Energy Innovation Basecamp 2026
Problem Statement EIP162

How do we develop scalable voltage and stability optimisation algorithms that match the maturity of thermal constraint solvers to enable resilient, low inertia electricity systems?

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 the use of existing infrastructure

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

What is the problem?

The growing share of volatile, fluctuating renewable generation has placed additional demands on the transmission networks, resulting in an increase in grid congestion. The cost of balancing services required to manage constraints and maintain grid stability has risen substantially, directly impacting consumers.

NESO currently uses manual Network Topology Optimisation (NTO) to help manage constraints. NTO is a continuous process of using transmission system assets to alter the electrical flow from generation to demand. The more efficiently the system can run, the fewer balancing actions are required and therefore the cost of balancing actions can significantly reduce.

A recent NIA funded project identified that although automation techniques have been developed to solve thermal constraint optimisation problems, voltage and stability optimisation algorithms are less advanced and currently not fit for purpose for an operational environment, restricting the automation of analysis of more complex power system constraints.

How can we develop scalable voltage and stability optimisation algorithms to enable future automation of NTO processes?

What are we looking for?

We are looking for new methods and techniques that improve optimisation algorithms that can be used for determining voltage and stability power system limitations on the transmission network. This can be delivered either as research, or as a tested product.

What are the constraints?

The solution must have the potential to work with network planning tools (e.g. Powerfactory), either in their existing format, or through future development to those tools.

Who are the key players?

Direct stakeholders: NESO and other System Operators globally, DSOs.

We are ideally looking to work with research institutes, universities and companies interested in complex power system research.

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

This builds on the NIA funded report into Network Topology Optimisation (NIA2_NESO087) which highlights voltage and stability optimisation algorithms as a key area to advance in order to achieve automation of NTO.

What else do you need to know?

Use this space to add anything else that an innovator would need to know to submit a submission to this problem statement. This may be additional context on the issue, additional sources of information, additional information about your network's processes, or any additional enablers and constraints.

N/A

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.