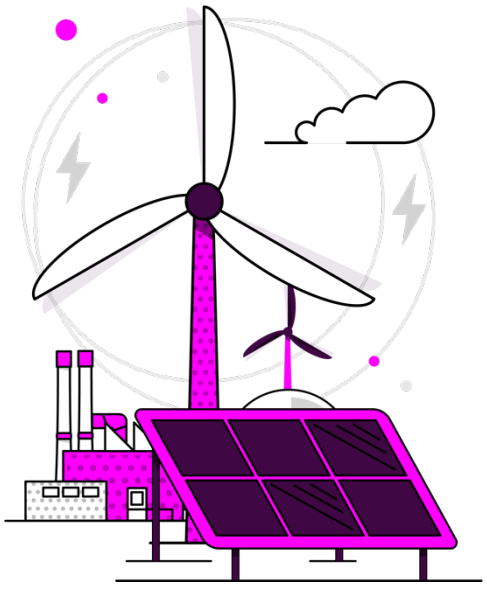
December 2024

Centralised Strategic Network Plan (CSNP)

High-level methodology principles

NESO
National Energy System Operator

Contents



1. Introduction

The CSNP at a glance

Executive summary

How to read this document

Introduction to the National Energy System Operator (NESO)

Our approach to stakeholder engagement

The CSNP at a glance

The vision of the CSNP is to provide an independent, coordinated, and longer-term approach to wider network planning in Great Britain (GB) to help meet the government's net zero ambitions.

Initially, this will focus on the electricity transmission network - onshore, offshore and interconnectors. Gas transmission and any proposals for a hydrogen system are expected to be included in future iterations.

This methodology outlines how we as the National Energy System Operator (NESO) will enact the vision of the CSNP, primarily focusing on wider planning of the electricity transmission network.

Given the scale of network investment expected, the CSNP will provide robust evidence-based decisions to ensure an effective transition in the interest of consumers. We will be transparent in our assessment as we consider solutions to support regulatory decisions. While taking a longer-term approach to network planning, ahead of need, and providing decisions with certainty – including through conducting a strategic environmental assessment (SEA) and habitats regulations assessment (HRA) plan – will support accelerated and timely delivery.

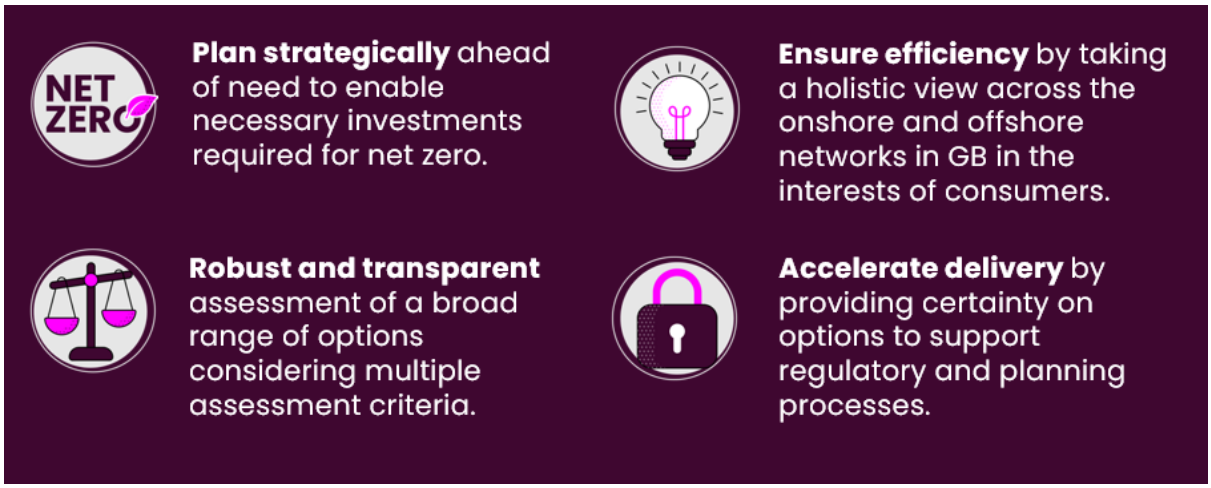
To enable an efficient future energy system, the CSNP, guided by the Strategic Spatial Energy Plan (SSEP) and Future Energy Scenarios (FES), will strategically plan the electricity, and in future gas, transmission network.

Our current network planning process will see two critical changes:

- Move to a three-year process, in alignment with the SSEP, to provide decisive signals and additional time for option development.
- Progress options into a delivery pipeline to provide certainty on network investments required for net zero and enable focus on detailed design.

The aim of this document is to consult on our proposed approach to electricity transmission network planning. How to provide feedback is contained within the "our approach to stakeholder engagement" section of this methodology.

The four key CSNP ambitions



Contact us

- Our stakeholder engagement approach is outlined in full in the "our approach to stakeholder engagement" section of this methodology.
- If you wish to get involved or be added to our mailing list, please get in touch at box.sep-portfolio@nationalenergyso.com.
- You can also submit your feedback via our feedback form, between **9 December 2024 and 11:59 pm on 20 January 2025**. We are interested in both general feedback and feedback for specific sections. We have asked some questions throughout this document after explaining our thinking – if you have an opinion on our approaches, then please respond to these as well.

  Submit your responses here

Useful information

- Detailed definitions of terms used within this report can be found in our CSNP glossary.
- Regular updates will be posted on the NESO website.

Executive summary

The Centralised Strategic Network Plan will provide an independent, coordinated, and long-term approach to network planning in Great Britain (GB) to help achieve its net zero ambition.

Through the CSNP framework, we will determine the transmission infrastructure required to deliver the energy networks of the future. This will enable a whole system perspective that considers the connections between energy vectors and their relationship with the wider system to help meet GB's net zero ambition.

In this methodology, and the focus of this consultation, we present the approach for the onshore and offshore electricity transmission networks as well as cross-border (international) electricity interconnectors.

As we progress towards net zero, major investment is needed across GB's electricity transmission network. The CSNP will ensure our network planning approach is appropriate given the level of change anticipated. It will provide an independent, coordinated, and longer-term (25-year) approach to electricity network planning while seeking to accelerate the delivery of transmission infrastructure.

As we move to the enduring CSNP framework, we have published a series of transitional Centralised Strategic Network Plans (tCSNP) for the electricity transmission network. These consist of the Pathway to 2030 report (tCSNP1, July 2022) and the Beyond 2030 report (tCSNP2, March 2024). The methodology for a tCSNP2 Refresh will also be out for consultation at the same time as this document (December 2024).

The tCSNPs have bridged the gap to the CSNP framework through the introduction of a multi-criteria assessment, coordinated offshore and onshore network planning, and regulatory funding for the 2030 grid.

The CSNP framework will be a three-year cycle to provide clearer, decisive signals and additional time for investment option development. As part of the framework, we will seek to provide certainty and increased clarity on the transmission infrastructure required to meet net zero.

As part of the CSNP, the system analysis will extend to cover a wider scope of system requirements and provide a year-round view. We will take an evidence-based approach to assess a broad range of options against a range of assessment criteria and further ensure environmental issues are appropriately considered and consulted on through completing a strategic environmental assessment (SEA) and habitat regulations assessment (HRA) plan.

Underpinning the above, stakeholder engagement will be fundamental to the CSNP, and we will share and consult on its development on an ongoing basis.

This document, focusing on the framework for electricity transmission, is the first of a series of opportunities for stakeholders to shape our thinking on how the CSNP framework could develop. This document is under consultation currently (9 December 2024 to 20

January 2025) on the high-level principles for the CSNP's methodology. Following which, we will develop a methodology in further consultation with stakeholders, which will be sent to Ofgem to approve.

Through this consultation, we introduce our thinking for the CSNP framework and build upon the outcomes of Ofgem's decision document. We would like to hear your views on our proposals which we will use to inform the further development of the framework. We have highlighted key areas throughout the document where we would welcome feedback, however you are welcome to comment on any element you wish. You can do this through our feedback form.

How to read this document

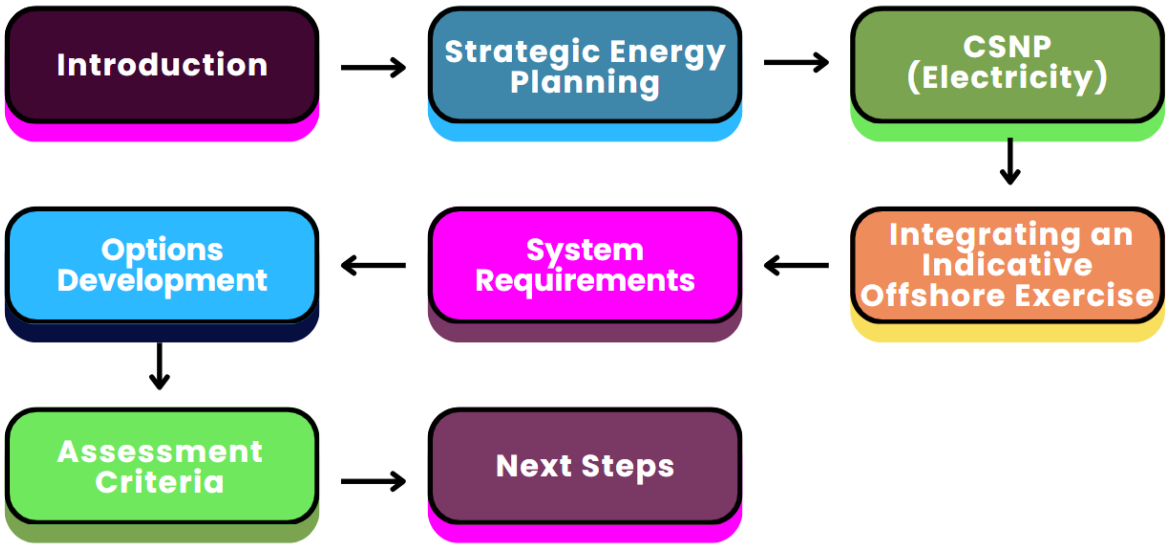
This document provides an overview of our approach to developing the CSNP, a key part of NESO's long-term, strategic approach to network planning. The CSNP constitutes a broad, whole energy system view to transforming the pace and scale of our planning, which is critical for delivering affordable, clean, and secure power, as we journey towards our net zero future.

The "CSNP at a glance" section is written so that any interested stakeholder quickly reach an understanding of the CSNP and its ambitions, plus contact details and opportunities for stakeholder engagement.

The full document provides further detail on the CSNP and its process, assessment criteria, and wider approaches. This further detail is aimed at stakeholders that are part of the energy industry and therefore provides more detailed technical explanations.

Navigating this document

The body of this document is split into eight main sections:



There is also a glossary included at the end of the document, if required.

Revision history

This document sets out the high-level principles we are developing as part of the CSNP methodology and was published 9 December 2024.

This is a precursor to the CSNP methodology, which will incorporate all information found in this high-level document, and provide further detail and clarity on the CSNP framework and processes. We will consult on a draft methodology in Q2 2025. The CSNP methodology is due to be published late 2025.

We are also working with colleagues across NESO to ensure that our consultation is coordinated across the organisation. We have also launched consultations on both the transitional Centralised Strategic Network Plan (tCSNP2 Refresh) and Strategic Spatial Energy Plan (SSEP), which you will be able to comment and engage on using the same form. We welcome comments on any aspect of this document, not just responses to the questions we raise.

Introduction to the National Energy System Operator (NESO)

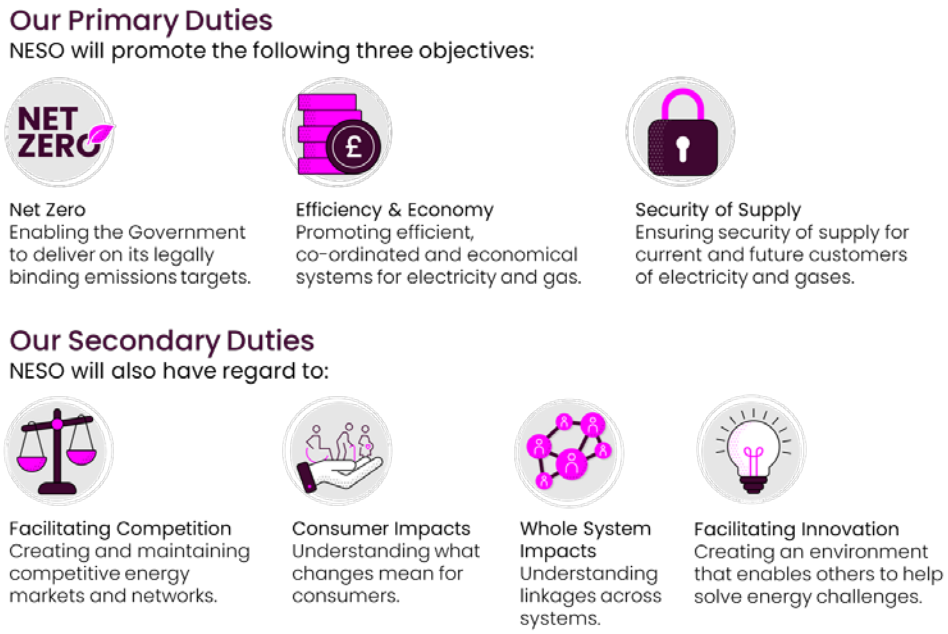
The UK's 2023 Energy Act set the legislative framework for an independent system operator and planner to help accelerate Great Britain (GB)'s energy transition, leading to the establishment of the National Energy System Operator (NESO).

Fundamental to NESO is the ability to bring an independent, impartial voice to energy system planning and operations that takes this whole system view. We'll consider all the interrelated challenges and trade-offs and ultimately work towards optimal outcomes for energy consumers.

