Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Sep 2026

Project Reference Number

NIA3_NESO007

Project Registration

Project Title

Flexible Operation of Data Centres Feasibility Study

Project Reference Number

NIA3_NESO007

Project Licensee(s)

National Energy System Operator

Project Start

September 2026

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Innovation@neso.energy

Project Budget

£360,000.00

Summary

Data centres are among the fastest-growing sources of electricity demand in GB, with NESO scenarios projecting 6–15 GW of additional grid capacity by 2050. Current frameworks treat this demand as passive and firm, despite evidence that significant portions of DC (Data Centres) load are controllable and non-coincident. This feasibility study will produce the first quantitative evidence base on DC flexibility potential through compute workload shifting, smart scheduling and behind-the-meter asset strategies. Working with DC operators as a stakeholder panel, the study will quantify flexibility potential, assess operating model feasibility and enablers, develop a GB-wide cost-benefit assessment, and propose pragmatic next steps for trials supporting demand connections reform.

Third Party Collaborators

baringa

Nominated Contact Email Address(es)

Innovation@neso.energy

Problem Being Solved

NESO and network owners are currently operating in an environment where data centre demand is widely treated as inherently inflexible, always-on load, with limited consideration of how compute workloads, server utilisation, or operational practices vary in practice.

As a result, data centres are largely treated as fixed, non-responsive demand within system operation and connections processes, even where peak capacity usage is non-coincident or infrequently realised. There is limited system-level, evidence-based understanding of how server utilisation, workload diversity and resilience practices translate into power demand profiles, whether compute tasks could be shifted in time or between sites without compromising service, and what technical, commercial or market barriers prevent flexibility from being exposed today.

Method(s)

This project will be delivered through six work packages defined below (WP1a, WP1b, WP2–WP5), with WP5 (stakeholder engagement) running across the study. Analytical workstreams run in parallel from mobilisation, feeding a synthesis and forward-look phase. Each work package below sets out how it will be delivered, the methods used, what is produced and what it enables. Risk ratings per WP reflect delivery risk and are aligned to the ENA ENIP framework.

WP1a: DC Flexible Operation Assessment (Objective 1)
Description (how it will be done): Segment the UK DC fleet by business model, ownership and operational characteristics (now and future growth); scan and engage relevant projects (e.g. Emerald AI https://www.emeraldai.co/, EPRI) https://www.epri.com/ ; classify compute task types by flexibility (latency-critical, delay-tolerant, location-flexible); establish baseline server utilisation and load diversity across a sample of sites; and quantify the unconstrained flexibility potential of the fleet.

Methods/approach (this is subject to datacentre willingness to share data and a range of options possible for levels of transparency): Analysis of operator-supplied interval power and utilisation data (using Uninterruptable Power Supply, UPS/cooling load and Power Usage Effectiveness proxies where IT-load data is unavailable), diversity/coincidence-factor calculation across sites, workload segmentation via inventories and structured operator input, and an Excel/Python optimisation model to simulate a re-optimised "tomorrow" schedule versus "today". Published benchmarks (e.g. Lawrence Berkeley, ITIF, Uptime Institute) fill data gaps, with sensitivity analysis throughout.
Output (what is delivered): A DC segmentation framework, a compute-task flexibility typology, a baseline utilisation and latent-capacity assessment, a quantified estimate of unconstrained flexibility potential (MW, MWh, compute hours) and a prioritised list of segments for future engagement or trials.
Expected outcome (what this enables): A defensible, peer-reviewed evidence base for the scale of DC operational flexibility as the foundation for the CBA (WP3), operating-model design (WP2) and demand connections reform. This is the primary driver of the "unlock latent capacity / reduce peak demand" benefits.

WP1b: Behind-the-Meter (BtM) Flexibility Assessment (Objective 2)
Description (how it will be done): Classify BtM "bridging asset" scheme types at DCs (batteries, UPS, on-site generation, microgrids), establish their prevalence and direction of travel, assess scheme economics and residual flexibility available to the system beyond the DC's own needs, understand likely onward use after firm connection, and run a high-level regulatory impact assessment.
Methods / approach: An asset-register and market-scan approach (techUK/UKSPA, UK Science Park Association and public sources), economic modelling of representative schemes using price curves, Gridcog and benchmark capex/opex, and connection-acceleration cost/benefit and hurdle-rate analysis validated with operators and NESO.
Output (what is delivered): A BtM asset archetype classification, quantified example scheme economics, an assessment of residual flexibility (MW/MWh) for the system, and a high-level regulatory impact assessment.
Expected outcome (what this enables): Evidence on how existing/planned BtM assets could accelerate connections and offer system flexibility — feeding operating-model design (WP2) and the CBA (WP3) and supporting the "accelerate connections" benefit.

