Public

Constraints Collaboration Project Webinar

Quarterly update
4 July 2025

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National Energy System Operator

Introduction

Agenda	Timings	Speaker
Introduction	2 mins	Becky Hart
Project update	5 min	Alifa Starlika
Topic 1: Boundary flow smoothing	20 mins	Anna Rita Cosi and Frazer-Nash Consultancy
Topic 2: Extended intertrip scheme	15 mins	Haarith Dhorat
Topic 3: Demand for constraints	10 mins	Alifa Starlika
Discussion and Q&A	30 mins	Dave Phillips
Next steps and thank you	5 min	Alifa Starlika

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Objectives

Objectives of this session

1. To present progress on the Boundary Flow Smoothing Innovation Project and Constraint Management Intertrip Scheme

2. To share next steps for Demand for Constraints

3. To provide industry the opportunity to ask questions and share insights

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Project update: delivery plan and timeline

Key: ◆ Milestone ● Webinar

Activity	2025					2026+
	March	April	May	June	July	
Demand for Constraints	Options assessment and CBA ◆ Share CBA for Demand for Constraints	Develop mitigation plans to address NESO risks		◆ Decision to proceed	Set up DFC delivery team and scope project	
Constraints Management Markets	Final stakeholder input ◆ REMA programme update	Review of LCM and next steps for DFS			Investigations of future DFS	
Intertrip	B6 intertrip system studies ◆ Share update	Progressing the development of Intertrip schemes and continuing to investigate technical options relating to Intertrip				
		Working through options and possible models for the intertrip system studies				
Boundary flow smoothing	Project set up and contract finalisation ◆ Commencement of innovation project	Innovation project - 6 months, from May to November 2025				

These dates are indicative and subject to change.

Stakeholder engagement	● Quarterly webinar	Ongoing engagement	● **Today 04 July 2025** Quarterly webinar

We are committed to continuing the collaboration on constraints through CCP. All workstreams will progress beyond this year

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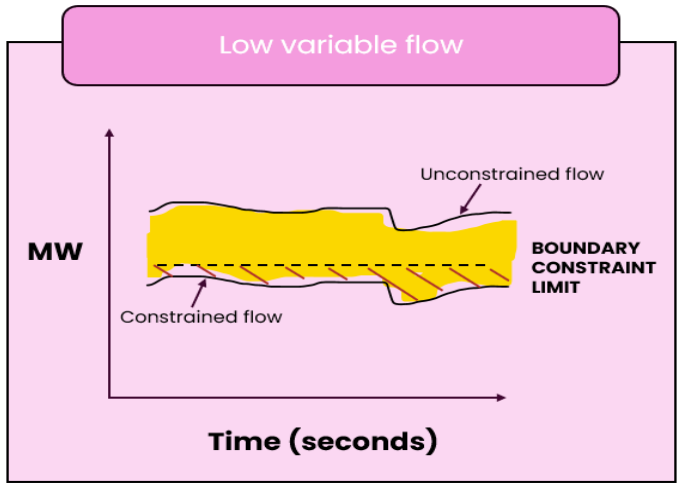
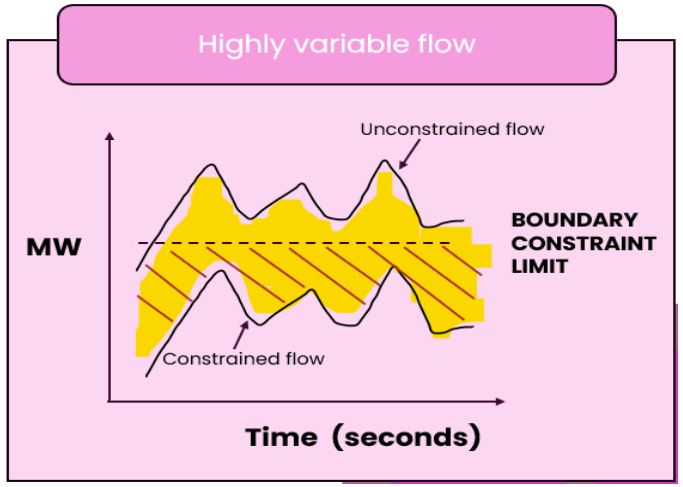
Project Update