With representation across England, Scotland and Wales, NESO will proactively and transparently engage across GB, to jointly create an energy system where prices are affordable, supply is secure, and the sources are low carbon.

A whole system challenge

NESO will take a whole system approach, looking across natural gas, electricity, and other forms of energy to fulfil our primary and secondary duties as described in the Energy Act. We will engage participants in all parts of the energy ecosystem to deliver the plans, markets, and operations of the energy system of today and the future.



The CSNP is aligned across all three of NESO's primary duties through the core tenets set out in this document:

- Our strategic energy planning is looking at requirements for net zero ahead of need.

- We're taking a holistic, coordinated view of the GB network for both efficiency and consumer benefit.
- Providing security of supply through our robust and transparent evidence-based assessment of options to improve the GB network.
- Ensuring that we accelerate delivery to enable us to reach an efficient and secure net zero future as soon as possible.

Our approach to stakeholder engagement

Indicative timeline of stakeholder engagement and consultation

Key message: Our approach will be coordinated across the Strategic Energy Planning (SEP) function to ensure an efficient engagement process for stakeholders with interests across our suite of future network plans. We will be open and transparent so stakeholders can understand, and feed into, our plans.

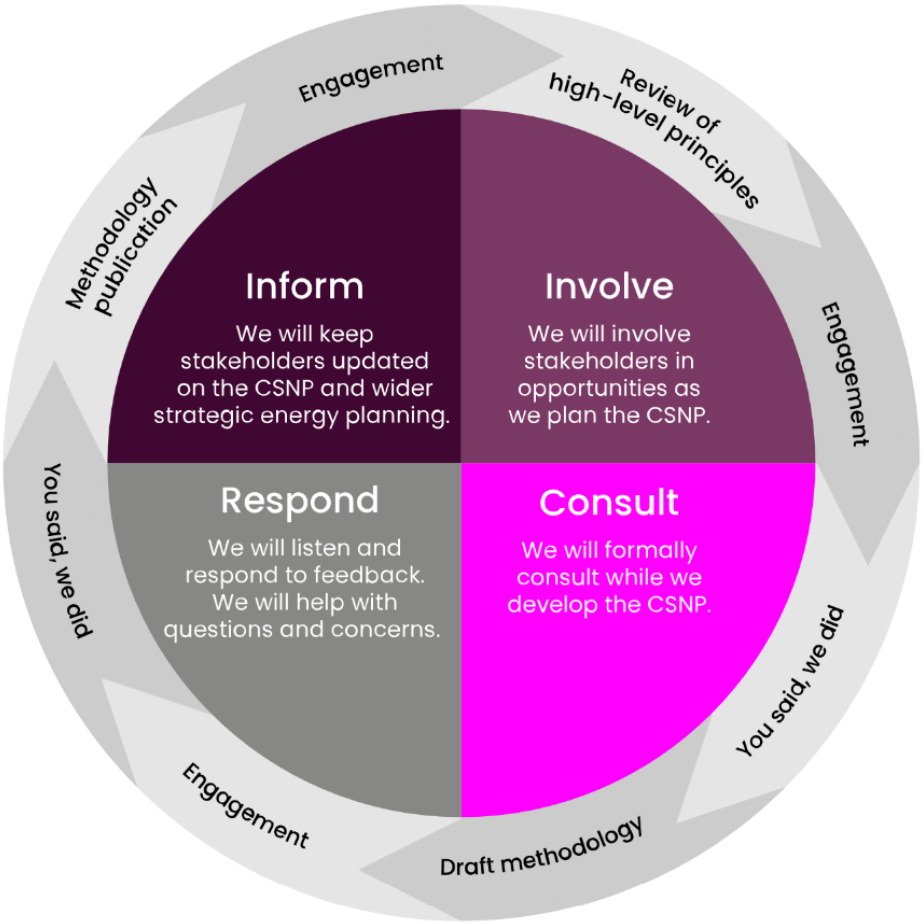
To ensure meaningful engagement that instils confidence in the CSNP, we will consider all input from stakeholders, creating a better plan and encouraging advocacy of the CSNP overall.

We will seek advice from experts and stakeholders via established SEP stakeholder groups to gather data and opinions. This will be supported by a clear engagement plan designed to inform and build advocacy from different stakeholders, we will provide feedback opportunities and explain how we have considered and acted on feedback.

We plan to engage with stakeholders throughout the process of developing and publishing our methodology. Where possible, we will go out and engage on sections of the methodology as and when they are at an advanced stage to be able to explain and ask for your thoughts.

We will use various communication methods, such as roundtables, workshops, events, online seminars, forums, and surveys. Our engagement principles focus on timeliness, transparency, proactive engagement, acting on feedback, and tailoring approaches to diverse stakeholders. We aim to engage early, clarify how feedback shapes the plan, and maintain confidentiality where needed.

Our engagement approach

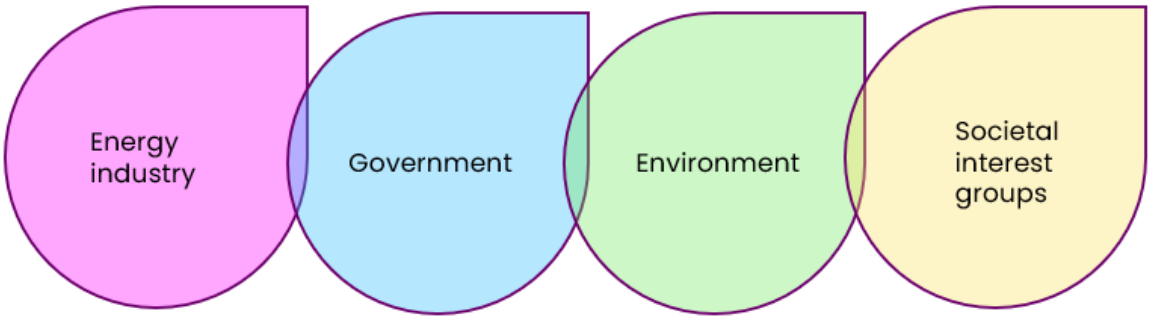


All feedback will be considered, even if not all views can be incorporated. We strive for efficient stakeholder engagement, building on existing relationships and ensuring accessibility.

Regular feedback will help improve our engagement process. Meaningful engagement is crucial for challenging and reviewing our plan, gathering specialised data, coordinating information sharing, and meeting statutory consultation requirements.

Who are our stakeholders?

The CSNP is a GB-wide plan. The CSNP constitutes a broad, whole energy system view to transforming the pace and scale of our network planning, which is critical for delivering affordable, clean, and secure power, as we journey towards our net zero future. To enable us to be able to deliver this ambitious plan, we need to consider the views of our stakeholders. To do this, we have segmented them into the following categories:



Q: Would you add any further stakeholder groups to this list?

Engagement principles

The following will define our stakeholder engagement:

- **Timely and transparent:** we will engage early, and our process, methodology, and stakeholder approach will be transparent. We will make it clear to stakeholders how we will consider their feedback and how they can shape the plan, while adhering to the confidential nature of the work where appropriate.
- **Proactive engagement:** we will identify stakeholders with interest or expertise in energy planning whose inputs could materially improve the plan. We will update our stakeholders proactively on new and changing information via our regular stakeholder groups and public communications.
- **Action feedback:** we will consider all feedback from our stakeholders during the engagement process. In the main, we will group feedback under themes and share how we have considered and addressed these themes. We will be candid with stakeholders that we will not be able to action all feedback we receive. This could be for a variety of reasons, like some views conflicting with the aims of the plan. Finely balanced trade-offs will need to be made. A clear explanation will be provided for any feedback that is not used.
- **Coordinated engagement:** where we can, we will align stakeholder engagement activity across NESO's Strategic Energy Planning (SEP) activity, aiming to be as efficient as possible with stakeholders' time. We will build on relationships formed during other strategic planning activities and explain to stakeholders how the SEP projects all fit together.
- **Tailored engagement:** we will ensure our engagement is accessible and at the right level for our diverse range of stakeholders, who all have different experiences of the energy sector and network planning. We will regularly seek feedback to understand if the engagement is working for stakeholders so we can improve.

Key engagement activities

We will:

- **challenge and review our plan with experts,** to ensure our final recommendations are robust and incorporate stakeholder feedback.
- **gather specialised data from the stakeholder groups** which could inform and improve the quality of the plan.
- **have an agreed approach to coordinate sharing and exchange of information with stakeholders.**
- **meet statutory consultation requirement for the SEA & HRA plan -** as outlined in the government guidance.

When will we engage?

Continued engagement with the various working groups throughout the development of the CSNP will help shape, challenge, and review its outputs. Alongside this, we will also provide public transparency via regular communications and updates and have regular bilateral engagement with interested and influential stakeholders. We are really interested in your views and how you want to see future materials regarding the CSNP.

Q: What can we do differently to make it easier for you to participate?

Governance

The governance structure for the CSNP is currently under development. Given its scale and significance, it is essential that decision making is appropriately overseen and monitored.

We will look to establish an approach that will advise and guide NESO, ensuring oversight and accountability from UK, Scottish, and Welsh governments and Ofgem, while considering stakeholder feedback.

2. Strategic Energy Planning

What is the CSNP for the whole system?

What is the SSEP?

What is the RESP?

How do these plans interact?

Strategic Energy Planning

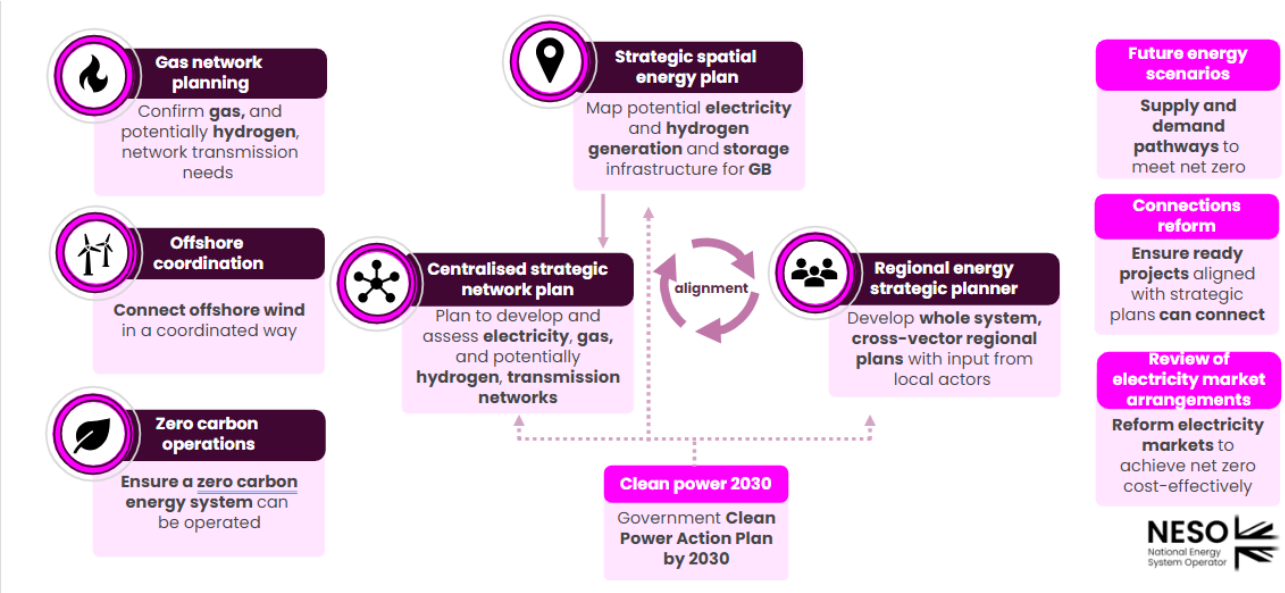


Diagram showing interactions between NESO's Strategic Energy Planning projects

What is the CSNP for the whole system?

We are accountable for delivering the CSNP and providing an independent, coordinated, and longer-term approach to wider network planning in GB to help meet the UK government's net zero ambitions. The CSNP will consist of a collection of plans focusing on electricity transmission network planning, of which this document focuses on, as well as developments in natural gas transmission and in the future, hydrogen.

Interaction with Gas Strategic Planning

The National Transmission System (NTS) transports high pressure natural gas around GB via thousands of kilometres of pipelines, this is owned and operated by National Gas. As NESO, we have taken on certain long term gas network planning responsibilities, including the process to identify network capability needs and to then develop and assess network options every two years.

Through the publication of the Gas Network Capability Needs Report (GNCNR), we, as NESO, are providing our first independent view of the NTS's capability to meet GB current and future network requirements.

The findings within the report will be used by National Gas Transmission (NGT) to propose network reinforcement options in the Strategic Planning Options Proposal (SPOP). Subsequently, NESO will evaluate any proposed reinforcement options and create a Gas Options Advice Document (GOAD) by the end of 2025.

The GNCNR represents a stepping-stone towards building a whole system Centralised Strategic Network Plan (CSNP), which will set out a coordinated, multi-vector approach to long-term network planning across GB that will accelerate the development of the Government's net zero ambitions.

Following a commission from the Secretary of State for Energy Security and Net Zero, NESO has also prepared advice to explore how GB could achieve a Clean Power electricity system by 2030 ('Clean Power 2030', or CP2030). The CP2030 analysis has also assessed the ability for the gas system to provide the flexibility required to ensure adequate security of supply.

What is the Strategic Spatial Energy Plan (SSEP)?

The SSEP will spatially map the optimal mix and location of clean generation and storage to meet forecast demand, net zero targets, and security of supply for all consumers. These will be optimised against high-level network needs as well as against cost, environment and community impact, economic growth, and other agreed objectives.

The single view provided by the SSEP will drive investment decisions across the entire 25-year horizon of the CSNP. This will ensure alignment with government policy and help consider combinations of energy system and network options to maximise utilisation of existing networks.

