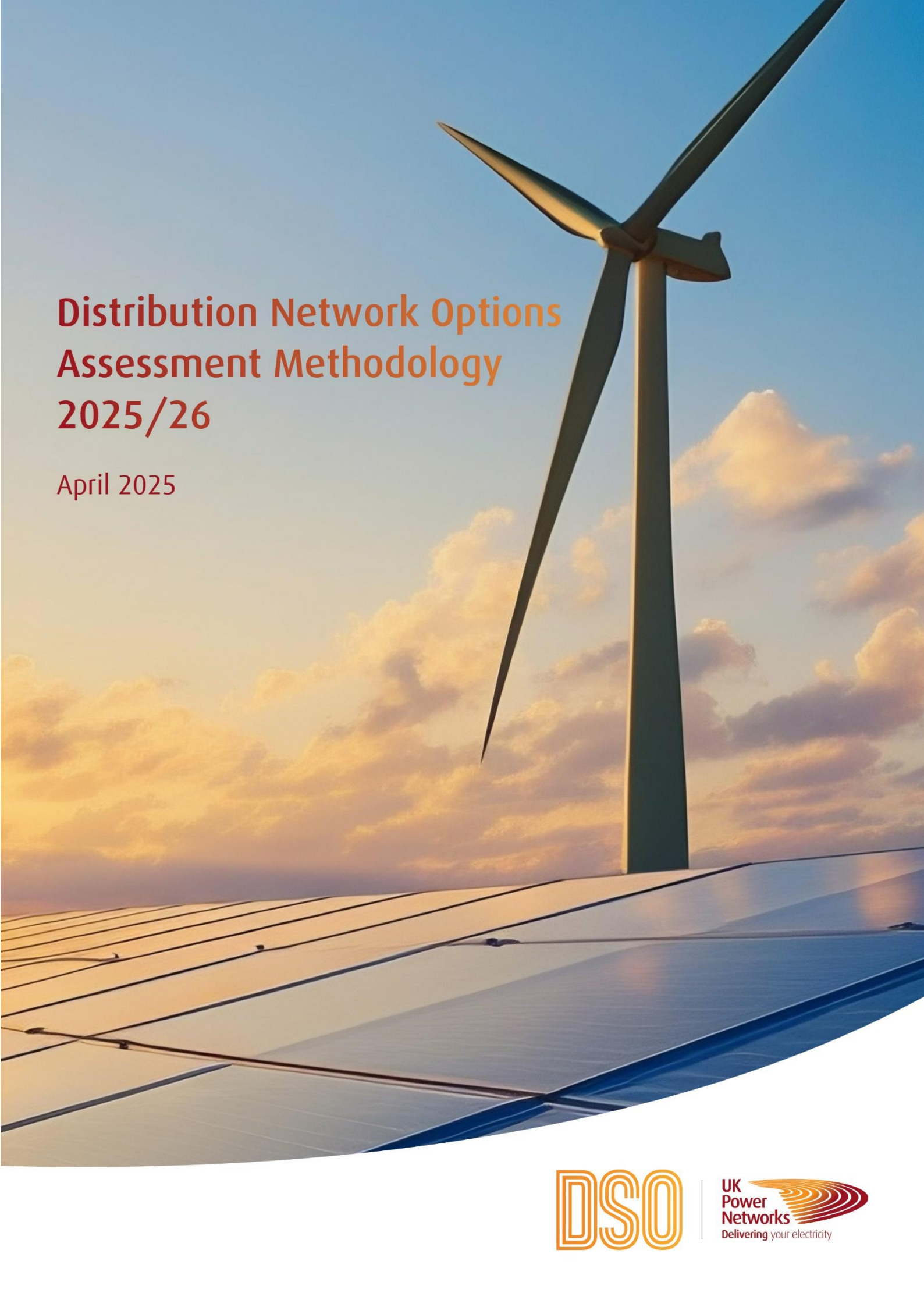




Distribution Network Options Assessment Methodology 2025/26

April 2025



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1. Executive Summary

UK Power Networks established the independent Distribution System Operator (DSO) to help transition the energy system to Net Zero and facilitate changing customer needs as efficiently as possible and without delays. Our Distribution Network Options Assessment (DNOA) Methodology is the DSO's investment appraisal framework and was first published in 2023 and updated in 2024¹. The DNOA Methodology uses the latest forecasts to develop, evaluate and recommend the most efficient network investment options objectively and transparently to address future network capacity needs.

