Energy Innovation Basecamp 2026
Problem Statement EIP169

Identifying and mapping where hydrogen switch over could have a demand impact on the electricity networks?

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: Net zero and energy system transition

Network Areas: Gas Distribution, Electricity Distribution, Electricity System Operator

What is the problem?

Achieving net zero requires coordinated transition across the whole energy system. It requires giving customers viable, affordable and resilient choices for decarbonising heat. Whether households adopt green gas, electrification, hybrid systems or an alternative gas supply each pathway has a distinct implication for electricity and gas networks that must be understood and mapped. Understanding how hydrogen switchover reshapes electricity demand is critical to ensuring resilient, affordable, and equitable decarbonisation.

The transition to hydrogen in industrial and commercial (I&C) sectors will reshape energy demand profiles. The problem is that network operators currently lack clear visibility of where and how hydrogen switch-over will occur, and what the net impact on electricity networks will be. Identifying and mapping where this switchover (some or all gas pipelines supplying domestic customers) may occur will impact future planning grid reinforcement, flexibility services, and investment pathways.

The key questions:

- *How will hydrogen adoption in I&C sectors reshape electricity demand profiles, and where will these impacts be most concentrated?*
- *How will a change in gas supply effect current domestic gas users? What are their options? Are these geographically limited? Considering just transition requirements.*

What are we looking for?

Solution(s) may include:

- Analytical tool and modelling single integrated approaches to quantify and map electricity demand impacts and reinforcement needs under different hydrogen adoption scenarios.
- Customer and stakeholder insights including studies, reviews, reports that capture customer pathway preference and behaviours or that show possibilities in different regions or scenarios that are specific to that area.
- Business models and operational strategies including innovative tariffs, incentive, or operation playbooks to manage transitional demand shifts and coordinate conversion schedules.
- This list is not exhaustive, and the scope is deliberately open to attract novel technical, social, regulatory or market-based approaches.
- **Solution expectations:**
- **TRL:** 3–4 considered if novel insights are offered.
- **Scalability:** Must be operable at regional or national scale.
- **Testing:** Solutions should have been validated to some extent, either through pilots, modelling, or case studies.

What are the constraints?

- **Uncertainty management:** The solution must quantify ranges, scenarios, and confidence levels, not single-point forecasts.

  (UK heat decarbonization is unsettled at local levels; hydrogen for domestic heating remains uncertain, while electrification is advancing. Some zones may trial or adopt hydrogen; others will not. Solutions must handle multiple policy pathways and reversibility.)

- **Regulatory Compliance:** The solution must comply with UK energy regulations, and align with Ofgem reporting, privacy laws, cybersecurity standards, funding and relevant safety frameworks.
- **Technology:** Be compatible with existing electricity network planning methodologies. Technology-agnostic that can reflect hydrogen, electrification, and hybrid scenarios; no single-path bias.
- **Timeline:** Provide pilot-ready capability within 6–12 months; scalable deployment plan within 12–24 months.
- **Budgetary discipline:** Modular delivery with clear milestones, enabling staged approvals

Who are the key players?

- **Key Stakeholders:**
  - Electricity networks (adopters): UK Distribution Network Operators (DNOs) and transmission planners—asset managers, network strategy, system planning, flexibility procurement teams.
  - Gas networks: Regional GDNs coordinating conversion plans and customer transitions.
  - Government and regulators: DESNZ, Ofgem, HSE—policy oversight, funding alignment, safety.
  - Local stakeholders: Local authorities, combined authorities, housing associations—execution partners and community engagement.
- **Adopters:**
  - Network operators.
- **Beneficiaries:**
  - Energy networks (better planning, risk reduction), businesses (clarity on energy costs), policymakers (progress toward net zero), customers (reliability, affordability), regulators (evidence-based decisions), and communities (coordinated transitions).
- **Innovators sought:**
  - All with relevant experience, knowledge and understanding.

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

- **Build on:**
  - Smart meter data, EPC ratings, building archetype libraries and LV visibility project led by DNOs.
  - Gas network hydrogen conversion planning and neighbourhood pilots (e.g., H100 Fife, East Coast Hydrogen).
  - Local authority heat decarbonisation strategies and community energy planning.
- **Relevant trials and insights:**
  - H100 Fife and Gateshead hydrogen homes pilots (appliance conversion, customer engagement).
  - Hydrogen Technical & Safety Case projects (Cadent/SGN) providing evidence for domestic use.

- Customer engagement studies on heating preferences, willingness to adopt hydrogen, and barriers to uptake.

- **Future dependencies:**
  - Certification and rollout of hydrogen-ready appliances.
  - Policy decisions on domestic hydrogen and customer choice frameworks.
  - Improved smart meter granularity and LV monitoring for real-time impact measurement.
  - Community engagement processes to support vulnerable customers.

What else do you need to know?

Innovator submissions to this problem statement will be open on the Smarter Networks Portal from 3rd 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.

Dependencies and links to ongoing work

- **Build on:** Existing DNO load forecasting, LV visibility programs, flexibility tenders, and digital twin initiatives; gas network hydrogen pilots and conversion planning where available.
- **Relevant trials and insights:** Prior hydrogen blending and neighborhood pilots, local area energy planning, whole-system modeling, and winter peak studies; evolving national policy signals on domestic hydrogen and heat.
- **Future dependencies:** Siting decisions for hydrogen production and storage; appliance certification and rollout timelines; smart meter and EPC data quality improvements; continued DER and EV adoption.
- **What to reference:** Network strategy pages, constraint maps, flexibility market documentation, and any published heat electrification or hydrogen feasibility studies within the target regions.

What else you need to know

- **Data needs to quote in proposals:**
  - **Network:** Feeder maps, ratings, asset constraints, historical load traces, voltage data.
  - **Customers:** Aggregated smart meter profiles, EPC distributions, building archetypes, fuel poverty indicators, appliance penetration rates.
  - **Hydrogen:** Conversion sequencing scenarios, customer opt-out rates, appliance availability, temporary heating provisions, production site plans and load profiles.
  - **External:** Weather histories, local planning policies, DER/EV adoption trajectories.

- **Modelling expectations:**
  - **Scenario coverage:** No-hydrogen, partial/hybrid, full hydrogen in selected zones; seasonal and extreme-weather stress tests.
  - **Uncertainty:** Confidence intervals, sensitivity analyses, and explainability for assumptions.
  - **Operational use:** Clear thresholds for “action needed,” trigger conditions for reinforcement vs flexibility, and exportable reports.
- **Delivery artifacts:**
  - **Geospatial tool/UI:** Interactive maps and dashboards.
  - **APIs/data pipelines:** Secure ingestion and output integration.
  - **Documentation:** Assumptions register, validation results, change logs.
  - **Playbooks:** Transition management during conversion windows, customer communications insights, and flexibility sourcing strategies.
- **Success metrics:**
  - **Accuracy:** Reduction in forecast error for affected feeders.
  - **Actionability:** Number of identified hotspots with mitigations planned.
  - **Time-to-decision:** Faster scenario turnaround for planning teams.
  - **Stakeholder confidence:** Positive reviews from operations and regulatory engagement.
- **Proposal essentials:**
  - **Team capability:** Whole-system modelling, geospatial analytics, and utility-grade software delivery.
  - **Pilot plan:** Region selection, data access, validation methods, milestones.
  - **Governance:** Data privacy, cybersecurity, and ethical handling of customer data.
  - **Scalability:** Roadmap to national roll-out and integration with multiple DNOs.

If you want, I can tailor this to a specific DNO region, add a lightweight TRL scoring rubric, or draft a pilot scope with timelines and deliverables.