WP2: Operating Model Feasibility & Enablers (Objective 3)
Description (how it will be done): Identify the system needs DC flexibility can serve; define a spectrum of operating and market models from local intra-site optimisation to fleet-wide coordination; identify candidate products (access products, flexibility products, requirements of connection); assess technical, commercial and regulatory feasibility including barriers and enablers; define process and system requirements per model; and recommend near-term options for trials.
Methods / approach: Review of existing scheduling/orchestration tools and flexibility market designs (DSR, DFS, capacity market); definition of a minimum viable architecture per model; feasibility stress-testing across technical/commercial/regulatory dimensions; and validation through stakeholder workshops and operator interviews (WP5).
Output (what is delivered): A defined spectrum of flexibility operating models, candidate commercial products for NESO/DSO, a feasibility assessment across three dimensions, process/system requirements per model, and recommended models for future trial.
Expected outcome (what this enables): A clear shortlist of viable models with documented requirements, ready for trial design and with near-term options for demand connections reform, translating raw flexibility potential into deliverable mechanisms.

WP3: Cost / Benefit Assessment (Objective 4)
Description (how it will be done): Model flexibility scenarios (flexible operation plus BtM asset combinations) with no DC energy unserved; quantify energy and carbon benefits; assess Maximum Import Capacity (MIC) reduction and its effect on connection costs and timeframes; assess system peak-load reductions and grid capacity/infrastructure impacts; cost the operating models; and summarise net benefits for the system, operators and consumers.

Methods / approach: A CBA framework consistent with NESO/Ofgem practice, site-level energy/carbon optimisation (e.g. Gridcog), MIC-reduction and connection-acceleration assessment integrating DC operational data with NESO grid/connection and FES insight, and scenario plus sensitivity analysis on key assumptions.
Output (what is delivered): A GB-wide cost-benefit assessment, scenario-based benefit estimates (energy, carbon, grid capacity), and a sensitivity/risk-adjusted net-benefit view for NESO, DC operators and consumers.
Expected outcome (what this enables): A credible quantified case that flexible DC operation is viable and worth pursuing into trials — the core evidence for consumer net benefit and for connection-reform decisions.

WP4: Forward Proposals & Trial Strategy (Objective 5)
Description (how it will be done): Synthesise WP1–WP3 into a proposed solution set and strategic roadmap; produce the project report and summary communications; develop a trial strategy with scope, design and required enablers; draft an implementation roadmap and timeline; and prepare a proposal summary for NESO and external audiences.
Methods / approach: Structured synthesis and prioritisation of findings, iterative drafting with stakeholders (WP5), and trial-design best practice applied to the shortlisted models.
Output (what is delivered): A proposed solution set and roadmap, a comprehensive project report, an outline trial strategy and design, and a proposal summary.
Expected outcome (what this enables): Actionable, funded next steps agreed with NESO and a clear path to trial mobilisation — converting study findings into a delivery pathway.

WP5: Stakeholder Engagement (cross-cutting, Objective 6)
Description (how it will be done): Mobilise the consortium and establish an advisory/steering forum; recruit and onboard a DC stakeholder panel (in progress ahead of mobilisation and participants already secured in principle pending mobilisation of the project); run structured engagement (interviews, workshops, surveys); capture feedback into WP1–WP4; coordinate with NESO and government (including DSIT) on policy alignment; and secure expressions of interest for trials.
Methods / approach: A tiered engagement model with bilateral sessions for sensitive early topics and round tables for later reviews, a "data ladder" allowing participation at any data level, anonymised/operator-blind handling under NDA, and engagement via industry bodies (techUK, UKSPA, Data Centre Alliance).
Output (what is delivered): An operating advisory group, structured engagement outputs, systematically captured feedback, policy-alignment coordination, and expressions of interest for trials.
Expected outcome (what this enables): Findings grounded in operational reality with broad industry buy-in — the enabler for data access (de-risking WP1) and for a credible trial phase.