Over the past year, there has been a renewed focus on how policy, regulation and energy networks can support the Net Zero transition. We are moving from a relatively low demand environment with ample capacity headroom across our network to a period of high demand growth over the next decades, which will require more proactive investments.

This DNOA Methodology document focuses on the updates we are making to the framework in readiness for this paradigm shift. Through input and challenge from our Supervisory Board and over a dozen industry experts through a DNOA Roundtable event, we have updated our DNOA methodology to give greater confidence that our decisions are optimal for the long term.

We have set out the principle changes in our approach in this document to be implemented during 2025/26, but ongoing industry developments such as RESP outputs and Ofgem's RIIO-ED3 regulatory developments mean that future updates to the DNOA Methodology will be required to ensure it remains fit for purpose. The main changes include:

1. Understanding uncertainty of network needs

Forecasting helps us identify capacity needs over the short and long-term, but there is considerable uncertainty with respect to the exact timing, size and location of investments needed. To better model this uncertainty we have developed new scenarios that envelope the potential future trajectory as an input into the DNOA. We have also introduced quarterly forecast updates which increases our agility to course correct to new developments.

2. Ensure deliverability of investment portfolio over the long term

The core objective of the DNOA is to ensure right-sized capacity is delivered to the right place and at the right time. With higher volumes of investments needed over the next decades the DNOA framework has been updated to incorporate additional strategic inputs from the RESP, and optimisation of investments to smooth out demands on resources needed to deliver it. Flexibility will continue to have an important role such as to help accelerate connections and support whole system outcomes.

3. Touch the network once

To increase the efficiency of our investments to meet longer term needs, the DNOA will be evaluating the benefit of upsizing investments on load-driven and condition-driven network assets across our low and high voltage network. This will minimise future costs and disruption whilst also helping deliver the capacity needed by 2050.

4. Continuously improve governance arrangements

Our DSO governance arrangements are already industry-leading with legal separation and independent oversight of our Supervisory Board. To ensure independence further, we have appointed an independent third party to review and audit our DNOA recommendations.

¹ DNOA Methodology and reports - <https://www.ukpowernetworks.co.uk/our-company/distribution-network-options-assessment-dnoa>

2. Introduction

The rapid decarbonisation of the energy system, given fresh impetus by the government's commitment to decarbonise the power system by 2030, has created a dynamic and fast-evolving operating environment for network companies. We have now seen the launch of the NESO which will take on a RESP role, whilst Ofgem are consulting on future network regulation to accelerate network investments over the coming years.

We set up the DSO in April 2023 to ensure we would be able to keep delivering for customers on the path to Net Zero. Ofgem has recognised us as the leading DSO based on our performance in 2023/24, which shows that we are on the right track, but we know more needs to be done to adapt to the changing environment and customer expectations. At the heart of the DSO is the DNOA, which is the framework we follow to deliver distribution network investments efficiently and, through collaboration with others, help resolve wider system issues.

Network reinforcements and flexibility are the main tools we use. Reinforcement adds large blocks of capacity but takes several years to complete and is irreversible. In contrast, flexibility from flexible assets such as generation, storage, or flexible consumers adds variable volumes rapidly and at relatively low cost. Flexibility is therefore effective at managing an uncertain environment and remains a key tool for the DSO. However, we are also gearing up for an increase in reinforcements over the coming years needed to deliver growing electricity demand, RESP defined strategic needs, and policy goals such as Clean Power 2030.

This DNOA Methodology outlines the high-level approach and changes that will be developed during 2025/26, with updates and revisions to the methodology published later in 2025/26 which will provide more details of how they will be implemented. This will incorporate how the output from the RESP will interact with DNOA as well as developments with Ofgem's ED3 framework to account for the long lead-time of investments ahead of April 2028 when RIIO-ED3 starts.

