

NOTE: Solutions must be implemented using Beckn Protocol workflows.

## **Problem Statement 1: Utility Interface with Agentic Orchestration for Grid-Scale Demand Flexibility**

**Context:** Utilities are increasingly unable to autonomously monitor and mitigate feeder-level spikes in real-time as distributed energy resources (DERs) proliferate behind-the-meter. Manual coordination is slow, expensive, and lacks visibility and traceability.

**Challenge:** Build an agent that acts as a reliable co-pilot with a Command-Centre Dashboard interface for the DSOs (e.g. UK Power Networks) – forecast and manage local load flexibility at feeder/substation levels, aligned with Ofgem's flexibility reforms.

### **Minimum Expected Capabilities:**

- The agent must achieve a sub-5 second detection-to-dispatch SLA at feeder level, integrated with P415 VLP activation and traceable through OBP IDs for verifiable P444 settlement.
- Agents must implement Beckn Protocol workflows for the utility to discover available catalogues of subscribed DERs, optimise and activate the DERs to address the spike in demand
- Forecast localized grid overloads (e.g., at feeders or substations) using historical and real-time data.
- Coordinate with DERs to shift or shed load constrained by defined rules (e.g., home batteries discharge, EV charging deferment, heating load shifting).
- Maintain full audit logs: timestamped decisions, data sources, operator rule invoked, DER response, available for regulator review.

Note: Assume that the utility has published Demand Flexibility Programs, which have been subscribed by individuals & businesses, which forms the catalogue of DERs for this challenge.

### Good-to-Have Capabilities:

- Agent self-analyses exceptional scenarios and offers alternative pathways (e.g., multi-feeder failure).
- Differentiation between incentive-based vs emergency interventions (e.g., voluntary demand response escalation to forced curtailment).

**Why this matters:** Because the grid of the future cannot depend on human reflexes, it needs autonomous agents that sense, predict, and balance demand in real time to prevent blackouts and make flexibility a first-class operational asset.

---

## Problem Statement 2: Compute–Energy Convergence in a DEG World

**Context:** As digital infrastructure and AI compute demands surge, energy grids and data centres are becoming tightly coupled. In a DEG world, compute loads act as dynamic nodes in the energy ecosystem—needing coordination, optimisation, and flexibility.

**Challenge:** Design an agentic orchestration system that co-optimises compute demand (data-centre/AI-workloads) and energy distribution/storage/flexibility using DEG infrastructure.

### Minimum Expected Capabilities:

- Optimisation targets should minimise £ per inference under a defined carbon intensity cap, using workload deferral windows to monetise flexibility participation under P415.
- Model compute assets (e.g., AI training cluster, server farm) as energy-demanding entities with flexible scheduling windows.
- Forecast compute workload spikes and align with grid signals for energy availability, cost, carbon intensity.

- Initiate orchestration commands: defer workloads, shift compute region, schedule storage discharge, or enable renewable-only compute windows.
- Log decisions, data sources, compute/energy trade-offs, and system outcomes for audit.
- Compute agents publish job slots as Beckn catalog items; grid agents confirm via order lifecycle.

**Good-to-Have Capabilities:**

- Multi-agent negotiation: compute operator agent interacts with grid operator agent and storage/battery agents to dynamically allocate resources.
- Carbon-aware scheduling: workloads prioritised during low-carbon-intensity periods and rewarded via flexibility markets.
- Dashboard simulation showing compute-energy flows, cost savings, carbon reductions, and flexibility contributions.

**Why this matters:** Because AI and compute are now major energy loads — integrating them intelligently with energy networks is the only way to ensure our digital future doesn't destabilize the physical grid that powers it.