Project Management & Quality Assurance
Description (how it will be done): Project governance and reporting, quality assurance and peer review, milestone and risk management, and consortium coordination across the 17-week study.
Methods / approach: Established delivery and QA processes, a steering forum, and milestone tracking with early-warning triggers.

Output (what is delivered): On-time, quality-assured deliverables and effective consortium coordination.
Expected outcome (what this enables): Smooth delivery within the agreed timeline and budget.

Measurement Quality Statement
Outcomes are quantitative and evidence-based. Flexibility potential is measured through analysis of operator interval-power and utilisation data (diversity/coincidence factors, load factors, latent capacity in MW/MWh and compute hours) and through optimisation modelling of a re-optimised dispatch versus baseline (peak reduction, utilisation uplift, energy and carbon savings). System benefits are measured via the WP3 cost-benefit model (avoided grid capacity, MIC reduction, GBP and tCO_2). Results are validated by academic peer review (Imperial College London, Cardiff University), cross-checking against published benchmarks, and stakeholder sense-checking with DC operators and NESO.

Known limitations: reliance on a sample rather than the full fleet, on proxies (UPS/cooling load, PUE) where IT-load data is unavailable, and on modelling assumptions for shiftable load; all addressed through sensitivity analysis and confidence flagging on every input.

Data Quality Statement
The study draws on: operator-supplied interval power and server-utilisation data, behind-the-meter asset and cost data, and

workload/VM data (primary and most reliable, but commercially sensitive and not held centrally); NESO grid, connection, FES and carbon/price insights; and published benchmarks and academic studies (Lawrence Berkeley, ITIF, Uptime Institute, Cardiff, Google, Microsoft) plus open data.

Reliability and completeness vary: primary operator data is high quality but likely partial in coverage, so a four-rung data ladder allows contribution at measured, aggregated, proxy or validate-only levels.

Key gaps and assumptions - non-metered IT load estimated via PUE, shiftable-load fractions from literature where operator data is thin, and archetype generalisation across the fleet - are documented, confidence-flagged and tested through sensitivity analysis. Data is handled anonymised and operator-blind under NDA.

In line with the ENA's ENIP document, the risk rating is scored low
TRL Steps = 1 (1 TRL Steps)
Cost = 1 (£360k)
Suppliers = 1 (1 supplier)
Data Assumptions = 3 (moderate)
Total = 6

Scope

What we are doing?
A feasibility study to produce the first quantitative, operator-validated evidence base on the flexibility potential of GB data centres, and to assess how that flexibility could be captured through operating models, market products and behind-the-meter assets. It is a desk-based analytical and stakeholder study.
In scope:
> Baseline DC utilisation and load-diversity assessment across a representative sample of DC types (interval power/utilisation data and proxies), quantifying latent/unused capacity.
> Compute-workload segmentation by flexibility class (latency-critical, delay-tolerant, location-flexible) and estimation of the truly shiftable share.
> Quantification of flexibility potential (MW, MWh, compute hours) covering temporal shifting, spatial shifting and smart scheduling, and optimisation modelling of a notional "tomorrow" schedule versus "today".
> Behind-the-meter asset archetype assessment (batteries, UPS, on-site generation, microgrids), scheme economics, residual system flexibility, and connection-acceleration cost/benefit and hurdle-rate analysis.
> Operating-model design and feasibility (technical, commercial, regulatory), candidate flexibility products for NESO/DSO, and policy/regulatory barrier and enabler analysis (Ofgem, DSIT; data privacy, interruptibility, CNI status).
> A GB-wide cost-benefit assessment with scenarios and sensitivity analysis, a stakeholder-engagement programme (two-tier panel, workshops, interviews, surveys), and a trial design and forward roadmap.

Out of scope:
> Physical trials, pilots or live demand-response testing; detailed engineering design of orchestration platforms; and procurement, contracting or settlement of any flexibility product.
> Engagement with individual DC tenants/end-customers (engagement is at operator level); detailed cyber-security/CNI compliance assessment; and commercial negotiation of specific terms with operators.
> International markets (used only as benchmarks) and new detailed grid-reinforcement modelling (existing NESO/DNO insights are used).