The SSEP will act as a blueprint from which more granular plans, such as the CSNP, will flow. It will be updated in alignment with the CSNP's three-year cycle.

On 22 October 2024, UK, Scottish, and Welsh governments formally commissioned NESO to produce Great Britain's first Strategic Spatial Energy Plan (SSEP). The first SSEP will be a GB-wide plan that will map potential locations, quantities, and types of electricity and hydrogen generation and storage infrastructure over time, modelled across a range of plausible futures.

The SSEP will build on the government's plan to deliver clean power by 2030, the SSEP will support the energy transition to a net zero economy by 2050, efficiently and securely, by providing greater clarity on the nation's future energy requirements.

Future Energy Scenarios (FES)

The FES represent a range of different, credible ways to decarbonise our energy system as we strive towards the 2050 target. These are a NESO view of supply and demand pathways to net zero determined by comprehensive engagement and our own analysis and research.

To account for long-term uncertainties, the CSNP will use the multiple pathways provided by the FES, alongside the SSEP, to ensure consideration of different strategic routes to net zero. These will help inform longer-term optioneering and ensure that it is resilient to change.

What is the Regional Energy Strategic Plan (RESP)?

The Regional Energy Strategic Plans (RESPs) will develop coordinated whole energy system planning and governance across Scotland, Wales and nine English regions. They will help coordinate local authorities, distribution network operators (DNOs), gas distribution networks and other local stakeholders to set out regional energy infrastructure needs and unlock investment at a distribution level.
Regional Strategic Boards and working groups will be set up to provide key inputs and ensure stakeholders have a voice throughout all stages of the RESP process. Ofgem are the commissioning authority and have already held a consultation (July to October 2024) on the policy framework for the RESP role. Ofgem are currently analysing the responses and developing further details on a number of topics with a view to publishing the final policy framework in early 2025.

How do these projects interact?

The CSNP interacts with the SSEP and RESP, which will be developed in parallel. The interactions between them will foster coordination, consistency, and collaboration to support the development of an integrated and sustainable energy system.

The CSNP, SSEP, and RESP will need to align across different scales and levels of strategic planning. For example, these plans may involve the sharing of information, data, and insights to inform the development of each plan. This can include sharing scenario assumptions, modelling results, infrastructure requirements, and other relevant information to ensure a comprehensive and coordinated approach.

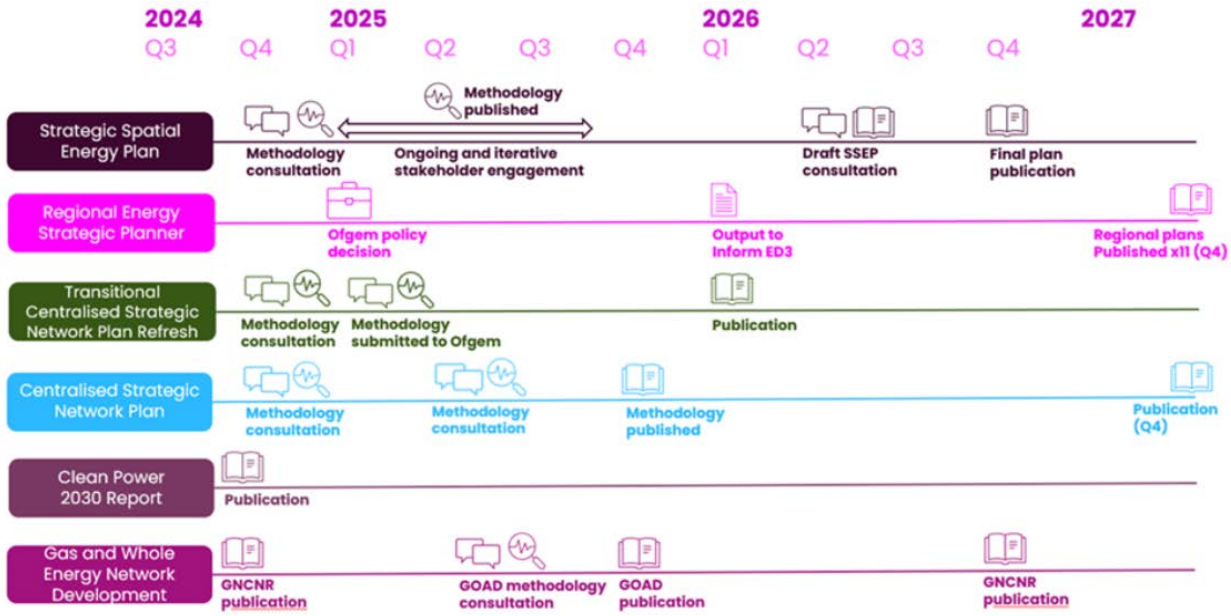
The CSNP, SSEP, and RESP will also interact with wider policies, regulations, and frameworks.

To ensure alignment, consistency, and avoid conflicts or duplication of efforts, we will also consider policy objectives and targets set at national, regional, and local levels.

In the long term, the plans will undergo iterative processes, whereby feedback and insights from one plan inform the development or revision of another. For example, insights from the development of the RESP will inform the development of future iterations of the SSEP, which in turn may provide feedback for follow-on iterations of the CSNP and RESPs respectively.

We may share relevant data, research findings, modelling results, and scenario assumptions between plans, ensuring a comprehensive and collective understanding of the energy system and its dynamics.

The respective teams will each analyse and evaluate the shared information to identify areas of alignment, potential conflicts, and opportunities for coordination. This may involve comparing scenario assumptions, assessing infrastructure requirements, and identifying synergies or trade-offs between different plans.



3. Centralised Strategic Energy Plan (Electricity)

A longer-term, more strategic approach to network planning

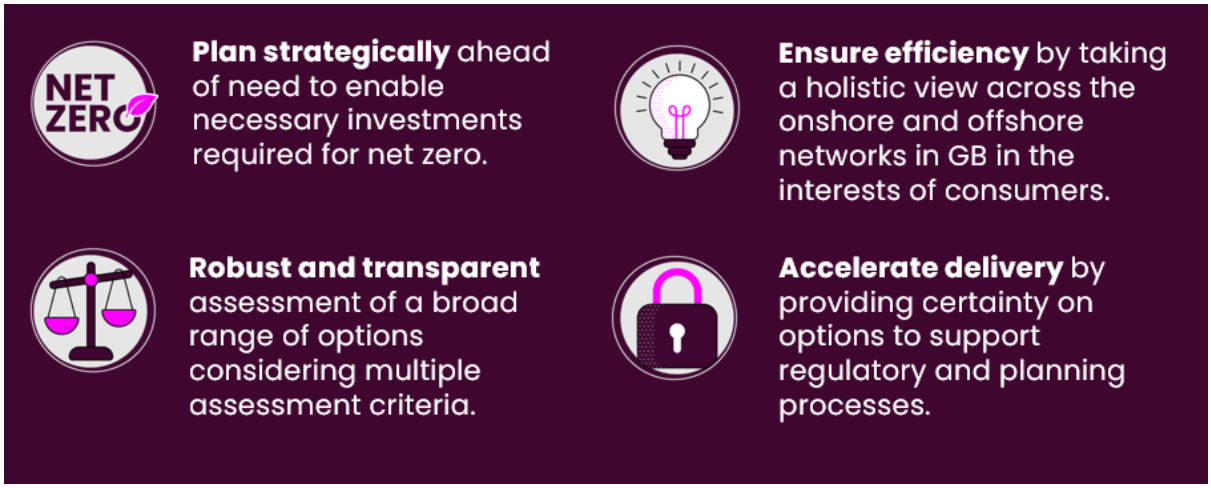
What parts of electricity transmission network planning will the CSNP cover?

The CSNP cycle

Providing certainty through a delivery pipeline

A longer-term, more strategic approach to network planning

The CSNP's four key ambitions:



This document sets out how the CSNP is taking a new approach to electricity transmission network planning for GB (detail on other energy vectors is forthcoming in 2025). It will strategically plan across the whole transmission network, onshore and offshore, holistically, enabling coordinated, efficient network development and ensuring access to reliable, clean, and affordable electricity.

A view of the current network planning process can be seen in the Beyond 2030 report, beginning on page 14. The CSNP is looking to introduce two key changes to this process:

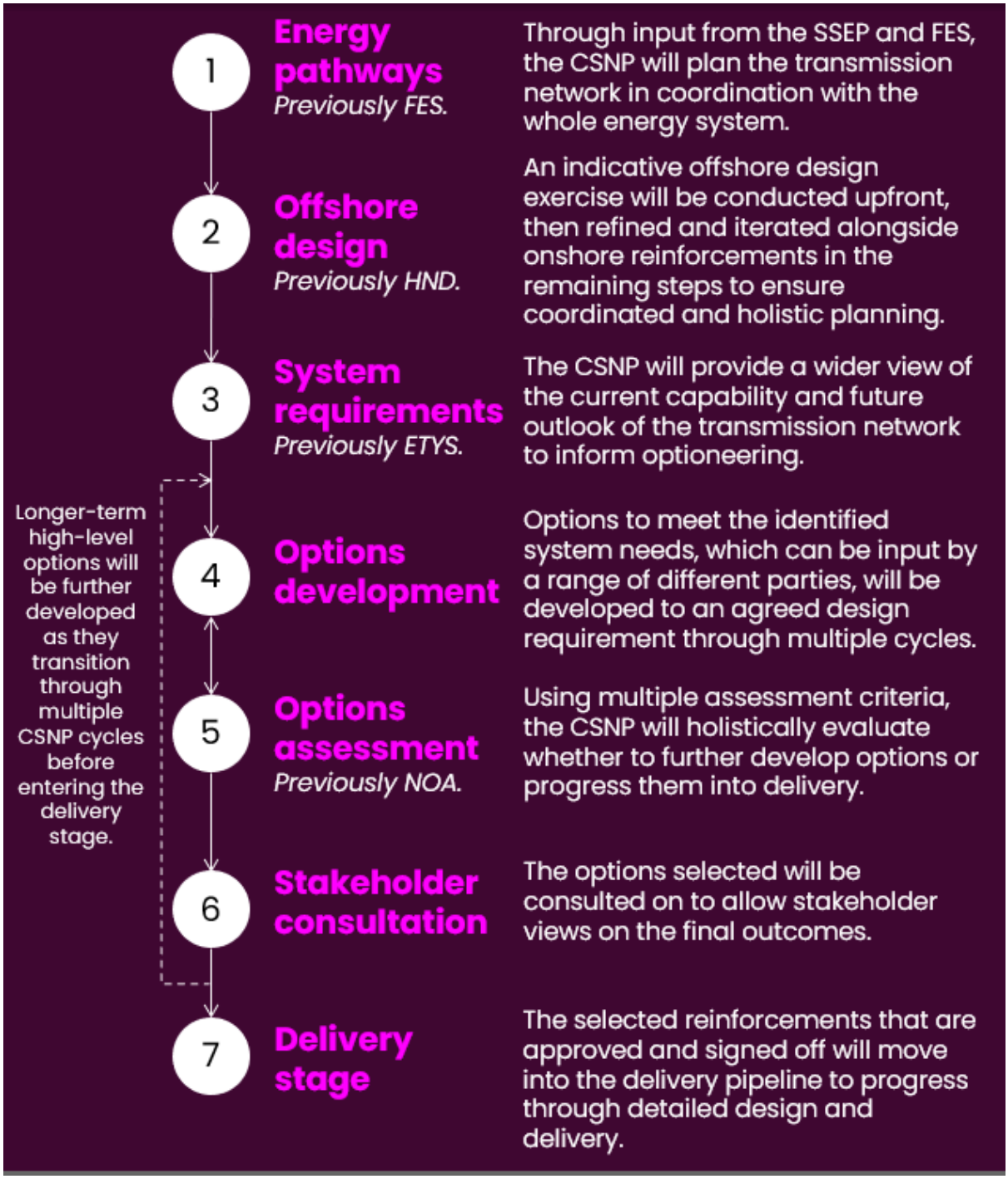
- Move to a three-year process, in alignment with the SSEP, to provide decisive signals and additional time for option development.
- Progress options into a delivery pipeline to provide certainty on network investments required for net zero and enable focus on detailed design.

Providing certainty to help accelerate the delivery of transmission infrastructure is critical to GB's net zero ambition. Through establishing a delivery pipeline, the CSNP will provide certainty on the needs case and strategic parameters of transmission reinforcements to help the planning and consenting, regulatory, and supply chain processes. This will help expedite the delivery of transmission infrastructure to ensure timely network development.

To realise this, the CSNP will plan the network more strategically, ahead of need, across a rolling 25-year horizon. This longer-term view will provide opportunity to coordinate reinforcements and anticipate investments required to meet GB's net zero targets.

The CSNP will be robust, evidence-based, and transparent in evaluating a breadth of options, whether upgrading the existing network, developing new reinforcements, or identifying more innovative solutions. We will ensure that the need for network development is considered against multiple assessment criteria, including economic efficiency, environmental and community impacts, as well as deliverability and operability, to ensure a sustainable, collaborative plan that provides maximum benefits to GB.

Framework steps



Why is electricity transmission network planning important?

As GB continues to transition away from dependency on fossil fuels for electricity, heat and transportation, there will be an even greater need for clean sources of electricity. Vital works are already undertaken to ensure that the grid is up to the task of carrying all this clean energy to communities across GB. As we connect more sources that produce clean energy here in the UK, we will become more self-sufficient with regards to our energy supplies.

There is a broad range of works currently underway across the industry that are aligned to meeting GB's net zero grid and 2050 climate targets. These include our Clean Power 2030 report, detailing steps to deliver clean power by the end of this decade, and the Beyond 2030 report, which recommends a set of offshore and onshore network upgrades which total an additional £58 billion of direct investment in our electricity networks, facilitating the connection of an extra 21 GW of offshore wind power, plus a breadth of other low carbon generation sources across GB.

