Response to RIIO-3 Statutory Consultation on Proposed Licence Modifications

On behalf of the Rossendale Valley Energy (RVE), thank you for the opportunity to respond to the statutory consultation on proposed RIIO-3 licence drafting modifications. Rossendale Valley Energy is a volunteer-led Community Benefit Society working to deliver locally owned, low-carbon energy systems that improve affordability, resilience, and community wellbeing. Our ambition is to demonstrate scalable, place-based models that reduce emissions, tackle fuel poverty, and ensure the benefits of the energy transition are retained within communities.

1. **Whole-system coordination and innovation governance**

Rossendale Valley Energy welcomes the proposed inclusion of the National Energy System Operator as an Interested Party in network companies’ Innovation Strategies. From a delivery perspective, this is an important signal that innovation must increasingly align with whole-system planning rather than operate as isolated technical trials.

However, through delivery of the Net Zero Terrace Streets (NZTS) programme (see appendix A), we consistently encounter a structural gap between national system planning and the reality of deploying low-carbon heat, flexibility, and smart energy systems at neighbourhood scale. While household-level technologies and national optimisation platforms are both advancing rapidly, there remains no clearly defined operational layer responsible for coordinating energy systems at street-to-community level.

NZTS demonstrates that this “missing middle” is not theoretical. It is the layer required to translate system ambition into delivery, and without it, innovation activity struggles to move beyond pilots into scalable, investable infrastructure.

1. **The Smart Grid Architecture Model**

In this context, Rossendale Valley Energy strongly supports the use of the **Smart Grid Architecture Model (SGAM)** (see Appendix B) as a common reference architecture for innovation, planning, and regulatory dialogue. SGAM provides a shared language for describing where capabilities sit within the energy system, distinguishing clearly between physical assets, communications, information models, system functions, and business or regulatory roles. NZTS uses SGAM explicitly to ensure that innovation activity is system-coherent rather than component-led. In particular, it makes visible where current gaps persist, most notably in the **Information and Function layers at local scale**. Without a common architectural reference such as SGAM, there is a risk that innovation continues to focus on devices and platforms in isolation, rather than on the information and operational layers required for effective coordination.

1. **Unlocking local value and flexibility**

A recurring barrier encountered through NZTS delivery is that local system value, including flexibility, constraint management, and resilience, remains difficult to evidence, aggregate, or monetise under current arrangements. This is not due to a lack of assets, but due to the absence of a defined local system intelligence and control layer.

NZTS addresses this by clearly separating roles across system layers. Home Energy Management Systems (HEMS) operate at the household level, while a Community Energy Management System (CEMS) sits in the Information layer, acting as a dynamic digital twin of the local energy system. This system intelligence is then operationalised through a Smart Local Energy System (SLES) in the Function layer, coordinating assets, sequencing actions, and optimising outcomes across cost, carbon, comfort, and network constraints.

Where this missing middle is absent, flexibility remains fragmented, innovation remains difficult to scale, and benefits fail to flow back to households. NZTS demonstrates that when these layers are explicitly designed and governed, flexibility can be unlocked in a way that is both system-aligned and consumer-focused.

1. **Investment discipline and non-network alternatives**

As network investment becomes increasingly constrained, non-network solutions and demand-side flexibility will need to play a greater role in maintaining system performance and value for money. However, NZTS delivery experience shows that flexibility cannot function as an effective alternative to reinforcement unless it is coordinated, predictable, and governed at local scale.

The combination of CEMS and SLES provides this capability, enabling local optimisation that can defer reinforcement, reduce peak demand, and improve resilience. Crucially, this allows value created through system optimisation to be measured and, where appropriate, returned to consumers rather than captured in an extractive manner.

This reinforces the need for RIIO-3 frameworks to recognise and enable this intermediate system layer, rather than assuming flexibility will emerge automatically from asset deployment or price signals alone.

1. **Concluding remarks**

In summary, Rossendale Valley Energy supports the intent of the proposed RIIO-3 licence modifications, particularly where they strengthen whole-system coordination and accountability. However, delivery experience through NZTS shows that these objectives cannot be met without explicit recognition of the local system intelligence and operational layer that sits between households and national system actors.

Without filling this missing middle:

* innovation remains siloed,
* flexibility remains fragmented,
* and value fails to return to consumers and communities.

NZTS demonstrates that this layer can be built, governed, and operated in practice. The challenge now is to ensure that regulatory frameworks evolve to recognise and enable it.

# Appendix A:Net Zero Terrace Streets – viewing the system through the lens of households

**A one-touch, whole-systems approach to decarbonising homes and rebuilding community wealth**

**What it is**  
Net Zero Terrace Streets (NZTS) is a pioneering, community-led model to retrofit and decarbonise the UK’s hardest-to-treat housing — the 6 million pre-1919 terraced homes that define so many of our towns and cities. Developed by **Looped Energy Communities CIC** and **Rossendale Valley Energy (**a Community Benefit Society), the model integrates physical infrastructure (shared ground-loop heat networks, fabric retrofit, solar, and storage) with digital infrastructure (the **Fairer Warmth platform**), community governance, and long-term finance.

