spain

8 regions
with Madrid and Aragón as main hubs

We have participated in projects worldwide across cultural architecture, healthcare, leisure, transport and institutional buildings, ensuring quality and control throughout the project lifecycle.

Applus+ is committed to sustainability and accredited to provide independent quality control for **energy efficiency certifications** such as LEED®, BREEAM® and Passivhaus®.



CITY OF CULTURE, SANTIAGO DE COMPOSTELA (SPAIN)



ASTURIAS CENTRAL UNIVERSITY HOSPITAL, SPAIN



MUSCAT AIR TERMINAL BUILDING, OMAN

Applus+ has experience across all types of civil infrastructure, including:

Transportation
Water-related works (water supply and sewerage)
Ports
Airports



Madrid–Galicia High-Speed Railway, Portocamba–Cerdedelo – ADIF (Spain)



Supervision services for the extension and upgrade of the Beira Alta Railway Line – Infraestruturas de Portugal (Portugal)



Project management and supervision services across the Spanish airport network – AENA (Spain)



Instrumentation and monitoring for Metro Porto's Yellow Line (Portugal)



Geotechnical engineering services for the extension of the Conso Hydroelectric Power Plant – Iberdrola (Spain)



Supervision services for the Ares WWTP and sewerage network – Augas de Galicia (Spain)



Project management and supervision for the new air terminal building in Las Palmas – AENA (Spain)



Construction supervision for the AP-9 Highway – AUDASA (Spain)

Applus+ has experience across a range of power infrastructure projects, providing:

Detailed Engineering Design
Permitting
Supervision during Construction

O&M Inspection
Testing and supervision for decommissioning

Our clients include major industry players such as REE, Endesa, Naturgy, Iberdrola and Repsol.



Detailed design – Cañaveral Substation (400 kV)



Supervision Services for Civil Works in the Nuclear Power Plant



Valdeconejos Power Line (220kV)



Power Line (220 kV)



France–Spain Interconnection Project



Project Management and Supervision for the Decommissioning of Thermal Power Plant



Project Management and Supervision for the Decommissioning of Thermal Power Plant



Owner's Engineering Services



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