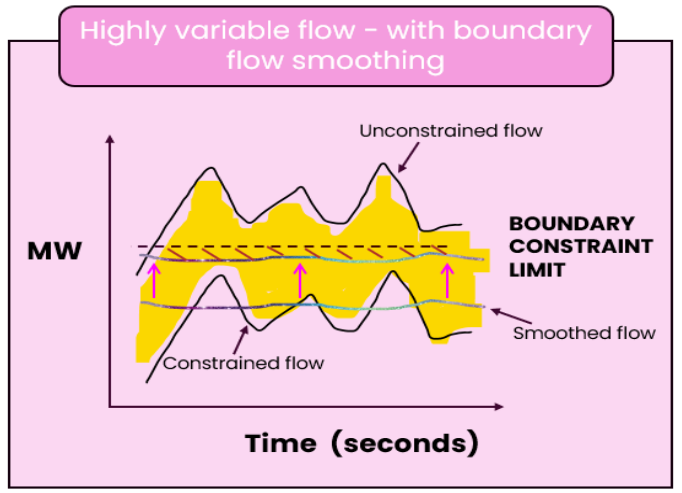
Topic 1: Boundary flow smoothing

Anna Rita Cosi and Jack Dowel (Frazer-Nash Consulting)

Updates on the boundary flow smoothing project







- **Power flows over constrained boundaries are often very variable,** due to rapid changes in supply and demand on both sides of the boundary

- **This variability can make it harder to keep the constrained flow to just below the limit.** Therefore, when variability is high, ENCC may choose to reduce the flow a bit further, to reduce the risk of the variability in the flow causing the limit to be exceeded

- **With a smoothing service, a flexibility service provider (FSP), located near a constrained boundary, could receive a high-resolution, low-latency data feed of the flow over the boundary**. The FSP could adjust its supply or demand to counteract the flow variability, and it would provide the service whenever instructed, typically when the boundary is constrained

Potential implication

- If the fluctuation in the boundary flow could be reduced, it might allow the control room to take less actions, **enabling more renewable power to cross the boundary and thus reducing constraint costs**

Structured approach to assess the potential of boundary flow smoothing

Data Analysis

Analyse concurrent historical data on boundary flows and tagged BM curtailment actions

1. What constraint actions were taken?
2. Calculate the statistics of the flow conditions on constrained boundaries.

Algorithm Development

Devise algorithms that smooth the observed flows and analyse the results

1. What are the statistics of the smoothed flow?
2. Estimate by how much the smoothed flow could be increased while not worsening exceedance occurrence.
3. What are the characteristics of the flow when smoothing has most impact?

Technology Characterisation

Understand the characteristics of technologies that could be used to smooth boundary flows.

1. How do these characteristics and latencies combine to impact the smoothing algorithm performance?
2. Analysis of the power flows and flexibility capacity required.

Cost Benefit Analysis

Understand whether the smoothing can be commercially viable

1. Estimate the reduction in curtailment and redispatch resulting from applying smoothing.
2. Might this be attractive to the owners of suitable technologies? – i.e. How does this compare to other revenue streams?