**What it does**  
NZTS delivers **affordable, low-carbon, healthy warm homes at no upfront cost**. It removes barriers that prevent households from joining the energy transition by combining:

* **Fabric and heat upgrades** – standardised retrofit plus shared ground-source heat pumps, solar PV, smart cylinders, and batteries.
* **Digital optimisation** – smart-system control, real-time data, and demand-side flexibility so communities benefit from grid services revenue as part of a cooperative energy club.
* **Community engagement and trust-building** – using the *Reach → Engage → Retain* approach and local Energy Champions to co-produce every stage with residents.
* **Fair finance and ownership** – costs recovered through a fair monthly charge tied to the infrastructure, not the individual, with surpluses reinvested locally.

**How it works – the one-touch model**  
Each cluster works with a *Local Development Organisation (LDO),* a community-anchored delivery partner supported by Looped’s national “hub.” Looped provides the digital platform, quality assurance, and investment toolkit; LDOs deliver engagement, installation, and long-term stewardship. This **hub-and-spoke structure** ensures standardisation, scalability, and community ownership across the UK.

**Why it matters**  
NZTS offers a *whole-systems* route to Net Zero that connects people, place, and infrastructure, based on the cooperative model and ethos of non-extraction and community solidarity:

* Tackles fuel poverty and health inequality through stable, lower energy bills.
* Builds local skills, jobs, and supply-chain confidence.
* Creates investable, non-grant-dependent portfolios for institutional and public investors.
* Re-establishes **community agency and trust** in the transition—making clean energy a public-good utility, not a private luxury.

**The outcome**  
A replicable, data-driven framework that regenerates neighbourhoods, retains wealth locally, and embeds democratic oversight in the energy system—**transforming terrace streets into engines of community prosperity.**

*Figure* *1 Terraces fit for our communities today and into the future*

Diagram of a house with solar panels and a diagram

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A diagram of a house heating system

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**The Smart system:**

Through delivery of the Net Zero Terrace Streets programme, Rossendale Valley Energy is demonstrating in practice how the current system lacks a defined operational layer between individual household assets and national system coordination. NZTS is designed around a clear architectural separation of roles using the Smart Grid Architecture Model. At household level, Home Energy Management Systems operate in the component and field layers, capturing device-level data and enabling basic control. At community scale, a Community Energy Management System sits in the **Information layer**, acting as a dynamic digital twin that aggregates and contextualises data across multiple homes, assets, and network constraints.

This system intelligence is then operationalised by a **Smart Local Energy System**  operating in the **Function layer**, coordinating assets, sequencing actions, and optimising outcomes across cost, carbon, comfort, and system constraints. Without this missing middle, the paired Information and Function layers at local scale, flexibility remains fragmented, value is difficult to evidence or monetise, and benefits fail to flow back to consumers. NZTS shows that when these layers are explicitly designed and governed, flexibility can be unlocked in a way that is scalable, system-aligned, and capable of returning value to households rather than being captured in an extractive, winner-takes-all manner.

# Appendix B- The Smart Grid Architecture Model (SGAM)

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## Purpose of SGAM

The Smart Grid Architecture Model (SGAM) is a reference framework developed within IEC and European smart grid standardisation to support the systematic description of smart grid use cases, architectures, and interoperability requirements.

SGAM does not prescribe technologies or solutions. Its purpose is to provide a common architectural language that allows stakeholders to:

* describe where a use case sits in the power system
* understand which functions, data models, protocols, and components are required
* assess interoperability and standardisation gaps
* compare architectures consistently across projects and organisations

At its core, SGAM answers a simple but critical question: *If a given smart grid capability is to work in practice, what needs to align — and where?*

## The SGAM cube: three dimensions

SGAM is represented as a three-dimensional cube, combining system scope, control hierarchy, and interoperability layers. Each dimension answers a different architectural question.

### Domains (system scope)

The Domain axis describes where in the electrical energy conversion chain a function or use case applies. In the canonical SGAM diagram, the domains are shown along the front horizontal axis:

* Generation
* Transmission
* Distribution
* Distributed Energy Resources (DER)
* Customer Premises

These domains represent physical and operational parts of the electricity system. A use case may be confined to a single domain or span multiple domains (for example, Distribution ↔ DER ↔ Customer Premises).

SGAM makes cross-domain interactions explicit, which is essential for understanding modern smart grid use cases that span network boundaries.

### Zones (management and control hierarchy)

The Zone axis describes levels of control and management, shown vertically in the diagram:

1. **Process:** Physical energy conversion processes (e.g. electrical flow, mechanical conversion).
2. **Field:** Sensors, actuators, and primary equipment interfacing directly with the process.
3. **Station:** Aggregation and local automation, typically at substations or equivalent facilities.
4. **Operation:** System operation functions such as network control, monitoring, and supervision.
5. **Enterprise:** Business processes including planning, asset management, and organisational control.
6. **Market:** Market participation, trading, settlement, and regulatory interaction.