3. What is the Distribution Network Options Assessment?

Introduction to the DNOA

The DNOA is the framework of processes that underpins the appraisal of investments and subsequent recommendations which aim to deliver the optimal development of both our distribution network and of the wider electricity system and sits at the heart of how the DSO is enabling the transition to Net Zero at least cost to bill payers.

The main stages of the DNOA are explained below and shown in Figure 1:

- 1. Understanding future network needs** using the latest stakeholder-led intelligence and best-in-class forecasting systems.
- 2. Evaluating all options to resolve needs** from a toolkit of network and non-network flexibility solutions and selecting the best solution considering timing, uncertainty, sizing, and efficiency.
- 3. Reviewing and approving recommendations** through robust governance arrangements including a DSO:DNO Operational Agreement and an independent Supervisory Board, before publishing the decision and implementing the solution.

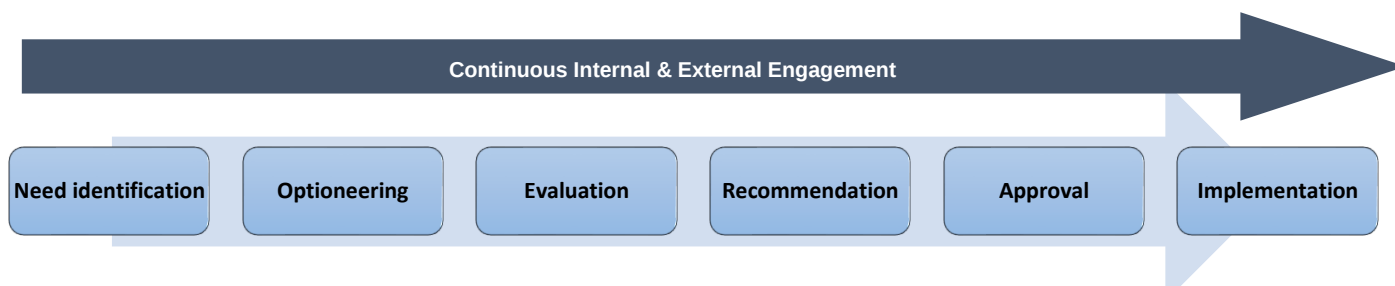


Figure 1: Stages of the Distribution Network Options Assessment

The DNOA Methodology is the document that describes the approach to the DNOA including the principles, methods, and governance of developing an optimal network and is regularly updated. It provides transparency to our stakeholders and customers with respect to the recommendations we make to meet the distribution network's capacity needs. It may therefore be of interest to a wide range of stakeholders with an interest in how the distribution network is developed including network users, consumer groups, flexibility providers, other system and network operators, market operators, regulators and policy makers.

Previous versions of the DNOA Methodology and the recommendations are available on our website at: <https://www.ukpowernetworks.co.uk/our-company/distribution-network-options-assessment-dnoa>.

4. Need identification

4.1. Introduction to forecasting

The DSO calculates and monitors future network capacity needs to inform the size, timing, and type of intervention required across our asset base. We cover an area of over 29,250 square kilometres in London, the East and South East of England, managing 982 Primary and Grid substations and 116,961 Secondary substations.

There are broadly four steps to identifying needs which are considered as part of the DNOA's 'need identification' step:

1. **Forecast** – develop scenarios of future load based on network measurements, predictive models and stakeholder input, including local and industrial needs, and aligned to the NESO's pathways. Scenarios are then translated into loading at specific substations. More details can be found in our annual Distribution Future Energy Scenarios (DFES) documentation². A significant improvement made is the increased frequency of updates of inputs to our forecasts, from annual to quarterly, to improve our responsiveness to fast-changing developments such as customer connections.
2. **Determine Headroom** – calculate the difference between forecast and existing network capacity to identify network locations with potential capacity needs. The methodology of calculating and reporting network headroom is explained in the Network Development Plan Methodology³.
3. **Investigate** – verify and confirm capacity needs through further investigation of site-specific characteristics. See section 4.3 for more details.
4. **Asset condition** – the previous steps identify needs driven by load growth, but as will be discussed in section 5.3, the DNOA will now include review of works related to asset condition.

