Why local data, coordination and control nodes are critical infrastructure

The UK energy system is missing a **critical layer of digital infrastructure**: local data and coordination nodes that translate activity at household and street level into system intelligence that can be acted on safely and fairly. This "missing middle" sits between rapidly expanding consumer-led flexibility platforms and the physical operation of local networks.

Without **structured information nodes** (e.g. feeder-level Community Energy Management Systems) and a corresponding **local operating layer** (SLES), system signals increasingly bypass local constraints. National price signals, aggregators and flexibility platforms act directly on devices behind the meter, with little or no visibility of feeder or substation conditions. This creates avoidable risks: local overloads, inefficient curtailment, premature reinforcement, and loss of value that could otherwise be shared locally.

Crucially, this is **not just an efficiency issue**. These local data and control nodes are a prerequisite for **system resilience and national security**. In the event of cyber-attack, extreme weather, or geopolitical disruption, the UK currently lacks the ability to see, coordinate or operate energy assets at local scale. Even homes with solar, batteries and EVs cannot operate meaningfully, without local visibility and control logic.

Missing nodes mean single points of failure; distributed digital nodes reduce them. This mirrors how resilient digital systems are designed in every other sector.

The Smart Grid Architecture Model (SGAM) provides a common reference framework to show this clearly. When applied consistently, it reveals that many current policies and consultations (asset registration, RESP methodology, load control licensing) are focused on governance or market layers while assuming data and coordination will "appear later". In reality, governance must be built *around* where data is generated, aggregated and operationalised, not the other way round. The absence of a shared architecture is leading to fragmented innovation, misaligned regulation and slow system learning.

With emerging geopolitical threats, **local data and coordination nodes should be treated as critical national infrastructure**, just like substations or communications networks. They underpin flexibility, resilience, fairness and long-term value for money. Building them deliberately, rather than as a by-product of individual projects, is now urgent.

Implications for SLES and the "missing middle"

- **Information and function layers are underdeveloped**, not because of lack of technology, but because no shared operating framework exists.
- **CEMs act as essential relay nodes**: they aggregate, govern and contextualise household-level data before it reaches wider system functions.
- **SLES is the missing operating layer**: the place where system intelligence is turned into coordinated action across DSO platforms, aggregators, VPPs and national markets.
- Skipping nodes (e.g. national platform → Home energy management systems or home devices) weakens system safety, efficiency and resilience.
- Innovation funding alone will not solve this unless projects are deliberately aligned and integrated.

Suggested next steps (practical and political)

1. Establish SGAM as the common reference architecture

Use SGAM explicitly across innovation programmes, consultations and sandboxes to:

- Map where projects and policies sit
- Expose gaps in information and function layers
- Clarify interfaces, boundaries and responsibilities

2. Run a Super Sandbox for SLES

Create a **multi-project, multi-actor Super Sandbox** to:

- Define what a SLES is (and is not)
- Specify interfaces between CEMs, DSO platforms, aggregators and national systems
- Test governance, data trust and fair-share logic in practice

3. Position CEMs and SLES as critical infrastructure

Reframe local digital coordination as:

- A prerequisite for unlocking flexibility at scale
- A resilience and national security issue
- A necessary complement to mass rollout of solar, storage and EVs

4. Align policy, regulation and innovation pathways

Ensure ongoing consultations explicitly reach:

- Information nodes (where data is generated and aggregated)
- Function layers (where coordination and control occurs)
- Rather than stopping at registers, licences or market rules

5. Build a clear political narrative

Frame this work around:

- **Security and resilience** (local nodes reduce single points of failure)
- **Value for money** (avoiding unnecessary reinforcement)
- **Community benefit and fairness**
- **Future-proofing** (AGI-ready, but citizen-protected systems)

Local energy data and coordination is no longer optional infrastructure. Without it, policy ambition will continue to outpace system capability. With it, flexibility, resilience and equity become achievable and scalable outcomes.