The Zones dimension distinguishes physical control, system operation, and business/market activities, which are often conflated in informal discussions.

### Interoperability layers (what kind of capability)

The Interoperability Layers form the third dimension of SGAM and are typically drawn as stacked horizontal planes cutting through the cube. They describe what type of capability or artefact is involved, from physical assets to business intent.

Component Layer

This layer contains physical components:

* power system equipment
* sensors and actuators
* protection devices
* IT hardware

These components are mapped to specific domains and zones (e.g. field devices in Distribution, station equipment at substations).

Communication Layer

This layer describes how information is exchanged between components:

* communication protocols
* network technologies
* transport mechanisms

The focus here is on interoperable data exchange, not on the meaning of the data.

Information Layer

The Information Layer represents shared meaning. In the SGAM diagram this is explicitly annotated as: “Data Model”

This layer includes:

* canonical data models
* information objects
* semantics and ontologies

Its purpose is to ensure that exchanged data is interpreted consistently by different systems and organisations. Data can exist without interoperability; information requires common semantics.

Function Layer

The Function Layer represents logical functions and services that realise a use case. In the diagram this layer includes:

* “Outline of Use Case”
* “Functions”

This reflects SGAM’s methodology:

1. Start from a use case
2. Derive required functions
3. Map those functions to information, communication, and components

Functions are defined independently of specific actors or implementations.

Business Layer

The Business Layer represents business objectives, policies, and regulatory frameworks, as indicated in the diagram by annotations such as:

* business objectives
* political and regulatory context

This layer captures:

* market rules
* roles and responsibilities
* organisational processes
* regulatory constraints

It ensures that technical architectures are aligned with institutional reality.

## Why SGAM is relevant

As energy systems become more distributed, digital, and cross-sectoral, the number of interactions between domains, organisations, and technologies increases rapidly. SGAM provides a stable reference structure that allows these interactions to be described, compared, and reasoned about consistently.

By separating components, communication, information, functions, and business context, SGAM helps ensure that smart grid solutions are coherent, interoperable, and scalable.

SGAM does not tell us what to build — it helps us understand what must align for any smart grid capability to work.

## How the Information and Function layers are underdeveloped

The SGAM framework helps explain not just where activity is happening, but where it is not. It is important to clarify **how information and function layers should be organised in a well-functioning smart energy system**, and where today’s gaps lie.

### The information layer (where the Community Energy Management System needs to sit)

**What it is**

It is a **network of nodes**, each operating at a different physical and social scale:

* The Information layer is where **raw data is turned into system intelligence**
* It sits **between devices and decision-making**
* This is not the control layer, it is about **representation and aggregation**

**What it does**

* Aggregates data from many assets and households
* Adds **context** (location, time, network topology, constraints)
* Creates **shared, trusted views of system state**
* Manages permissions, governance and data boundaries

**Why it matters**

* Decisions are only as good as the information they are based on
* Without this layer:
  + data remains fragmented
  + planners and operators see partial pictures
  + households are acted on without visibility or protection

|  |  |  |
| --- | --- | --- |
| Node | Domain | Zone |
| Household / HEMS | Customer Premises | Field |
| **Feeder (CEMS)** | DER | Station |
| Secondary substation | Distribution | Station |
| Primary substation | Distribution | Operation |
| Regional / National | Transmission | Market |

Diagram of a diagram of a structure

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Today, data exists at most of these levels, but persistent, governed aggregation at the community / feeder level is largely missing. This is the critical gap that prevents data becoming system intelligence.

### The Function layer: where intelligence becomes coordinated action and where the SLES sits

**What it is**

* The Function layer is where system intelligence is **coordinated and optimisation happen**
* It uses system intelligence to decide **what should happen next**
* It operates at multiple scales: local, distribution, national

**What it does**

* Resolves conflicts between competing objectives
* Coordinates assets to manage constraints
* Optimises outcomes (cost, carbon, comfort, security)
* Translates intelligence into **operational action**

**Why it matters**: Without this layer:

* flexibility is uncoordinated across the layer
* optimisation happens at the wrong scale
* risks are pushed onto consumers and networks

At present, much of the Function layer exists at **regional and national scale**, including:

* DSO flexibility procurement platforms
* National balancing and flexibility mechanisms
* Market-based price signals and optimisation tools

These functions are powerful, but they largely assume that **local system intelligence exists below them**. What is missing is a **dedicated local operating layer** that can:

* interpret feeder-level intelligence,
* resolve local constraints,
* sequence actions across assets,
* and reconcile local and national objectives.

|  |  |  |
| --- | --- | --- |
| Function layer | Domain | Zone |
| **SLES** | Distribution / DER / Customer | Field → Station → Operation |
| DSO flex platform | Distribution | Operation → Enterprise → Market |
| Tx flex platform | Transmission | Market → Enterprise |

**Diagram of a diagram of a grid with blue circles and lines

AI-generated content may be incorrect.**

The missing middle of the energy system is therefore not a single technology gap, but the **absence of coherent Information nodes (CEMS) paired with a local Function layer (SLES)**.