What parts of electricity transmission network planning will the CSNP cover?

The CSNP will focus on wider grid reinforcements that help transfer power across GB, by providing additional system capability on the main integrated transmission system (MITS). Given the complexity of the transmission network, wider system reinforcements must be planned holistically to ensure the most efficient and economic design is achieved, while also considering deliverability, operability, environment, and community factors.

The CSNP will consider the future onshore and offshore electricity transmission network as well as cross-border interconnectors.

Alongside this, the CSNP will include technical assessments to identify any residual voltage and stability requirements.

Interactions with Connections Reform

The CSNP will also have a strong link to the new connections process. The proposed new Connections Network Design Methodology (CNDM) will set out how the transmission network will be designed for those applying to connect to or use the transmission system. New customer connections and additional network reinforcements identified through the CNDM will inform wider network planning in the CSNP. You can read more about Connections Reform on our website.

The CSNP cycle

Key message: Our annual network planning process will move to a three-year cycle, considering system requirements across a 25-year rolling planning horizon.

Our current annual network planning process will be extended across a three-year cycle, considering system requirements across a 25-year horizon. This will enable a more strategic approach, ahead of need, while enabling sufficient time for option development and additional assessments. This new cycle has been visualised below.

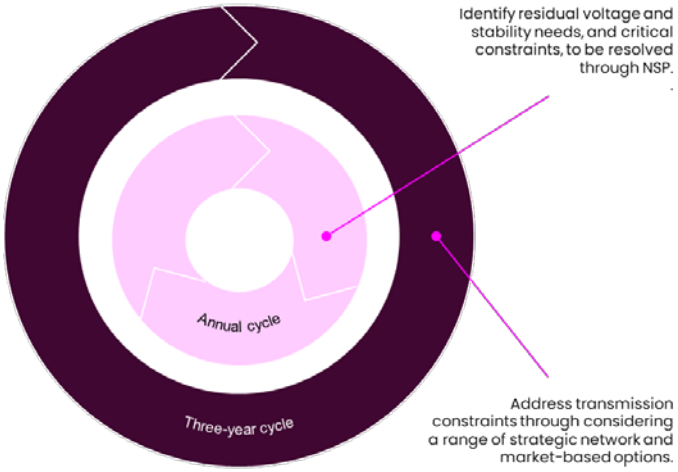
Why are we moving to a three-year cycle?

Optioneering

The extended cycle will give parties more time to develop a greater range of mature options. This will support robust decision-making and provide the maximum benefits for GB.

Consultation

The additional time will allow for further stakeholder and statutory environmental consultations which will be fundamental to the CSNP.



Decisive

The three-year cycle will help provide certainty to stakeholders, industry, and supply chains through consistent, clear and decisive signals, which are not subject to continuous change.

Coordinated

It will also allow options to be considered more collectively to support longer-term, coordinated investments, as opposed to incremental decisions decided on an annual basis.

Focus and aims of the cycle

The three-year cycle will focus on addressing points on the transmission network where more transfer capacity is needed to continue delivering electricity effectively. This could include recommending new solutions (including innovative technologies), or upgrading existing onshore and offshore network, as well as considering opportunities for market-based solutions through Network Services Procurement (NSP), previously called Pathfinders.

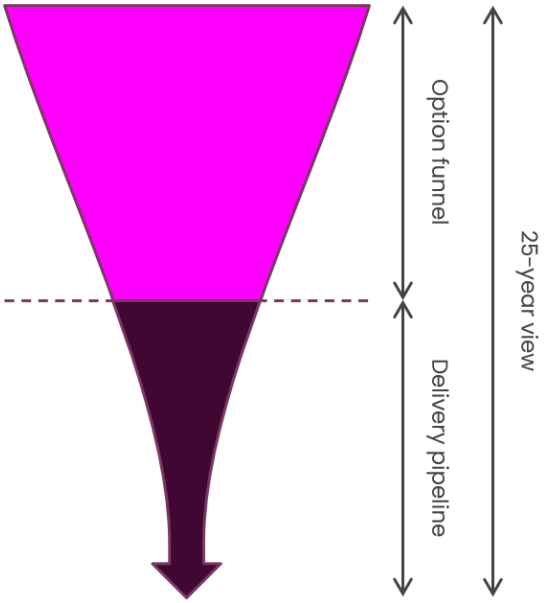
An additional annual cycle will identify and resolve residual stability and voltage needs through our stability and reactive power markets as part of NSP. These will consider market-based solutions as well as the more traditional transmission-based solutions. Through this cycle, there may also be opportunity for market-based solutions to manage additional nearer-term transmission constraints arising from delays to schemes.

Options funnel

We will consider a breadth of potential options which will be developed through desktop assessment and will form a funnel of options spanning 25-years. This will enable further optioneering and timely signals to supply chains and investors.

The CSNP will then select which projects to progress into the delivery pipeline and through to detailed design, construction, and delivery, based on anticipating system needs. The projects which have moved into the delivery pipeline will only be reassessed in subsequent cycles of the CSNP if there have been material changes to the reinforcement or its needs case. This will give delivery bodies certainty to enable delivery at increased pace.

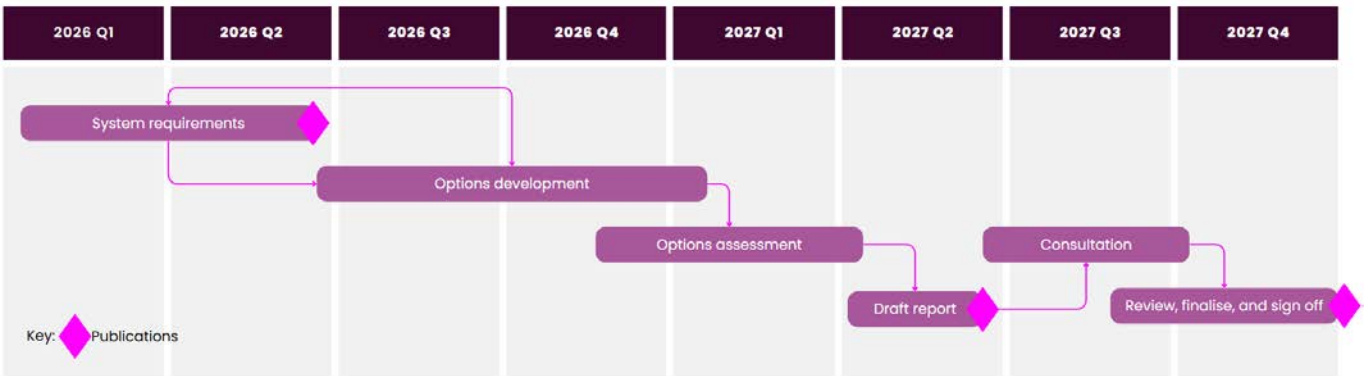
Progression into the delivery pipeline will consider when the reinforcement is required (including build time) and allow sufficient time for the early network competition process.



For illustrative purposes

We will work with stakeholders to further establish an appropriate time horizon for the delivery pipeline, given wider policy and regulatory reform.

The first CSNP will start in 2026 with a final publication in 2027, as illustrated below. We will set out a more detailed timeline in our future draft methodology.



Providing certainty through a delivery pipeline

Key message: The CSNP will seek to provide certainty on the needs case and strategic parameters of reinforcements progressing into the delivery pipeline.

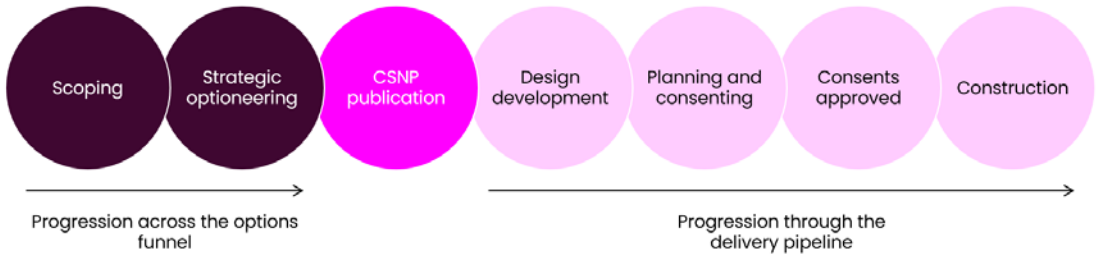
Through the strategic optioneering stage, a number of options are developed so that the preferred reinforcements can be identified. At the end of this stage, and following robust, evidence-based assessment, the preferred reinforcements will progress into the delivery pipeline and will be used as the basis for regulatory processes.

At this point, there will be certainty on the needs case and strategic parameters of reinforcements, as below:

- The needs case of reinforcements, defined as the additional capability provided across a system boundary or boundaries as well as any wider drivers.
- The strategic parameters of reinforcements, including whether a reinforcement is onshore or offshore, high voltage direct current (HVDC) or high voltage alternate current (HVAC), predominantly overhead line (OHL) or underground cable, its spatial envelope and connection in relation to the MITS.

The above strategic parameters have a critical impact on reinforcement costs, environmental and community impacts, and interactions with the wider network. The strategic envelope is a broad study area which may cover multiple indicative option variations and their connection in relation to the MITS. This concept is further illustrated in the section on indicative design requirements. Providing certainty on the needs case and strategic parameters of reinforcements will help ensure decisions coordinated across GB, in the CSNP, are continued through the later detailed design stage.

Beyond the CSNP, and through the delivery pipeline, the party responsible for developing each asset will refine the preferred option through detailed design and delivery. This includes engaging with local communities, identifying routeing, and progressing through planning, consenting, and construction. Investment projects in the delivery pipeline will only be reassessed under exceptional circumstances. If there are material changes through detailed design, we may re-evaluate the justification for reinforcements. This will be captured through a change control process.



Indicative illustration showing phases in options funnel in purple, and in delivery pipeline in pink.

Change control process

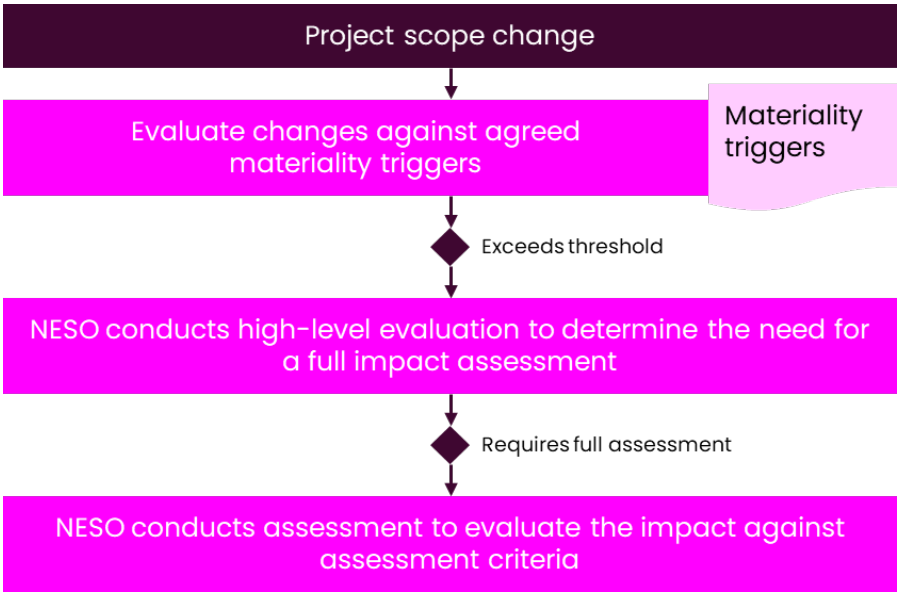
Where there are significant changes to projects or their needs case in the delivery pipeline, we will enact a change control process. We propose that the change control process will run from the end of the strategic optioneering phase – when options are progressed into the delivery pipeline – until Ofgem's full project funding assessment.

The change control process should not undermine the ambition to accelerate transmission delivery and should therefore look to provide certainty to delivery bodies. However, through evaluating any material changes to a reinforcement's scope or needs case, the change control process will ensure efficient delivery of options in alignment with decision-making in the CSNP.

Material changes will be determined by triggers whereby, under a limited and defined set of conditions, changes are evaluated. We propose the following project scope changes to be considered as triggers for the change control process.

- Any change to the strategic parameters of reinforcements, including routeing outside of its spatial envelope.
- A scope change that impacts the reinforcements' fulfilment of the original needs case.
- A change to the indicative substation combination, where these are electrically different in relation to the MITS.
- Any material change to the reinforcements' cost or delivery date.

We propose a staged process to evaluate project scope changes, as illustrated below. This will support an efficient and decisive change process and avoid the need to conduct a full impact assessment where this is evidently not necessary.



Alongside project scope changes, there could be broader causes of change to reinforcements in the delivery pipeline, which could contribute to material changes. These broader causes could include changes to interacting works, wider drivers such as connections or asset replacement, technology or innovation advancements, market reform, and policy change.

As we further engage with key stakeholders, we will set out more detail on the change control process in our future consultation – including on timing, process and further defining the listed triggers across broader causes of change.

Q: Are you supportive of our proposal to shape the triggers around strategic parameters and introduce a staged change control process?

Interactions with the Electricity Transmission Design Principles (ETDP)

Through stakeholder engagement, NESO has been developing the ETDP following the recommendations published in the Transmission Acceleration Action Plan. A draft ETDP will be published for consultation in 2025. These principles may support the options development step of the CSNP and provide guidance on the consideration of different options.

