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NIA Project Annual Progress Report Document

Date of Submission

Jul 2025

Project Reference Number

NIA2_NESO097

Project Progress

Project Title

Assessment of Alternative Approaches to setting NTCs

Project Reference Number

NIA2_NESO097

Funding Licensee(s)

NESO - National Energy System Operator

Project Start Date

January 2025

Project Duration

0 years and 7 months

Nominated Project Contact(s)

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Scope

The scope of the research project comprises of four stages and includes key areas of focus:

Scope item 1 – Summary of current arrangements

- A summary of the drivers of need for NTCs.
- Description of the frameworks NESO currently uses to set NTCs (based on NESO's NTC Calculation Policy) and compensate interconnectors (based on NESO's Methodology for Commercial Arrangements relating to Interconnector Capacity).
- Outline of the benefits and drawbacks of the current approach.
- An inception report to NESO summarising the analysis.

Scope item 2 – Assessment of a potential NTC market

- Outline of the theoretical benefits of an NTC market, as a result of potential competition between interconnectors to meet NESO's needs.
- Assessment of the feasibility of an NTC market, including consideration of the extent to which NESO's requirements are locational.
- A high-level design for a potential NTC market.
- A quantitative cost benefit analysis of an NTC market, leveraging historical NTC usage data (to identify the periods in which NTCs have typically been required) and the outputs of FTI's dispatch model (for example, future power prices and interconnector flows), by analysing a counterfactual 'status quo' scenario and an NTC market scenario.
- A presentation to NESO summarising analysis.

Scope item 3 – Possible alternatives to NTCs (expanding trades market)

- Exploration of the potential to systematically extend the use to of trades, from interconnectors to a greater number of generators (and, in turn, energy traders). This could increase the potential benefits, by further increasing competition and liquidity.
- A cost benefit analysis of a Trades market.
- An interim report to NESO summarising analysis.

Scope item 4 – Recommendations

- Development of recommendations for options to reduce reliance on the use of NTCs
- A final report to NESO that sets out our methodology, results and recommendations (summarising Scope Items 1 to 3).
- A cost-benefit analysis of an NTC market would compare the costs paid by consumers for expected future NTC adjustments: (i) under the current status quo arrangements to those (ii) under an NTC market in which NESO is assumed to be able to restrict the interconnector(s) facing the lowest price differential, and therefore incurring the lowest cost.

Objectives

The objective of this project is to:

- Assess the feasibility of a market-based mechanism for setting NTC restrictions. The project will first analyse the current NTC arrangements in GB, then will create a high-level design option for a NTC market and a cost benefit analysis.
- Assess and provide alternative options to reduce reliance on non-market based balancing options (NTCs). The project will include a quantitative assessment of the costs and benefits of an alternative approach to NTCs.

Success Criteria

The project's success will be measured by its ability to achieve the objectives, through:

- An assessment of the feasibility of an NTC market supported by qualitative and quantitative analysis, cost benefit analysis and a high-level design option.
- A proposal of an alternative option(s) to NTCs supported by qualitative and quantitative analysis, and cost benefit analysis.
- A recommendation of which of the following is the most suitable option: current NTC arrangements, an NTC market or an alternative to NTCs, supported by evidence.

Performance Compared to the Original Project Aims, Objectives and Success Criteria

National Energy System Operator (“NESO”) has endeavoured to prepare the published report (“Report”) in respect of Assessment of Alternative Approaches to setting NTCs, NIA2_NESO097 (“Project”) in a manner which is, as far as possible, objective, using information collected and compiled by NESO and its Project partners (“Publishers”). Any intellectual property rights developed in the course of the Project and used in the Report shall be owned by the Publishers (as agreed between NESO and the Project partners).

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Background information: The electricity system has significantly evolved over the past ten years, with increasing amounts of renewable generation on the network, and a reduction in the amount of synchronous generation. This is leading to increased frequency volatility and more frequent, and larger, thermal and margin constraints. Actions taken by NESO to manage these constraints to maintain system security are increasing in both volume of actions and costs to consumers. This topic is being widely discussed given an expected increase in the number of interconnectors connecting to the grid and the need to manage constraints which is one of the main challenges being considered in REMA. Constraints will become even more exacerbated due to the location of the connection points for new interconnectors (mainly southeast England) and their large MW capacity.