- In progress
- Just starting
- Future work

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Initial data analysis has identified some key technical challenges

Data Analysis | **Algorithm Development** | **Technology Characterisation** | **Cost Benefit Analysis**

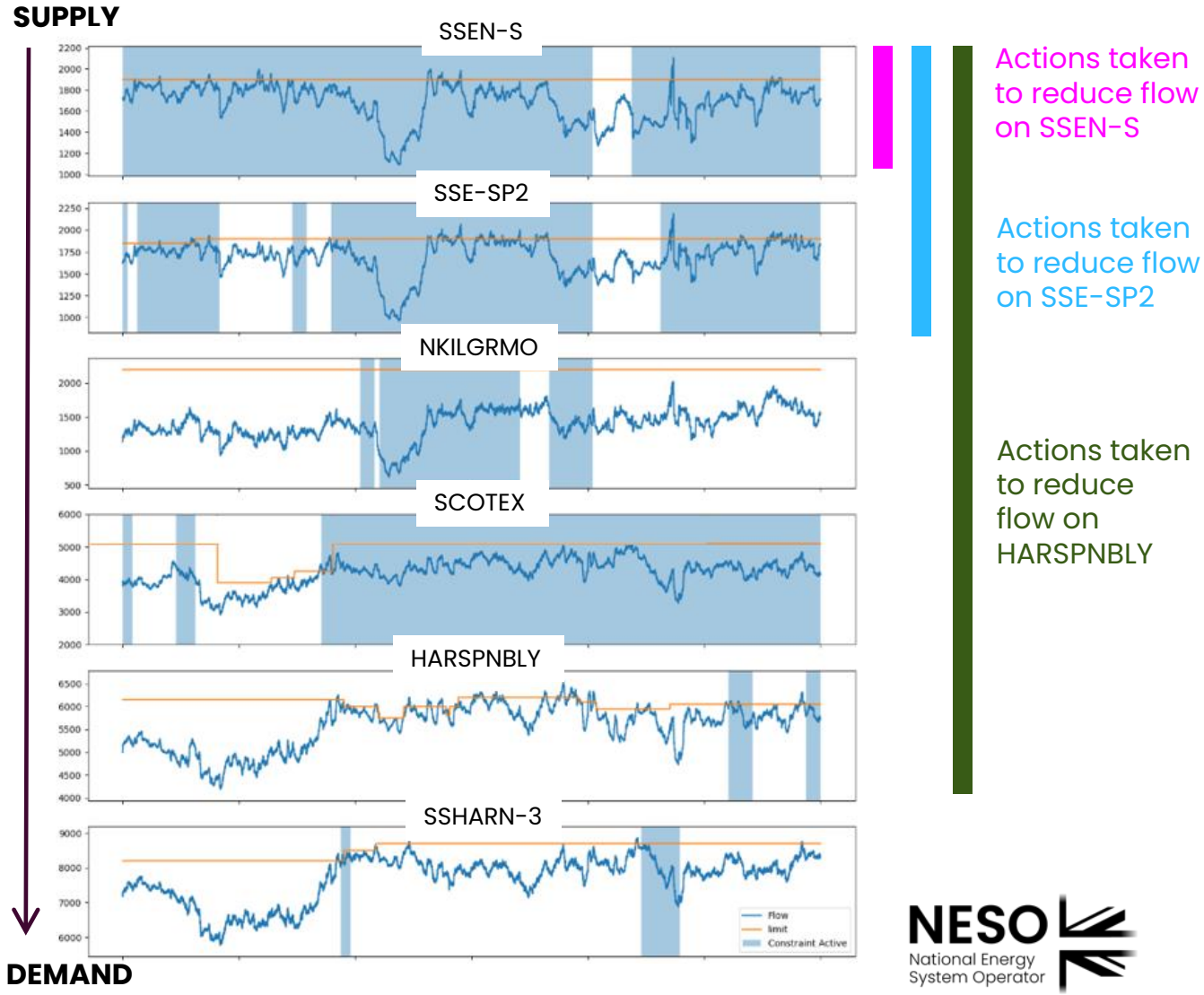
Analysis

What is the issue?

- **Nested boundaries:** Boundaries in Scotland and the North of England are nested because the flow is heavily interlinked. This means that our analysis cannot look at singular boundaries and the network must be considered more holistically
  - Constraining actions that are tagged for one boundary might have been taken to reduce flow at a 'downstream' boundary
  - There are periods when multiple boundaries are constrained so this makes the task more complex.