Interactions with early competition

Early competition is a process to select competitively appointed TOs (CATOs) to deliver a network solution on GB's electricity transmission system. A CATO would be responsible for the design, build, and ownership of transmission assets with onshore connection points. This will help encourage new entrants into the transmission owner market, enabling new ways of working, and aims to seek the best solutions in the most cost-effective way for consumers. Non-network solutions will be progressed through processes such as NSP, rather than early competition.

The CSNP will support early competition by providing certainty on the needs case and strategic parameters of reinforcements, while ensuring opportunity for innovation in detailed design.

We will set out more information on the sequencing and process of determining CATOs within the CSNP in our CSNP methodology consultation next year.

4. Integrating an Indicative Offshore Exercise

Indicative offshore design exercise overview

Interconnectors

Indicative offshore design exercise overview

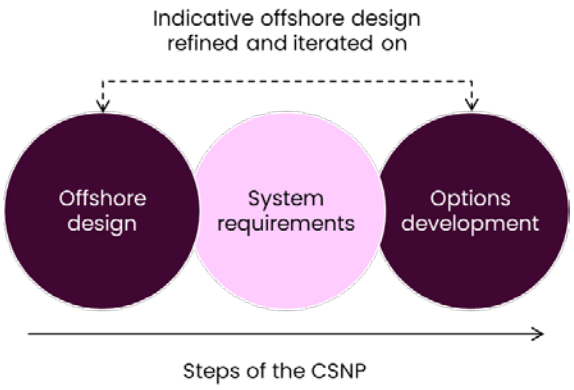
Key message: The CSNP will provide the opportunity to plan across the whole electricity transmission network holistically – onshore and offshore and including interconnectors – to facilitate coordinated and efficient network development.

We propose to conduct an indicative offshore design exercise as the first step of the CSNP and then further refine it through the remaining steps.

The scale of this proposed exercise will be informed by the extent of future strategic offshore infrastructure determined regionally by the SSEP. Given the potential GW-scale injections, or ejections, from offshore infrastructure, it will be important to ensure these are considered in the assumptions, modelling, and analysis of system requirements in the CSNP. This approach will provide early certainty of system need to kickstart optioneering, considering the critical impact of the offshore network on onshore power flows. The coordination of an indicative offshore design may also help resolve wider system constraints and reduce the extent of reinforcements required to provide greater benefits to consumers, local communities, and the environment.

We propose to refine, iterate and further develop the indicative offshore design alongside identifying and developing onshore reinforcements in the options development step of the CSNP. This will maximise potential for coordination and efficient network development and enable opportunity to plan onshore and offshore, holistically. At this point in the process, we also propose to facilitate changes to the indicative offshore design proposed by prospective offshore TOs (OFTOs) or developers. This will enable broader parties to influence the offshore design to support innovative thinking and ensure deliverability. Critically, through aligning the strategic planning of the whole transmission network, this coordination will provide certainty to support reinforcements progressing into the delivery pipeline and mitigate the risk of later changes through detailed design.

We will continue to engage with key stakeholders as we further develop this proposal. Further policy development is also required on this proposal with Ofgem as we advance from early thinking.



Q: Are you supportive of our proposal to conduct an indicative offshore design exercise ahead of and further refined through the CSNP?

Interconnectors

Key message: We aim to bring future interconnector expansion forward in the network planning cycle as part of the wider offshore design work, allowing for stronger co-optimisation of onshore and offshore elements of the network.

This offshore network design will need to consider a range of technology types, one of these being interconnectors.

The need to include interconnection within the CSNP was raised in the December decision document from Ofgem, detailed on page 90, with the view that the CSNP should work to support future cap and floor allocation windows (this being the primary process to grant regulatory approval for future interconnector projects) for both point to point interconnectors and offshore hybrid assets (OHA).

Previously, interconnector analysis was performed at the end of the network planning process, building off the network plan created for that year. This would mean any recommendations made regarding interconnectors were overlaid on top of an optimised network, potentially creating inefficiencies. This also means that the recommendations produced do not have a strong reason to be developed as they are not considered within the corresponding onshore plan, likely requiring additional onshore reinforcements to be made to facilitate these projects. As it would take time for such onshore reinforcements to be optioneered, this would push back delivery timescales, reducing the benefit that can be offered by the interconnector and creating a cyclical problem. Due to this and other factors (such as uncertainty regarding connecting countries' long-term plans), our current process can't form the core of future thinking regarding interconnector expansion, and we aren't able to give the long-term clarity that can otherwise be seen with onshore network planning.

We've identified an opportunity to include this interconnector analysis as a part of the offshore design exercise at the front of the network planning process. This process would identify the most beneficial opportunities for future interconnection through first considering viable study cases, understanding the regional capacity for additional interconnection through the SSEP, then determining the optimal pathway to reach such capacities. This analysis can then be used to inform future cap and floor allocation windows. This analysis would consider theoretical projects likely beyond 2035 (due to the lead time required for development of such projects) and the output would consist of a shortlist of the most beneficial projects with a set of parameters for their development. These parameters would include:

- GB connection location, this will utilise the output of the SSEP to determine viable landing points and optimal regional capacities
- Connecting market
- Ideal delivery year
- Capacity
- System costs

- Whether the project should be point-to-point or has potential to be an OHA

This shortlist of projects can then be included within the offshore design exercise. As mentioned previously this will allow for broader parties, such as potential interconnector developers, to offer their insight further refining the design and ensuring a deliverable, forward-thinking offshore design that can be closely aligned with the necessary onshore reinforcements.

This approach will bring a range of benefits for the network planning process, chief among them is creating a more aligned, holistic network plan, considering as broad a range of technology as possible. This can also bring benefit through ensuring alignment with our neighbours in Europe as they also work to develop a long-term vision towards the future of their offshore infrastructure.

This will also give greater certainty to all parties involved in developing such projects on the need for future projects at the earliest possible stage. This will help de-risk future interconnector projects and allow developers to make the necessary commitments needed to accelerate new projects.

Including interconnection within the offshore design exercise is sensible, as generally the infrastructure required for different offshore technology such as offshore wind and interconnectors is largely similar and from the perspective of the onshore network has a similar scale of impact. Being able to consider these technologies together under the same design will provide significant benefits in terms of producing a more coherent network plan.

Q: Do you agree that identifying the above parameters within the CSNP would support the regulatory and development process for future interconnector expansion?

Q: Are these parameters suitable, or should any be removed or included?

5. System Requirements

Scope of analysis

Resilience

Scope of analysis

Key message: We will expand our view of system requirements, including across a longer-term horizon, and lead on additional year-round analysis.

Using the latest energy pathways from the SSEP and the FES, and the completion of the indicative offshore design exercise, this step of the CSNP will provide a view of future transmission requirements and capability in relation to the limits defined in the National Electricity Transmission System (NETS) Security and Quality of Supply Standards (SQSS). This will help parties understand where investment and development are needed.

Today, NESO has a range of different processes and publications for identifying system requirements , including our System Operability Framework (SOF) and NSP. As part of our regular network planning process, our Electricity Ten Year Statement (ETYS) describes the network capability and future power flows across boundaries. Through the CSNP – alongside our established boundary analysis – we will expand our view of system requirements. This will include additional year-round, circuit-level thermal analysis, a view across a longer-term horizon, as well as wider residual stability and voltage analysis.

Boundary analysis

Boundaries are used to represent the transmission network and understand where future power flow limitations may occur between parts of the system and across critical circuit paths. This is a valuable tool for longer-term strategic planning and analysing system requirements across GB. For the first CSNP, the transmission owners (TOs) and NESO will continue to undertake detailed power system analysis to determine boundary capability and identify the capability provided by proposed options. The boundary capability, an example of which is shown in the graph above, is the greatest power transfer that can be achieved without breaching any NETS SQSS limitations. This could be limited by thermal circuit rating, voltage constraints, or dynamic stability, analysed under the most onerous system conditions. We are also investigating how additional rotor angle stability studies could support our established boundary analysis.

Thermal

An additional year-round, circuit-level view of thermal constraints will provide visibility of overloaded network assets in consideration of seasonal variations in generation and

demand. This will enable opportunities to identify more targeted network or market solutions and provide greater context into network limitations to inform strategic optioneering. Through our thermal analysis, we will analyse circuit loading across the year and apply automated pre-fault and post-fault actions to mitigate overloaded assets. This will enable visibility of the risk, determined by the magnitude and frequency, of overloads specific to individual circuits or other network assets.

You can read more about our developing thermal analysis in our recent ETYS.

Residual voltage

Our voltage analysis will continue to ensure that the voltage on the future system can be maintained within the NETS SQSS planning limits. As we continue to transition to our future energy mix, it is critical that we proactively identify future voltage needs and further our ability to manage reactive power. Through the CSNP, we will integrate and lead on annual voltage analysis as part of our regular network planning process. We will conduct analysis across the year and apply a consistent approach to determine the requirement of reactive power compensation, whether from high power flows at winter peak or low demand at summer minimum. This will support our future mid-term and current long-term reactive power markets.

Residual stability

Stability, including short circuit level and inertia, are fundamental to ensure the safe and secure operation of the electricity transmission network. As more asynchronous plants connect to the network, it is important to identify the future requirements for short circuit level, inertia, and other potential services to maintain system stability. As part of our regular network planning process, NESO will conduct annual technical assessments on minimum short circuit level requirements at critical snapshots across the year and inertia requirements. Like our residual voltage analysis, this will also support our mid-term and long-term stability markets.

Interactions with our markets

Through assessing system needs holistically, we will be able to take a more rounded view of future requirements. In our Markets Roadmap, we set out our stability and reactive power markets, which will accelerate new asset build through longer-term contracts or offer nearer-term agreements to optimise existing infrastructure. These will be a key part of our future network planning process. Through them, we will seek to widen market access, enhance competition, bring costs down and where possible, facilitate the stacking of services to resolve concurrent issues. Whilst we will look to resolve residual stability and voltage needs annually through our markets, options that provide additional capability where boundaries are limited by voltage constraints or dynamic stability will continue to be part of the options assessment in the CSNP.

System insight and national trends

The scope and extent of our detailed power system analysis is dependent on power system models – these are produced where there is greater certainty on the future network. Beyond the modelling horizon, our analysis will take the form of system insights and national trends. This will include our established boundary charts, which show boundary capabilities comparative to longer-term power flows and the NETS SQSS criteria. These provide a valuable indication of where future reinforcements may be needed to increase capability. We are also investigating how we can provide an optimised view of the future transmission network, through indicating an optimal combination of boundary reinforcements, to provide further context ahead of optioneering. Like those included under our SOF, we are also proposing to include a longer-term view of system trends at a national level. These assessments will likely become more qualitative in the longer-term and provide a narrative on how our future energy mix may influence future system needs.

Q: What are your views on the proposed approach to system requirements?

Resilience

Climate change will lead to an increased frequency and severity of extreme weather events (i.e., floods, heat waves, wind droughts), along with changes to average conditions.

At the same time, the transition to net zero will result in greater reliance on electricity and increase vulnerability to extreme climate events, including the potential for cascading impacts with other sectors (e.g., transport and telecommunications) due to greater electrification and interdependency. In addition to climate related events, there are other factors, such as cyber and physical security events, which can also impact resilience of the energy system.

It is important that we have the capability within the CSNP to consider extreme climate events, changes to average conditions due to climate change, as well as other high-impact, low-probability (HILP) events, throughout the network planning process. This will help us make informed decisions under uncertainty regarding the best investment options. The objective is to be capable of incorporating and testing extreme HILP data ranges and industry-recognized scenarios to support our strategic advisory role to the UK government and Ofgem regarding the potential impacts on the future network should an extreme event occur. This could include considering areas more likely to be prone to flooding or drought, as well as very high or low temperatures, which are expected impacts of ongoing climate change.

We recognise that there are already various activities taking place across the industry to address resilience related issues of the energy system, including the Electricity Safety Quality and Continuity Regulations, the newly established Directorate on Resilience and Emergency Management at NESO, and various climate change adaptation activities by TOs. We are currently conducting a mapping exercise to identify different types of resilience, the processes that currently consider them, and the owners of these processes to capture what could drive a CSNP investment decision in relation to climate resilience and broader resilience issues.

Q: We would welcome responses that:

- enable us to learn from or align to what other infrastructure providers are doing regarding climate risk
- help identify credible extreme climate events and other HILP events
- discuss the governance process to agree on the credible HILP events that need to be considered in the CSNP

6. Options Development

Indicative design requirements

Broadening participation

Indicative design requirements

Key message: We have defined a set of minimum design requirements that options progressing into the delivery pipeline must fulfil.

The CSNP is a process whereby reinforcement options will progress across multiple cycles, or more quickly where required, from a high-level to strategic options at the end of strategic optioneering – it is at this point that options will progress into the delivery pipeline – if justified against the assessment criteria.

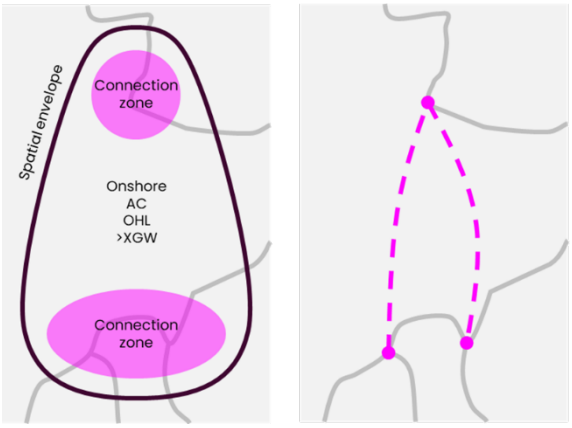
Before progressing options into the delivery pipeline, reinforcements need to be suitably developed and provide sufficient information to enable a robust assessment across the assessment criteria. We propose the below list of indicative design requirements for options progressing into the delivery pipeline. These requirements will be used as the basis for regulatory processes but may be subject to local engagement and detailed design:

- Single line drawing
- Asset ratings and electrical parameters
- Substations and evidence of feasibility
- Required outages and interactions
- Alignment with wider drivers including asset replacement
- Indicative study area
- Strategic mitigation such as strategic undergrounding
- Cost breakdown
- Programme breakdown and earliest in service date (EISD)

These indicative requirements will demonstrate fulfilment of the needs case and alignment with the strategic parameters of reinforcements, including boundary capability provided and whether a reinforcement is onshore or offshore, HVDC or HVAC, predominantly OHL or underground cable, its spatial envelope, and connection in relation to the MITS.

