🔌 **Voltage Matters – Flexibility Webinar**

Key Takeaways by Presentation

🟦 **Opening & Forum Update (Jon Hiscock, Ian Cooper, Richard Parke)**

- **Voltage Matters is evolving** from a discussion forum into a **problem-solving, collaborative industry space**.
- **EA Technology acquisition of Fundamentals** strengthens capability and signals continued commitment to the forum.
- Key recurring industry themes:
    - Voltage increasingly acting as a **constraint**, especially at LV (e.g. EV charging tripping issues).
    - **Legacy planning assumptions** are no longer fit for dynamic, decentralised systems.
    - **Limited LV visibility** remains a critical barrier.
    - Ongoing **regulatory and standards changes** (e.g. ESQCR, wiring regs) will shape future solutions.
- Big opportunity: **smarter voltage management** to unlock capacity and reduce curtailment.

🟧 **Gary Swandells – DSO Performance & Regulation**

- Current DSO performance framework (ED2):
    - Relies heavily on **qualitative assessment + stakeholder input**, not hard metrics (yet).
- **ED3 will introduce stronger outcome-based metrics**, including:
    - DER integration
    - Voltage management
    - Operational efficiency
- Key message:
  👉 **Stakeholder engagement matters**
    - Industry input directly influences DSO performance scoring and incentives.
- Important shift:
    - **Innovation ≠ ambition**
    - Value is recognised when solutions are **implemented at scale (BAU)**, not just piloted.

- Challenge identified:
    - Industry suffers from **“pilot-itis” and siloed innovation**
    - Need stronger **cross-network adoption of proven solutions**

🟩 **Julian Leslie (NESO) – Operating a Decarbonised System**

- Huge progress toward **zero-carbon system operation**:
    - Recently achieved **97.7% zero-carbon operation for short periods**.
- Flexibility requirement:
    - Increase from **~4 GW today to ~12 GW by 2030**.

⚡ **Why voltage is now a major challenge:**

- System has shifted from **static → highly dynamic**
- Key drivers:
    - Rapid swings in demand and generation (within hours)
    - High renewable penetration → **lightly loaded networks causing voltage rise**
    - Growth in **inverter-based technologies** (solar, EVs, batteries)
    - Changing consumer loads (LEDs, electronics, overnight charging)

🛠️ **Solutions being deployed:**

- Reactive power assets & **Pathfinder projects**
- **Switching out circuits** (now routine operational tool)
- Use of **HVDC and network configuration**
- Improved modelling and forecasting
- Collaboration with DSOs to:
    - Access **distributed reactive power**
    - Improve **whole-system voltage control**

👉 Key insight:

Voltage control is now a **whole-system problem**, not just transmission vs distribution.

🟪 **James Harrow and Olayinka Ayo, Project SOLVE (GEO & EDF UK)**

🎯 **Core idea:**

Use **smart meter + in-home device data** to deliver **real-time LV visibility and control**.

🔍 **Key findings:**

- Current visibility is too slow:
    - Smart meter data is **half-hourly and retrospective**
- High-resolution (seconds-level) data enables:
    - Faster fault detection
    - Proactive voltage management

⚠️ **Emerging issues:**

- **EV charging + heat pumps + batteries** causing:
    - Voltage fluctuations
    - Increasing customer complaints
- Estimated:
    - ~28,000 EV chargers impacted by voltage issues
    - Potential **£25m+/year investigation cost** for DNOs

💡 **Proposed solutions:**

- Real-time monitoring via **in-home displays / CAD devices**
- **Appliance-level flexibility control** (turning devices on/off to manage voltage)
- Adoption of:
    - **OpenADR** (flexibility standard)
    - **Matter** (interoperable smart home ecosystem)

📊 **Value to DNOs:**

- Reduced complaints & site visits
- Better targeting of flexibility
- Improved planning and forecasting
- Alignment with Ofgem incentives

👉 Key insight:

Future flexibility will be **hyper-local and device-level**, not just grid-level.

🟥 **Andy Howard (Electricity North West) – Project QUEST**

🎯 **Objective:**

Deliver **whole-system coordinated voltage optimisation** across all voltage levels.

🔧 **What was achieved:**

- Real-time voltage control across:
    - LV (Smart Street)
    - HV (CLASS)
    - 33kV (new enhancements)
- Developed **network-wide optimisation software**
- Integrated:
    - Third-party systems (e.g. DER, aggregators)
    - Digital twin modelling

✅ **Key outcomes:**

- Proven ability to:
    - Optimise voltage across the network simultaneously
    - Balance multiple priorities:
        - Customer savings
        - Loss reduction
        - Flexibility services
- Demonstrated:
    - **Interoperability with external systems is feasible**
    - Digital twins are effective for validation

👉 Key insight:

Coordinated, multi-level voltage control can unlock **significant system-wide benefits**, beyond siloed approaches.

⚡ **Overall Cross-Cutting Takeaways**

1. Voltage is becoming a primary system constraint

- Driven by decentralisation, electrification, and renewables

2. Visibility at LV is still a critical gap

- Real-time data is essential for future operation

3. Flexibility is shifting:

- From **centralised → distributed → hyper-local**
- Increasing role of **consumer devices**

4. Industry challenge:

- Moving from **innovation pilots → scalable deployment (BAU)**

5. Whole-system coordination is essential:

- Transmission + distribution + consumers must act together

6. Regulation is evolving:

- ED3 will place stronger emphasis on:
    - Outcomes
    - Voltage management
    - Flexibility effectiveness