How do we navigate this issue currently?

- We are developing an approach to automate attribution of an action to the appropriate nested constrained boundaries.



There are key KPIs which influence the choice of smoothing algorithms

Data Analysis | **Algorithm Development** | Technology Characterisation | Cost Benefit Analysis

To measure the success of smoothing algorithms we have developed a set of Key Performance Indicators (KPIs) to use

Key Performance Indicator	Description
Range & Standard Deviation	Reduction of variance within a specified time window
Boundary Flow Limit Compliance	Enables mean flow to be increased while reducing (or not increasing) the risk of exceeding flow limits beyond controllable levels
Technical Feasibility	Must be deliverable by a technically feasible asset
Operational Runtime	Algorithm must run quickly enough for real-time operational implementation
Smoothness Index (Adams & Van Devender)	A classical mathematical measure of smoothness defined by curvature
Peak Power	Peak MW import and export value for assessed period
Total Energy	Total import and export energy required for assessed period

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Any new service needs to be inclusive to all kinds of technology

Data Analysis | Algorithm Development | **Technology Characterisation** | Cost Benefit Analysis

OBJECTIVES

Identify flexibility technology archetypes and classify these by the key characteristics for a smoothing service

APPROACH

- Identify feasible flexibility technology options that could provide a smoothing service.
- Quantify the capabilities of the technologies through research and stakeholder engagement
- Group capabilities to develop a list of simplified flexibility archetypes
- Classify according to characteristics that are likely to be important for a flow smoothing service

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Summary and next steps

We have outlined

- Our approach and progress made so far
- Identified the main technical complications
- Outlined how we predict we'll measure the suitability of solutions
- The process for archetype development

Engagement opportunity

- We are engaging with industry stakeholders for the technology characterisation
- This will mean we have a better understanding of the capabilities of assets to provide smoothing services and any service can be designed to enable as much participation as possible

Information of interest

- **Technical capabilities:** Response times, ramp rates, power output and energy capacity
- **Operational characteristics:** Notice period and existing communication and data links

How to get in touch?

- **box.market.dev@neso.energy**
- **Deadline of the 18/07/25** with **interviews starting from the 21/07/25**
- You will receive a form to arrange an interview along with a briefing pack
- Shared list of archetypes with indicative technical capabilities along with any general insights from the engagement