It may be appropriate to facilitate option variations within the same strategic parameters, but with a preferred variation identified and progressed as the basis for regulatory processes. This may be the case where variations provide similar benefit. This would be context dependent, with consideration of interactivity with connections or dependent reinforcements, while ensuring variations meet a consistent needs case. This is illustrated below, where the indicative options will be subject to local engagement and detailed design.

Illustration showing strategic parameters of options (left) covering indicative option variations (right).



We will provide further detail and specification on the listed indicative design requirements through our methodology next year.

Q: Do you agree with proposed high-level list of indicative design requirements?

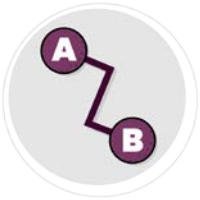
Broadening participation

Key messages:

1. We propose supporting broader, more innovative options in the CSNP through giving greater clarity on the long-term needs of the network.
2. We also propose working in collaboration with parties across industry to ensure those with new ways of thinking can come forwards and that options that come in can be robustly compared to alternatives.
3. We are also looking into how NESO can best create independent options to guide future optioneering.

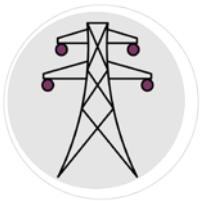
To ensure that any recommendations made by the CSNP are as robust as possible, as broad a range of options as possible needs to be considered. Ideally these options come from a range of providers, considering a range of different technology, with a focus on bringing forward innovative new thinking.

These options will need to meet a diverse range of system needs. These include thermal needs, where an increase in the network's ability to transfer energy is needed and operability needs where the system requires additional support to operate effectively. These needs primarily take the form of support to maintain voltage levels or system stability. These needs will also have an impact over a wide range of timescales, some will be expected to be short-term needs that will not exist for more than ten years. Others will be long-term where the need is expected to persist beyond ten years. Options to meet these needs can come in many forms, these may include:



New circuits
These can include construction of new transmission lines, or underground and offshore cables .

New substations
Construction of new substations to facilitate new infrastructure.



Improving existing circuits
Increasing the capacity of current transmission infrastructure through various means. (Uprating lines, reconductoring, expanding substations).

Non-network asset-based solutions
These are physical assets built typically to address network operation, such as synchronous compensators, battery storage, and shunt reactors.

Operational solutions
Changing the way in which equipment is used to get more out of current infrastructure.

Commercial solutions
Commercial agreements with NESO that support the operation of the grid and can be contracted flexibly.

These different option types can have significant differences in terms of scale, cost and delivery timescale. Operational solutions that don't require construction of new infrastructure may be able to be installed within a year, while a new transmission line would require several years before it can be delivered. This means that some types of options are typically more suited to meeting certain types of system need.

We've seen broad participation from a range of commercial parties in meeting short-term needs, both operability and thermal in nature. This participation typically happens through market driven approaches, such as NSP, to source solutions from the market to address local voltage and stability issues, as well as using commercial solutions to mitigate constraint issues.

Meanwhile long-term needs are typically met through the network planning process (such as Beyond 2030). Options here are often provided by TOs proposing large-scale new network build options. Other parties have been able to submit options to meet needs at this scale, through the Interested Persons process, but this currently sees limited participation.

Going forward we intend to encourage and accept a wide range of options to be considered in the CSNP. In meeting the system need, we expect options to be produced by TOs (as today), by third parties including non-network solutions, and NESO developed solution designed where we identify alternative options and in response to stakeholder feedback. These options, regardless of the type being proposed, all need to be developed to the same level so that they can be fairly assessed with one another and included within the statutory environmental consultations.

Currently there are various challenges which reduce participation by third parties in meeting long-term needs. Key among them being the different funding arrangements for option development between a TO submitting a network option and a third party submitting a non-network option to meet an equivalent need, this being driven by the different license requirements such parties operate under. Considering the nature of these requirements, a single process would be unlikely to be able to treat such a diverse range of parties equivalently unless through extensive collaboration between involved parties.

Other challenges when supporting broader options for meeting long-term needs include how best to share necessary information between parties to allow for all options to be developed to the required standard. For a third party to be able to propose and develop an option to be operated on a transmission network, it will require an exchange of information between the third party and the relevant network owners. If these parties are proposing options to meet the same need there is a chance that they can be in competition with one another, this could potentially undermine sensitive commercial information for a party during this data exchange.

Q: Considering the above identified challenges, what suggestions would you offer in addressing these and supporting third parties in proposing a broader range of options to meet long-term needs?

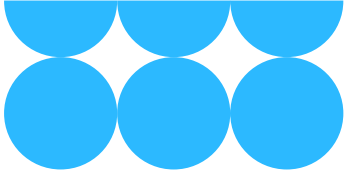
To help resolve these challenges and create a level playing field between as broad a range of option providers as possible requires bringing forward new thinking, the transition to NESO gives an opportunity to make some of these changes. Some of the key areas we are looking to focus on include:

- Utilising the long-term vision given by the CSNP to define how the network will need to operate in the future and steer innovation towards supporting this.
- Ensuring a commercial pathway is available for proven innovative projects to be included within the CSNP when suitable to meet a system need.
- Maximising the potential of NESO at the heart of the energy industry to support option development from a wide range of sources.

The CSNP will consider a 25-year timescale, whilst needs identified this far out may not directly be met by options now, they are still important to identify through creating a picture of the network operation. This can indicate to industry where we see the greatest challenges for the future network and where efforts should be focused to find new approaches to meet those challenges.

Whilst giving a clearer long-term view on what the network will need should help in steering future innovation to the right places, there remains a challenge in how such options can be brought onto the network once suitably developed. There are several aspects to this, the key ones being:

- How to suitably assure that an innovative option can supply the service required under a broad range of conditions in a manner compatible with system operations?



- How to appropriately balance the potential long-term benefit of an innovative option which carries a greater short-term cost?

For innovative options to be supported, both points will require an adjustment towards how risk is considered when conducting network planning. We are currently working through how this balance can best be achieved and appreciate feedback from industry on this point.

NESO will sit at the middle of the energy system and hold a strategic, whole system view of the network. As this capability further develops there is potential for NESO to play a more active role in supporting future optioneering work and bringing forward new ways of thinking. This can come in the form of NESO working in collaboration with other parties or through putting forward high-level options independently when needed.

Initially, whilst NESO builds capability, we propose the focus be on collaboration in optioneering. This could be NESO working alongside parties (such as TOs) to share high-level options and checking between one another for technical feasibility. NESO could also focus attention more closely on needs that cross multiple network regions to find opportunities for cross-network collaboration. This would ensure that a broader range of options can be considered from the outset, with more robust justification for any recommendations through showing a clear consideration of alternative options.

Discussions are currently ongoing as to how much NESO can do in this space as capability grows; current areas of consideration include:

- Whether our growing regional network planning capability can assist in identifying solutions at a distribution level that can mitigate needs at a transmission level.
- How best to collaborate with broader parties when new viable innovative approaches are put forward but require additional support?

Another approach is for NESO to create high-level options independently. It is a continued requirement for NESO to have the ability to put forward notional options where we have identified a need, such as limited alternative options or an opportunity to bring greater benefit to the network.

We propose the focus for any independent NESO options remain on these niches (meeting needs with limited options available or where opportunities are identified to use new thinking). These options would not have to remain wholly NESO-owned, when suitable there would be scope to collaborate with other parties to support further development. Also, NESO creating an independent option would not preclude any other parties from submitting their own options.

Q: How can NESO most effectively support the optioneering process through creation of independent options?

It is important to state that these approaches are still in an early stage of development and remain open to adjustment as we get into further detail, we welcome and encourage feedback from stakeholders on how best to progress this thinking.

7. Assessment Criteria

Assessment criteria overview

Assessment criteria overview

Key message: We will robustly assess all the proposed options against a range of assessment criteria and effectively integrate them for comprehensive evaluation. We will conduct strategic environmental assessment (SEA) and habitats regulations assessment (HRA) plan to ensure environmental issues are appropriately considered and consulted on.

In the assessment stage, our focus will be on evaluating the options received using a multi criteria assessment (MCA) approach. The criteria will include considerations of economic efficiency, environmental and community impacts, as well as deliverability and operability.

We will robustly assess all the proposed options against these assessment criteria and effectively integrate them for comprehensive evaluation. We recognise that the options assessed will have different maturity levels within one CSNP cycle and we propose to apply the assessment criteria differently depending on option maturity.

Economic efficiency	Deliverability	Operability	Environment	Community
Utilise economic assessment tools for optimal design and consumer value	Consider supply chain, construction timeframes, and consenting challenges for practical delivery	Consider real-time operability challenges associated with network design options	Use geospatial data and information across multiple impact themes to minimise impact on the environment	Use geospatial data and information across multiple impact themes to minimise community impact

As part of the CSNP methodology development, we are currently reviewing and refining the existing assessment methodologies to ensure their suitability for the CSNP. We are also assessing the validity of current topic areas while identifying new areas to be included.

In this process, we place special emphasis on considering both quantifiable and non-quantifiable factors, reducing subjectivity, and ensuring a comprehensive evaluation of individual design options and option combinations. The aim is not only to identify the best investment options but also to foster clear understanding among the stakeholders on how the investment recommendations are made.

Balancing the criteria

Our goal within the CSNP is to develop a methodology that effectively integrates the assessment criteria, enhancing the robustness and transparency of our assessment process for consistent decision-making.

Within the existing methodology, equal consideration (weighting) of the assessment criteria is sought for both onshore and offshore networks. However, the challenge lies in assigning equal weight to non-quantifiable objectives, while also getting consensus among stakeholders on what weight should be assigned even where quantification is possible.

The new framework through its detailed methodology will aim to balance the assessment criteria by considering both quantifiable and non-quantifiable factors, reducing subjectivity, and ensuring a comprehensive evaluation of each network design option and combination. It will clearly outline when and how each assessment criterion will be considered in the decision-making process, ensuring robustness and transparency. Lessons learned from Beyond 2030 will be integrated, and consistency will be pursued across all components of Strategic Energy Planning (SEP), including SSEP.

As NESO, we recognise the importance of justifying decisions by comparing progressed and discounted options, presenting alternatives, and providing rationales for elimination. Through the new framework, we aim to visualise trade-offs and recommendations, considering different reporting requirements. We are exploring interactive visualisation tools and more effective ways of presenting results.

To incorporate different criteria into the CSNP decision-making process, we are currently exploring various options. These options include the monetisation of certain factors, a narrative justification, and appropriate weighting of criteria to support the decision-making process.

We recognise that the proposed framework for balancing the assessment criteria should be 'fit for purpose' and bring alignment between individual assessment criteria and overarching decision-making methodologies, ensuring consistency with NESO's internal capabilities, and supported by accessible evidence and data. A holistic approach is essential, integrating practical challenges, efficiency improvements, while actively engaging stakeholders and regulators for successful implementation.

Q: How should we bring each of the different assessment criteria together to make the final recommendations?

Economic efficiency

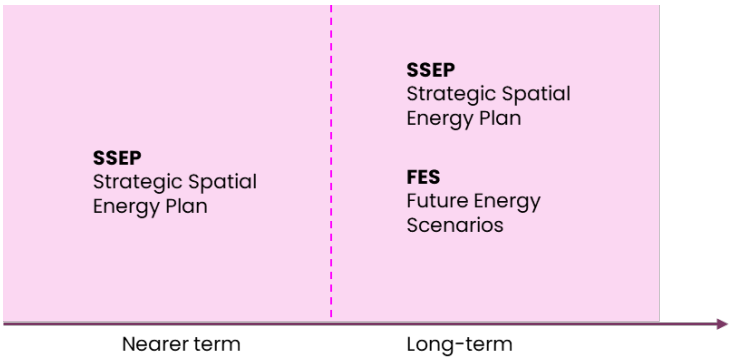
Following the approach set out in the NOA methodology, the economic assessment currently utilises financial data, such as capital infrastructure and operational costs, and network constraint costs, to determine the net present value (NPV) of each design. This allows for the effective comparison of economic feasibility of network design options.

Suitability of a least-worst regret approach

We currently use a least-worst regret (LWR) decision-making approach to stress test options provided to us against a range of different Future Energy Scenarios (FES). LWR has been used in NOA and transitional Centralised Strategic Network Plan (tCSNP), as well as in the Large Onshore Transmission Investment (LOTI, formerly Strategic Wider Works) cost

benefit analyses (CBAs) and other ad-hoc CBAs. LWR is regarded as "risk-averse": it chooses the option that minimises the worst error – LWR ensures the decision would never be very wrong.

NESO is moving from using a range of scenarios to a single pathway (in the SSEP) for nearer term, followed by a range of Future Energy Scenarios (FES) for long-term. In the absence of multiple scenarios in the nearer term and with the need for anticipatory investments we are currently reviewing the suitability of the LWR method for decision making within the CSNP and to identify appropriate economic modelling tools and methodologies that align with the changes proposed in the new framework.



Sensitivities and stress testing

We recognise that with the need for significant network expansion, stress-testing the decisions for different pathways and sensitivities becomes crucial. Evidence to back the recommendation decisions is necessary to give decision makers confidence in approving the network plans.

