Energy Innovation Basecamp 2026
Problem Statement EIP167

OHL joint integrity assessments

The following problem statement has been developed by the innovation teams within the UK's Gas and Electricity Networks for the 2026 Energy Innovation Basecamp.

Theme: Maximising Use of Existing Infrastructure

Network Areas: Electricity Distribution

What is the problem?

Distribution Network Operators (DNOs) want to improve their ability to extend the life of overhead conductors, and improve network resilience. One area we have observed is a trend of conductor drops and overhead line (OHL) joint failures where tree contact is not the cause. Evidence suggests that components are reaching end-of-life due to age-related deterioration, loss of mechanical strength, corrosion, fretting fatigue, and legacy construction standards.

Current practice relies heavily on visual inspection and aged based modelling. However, none of these approaches allow a direct, field-based, non-intrusive measurement of the mechanical strength of in-service conductors or joints. Without this, we cannot reliably identify the specific spans, jumpers, or joints at highest risk of failure. This leads to unplanned outages, safety risk, and emergency repair costs.

The core question to innovators is therefore:

Can we directly measure (not infer via AI/ML) the mechanical health, tensile strength, structural integrity, and remaining life of legacy 11 kV and 33 kV overhead line conductors and joints using a short-duration, non-permanent, non-outage method?

What are we looking for?

We seek non-destructive, short-duration inspection or measurement technologies capable of quantifying mechanical strength or material degradation of OHL conductors and joints.

Solutions must be able to:

- Measure (not estimate) characteristics such as tensile stress, material fatigue, and conditions which increase the probability of failure.
- Operate live-line, avoiding outages.
- Be suitable for one-off or short-term deployment, not permanently installed hardware.
- Be deployable via drones, hot-stick techniques, hot-glove methods, or other contact-on, non-outage methods.
- Apply to legacy OHL assets, not new build designs.

Desired TRL

- Minimum TRL 3–5, with a credible route to field trial within the Basecamp programme.
- Technology may be adapted from other sectors (rail, aerospace, oil & gas, NDT industries).
- Should demonstrate laboratory validation or sector-agnostic proof-of-concept.

Possible solution directions (non-exhaustive)

- Portable NDT methods (e.g., magnetic flux leakage for ACSR, guided-wave ultrasonics, eddy current testing, acoustic emission).
- Drone-deployed NDT payloads able to clamp briefly onto a conductor.
- Temporary strain measurement devices assessing elasticity and creep.
- Localised microwave/THz interrogation of strand deterioration.
- New sensors for quantifying the condition of compression joints.
- One-off small form-factor devices lowered onto live jumpers to identify cracking or mechanical fatigue.

What are the constraints?

The solution must:

- Require no planned outage to install or deploy.
- Be suitable for live-line working or drone application.
- Be non-permanent (short-term fit or single measurement event).
- Comply with relevant DNO live-working rules, ENA TS/OHL standards, and ESQCR.
- Be applicable across multiple conductor types used in legacy UK OHL networks (e.g., SCA, AAAC, ACSR).
- Operate in typical UK environmental conditions (wind, temperature, salt exposure).
- Provide usable outputs that integrate into existing OHL asset health frameworks.
- Be cost-effective to allow sampling across large fleets rather than small, isolated trials.

Who are the key players?

DNOs

Does this problem statement build on existing or anticipated infrastructure, policy decisions, or previous innovation projects?

Relevant SNP projects (examples)

- **OHL inspection & drone trials** (UKPN, SPEN, NGED).
- **PROACTIVE – Predictive OHL Asset Management** (SSEN): analytical and modelling approaches but no direct measurement system.
- **Dynamic Line Rating projects**: measure temperature and sag, not mechanical integrity.
- **Drone-based partial discharge detection** trials (DNOs): electrical condition only.
- **LiDAR and high-res visual surveys**: good for geometry, not mechanical health.
- **OHL risk modelling** (SPEN & Northern Powergrid): algorithmic prioritisation, but lacking direct NDT input.

What else do you need to know?

- DNOs ideally want a technology that can be deployed span-by-span, sampling the asset population to inform targeted replacement.
- A successful innovation would enable a new asset-health dataset, which could later be paired with ML clustering or risk models (but only once direct measurements exist).
- Techniques proven in other industries (aerospace cable integrity, suspension bridge cable scanning, rail OHL tension assessment, oil & gas riser inspection) could be adapted.
- Proposed solutions should consider:
    - Safety and clearance constraints on live lines
    - Brief attachment mechanisms for drone payloads
    - Conductors under wind-induced oscillation
    - Short-duration tests
    - Compatibility with 11 kV and 33 kV assets, including jumpers and mid-span positions

Innovators should review existing ENA and network standards available on the Smarter Networks Portal, as well as previous OHL innovation projects, to ensure alignment and avoid duplication.

Innovator submissions to this problem statement will be open on the Smarter Networks Portal from 4th February to the 13th March, but we encourage you to submit your response as early as possible, as networks will be able to review submissions as soon as they come in.

You can also use the virtual Q&A on the Smarter Networks Portal to ask for more information about this problem statement. Questions may be answered online or at the ENA Problem Statement Launch on 4th February 2026. More information on last year's Basecamp programme can be found on the Smarter Networks Portal.