Objective(s)

Objective 1: Quantify the unconstrained flexibility potential of the UK DC fleet (WP1a)
Objective 2: Assess behind-the-meter flexibility potential and connection value (WP1b)
Objective 3: Define a spectrum of feasible operating models and market enablers (WP2)
Objective 4: Develop a GB-wide cost-benefit assessment (WP3)
Objective 5: Develop forward proposals and trial strategy (WP4)
Objective 6: Build broad-based stakeholder engagement and consensus (WP5)

What will change as a result of this project
This study will provide NESO — for the first time — with a quantitative, operator-validated evidence base on DC flexibility. This could directly enable:
1. Evidence-based demand connections reform — replacing worst-case assumptions about DC demand with data on what is

genuinely flexible, enabling conditional or staged connection offers and Maximum Import Capacity reduction
2. New flexibility and access product design — identifying candidate products (access products, flexibility products, connection requirements) that NESO and DSOs could procure from DCs
3. Informed system planning — allowing NESO to distinguish between DCs that are genuinely inflexible and those that could operate flexibly, improving demand forecasting and infrastructure planning
4. A credible path to trials — with stakeholder buy-in, trial designs and a roadmap for implementation, definitively evidencing the potential for DC flexibility

Consumer Vulnerability Impact Assessment

Data centres are commercial/industrial consumers, not domestic or vulnerable consumers, so the Method has no direct behavioural or affordability impact on consumers in vulnerable situations. The effects on vulnerable consumers are indirect and expected to be positive:

> Financial: by evidencing where DC demand can be treated as flexible or conditionally firm, the study can reduce over-provisioned grid reinforcement and defer capacity that would otherwise be distributed across all consumers, helping contain network charges that feed into all bills, including those of vulnerable consumers.

> Technical/operability: better use of existing infrastructure and faster connections support a secure, affordable system as digital demand grows, reducing the risk that DC growth crowds out or raises costs for other network users.

> Wellbeing: no negative wellbeing or distributional impact on vulnerable consumers is anticipated. The study does not rely on any vulnerable consumer changing behaviour, adopting technology or bearing new costs.

Success Criteria

The project will be judged on the usefulness of its outputs. Key outputs and success criteria:

> Quantified flexibility evidence base (WP1a): a robust, peer-reviewed estimate of DC operational flexibility (MW/MWh, compute hours) accepted by NESO as the basis for CBA and forward planning; utilisation and diversity quantified across the sample; compute load classified by flexibility category.
> BtM flexibility assessment (WP1b): archetypes defined and assessed with residual system flexibility (MW/MWh) quantified and validated by NESO and operators, sufficient to inform operating-model design and CBA.
> Operating models and enablers (WP2): a clear spectrum and shortlist of models with documented technical/commercial/regulatory requirements, endorsed by stakeholders, with near-term options identified for demand connections reform.
> Cost-benefit assessment (WP3): a credible GB-wide CBA - benefit ranges (GBP), carbon (tCO_2 avoided) and MW of deferred grid capacity across scenarios - that builds stakeholder belief that flexible DC operation is viable and worth trialing.
> Forward proposals (WP4): an actionable, funded set of next steps agreed with NESO, with a defined trial scope and design and secured expressions of interest.
> Stakeholder engagement (WP5): broad, active participation across DC operators, academia, NESO and industry bodies that validates the outputs - measured by workshops/interviews completed, endorsement of feasibility study report, and expressions of interest for trials.

Project Partners and External Funding

Project partner: Baringa
No external funding

Potential for New Learning

New knowledge the project aims to develop:

> The first GB-scale, operator-validated quantification of DC operational flexibility (temporal shifting, spatial shifting, smart scheduling) expressed in MW, MWh and compute hours.
> A segmentation of the UK DC fleet and a typology of compute tasks by flexibility class, distinguishing where flexibility is real from where it is not.
> Evidence on behind-the-meter asset archetypes, their economics and their residual value to the system, and on how they could accelerate connections.
> A spectrum of feasible operating models and candidate market/connection products, with technical, commercial and regulatory

feasibility assessed, and a GB-wide cost-benefit evidence base.

Dissemination:
Findings will be shared with industry through the project report and summary communications, stakeholder workshops and round tables, and engagement via industry bodies (techUK, UKSPA, Data Centre Alliance). Supporting academic institutions may publish peer-reviewed outputs. In line with NIA governance, project learning and recommended next steps will be published on the ENA Smarter Networks Portal at the end of the project.