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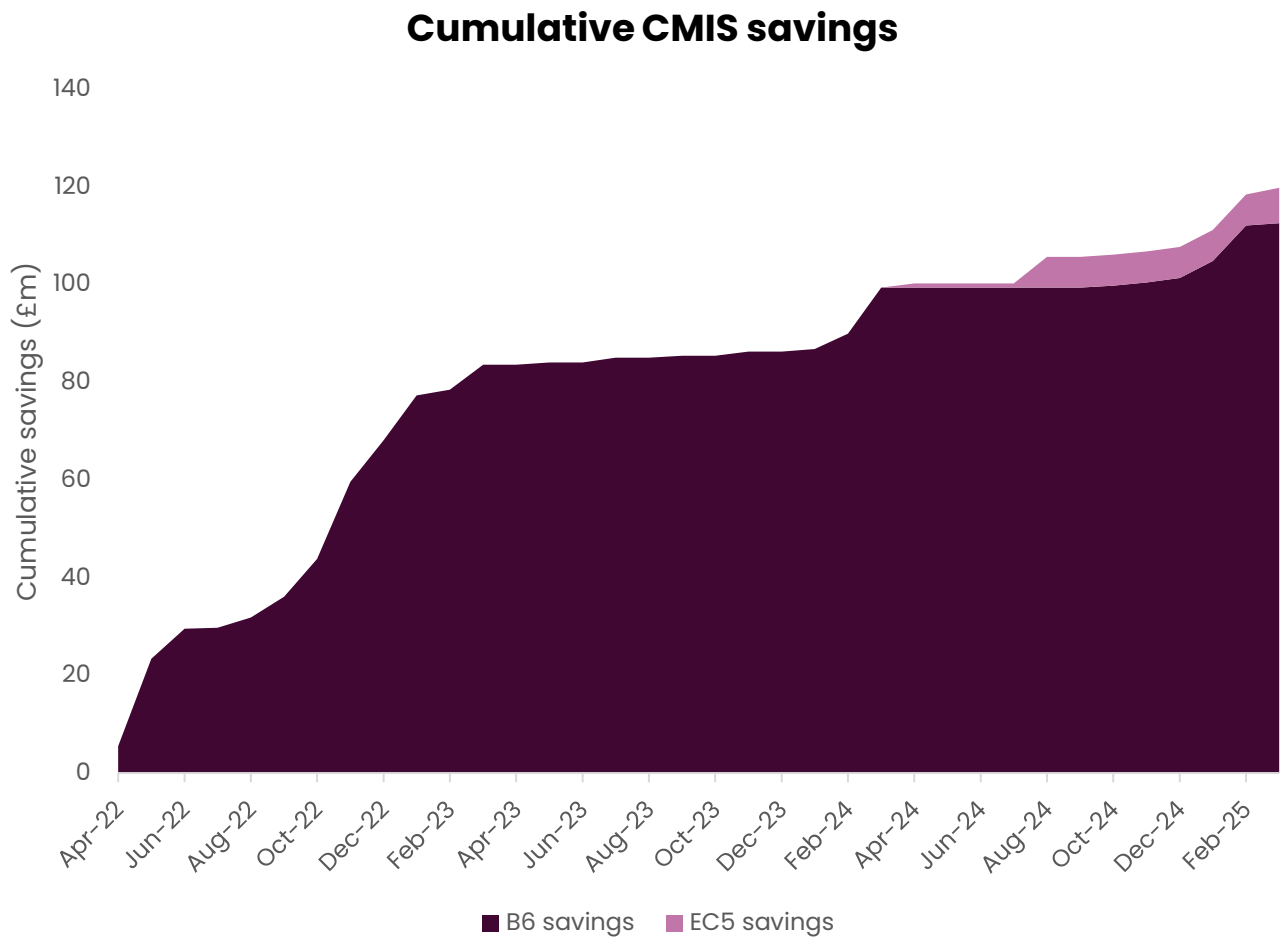
Project Update