Aim

NTC restrictions are currently the only tool NESO can guarantee an interconnector's flow will not risk a breach of Grid System Security. A like for like alternative to NTCs (that meets system security) has not been developed, the project findings will provide insights into

potential alternatives including a market-based option.

Performance Compared to the Original Project Aims, Objectives and Success Criteria

Objective

The objective of this project was to assess the feasibility of a market-based mechanism for setting NTC restrictions. The project analysed the current NTC arrangements in GB, to create a high-level design option for a NTC market and a cost benefit analysis. With the project, an assessment was made to determine if there are alternative options to reduce reliance on non-market based balancing options (NTCs). The project included a quantitative assessment of the costs and benefits of an alternative approach to NTCs.

Method

This project has been led by FTI Consulting with input from NESO and wider stakeholders.

The methods used to deliver this project included qualitative and quantitative analysis and cost benefit analysis.

The analysis was conducted across the below scope items:

1. Summary of current arrangements

This section explains the need for NTCs and how it differs from other interconnector-related tools. It sets out the frameworks that determine how NESO utilises NTCs, which may include analysis of historical data on NTC usage. This could include both analysis at an aggregate level, annual level, and at a more granular issue-specific level (e.g., actions to mitigate a specific thermal constraint). This scope also sets out the benefits and drawbacks of NTCs.

2. Assessment of a potential NTC market

This section proposed a high-level design of an NTC market considering the auction/bidding process, geographical location of interconnectors, the role of NESO and interconnectors, and fallback mechanisms. Also, safeguards against gaming, for example, a market that is designed in such a way that it would not be possible for interconnector(s) to influence power prices and its own rents were considered. The section set out theoretical benefits and drawbacks of an NTC market and produce a cost benefit analysis of an NTC market comparing the costs paid by NESO for expected future NTC adjustments: (i) under the current NTC arrangements to those (ii) under an NTC market, in which NESO is assumed to be able to restrict the interconnector(s) facing the lowest price differential, and therefore incurring the lowest cost. To do this, the section relied on a combination of data on historical NTC adjustments and the outputs of FTI's dispatch model, which includes forecasts of future power prices, generator outputs, and interconnector flows. Finally, this section calculated the expected future costs of NTC restrictions.

3. Possible alternatives to NTC

This section assessed expanding the market for GTMA Electricity Trades. The section aimed to produce a cost benefit analysis of a trades market. To do this the section relied on a combination of data on historical NTC adjustments and the outputs of FTI's dispatch model. FTI Consulting will provide a report and/or presentation upon completion of each scope item. Also, FTI delivered a final report to NESO that sets out the methodology, results and recommendations.

Outcome – conclusion from the report.

Key finding 1: NESO's existing NTC tool is effective in supporting system security, providing functionality that is not available to NESO via other options, but risks exposing GB consumers to higher than necessary costs and is not transparent

Key finding 2: Implementing an NTC market could, in theory, reduce costs to GB consumers while still maintaining system security by focusing restrictions on the lowest cost ICs to restrict. Potential benefits will increase when the variance across different connected European market prices is high.

Key finding 3: An NTC market is likely not suitable for GB ICs outside of the Southeast due to a lack of competition in those areas. As such, the status quo cannot be – in the short to medium term - fully replaced by an NTC market, necessitating future derogations from Ofgem.

Key finding 4: Whether the potential benefits of an NTC market can be realised in practice is uncertain, in part due to the risk of participants having significant market power or engaging in strategic bidding, even within the Southeast. Given the likely complexity associated with implementing an NTC market, the overall case for doing so therefore appears modest, particularly in the short term.

Key finding 5: Enhancing NESO's trading operations would be in keeping with NESO's recent direction of travel and could help to reduce the reliance on non-market NTC restrictions but would bring significant additional complexity and does not remove the need for NTC restrictions as a tool for managing the system.

Key finding 6: In recent years, NESO has improved the transparency of its use of NTC restrictions and the efficiency of its trading operations. However, recognising the concerns raised by ICs, we agree that there is likely scope for further improvements. Our quantitative assessment of i) a formal NTC market; and ii) expanding NESO's existing Trades function identified relatively modest benefits and material risks. As a result, a continuation of incremental reforms to the existing arrangements appears to be – for the time being – a more appropriate way forward compared to a more fundamental re-design of the NTC tool.