Scale of Project

This is a GB-wide feasibility study delivered over approximately 4 months at a cost of £360,000. It is a desk-based analytical and stakeholder study - not a demonstrator - sized to establish the evidence base and forward path rather than to deploy technology.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

Great Britain (England, Scotland and Wales). The study addresses the GB electricity system at both transmission (NESO) and distribution levels, drawing on NESO grid, connection and FES data and on DNO data (e.g. UKPN) for DC demand profiles. DC sites sampled will be GB-based; international studies are used only as benchmarks. Findings are intended to be applicable across GB.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Project spent broken down by work package:

WP1a: DC Flexible Operation Assessment £89,979
WP1b: Behind-the-Meter Flexibility Assessment £46,240
WP2: Operating Model Feasibility & Enablers £64,447
WP3: Cost / Benefit Assessment £51,148
WP4: Forward Proposals £51,415
WP5: Stakeholder Engagement (cross-cutting) £36,418
Project Management & QA £10,354

Total estimated project cost £360,000

The costs presented by work package reflect the direct project delivery activities. In accordance with the NIA Governance and Licence Condition requirements (including the provision for up to 25% of project costs for internal expenditure), the total reported project cost may differ from the sum of work package costs outlined above. All costs are reported to Ofgem in full through formal regulatory reporting at the end of each financial year.

Project Eligibility Assessment Part 1

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

The project directly facilitates the energy system transition. Data centres are one of the fastest-growing sources of GB electricity demand (6-15 GW of grid capacity projected by 2050), and are currently treated as passive, firm, coincident load. By producing quantitative, operator-validated evidence on how much DC demand is genuinely flexible - through temporal and spatial workload shifting, smart scheduling and behind-the-meter assets - the project enables:

> more efficient integration of DCs into the system, reducing peak demand and grid-reinforcement needs and accelerating connections for DCs and other users;
> alignment of DC electricity use with renewable generation and system conditions, supporting net-zero delivery; and
> evidence-based demand-connections reform and new flexibility products, helping NESO plan and operate a secure, affordable, low-carbon system as digital demand grows.

How the Project has potential to benefit consumer in vulnerable situations:

The benefit to consumers in vulnerable situations is indirect but positive. Data centres are commercial consumers, so the project places no cost or behavioural requirement on vulnerable consumers. By evidencing where DC demand can be treated as flexible or conditionally firm, the project can reduce over-provisioned grid reinforcement and defer capacity that would otherwise be socialised across all consumers - helping to contain the network-charge element of bills, including for vulnerable consumers - while supporting a secure, affordable system as digital demand grows.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved

n/a

Please provide a calculation and/or description of the expected benefits of the solution

At this feasibility stage the net benefit is described qualitatively, with quantification to follow from the WP3 cost-benefit assessment.

Please provide an estimate of how replicable the Method is across GB

The Method is highly replicable across GB and is intended to inform a national approach. It is an analytical and assessment methodology (segmentation, load-diversity and utilisation analysis, workload flexibility classification, optimisation modelling, BtM archetype and cost-benefit assessment) that applies to any DC operator, site type or region. Because it uses well-understood metrics, standard tools (Excel, Python) and published benchmarks to fill gaps, it can be extended from the study sample to the full GB fleet and re-applied as data coverage grows. Findings on operating models and market products are GB-wide by design and intended to inform national demand-connections reform.

Please provide an outline of the costs of rolling out the Method across GB.

The Method described here is feasibility assessment methodology to inform a national approach to DC integration, and as such the exact form of recommendations and hence costs for solutions is not yet known. The project will establish the size of for the potential benefit of more flexible operation of DCs alongside flexibility from wider assets, as well as the enablers required to deliver various potential approaches. Delivering these enablers would require, subject to successful trials, standing up elements such as market signals, flexibility products and connection-reform mechanisms. Costs to DCs to deliver flexibility could involve the cost of BtM assets or local flexibility schemes, as well as capabilities for internal scheduling of compute workload. These costs would be informed and scoped through the project as part of the feasibility study Cost/Benefit Assessment.