Topic 2: Constraint Management Intertrip Schemes

Haarith Dhorat

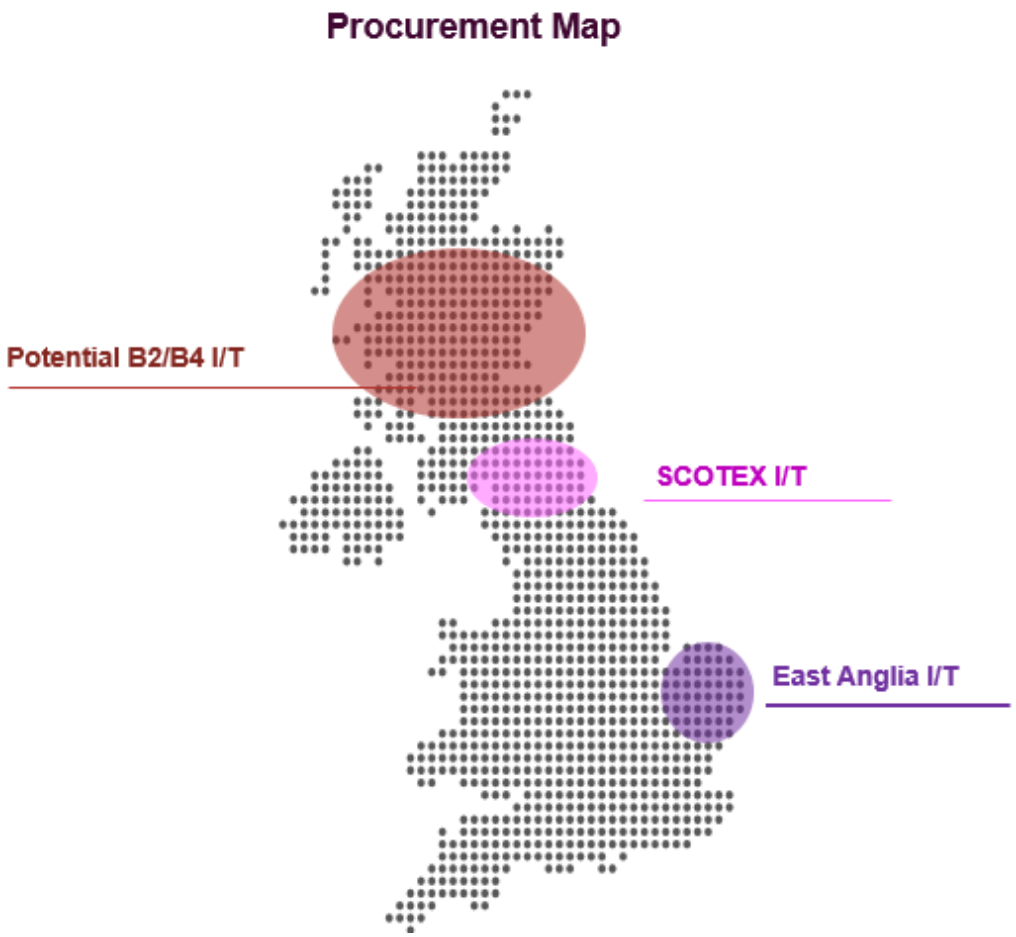
We have delivered savings through the existing Constraint Management Intertrip Scheme (CMIS)



£120m savings delivered to date

- Intertrip scheme enables the NESO control room to facilitate more power to flow on the existing transmission infrastructure, thus reducing the amount of generation being curtailed pre-emptively to avoid thermal constraints
- The schemes (owned and operated by the relevant TO), enable to the tripping/fast de-loading of generators in the event of a fault on the network to prevent circuits become overloaded
- At present two Intertrip services (B6 in Scotland and EC5 in East Anglia) have been implemented and are helping to manage network congestion at the B6 and EC5 boundaries

Based on previous success, we are expanding the rollout of Intertrips



CMIS Scotland (multiple boundary areas):

- NESO is working with both Scottish TOs to explore options for a Constraint Management Intertrip Service (CMIS) at the B2 and B4 boundaries
- This work includes assessing whether to integrate the B6 boundary or pursue a separate solution, with all services targeted for **mid-2027**
- More information expected in market update by **second half of 2025**

SCOTEX I/T - CMIS B6:

- Extension of B6 by National Grid Electricity Transmission (NGET) to include circuits in North England that can be managed by generators in Scotland
- Delayed since the previous update, now expected to complete **mid-late 2026**

East Anglia I/T - CMIS EC5:

- An enduring commercial CMIS for the EC5 boundary region
- Introduces 200ms Stability Trip alongside the existing Thermal (10 second de-load), with increased number circuit monitoring
- Tender outcome letters have now been sent to all bidding parties. Results published here
- Expected go live in **July 2026,** replacing the current Interim EC5 service

Project Update

Topic 3: Demand for Constraints

Alifa Starlika

Update on Demand for Constraints

Overview of DFC

- Use of the DfC **could reduce curtailment by enabling more effective use of available renewable generation and incentivise strategic investment in flexibility**
- **In the short run, DfC aligns with NESO strategic objectives and Low Carbon Flexibility Roadmap actions** for driving up participation of industrial and commercial (I&C) demand side response in NESO markets
- **In the long run, DfC contributes to NESO's Clean Power 2030 vision and supports the UK government net zero commitments by incentivising demand behind constraints**

What has happened to date?