Required Modifications to the Planned Approach During the Course of the Project

So far here there have been no required modifications to the planned approach.

Lessons Learnt for Future Projects

The key lessons learned from work package 1:

- Following Ofgem's recent Window 3 decision, IC capacity in the southeast could increase to 13 GW by 2032, potentially driving greater volumes of network constraints and resulting NESO actions.
- In practice, the cost of making a given IC whole (consistent with the overarching objective of the NTC Commercial Arrangements policy) will, at times, vary by IC. Broadly, ICs that are connected to markets with smaller differentials between the GB whole price and the connected market wholesale price will be cheaper to make whole, and vice versa. Additionally, the non-market nature of the current tool means there is no potential for competitive pressures between ICs to drive down compensation payable by NESO, although compensation is typically based on market prices (for example, the results of subsequent capacity auction results). Taken together, these issues mean that the current NTC design risks imposing higher than necessary costs on GB consumers.
- Investment decisions are unlikely to be materially impacted by NTC usage under the status quo (at least as long as the nature and frequency of NTC usage remains broadly in line with recent historical trends).

The key lessons learned so far from work package 2

- Expected £1.1m of savings with an NTC market compared to the current status quo arrangements.
- Growing complexity of managing GB system constraints (due to, for example, regional imbalances between supply and demand, growing interconnector capacity, increased intermittency from growing renewables capacity) is likely to change the size of average NTC restrictions.
- Gross cost savings of a competitive market for NTC restrictions is driven by differences in GB-EU price differentials across connected countries.
- An NTC Market necessarily allocates a greater proportion of restriction onto one or two interconnectors, over others. In approving an NTC market, Ofgem and NESO would signal a willingness for reduced utilisation of some cables over others.
- Interconnectors facing the greatest volume of restrictions may, at best, reflect this inconvenience in their bids. However, they may also interpret high restriction levels as reflective of their significant value to the system and therefore, increase bids above cost-effective levels.

Note: The following sections are only required for those projects which have been completed since 1st April 2013, or since the previous Project Progress information was reported.

The Outcomes of the Project

The report from FTI indicated findings which have been summarised below:

NTCs are required to manage system security - NESO's existing NTC tool is effective for system security and offers unique functionality, but it may lead to higher costs for GB consumers and lacks transparency.

Introducing an NTC market could theoretically lower consumer costs while maintaining system security, especially when price differences across European markets are significant.

An NTC market could provide some cost savings of between EUR 0.46m to EUR4.84M per year, which are related to the cost differentials in the connected countries. However, the benefits calculated come with a number of related assumptions. If these assumptions are not realised, then the benefits will decrease.

An NTC market is likely only viable for interconnectors (ICs) in the Southeast of GB due to limited competition elsewhere, meaning the current system will still be needed in the short to medium term. Realising the benefits of an NTC market is uncertain due to risks like market power concentration and strategic bidding. The complexity of implementation makes the case for change relatively weak in the near term.

Improving NESO's trading operations aligns with its current strategic direction and could reduce reliance on non-market NTC restrictions, though it would add complexity and not eliminate the need for restrictions.

While NESO has made progress in transparency and trading efficiency, further improvements are possible. A full redesign of the NTC tool is not justified currently; gradual enhancements are the preferred path forward.

All Interconnectors would have to transition from ITLs to NTCs.

Data Access

Details on how network or consumption data arising in the course of NIA funded projects can be requested by interested parties, and the terms on which such data will be made available by NESO can be found in our publicly available "Data sharing policy related to NIA projects (and formerly NIC)" and [Innovation | National Energy System Operator](#).

National Energy System Operator already publishes much of the data arising from our NIA projects at www.smarternetworks.org. You may wish to check this website before making an application under this policy, in case the data which you are seeking has already been published.

Foreground IPR

The following report is expected to be published on the Smart Networks portal at the completion of the project.

FTI Net Transfer Capacity Final Report consisting of:

- Review of existing arrangements
- Review of the benefits of potential NTC market