We are actively exploring sensitivity studies and stress testing required to evaluate the robustness of our assessments and to understand the potential impacts of varying assumptions or scenarios.

An innovation project is being established to assess the suitability of LWR analysis and propose economic decision-making tools for the CSNP. The scope of the project also covers identification of the credible sensitivities (such as national vs. zonal pricing and high-impact low-probability events such as extreme weather events) and stress testing approaches to be included in the CBA methodology.

Q: What are the alternative approaches to LWR, credible sensitivities and stress testing that are suitable for the CSNP, that support high-investment requirements to achieve net zero, but also provide consumer value?

Societal costs and benefits

Whilst the existing network options assessment process has focused on constraint costs operational costs and capital expenditure (CAPEX), the CSNP may incorporate other economic components such as societal costs in the economic assessment.

We recognise that it is important to consider carbon emissions reductions through proposed projects and to factor these into the economic assessment methodology of the CSNP. To align our economic assessment with Treasury Green Book guidance, we have incorporated a calculation of the societal value of carbon resulting from network reinforcement into our cost benefit analysis (CBA), including tCSNP2. This inclusion allows the impact on CO2 emissions to be a key consideration in our recommendations, with the definition of "consumer benefits" widened to include the benefit of lower emissions.

Balancing mechanism (BM) costs accrued from Contract for Difference (CfD) plants are to be removed from the final BM costs used for investment recommendations. The rationale behind this is that these costs will be borne by consumers regardless of whether the plant is re-dispatched or not (through the Low Carbon Contracts Company (LCCC) if they generate, or NESO if they are re-dispatched).

Q: What are your thoughts about considering broader societal costs and benefits in the CSNP economic assessment?

Earliest in-service date (EISD) and optimal delivery date (ODD)

The EISD is currently determined by the TOs based on their assumptions about various factors including supply chain and consenting. As the owner of the plans, NESO is well-positioned to evaluate scheme interactivity, as well as develop and scrutinise delivery plans and EISDs from a holistic GB-wide perspective.

The economic analysis currently assesses the economic benefit of delivering projects on the EISD submitted by the TOs, compared to a later delivery. However, the analysis does not quantify the potential benefit of delivering projects earlier than the EISD. This information (the ODD) could help determine the advantages of accelerating project delivery.

We are currently exploring how to support decisions to accelerate project delivery where it is in consumer's interests and how to provide clear evidence through modelling and analysis.

Q: What are your thoughts on NESO providing its perspective on optimal project delivery dates, including an economic analysis of the benefits of earlier delivery and the costs associated with delayed delivery?

Economic interaction of projects

The economic assessment should be able to consider economic interaction of projects to make the best investment decisions. Examples of economic interaction could be where a project doesn't create a strong economic benefit on its own but does so when considered together with other reinforcements. This aspect is currently addressed in the existing approach, and we are looking into areas that can be improved in the economic assessment process to better consider the economic interaction of projects.

Considerations for futureproofing and optionality

Incorporating considerations of future proofing and optionality within the CSNP options assessment methodology will enhance the effectiveness of network planning. When considering futureproofing and leaving room for optionality, several factors can be the extendibility of substations, whole system considerations (e.g. DNO future requirements such as for low voltage connected generation that can be addressed early), assessment of operational costs and consideration of supply chain. We are currently exploring where futureproofing and optionality is best placed within the CSNP options assessment process. For example, part of this aspect could be covered through the operability assessment criteria.

Options with different lifespans

There is a need for NESO to consider network and non-network options, with short-term and longer-term benefits in order to meet the needs of the system. We recognise that the CBA methodology should ensure these are considered fairly. Consideration should also be given to the opportunity cost of options. Some options will offer greater potential benefit in the long-term through reducing the need for further options down the line, or through mitigating a future additional system need that may occur.

Benefit-cost ratio

Benefit-cost ratio (BCR) can be a useful parameter to demonstrate value for money of options to the decision makers. Ofgem will be making decisions to fund and maintain the assets over their full lifetime. We are exploring how the BCR can be used in the CSNP economic assessment.

Q: What are your thoughts on the use of BCR in the CSNP economics assessment?

BRAG ratings

To evaluate deliverability, operability, environmental impact, and community impact, BRAG (black, red, amber, green) ratings are currently used. The methodologies were initially developed through engagement in the Offshore Transmission Network Review (OTNR) process, led by the UK government's Department for Energy Security and Net Zero (DESNZ) and later adopted in onshore network planning. The current BRAG methodology has been used in number of previous processes including Holistic Network Design Follow Up Exercise (HNDFUE) and tCSNP2.

Each assessment criterion is further divided into subtopics, and options are assigned scores that are then converted into BRAG ratings. However, it is acknowledged that relying solely on BRAG ratings may not provide a comprehensive differentiation, particularly when subjective factors are involved in non-quantifiable parameters.

Deliverability

The deliverability criteria in the current methodology focus on assessing the risks associated with delivering a network design by the earliest in-service date (EISD) based on several aspects including design complexity, construction complexity, technology readiness level (TRL), supply chain availability, and interactivity.

Under the CSNP the methodology for deliverability, the assessment criteria will be reviewed and refined to make sure they are fit for the CSNP while determining the validity of current topic areas and identifying new areas to be included (i.e., consenting challenges).

We are looking to incorporate further considerations for supply chain capability and technology readiness. Supply chain capability and capacity for new technologies and interdependencies between equipment/material suppliers and construction contractors will be explored. The technology readiness criteria will be reviewed to take into consideration the speed of new technology deployment and associated timescales for technology to mature.

We are mindful that the proposed new methodology should be compatible with operating practices and procedures, require reasonable assessment resource, be understandable by stakeholders, can be evidenced in a structured way, and is capable of being visualised.

Operability

Ensuring the practical and safe operability of individual options or proposed network designs is crucial. The existing methodology considers factors such as the changes requires to communication protocols, control and monitoring systems, and operating procedures to access the operability of options and network designs.

Under the CSNP, the methodology for operability assessment criteria will be reviewed and refined to make sure they are fit for use while determining the validity of current topic areas and identifying new areas to be included. We aim to identify areas where knowledge-based assessments and engineering judgment can enhance the operability assessment, and areas where high-level system studies (thermal, voltage, and stability) can be utilised (i.e. how the results of these high-level studies can be converted into a scoring mechanism) to further support the operability assessment while also considering time and resources take to do the studies.

The current methodology treats deliverability and operability as a combined criterion, weighted equally with other criteria. To further improve the CSNP methodology, deliverability and operability will be separated into two distinct assessment criteria under the CSNP. Recognising that they address different aspects of network designs will allow for a more focused assessment.

Much like the deliverability assessment, we are mindful that the proposed new methodology for operability assessment should be compatible with operating practices

and needs, require reasonable assessment resource, be understandable by stakeholders, can be evidenced in a structured way, and is capable of being visualised.

Q: What are your thoughts on separating deliverability and operability into two separate criteria?

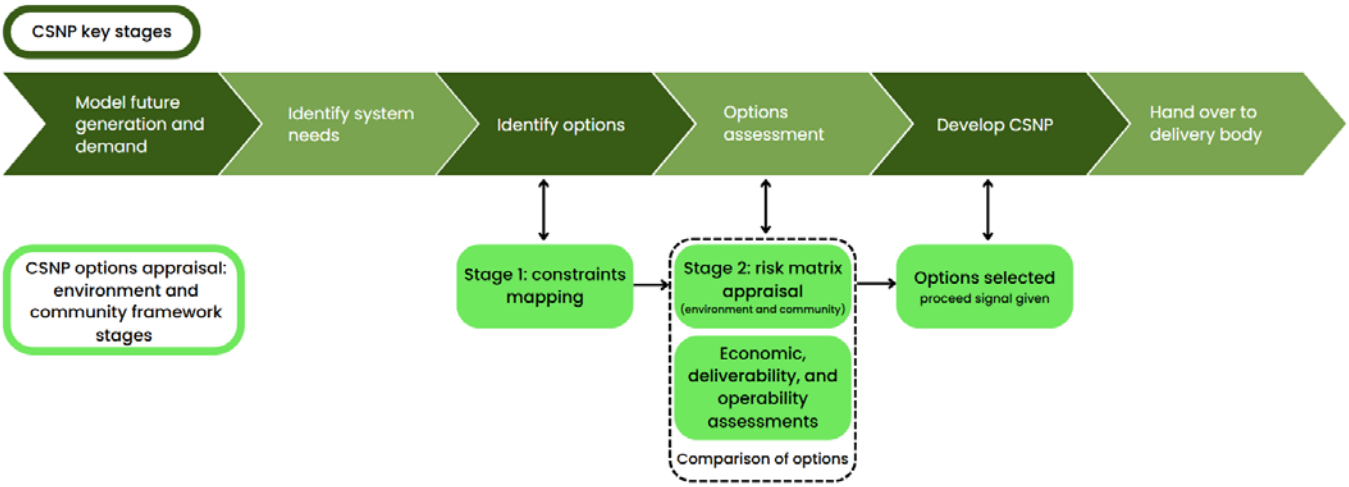
Q: What are your thoughts on the factors that we should cover under operability and deliverability criteria?

Environment and community

Ofgem have recommended that the options assessment developed under CSNP should include consideration of environmental and community impacts. This assessment will also include the following statutory environmental consultations: strategic environmental assessment (SEA), habitats regulations assessment (HRA) plan, and marine conservation zones (MCZ).

We are working with external consultants and are in early discussions with industry stakeholders on our environmental and community approach. Our approach is being developed to allow transparency into this process and integration with the other criteria of economics, deliverability, and operability.

Our approach is at an early stage in design, but our current thinking is that the assessment will incorporate a two-stage process:



The first stage is carrying out geospatial mapping to identify options which may have an impact on environmental or community constraints and which could be difficult to mitigate. We intend this to be based on a geographic information system (GIS) with overlayed constraints, ranked depending on their significance, forming a map which acknowledges these differences across GB.

The second stage will see us developing an impact-based appraisal risk matrix. It will use the data available at the CSNP high-level options appraisal stage and use a structured

method to define clear criteria for assessing the risk impact of each option. This approach will consist of a qualitive and quantitative assessment.

These criteria have been identified at a high level, and grouped into environmental and community themes, which are listed below:

Environment themes:

- Ecology and biodiversity
- Flood risk
- Global climate regulation
- Cultural heritage and historic environment
- Landscape/ seascape

Community themes:

- Local economy
- Air quality
- Recreation and tourism
- Community amenities
- Noise

Q: Are there any additional themes that you would add to this list?

Our current thinking is that each of the themes could be represented by a value on a numerical scale. This should form a sufficiently broad data range to enable distinction between options.

We are proposing that the quantitative outputs are balanced with a qualitative narrative.

This will capture additional information that may be available for options but is not reflected in the quantitative output. This would facilitate balancing the standardised and replicable quantitative outputs with the ability to provide context-specific qualitative information.

Providing additional qualitative information is crucial to overcome any issues due to lack of data or specificity of the solutions at the time of appraisal. The narrative can be used to capture:

- knowledge of whether constraints are avoidable or not (e.g. a national park at the edge of a study area that is highly likely to be avoided, versus a world heritage site crossing the study area which is unavoidable)
- knowledge of mitigation measures, particularly for more mature options, that may remove or reduce the risk of impact (e.g. proposed undergrounding of cables to avoid specific features)

- knowledge gained through previous option development that could suggest that the risk of impacts are higher than the quantitative outputs suggest

Q: What are your thoughts on the proposed approach to environment and community?

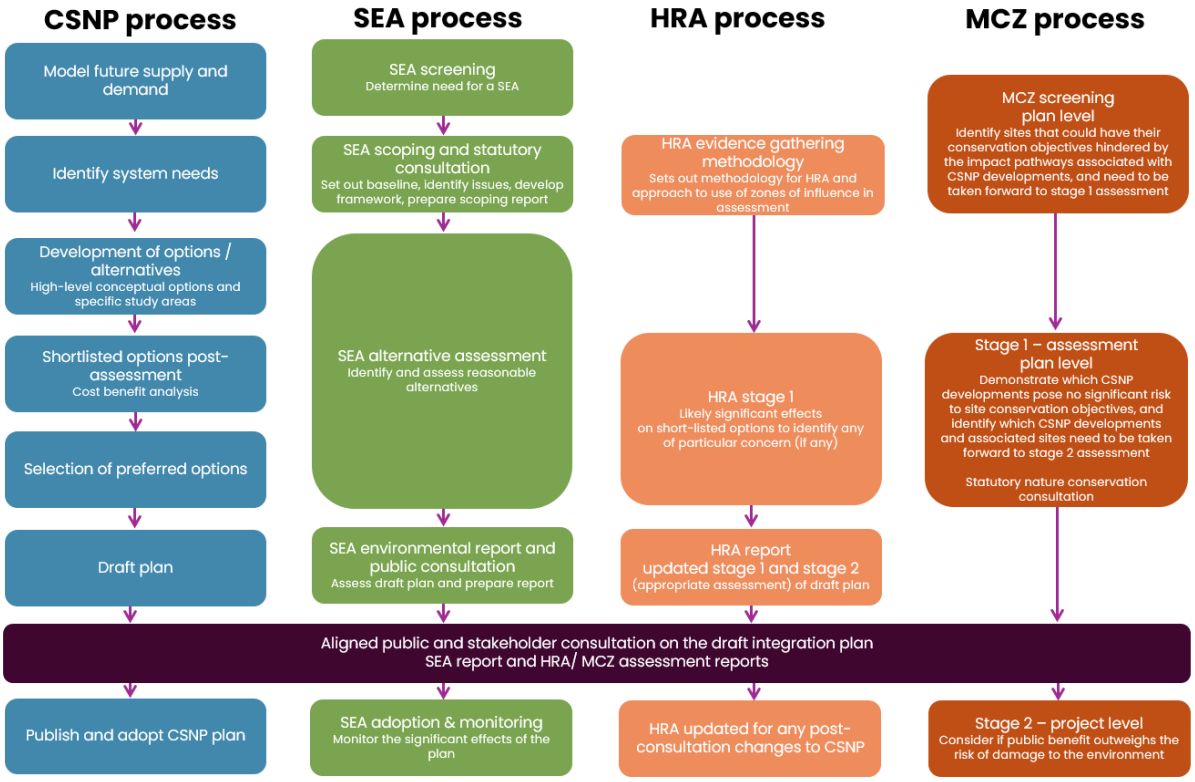
Q: What are the merits and drawbacks of taking a qualitative and quantitative approach?

