The British Hydropower Association (BHA)
ED3 response

Introduction

The British Hydropower Association is the UK's only membership organisation solely dedicated to representing the hydropower sector, including run-of-river hydropower, reservoir hydropower, Pumped Storage Hydropower (PSH), and Tidal Range technologies.

Our mission is to advance, promote and secure the long-term future of hydropower by engaging government, regulators, network operators and industry stakeholders. We work to ensure that hydropower is fully recognised as proven, reliable, dispatchable, low-carbon infrastructure, playing a critical enabling role in delivering a resilient, affordable, and decarbonised electricity system by 2030.

Why the BHA is focused on unlocking the *local value* of hydropower
Hydropower is the UK's most overlooked distributed energy resource. It delivers:

- Long asset lifetimes,
- Predictable winter-led generation,
- Inherent storage in many schemes,
- Dispatchable, low-carbon flexibility, and
- Local system stability services (voltage support, congestion relief).
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However, this local value cannot currently be recognised or rewarded because DSOs lack real-time visibility of distributed assets, especially at the low-voltage (LV) edge of the network.

Unlocking hydropower's local value requires building the missing middle layer of the energy system:

- A unified LV data layer, and
- A Smart Local Energy System (SLES) middleware environment capable of translating hydropower's flexibility into products DSOs can procure.

We are focused on this because it is now clear that the future of hydropower depends on creating the digital, market and regulatory conditions for hydropower to provide local flexibility, resilience and system value.

This is essential both for:

- protecting existing assets, and
- creating new markets and revenue streams that keep the sector sustainable and growing.

Q1.What are your views on our regulatory guiding principles that will inform the development of accountable investment planning and delivery?

We support Ofgem's guiding principles and recommend adding a requirement for DSOs to develop and use a unified, real-time LV data layer.
Today, DSOs have almost no visibility "behind the secondary substation". Yet this is where electrification impacts are already materialising. The hydropower digital twin demonstrator shows how even a single distributed generator can provide DSOs with live headroom, dispatchability windows, reservoir state-of-storage and ramping potential through a standardised data interface .

A regulatory principle should explicitly require the development of:
"Operational, street-level LV visibility and dynamic data integration to support strategic planning, flexibility procurement and operational decision-making."

Without this, investment planning cannot reflect real LV conditions.

Q2.Are the proposed objectives for the long-term integrated network development plans appropriate?

The objectives are directionally correct but incomplete unless they include:

- Integration of real-time LV operational data, not only forecast or modelled values.
- Visibility of distributed generation, storage and flexibility availability through standardised dynamic digital twin nodes.
- Mechanisms to ingest local balancing signals, including services that only manifest at sub-hourly granularity.

TRESP does not provide this. The missing layer is the local data and control environment—essential for anticipatory activity and investment.

Q3.What are your views of proposed structure and contents of the plan?

We recommend including a new section titled:
"Local Operational Data Layer & Smart Local Energy System (SLES) Integration"
This should cover:

- Dynamic Digital twin nodes at the feeder/substation level providing real-time generation, storage and voltage data.
- A SLES middleware layer to standardise how distributed assets connect to network signals – visible and actionable by the DSO.
- The services required to support local balancing: constraint management, locational turn-down/up, LV congestion pricing, voltage support.
- Forecasting frameworks using live reservoir telemetry and hydropower storage models (flexibility predictability far exceeds most DERs).

This ensures plans move beyond high-level forecasting to operationally meaningful LV planning.

Q4.Do you agree with the proposed use of tRESP outputs in DNOs' network impact assessments?

tRESP should guide high-level strategy, but DSOs should be required to pair it with:

- Site-specific digital visibility,
- Dynamic headroom forecasting, and
- Real-time flexibility availability (e.g., hydro ramping signals, sub-hourly reservoir state-of-storage).

tRESP alone cannot capture simultaneity risk, clustered LCT connections, or operational flexibility.

Q5.What are your views on the guidelines for proactive investment decision-making across all DNOs?

We support Ofgem's approach, but the guidelines will not deliver their intended outcomes unless proactive investment explicitly includes the missing middle: the unified LV data layer and the Smart Local Energy System (SLES) middleware.