Requirement 3 / 1

Involve Research, Development or Demonstration

Projects must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

Involve Research, Development or Demonstration - Please select all that apply

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☑ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☑ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The learning could enable Network Licensees to act on DC demand in ways not currently possible. Specifically, NESO and DNOs could potentially: reform demand-connection decisions by treating DC capacity requests differentially where flexibility is evidenced (staged, conditional or reduced MIC); design and procure new flexibility and access products suited to DC loads; improve demand forecasting and system planning by distinguishing genuinely inflexible DCs from system-aware ones; and target future trials at the highest-value DC and compute segments. The cost-benefit evidence directly supports business cases for these changes. Data analysed, and potentially collected in later trials phases, will also inform DNOs in DC connection studies.

n/a

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed. Networks must explicitly mention similar projects that they have considered and how these differ.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

The project does not duplicate existing work; it complements and builds on it. The Emerald AI project (NGET) demonstrates real-time DC power modulation at demonstrator level, but does not address fleet-level flexibility potential, operating models, behind-the-meter asset strategies or a GB-wide cost-benefit case - which are the focus here. Prior academic and industry studies (e.g. Lawrence

Berkeley, ITIF, Uptime Institute, Cardiff University, Google, Microsoft) provide benchmarks that this study uses and extends rather than repeats. No registered IFI, LCNF, NIA, NIC or SIF project has produced a quantitative, operator-validated GB evidence base on DC operational flexibility. The consortium will engage relevant projects (e.g. Emerald AI, EPRI) to build on prior learning and avoid overlap.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

N/A

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

The project is innovative because it aims to produce the first GB-scale, operator-validated quantification of data-centre operational flexibility, distinguishing where flexibility is real from where it is not across business models and workload types. It applies a novel, cross-disciplinary methodology - combining energy-system analysis with DC operational and IT-architecture knowledge - to a problem that has not been examined at fleet level in GB. Treating DC demand as a potentially controllable, system-aware resource (rather than fixed, firm load), and translating that into operating models, candidate market products and a cost-benefit case, has not been done before in the GB context.

Relevant Foreground IPR

Expected Relevant Foreground IPR comprises the analytical methodology, the DC and compute-flexibility segmentation frameworks, the optimisation and cost-benefit models developed for the study, and the resulting evidence base, operating-model options and recommendations. These will be shared openly under the default NIA IPR position. Some analysis draws on Partner's Background IPR (e.g. reference price curves and existing modelling capability) and third-party tools (e.g. Gridcog); this Background IPR remains with its owners and is used to generate, but is distinct from, the Foreground IPR.

Data Access Details

Data for this project and all other projects funded under the Network Innovation Allowance (NIA), or Strategic Innovation Fund (SIF) can be found or requested in a number of ways:
1. A request for information via the Smarter Networks Portal at https://smarter.energynetworks.org, to contact select a project and click 'Contact Lead Network'. National Energy System Operator already publishes much of the data arising from our innovation projects here so you may wish to check this website before making an application.
2. Via our Innovation website at https://www.neso.energy/about/innovation
3. Via our managed mailbox innovation@neso.energy

Details on the terms on which such data will be made available by National Energy System Operator can be found on our website: Data Sharing Approach | National Energy System Operator.

Please identify why the Network Licensees will not fund the project as a part of it's business and usual activities

This project cannot be delivered through business-as-usual activities because it seeks to generate new, pre-competitive evidence that does not currently exist and requires access to commercially sensitive operational data from multiple data centre operators, alongside specialist academic and industry expertise.
The project involves significant technical, commercial and regulatory uncertainty, with no guarantee that sufficient flexibility potential or viable operating models will be identified. As the learning will inform industry-wide decisions on data-centre connections, flexibility markets and system planning, the benefits are expected to accrue across the wider energy sector and consumers rather than to NESO alone.
NIA funding therefore provides the appropriate mechanism to manage the risks associated with developing this evidence base and to support informed future policy, market and network decisions

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks (e.g. commercial, technical, operational or regulatory) associated with the project

The project can only be undertaken with NIA support because the required evidence does not exist and cannot be generated through business as usual. It depends on assembling commercially sensitive operational data from multiple DC operators under a trusted, neutral framework (NDAs, anonymisation, academic credibility) - data not held by NESO or any single party. The associated risks make it unsuitable for BAU funding:

> Commercial: DC utilisation and asset-cost data are highly sensitive; operators will only share within an independent, anonymised, pre-competitive project - convening this is a core innovation-project function, not a BAU activity.
> Technical: the analytical approach is novel and cross-disciplinary (energy-system plus DC operational expertise) and carries delivery risk that no single organisation is resourced to absorb.
> Operational/regulatory: the benefits are diffuse public goods (informing connections reform, flexibility-market and system-planning policy) that no individual market participant has the incentive or mandate to fund, and outcomes are uncertain until the evidence is built.

This project has been approved by a senior member of staff

☑ Yes