- **Demand for Constraints is commercially viable,** with a cost benefit analysis (CBA) indicating potential consumer savings of £0.4bn to £1.2bn over the 2028 – 2035 period
- **A clear value proposition has been defined,** establishing DfC as a strategically distinct service from other NESO offerings
- **NESO supported further development of the scheme**, recognising the scale of potential consumer benefits
- We've **received interest from more than 20 demand providers** in the service
- Seven risks identified in March webinar, if they materialise, could delay the project and reduce the scale of demand capable of providing flexibility before 2030. **These risks have been assessed, with mitigation plans developed accordingly**
- **Procurement options have been explored to deliver Demand for Constraints at pace**

We've got the support from across NESO to progress

Next Steps

- **Progress Demand for Constraints** with additional risk mitigation in place
- **A dedicated virtual team will be established** to deliver the scheme
- **There will be opportunities for industry participation** when we begin developing the contract features and tender structures in coming months

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Value proposition of Demand for Constraints

		Demand for Constraints	LCM	DFS
Objective		**To incentivise new demand behind constraints, reducing curtailment costs and volumes**	**To provide route to market for non-BM assets unable to participate in existing NESO core markets**	**In-merit margin services for peak demand**
Contract Lengths		**Multi-year contract -** with a clause that the DFC contract would phase out if zonal pricing is introduced.	NESO contract allows providers to **bid on a per-LCM-event basis**	DFS Contract with NESO allows providers to **bid on a per-DFS-event basis**
Possible payment structures		**Structures being considered**: - Availability payments - Utilisation payment (in £/MWh) - Set hours or volume delivered - Stackability with other services.	**Utilisation payment (in £/MWh)** for the MW-flex delivered, up-to Instructed. MPAN-level qualification & data are required. Asset metering permitted.	
Eligibility	**Asset**	**New Asset**	**Existing**	**Existing**
	Flexible	**Yes**	**Yes**	**Yes**
	BMU/non	**BMU**	**Non BMU**	**Non BMU**
Where it would be active		**Scotland** (B0-B1, B3-B4 and B6) and potentially East Anglia (EC5)	**Scotland** (B4 and B6)	National
Procurement route		**Competitive tender process**	**Merit-based service and ongoing market**	

Demand for Constraints has clear strategic objectives and we would like your support in helping achieve those

Objectives

Demand for Constraints aims to incentivise new, strategic flexible demand behind constraints through long-term contracts.

- **New:** Asset that is not operational now or an asset with new capability to flex, for example through decarbonising heat
- **Strategic:** Large demand (BMU) which can provide sufficient scale to reduce constraints and aid NESO to unlock new flexibility needed for CP30
- **Flexible:** Ability to turn up their consumption of electricity at times of constraints with short notice (within an hour)
- **Behind constraints:** B0-B1, B3-B4 and B6 and potentially East Anglia (EC5)

NESO expects that the need for the Demand for Constraints contract will phase out, once more network build takes place

Opportunities for Stakeholder Insight

- You will be able to continue engaging with us during the detailed design stage through a dedicated, expert working group for Demand for Constraints, which we will establish soon
- We will host a regular webinar to present progress on the detailed design of Demand for Constraints and invite the industry to provide comments, suggestions and questions to help improve and develop the designs

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Discussion and Q&A

Next Steps

Next Steps

NESO will continue with the innovation project 'Boundary Flow Smoothing' and there will be opportunity for industry participation when we begin developing the technology archetypes. At that stage, we will reach out to ask for your insight about the potential of different assets.

For Demand for Constraints, NESO is starting detailed design, with plans to work with industry through a new, dedicated sub-working group for DfC. This platform will enable the NESO and industry to co-design the contract features.

NESO will continue progressing with the intertrip system studies and exploring the development of intertrip schemes beyond B6

Moving forward, we will coordinate stakeholder communication on demand and flexibility matters through the Power Responsive (PR) team

Thank you!

To keep in contact and to keep sharing your ideas, please visit our website or email us at

box.market.dev@neso.energy

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