Today, DSOs lack real-time visibility "behind the secondary substation". They cannot see feeder-level real time voltages, headroom, phase imbalance, or the availability of local flexibility from distributed assets such as hydropower, batteries or EVs. Without this visibility, proactive investment is reactive by default, because DSOs cannot assess where real time flexibility is viable, how much is available, or whether it can reliably defer reinforcement.

The SLES middleware layer provides the operational environment where DSOs can run local congestion management, publish locational signals, and dispatch flexibility in real time. Without investment in this layer, DSOs cannot implement dynamic, LV-specific services.

The system will be moving toward sub-hourly, algorithmic, real-time coordination, with 15-minute scheduling and continuous optimisation. DSOs cannot operate effectively in this environment using static flexibility auctions.

We therefore recommend that proactive investment guidelines explicitly include funding for LV visibility infrastructure, dynamic digital twins, SLES middleware, and local market-enablement tools. Without this, local flexibility and local value will remain inaccessible, and reinforcement will continue to dominate investment decisions.

Q23. Notwithstanding the proposals we have set out under 'Redefining Connections Types', do you have alternative proposals for what DNOs need to do to speed up connection times for LCTs, and what incentives (other than those we have discussed in this chapter, obligations and/or funding may be required to support this?

We strongly believe that DNOs cannot enable smart, flexible local energy systems under the current data architecture. The fundamental barrier is the absence of a unified, street-level LV data layer that provides visibility, coordination and market access for local flexibility.
Today, DNOs are expected to facilitate flexibility without having the underlying digital infrastructure to see where flexibility exists, when it is available, or how it is behaving at the LV level. Because of this, flexibility remains:

- invisible,
- uncoordinated,
- nationally driven, and
- locally destabilising.

1. Street-level LV data must be the foundation of a smart local energy system
DNOs currently lack granular information on:

- per-feeder EV ownership and charging behaviour
- clustering of heat pumps and hybrid systems
- rooftop PV and battery export patterns
- local voltage issues, thermal constraints, and coincidence peaks
- actual availability of domestic flexibility (e.g., hot water, thermal buffers, EVs, batteries)

Without this visibility, DNOs cannot:

- forecast where local flexibility will be needed
- identify when reinforcement can be deferred
- route local price signals to households
- design markets around real local constraints
- verify whether flexibility actions actually helped

A **unified LV data layer**, shared with local authorities, LDVs, community programmes and trusted partners, is essential to make flexibility real rather than theoretical.
This layer must become the **operational backbone** of every Smart Local Energy System (SLES).

2. DNOs must coordinate (not control) local energy behaviour through new local markets
At present, street-level assets — EVs, heat pumps, batteries, solar inverters — respond almost entirely to national price signals such as:

- wholesale price events
- Agile/Tracker tariffs
- ESO balancing services
- national DSR products

This creates situations where:

- 10 EVs on the same feeder start charging at 23:30,
- because the *national* price dropped —
  but the LV network cannot handle it.

This is already causing:

- transformer stress
- repeated voltage dips
- reinforcement pressure
- hidden network risk
- inability to trust domestic flexibility

National signals are *rational* for individual consumers,
but irrational for the LV network.
DNOs must therefore be enabled to introduce local price signals such as:

- local peak avoidance signals
- voltage support markets
- turn-down or turn-up products tied to feeder stress
- local congestion markets
- locational flexibility stacking
- controlled charging windows at street level

These new markets are impossible without the unified LV data layer described above.

3. ED3 must explicitly support the creation of new local flexibility markets
If ED3 does not create a regulatory and market framework for:

- local balancing services,
- local voltage markets,
- feeder-level congestion pricing, and
- LV-specific flexibility signals,

then the system will remain trapped in a national-only coordination model that cannot scale to millions of EVs and heat pumps.
This local market layer is where:

- new products emerge,
- households can earn value,
- local optimisation occurs,
- and reinforcement costs can be deferred.

It will also underpin future commercial models such as:

- neighbourhood flexibility clubs
- local balancing pools

- community-led flexibility aggregators
- heat-EV integrated street schemes
- local price responsive heat networks

This is *exactly* how the value of local flexibility becomes investable.