Further details on our environmental and community assessment criteria will be shared in the publication of our methodology, due in 2025.

Our approach to SEA, HRA, and MCZ assessments

We will be undertaking a range of statutory environmental assessments, including a strategic environmental assessment (SEA), habitats regulations assessment (HRA) plan, and marine conservation zone (MCZ) which are intended to be integrated into the CSNP framework to help ensure that environmental considerations underpin the process and help identify key issues and objectives.

The SEA, HRA plan, and MCZ will be undertaken in line with relevant regulation, which is detailed below.



Strategic environmental assessment

A strategic environmental assessment (SEA) is a systematic process for evaluating the environmental implications of a proposed policy, plan or programme and provides means for looking at cumulative effect and appropriately address them at the earliest stage of decision-making alongside economic and social considerations.

The SEA assesses the extent to which a given policy, plan or programme:

- provides an adequate response to environmental and climate change-related challenges
- may adversely affect the environment and climate resilience
- offers opportunities to enhance the state of the environment and contribute to climate-resilient and low-carbon development

Compared with a project level environmental impact assessment (EIA), an SEA provides recommendations at a strategic level and allows better control over interactions or cumulative effects of multiple and combined options.

The aim of an SEA is to ensure that environmental considerations are integrated into the outputs of the CSNP. The SEA process implicitly operates to prevent the selection of projects or policies without sufficient information about alternatives being appropriately considered and assessed.

The SEA for the CSNP will meet SEA requirements in England, Scotland, and Wales. These comprise:

- England - Environmental Assessment of Plans and Programmes Regulations 2004
- Wales - Environmental Assessment of Plans and Programmes (Wales) Regulations 2004
- Scotland - Environmental Assessment (Scotland) Act 2005

Habitats regulations assessment (HRA)

A HRA refers to the several distinct stages of assessment which must be undertaken to determine if a plan or project is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects) before deciding whether to undertake, permit, or authorise it. European sites are protected by the Conservation of Habitats and Species Regulations 2017 as amended (known as the Habitats Regulations).

All plans and projects (including planning applications) which are not directly connected with, or necessary for, the conservation management of a habitat site, require consideration of whether the plan or project is likely to have significant effects on that site.

The 'habitats regulations assessment screening' should take into account the potential effects both of the plan/ project itself and in combination with other plans or projects. Where an adverse effect on the site's integrity cannot be ruled out, and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if necessary compensatory measures can be secured.

If a proposed plan or project is considered likely to have a significant effect on a protected habitats site, then an appropriate assessment of the implications for the site, in view of the site's conservation objectives, must be undertaken.

The CSNP will be undertaking a HRA plan assessment.

Marine Conservation Zones (MCZ) / Marine Protected Areas (MPA)

Marine Conservation Zones (MCZ) and Marine Protected Areas (MPA) are types of marine nature reserves in UK waters. Under legislation across the England, Wales and Scotland, an assessment of the effects of proposed plans and projects on MCZs (England and Wales) and/or MPAs (Scotland) may be required.

We are also proposing to undertake MCZ and MPA assessments where appropriate, to enable the identification of potential areas of impact to marine and shoreline habitats.

Statutory consultation requirements for environmental appraisals

The role of the statutory consultees within SEA is to bring their individual environmental expertise to the assessment process. This means the public can better understand the likely effect of a plan on the environment and meaningfully contribute to the plan's preparation by offering an informed view.

We are required to consult the following bodies for the SEA, covering Scotland, England, and Wales:

- Scottish Environment Protection Agency (SEPA)
- NatureScot
- Historic Environment Scotland
- Historic England
- Environment Agency
- Natural England
- Cadw – the Welsh Government's historic environment service
- Natural Resources Wales
- Joint Nature Conservation Committee (JNCC)
- Marine Management Organisation

For the HRA, a consultation with the appropriate Statutory Nature Conservation Bodies (SNCB) will be carried out prior to the submission of the HRA options report to the Secretary of State. There is no strict requirement on when this must occur in the HRA process. However, we consider it is essential to involve and consult with the SNCBs from the HRA scoping stage. This will enable the early identification and testing of options that pose a risk to internationally important wildlife sites, so measures can be taken to reduce the need for derogations from the HRA regulations.

For HRA we are required to consult with the following SNCBs:

- Natural England
- Natural Resources Wales
- NatureScot

8. Next Steps

Next steps for the CSNP

1	Stakeholder consultation	We have published our high-level principles that we are proposing to undertake within our methodology. We are interested in your opinions on what we are proposing.
2	Analyse feedback	We will review the feedback received and identify where changes can be made to our methodology.
3	You said, we did	We will produce a "you said, we did" publication, indicating the themes that were provided as part of the feedback, and how we have used this to refine the methodology.
4	Publish our draft methodology	We will publish our draft methodology based on the feedback received and further work undertaken.
5	Stakeholder consultation	We will carry out a further stakeholder consultation to understand your thoughts on the more detailed, updated methodology.
6	You said, we did	We will publish an additional "you said, we did" publication to explain what we have done with feedback received during the second consultation.
7	Methodology submitted to Ofgem	Our methodology will be submitted to Ofgem to be formally accepted and agreed.

Underpinning all the steps will be continuous stakeholder engagement.

9. Useful information

Glossary

Legal notice

Glossary

Term	Description
AC: Alternating current	Is a type of electrical current, in which the direction of the flow of electrons switches back and forth at regular intervals or cycles. In Great Britain the direction is reversed 50 times each second, which is known as a frequency of 50 Hz.
BRAG: Black, red, amber and green	BRAG refers to a colour-coded level of risk that has been assigned to various elements of a project.
Boundary	A boundary splits the system into two parts, crossing critical circuit that carry power between the areas where power flow limitations may be encountered
Capacity	The maximum rated power output, usually measured in kilowatts (kW), megawatts (MW), gigawatts (GW) or terawatts (TW).
Capex: Capital expenditure	Capital expenditures and refers to the investments a company makes to acquire, improve or maintain long-term assets.
CATO: Competitively appointed transmission owner	An entity competitively appointed to construct, own and operate part of the GB electricity transmission network.
CSNP framework	The CSNP framework will encompass a range of different processes and outputs. It will include the publication of system requirements, a roadmap of potential longer-term options, as well as a plan of projects for delivery.
Circuit breaker	A piece of equipment that stops the flow of an electric current, used to prevent damage to the wires and equipment that are connected to it
CNDM: Connections Network Design Methodology	Is the proposed process by which the NESO and TOs will assess connection applications and define the roles and responsibilities.
Constraint	A situation where energy is restricted in its ability to flow between two points, for example, due to thermal or voltage limitations.
Constraint costs	The cost of taking balancing actions on the electricity transmission system which redispatch generation to prevent unacceptable flows across parts of the network.

CBA: Cost-benefit analysis	A method of assessing the benefits of a given project in comparison to the costs. This tool can help to provide a similar basis for all projects to be considered.
DC: direct current	Electrical current which flows consistently in one direction.
Demand	The amount of electrical power is being used by consumers.
DESNZ: Department for Energy Security and Net Zero	Is responsible for delivering security of energy supply, ensuring properly functioning energy markets, encouraging greater energy efficiency, and seizing the opportunities of net zero to lead the world in new green industries.
Detailed design	Includes consenting, planning and construction stages of project development.
DNO: Distribution network operator	Are licensed companies that own and operate the network of towers, transformers, cables and meters that carry electricity from the national transmission system and distribute it throughout Britain.
ETYS: Electricity Ten Year Statement	A NESO publication that shows the likely future transmission requirements of bulk power transfer capability of the national electricity transmission system.
Fossil fuels	A hydrocarbon-containing material such as coal, oil and natural gas, formed naturally in the earth's crust from the remains of dead plants and animals that is extracted and burned as fuels.
FES: Future Energy Scenarios	NESO's range of credible pathways for the future of energy out to 2050.
Generation	The sources of electrical power from a diverse range of sources.
GW: Gigawatt	A unit of power. 1 GW = 1,000,000,000 watts
GNCNR: Gas Network Capability Needs Report	As NESO, we hold a gas system planner licence in addition to our electricity system operator licence. The first GNCNR will be published by the end of 2024, which will outline the network capability on the NTS in relation to the natural gas supplies and demands from the Future Energy Scenarios (FES) pathways. Based on the GNCNR, National Gas will develop network options.
HVAC: High voltage alternating current	AC power transmission at voltages above 110 kilovolts (kV).

HVDC: High voltage direct current	DC power transmission at voltages above 110 kilovolts (kV).
HND: Holistic Network Design	Provided a recommended onshore and offshore design that could facilitate the UK Government ambition of 50 GW of offshore wind in GB by 2030.
Inertia	The kinetic energy stored in spinning parts of electricity power generators that helps to stabilise the system.
Interconnector	A high voltage cable that connects the electricity systems of neighbouring countries. In Great Britain an interconnector may typically consist of undersea cables to a neighbouring European country and allows for the trading and sharing of surplus electricity between the two.
Load factor	An indication of how much a generation plant or technology type has output across the year, expressed as a percentage of maximum possible generation. These are calculated by dividing the total electricity output across the year by the maximum possible generation for each plant or technology type.
NETS: National Electricity Transmission System	The NETS is otherwise known as the Electricity Transmission network which spans across the Great Britain. The network comprises a mixture of overhead cables, underground cabling, and subsea cables – the size of these assets varies from of 400kV, 275kV, and 132kV assets. These are all linked together via substations across the country that then connect separately owned generators, interconnectors, large demands, and distribution systems.
NIA: Networks Innovation Allowance	A set allowance each energy network receives as part of their price control allowance. It provides limited funding to energy networks to fund smaller technical, commercial, or operational projects directly related to licensees' network.
NOA: Networks Options Assessment	A NESO-run process that makes recommendations to TOs as to which projects to proceed with to meet future network requirements as designed in the electricity ten year statement.
NSP: Network services procurement	It seeks to open new ways for the industry to offer solutions to meet system needs across constraints, stability, and voltage. NSP helps reduce the need for new network build and include our stability and voltage markets.
Ofgem: Office of Gas and Electricity Markets	It is the UK's independent National Regulatory Authority, a non-ministerial government department. Their principal objective is

	to protect the interests of existing and future electricity and gas consumers.
OCSS: Offshore Coordination Support Scheme	A scheme that provides grants to offshore energy projects to develop coordinated options for offshore transmission infrastructure.
OHA: Offshore hybrid assets	It is a connection between two countries which also connects in another form of offshore generation. For example, instead of individual wind farms connecting one by one to the shore, offshore hybrid assets will allow clusters of offshore wind farms to connect all in one go, plugging into the energy systems of neighbouring countries.
OTNR: Offshore Transmission Network Review	It was launched in July 2020 with the objective to address the barriers in increasing offshore wind capacity to achieve net zero and ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way. This aims to find the appropriate balance between environmental, social, and economic costs.
Optimal	The option is economically justified in at least one scenario in the NOA.
OHL: Overhead lines	An electrical cable that is strung high above the ground using utility poles used for transmitting electrical power.
Reinforcements	Additional grid infrastructure implemented to ensure the national electricity transmission system can accommodate existing and future generation and demand.
RAS: Rotor angle stability	The ability of interconnected synchronous machines of a power system to remain in synchronism after being subjected to a disturbance.
SEA: Strategic Environmental Assessment	A tool that contributes to informed decisions in support of sustainable development by incorporating environmental considerations into the development of public policies, plans and programs.
Stability	It is the inherent ability of the system to quickly return to acceptable operation following a disturbance. The term is used to describe a broad range of topics, including inertia, system strength and dynamic voltage. If the system becomes unstable it could lead to a partial or total system shut down leading to the disconnection of consumers.

SQSS: Security and Quality of Supply Standard	It sets out the criteria and methodology for planning and operating the National Electricity Transmission System onshore and offshore.
SOF: System operability framework	Takes a holistic view of the changing energy landscape to assess the future operation of Britain's electricity networks. The SOF combines insight from the Future Energy Scenarios with a programme of technical assessments to identify medium-term and long-term requirements for operability.
Strategic parameters	They are confirmed at the end of the strategic optioneering and include boundary capability provided and whether a reinforcement is onshore or offshore, HVDC or AC, predominantly OHL or underground cable, its spatial envelope, and connection in relation to the MITS.
Substations	They contain the equipment that transforms the voltage of electricity.
System operability	The ability to maintain system stability and all the asset ratings and operational parameters within pre-defined limits safely, economically, and sustainably.
TO: Transmission owner	A collective term used to describe the three electricity transmission asset owners within Great Britain, namely National Grid Electricity Transmission (NGET), Scottish & Southern Electricity Networks Transmission (SSEN) and SP Transmission plc.

Legal notice

For the purposes of this report, the terms “NESO”, “we”, “our”, “us” etc. are used to refer to National Energy System Operator Limited (company number 11014226).

NESO has prepared this report pursuant to its statutory duties in good faith and has endeavoured to prepare the report in a manner which is, as far as reasonably possible, objective, using information collected and compiled from users of the gas and electricity systems in Great Britain, together with its own forecasts of the future development of those systems.

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