

New Network Equipment Designs and Topologies that allow 'Plug and Play' Construction

The following problem statement has been developed by the innovation teams within the UK's Gas and Electricity Networks for the 2024 Energy Innovation Basecamp.

Theme: Building Better and Faster

Network Areas: Electricity Transmission, Electricity System Operator

What is the problem?

Recommendation SE1 of the Winser report: A forum should be created between the Future System Operator (FSO), Transmission Owners (TOs), equipment manufacturers and Ofgem to review and update equipment standards used within Great Britain.

The government agrees that greater coordination between the ESO and later the FSO (once established), Ofgem, TOs and equipment manufacturers on equipment standards would be beneficial. The Electricity Networks Association will establish a forum with key stakeholders, including TOs and equipment manufacturers, in partnership with Ofgem, to review decisions to ensure that any agreed standards are able to be accounted for when assessing the needs.

Implementation of updates to rationalise and align equipment standards recommended through the forum will require a process to scrutinise and assess proposed changes. This process will need to comply with existing and future grid codes and be approved by the ESO (and then FSO, when established). The TOs and the ESO/FSO will develop a process to implement equipment standardisation recommendations agreed at the forum. It is suggested that the existing code modification process is used as a starting point.

[Transmission Acceleration Action Plan: Government response to the Electricity Networks Commissioner's report on accelerating electricity transmission network build \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/100000/transmission-acceleration-action-plan-government-response-to-the-electricity-networks-commissioner-s-report-on-accelerating-electricity-transmission-network-build)

What are we looking for?

There is an opportunity to provide, tools, practices, designs and standards that result in a standard approach to network design in the UK.

We invite ideas for:

- Creating industry forums that allow standards to be agreed.
- Harmonisation of the digitalisation of designs
- New equipment design that allows plug-and-play methods of constructing, including offsite commissioning.

What are the constraints?

Innovators should consider how their idea(s) will complement the government's response to recommendation SE1 of the Winser Report.

Who are the key players?

- Networks
 - Policy and standards
- Equipment manufacturers
- ESO/FSO
- Ofgem
 - Grid codes

Energy Innovation Basecamp 2024

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

There are a number of projects that have investigated standardisation and modularisation of equipment. For example:

- The application of Parametric Design to automate substation development Determine the feasibility of applying Parametric Design to electricity substation design Define the design rules which can be applied as parametric rules Determine the input data required to facilitate the parametric design and efforts required to collect this Establish the overall feasibility (cost, benefit, time saved) of this approach for the design of the electricity substations (both new and modification of existing ones). [The application of Parametric Design to automate substation development | ENA Innovation Portal \(energynetworks.org\)](#)
- Modular Approach to Substation Construction – SSEN-T Design Development Identify the requirements and standards that govern transmission substations up to a voltage of 275kV and 400kV - however, it is anticipated that this will initially focus on 132kV designs; [Modular Approach to Substation Construction - Design Development | ENA Innovation Portal \(energynetworks.org\)](#)
- Substation Compaction A number of options for reducing the footprint of substations using conventional Air-Insulated Switchgear (AIS) have been identified. A compact AIS design would have advantages in applications where restrictions in the available land are encountered. For example, such a design might allow extension bays to be constructed within an existing substation boundary where space is restricted. [Substation Compaction | ENA Innovation Portal \(energynetworks.org\)](#)
- Modular Approach to Substation Construction (MASC SSEN-T SHE Transmission proposes to demonstrate and deploy a permanent substation designed using a Modular Approach to Substation Construction (MASC). The current approach to substation construction differs little from that of 60 years ago; meanwhile many innovations in design and civil engineering could create a substation which is cheaper, faster to deploy and more suited to GB's low carbon energy future. MASC seeks to prove the following benefits: [Modular Approach to Substation Construction \(MASC\) | ENA Innovation Portal \(energynetworks.org\)](#)
- Future Intelligent Transmission Network SubStation (FITNESS) FITNESS will deliver the pilot GB live multi-vendor digital substation instrumentation system to protect, monitor and control the transmission network using digital communication over fibre to replace copper hardwiring, reducing cost, risk and environmental impact, and increasing flexibility, controllability and availability [Future Intelligent Transmission Network SubStation \(FITNESS\) | ENA Innovation Portal \(energynetworks.org\)](#)
- Project CLoCC - Customer Low Cost Connections developed 'off-the-shelf' standardised designs for connections that can be used regardless of the customer, size of connection, or type of gas, to minimise the cost and time of new gas connections to the national transmission system (NTS). [Project CLoCC | ENA Innovation Portal \(energynetworks.org\)](#)

What else do you need to know?

A coordinated network approach that is aware of previous work is required.

Innovator submissions to this problem statement will be open [here](#) during March and April, 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 in March 2024. More information on last year's Basecamp programme can be found [here](#).