4. DNOs should not deliver SLES — but they must provide the data layer and coordination framework

We do **not** believe DNOs should become retailers, aggregators or new energy service companies.
However, DNOs must:

- provide real-time LV constraint visibility,
- publish local flexibility requirements,
- operate neutral market facilitation platforms,
- provide APIs for local service providers,
- standardise LV digital architecture across regions, and
- ensure that local markets can transact safely.

This is similar to the Open Banking or Open Networks paradigm:
DNOs create the platform; others innovate on top.

5. Summary: What ED3 must ensure for Q23

ED3 must explicitly require that DNOs:

1. Develop a unified, street-level LV data layer in partnership with NESO
2. Enable new local flexibility markets tied to actual LV constraints.
3. Provide local price signals and coordination mechanisms to prevent EV/HP synchronisation driven by national prices.
4. Shift from passive planning to active local system management, based on data.
5. Support market entry for community, municipal and private flexibility providers, enabling a diverse ecosystem.
6. Integrate neighbourhood-scale intelligence, such as NZT Block-by-Block data from LDVs and councils.

This is how DNOs can truly enable smart, flexible local energy systems.

- regional demand and generation trajectories
- broad network reinforcement priorities

We recommend that Ofgem explicitly require DNOs to integrate tRESP + LV data layer + local delivery intelligence.
This creates the missing piece that turns high-level planning into investable, real-world delivery.

Q62. What additional data, digital tools, or visibility improvements are needed to enable DSOs to deliver proactive, spatially targeted network planning in ED3? Please provide examples of gaps or best practices.

Key gaps:

- Real-time voltage and phase measurements,
- Continuous storage SoC (hydro, batteries),
- Sub-hourly flexibility windows,
- Local balancing potential,
- Feeder-level export limits.

Tools required:

- Dynamic Digital twin nodes with open APIs,
- SLES middleware layer,
- Algorithms for local balancing and flex dispatch,
- Shared dashboards for DSOs.

Q63. How should DSOs incorporate flexibility services and connection process improvements into their network planning approach to ensure timely, efficient, and predictable connections? Should this be incentivised, and if so, how?

Flexibility must be integrated as:

- Locational,
- Temporal,
- Dispatch-dependent,
  not as a generic resource.

Incentives should reward DSOs that integrate verified, telemetry-based flexibility into planning.

Q64 -7 — Enduring role of flexibility

Flexibility remains critical, but only if:

- It is visible,
- Dispatchable locally,
- Verified through telemetry,
- Delivered at sub-hourly resolution.

This requires SLES and a continuous dynamic LV data layer.

Q75–80 — Loss optimisation

Loss optimisation depends on granular LV visibility.
Digital twin nodes allow DSOs to identify:

- Avoidable reverse flows,
- Local balancing opportunities,
- Ramping events that increase losses,
- Optimal local dispatch windows.

Loss optimisation cannot be embedded into ED3 without operational LV data.

Q81–Q84 — DSO incentive framework

DSOs should establish:

1. Feeder-level congestion products,
2. Voltage support services,
3. Real-time turn-up/turn-down markets,
4. Ramping services,
5. Local balancing markets,
6. Locational export limiting services,
7. Sub-hourly flexibility blocks (5–15 min).

Hydropower and aggregated local LCT assets are ideal early participants because they can deliver stable, predictable flexibility at any of these timescales.
Static pre-procured auctions cannot expose the value of these services.

Q131. Do you think that additional delivery incentives might be needed in ED3 and if so in which areas?

Yes — and two incentives are essential.

1. Local Flexibility Activation Incentive
Reward DNOs that:
- create local price signals
- enable peak shaving at LV feeder level
- support voltage management markets
- coordinate street-level DER behaviour

This shifts the system from national-only signals to **granular local balancing**.

2. LV Data Layer Development Incentive
Reward DNOs that:
- build unified LV data layers
- share LV data through structured SLES frameworks
- develop interoperable APIs
- support local market operators

This would accelerate the formation of local energy markets and enable genuine local flexibility.