² DFES methodology - <https://dso.ukpowernetworks.co.uk/distribution-future-energy-scenarios>

³ NDP Methodology - https://ukpowernetworks.opendatasoft.com/pages/ltds_ndp_landingpage/#NDP

4.2. Planning under uncertainty

The current DFES scenarios provide possible trajectories of future load growth. These scenarios are aligned to the NESO's pathways but represent a relatively narrow range of potential future outcomes. We note that:

- A narrow range between pathways can create a false sense of certainty;
- GB power demand has consistently underperformed relative to industry forecasts⁴; and
- Technological progress and energy efficiency's impact on dampening power demand have historically been underestimated. The assumptions on consumer behaviour using EVs and heat pumps has significant implications on demand profiles and therefore network capacity needs.

This means that whilst we can build confidence around the technology pathway needed for 2050, we do not yet know to what extent and how major peak demand increases will appear and the nature of the interventions required to address these capacity needs. There is little doubt that delivering a Net Zero system will require a significant increase in electricity demand and generation, but uncertainty is inherent to forecasting and should be managed to protect consumers from unnecessary costs.

To model the uncertainty in future outcomes and hence capacity needs, we have established a low and high scenario beyond the typical DFES. These new scenarios are created by adjusting key forecasting assumptions within ranges of potential outcomes over the entire period through to 2050. The high scenario assumes high load growth but with limited optimisation to smooth out demand peaks, whilst the low scenario has lower growth alongside high levels of optimisation and energy efficiency. Figure 2 shows the benefit of managing the potential for the high scenario whilst being agile enough to capture the consumer benefits if the lower scenario materialises. This is known as option value, the capability to course-correct in light of new information. Even if the forecast outturns as expected, we would still expect some sites' capacity needs to be fully met using flexibility to 2050.

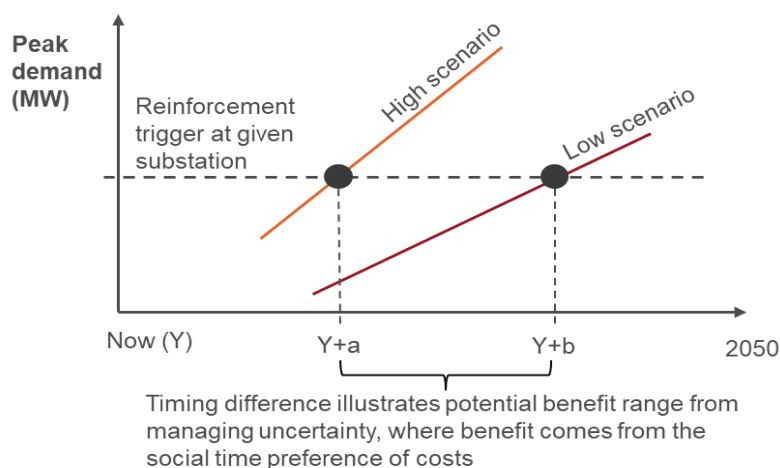


Figure 2: Benefit range of managing uncertainty

⁴ Future Energy Scenarios - <https://www.neso.energy/publications/future-energy-scenarios-fes/fes-documents>. Electricity demand in 2022 was found to be 14% below the NESO's lowest Future Energy Scenario in 2015. Similarly, slow demand growth has also been observed on the distribution network.

4.3. Verifying network needs

Having identified sites that may require intervention, further site-specific information is gathered to verify network needs. This allows us to target interventions and to define the counterfactual assumption correctly; the latter forms the basis of the valuation of options. These factors include, but are not limited to:

- a. **Forecasted load duration** – headroom data gives us the magnitude of the additional peak capacity required but we also need to understand the duration. A short period of high load for example can generally be accommodated within safe parameters of network assets and does not require further intervention.
- b. **Forecasted load persistence** – headroom data may sometimes show year on year volatility at some sites due to changes in forecasts. We want to ensure that interventions target sites with a clear and consistent pattern of need over multiple forecasting cycles. This can be determined by reviewing historic load data over the past few years. In addition, we also test the needs against a low, central, and high demand scenario and if there is a need in the low scenario this also indicates a higher confidence need.
- c. **Flexibility services availability** – at sites where flexibility currently provides capacity, we check whether contracts are performing as expected and whether flexibility can feasibly continue to provide future capacity or whether an alternative intervention is required.
- d. **Network architecture** – additional capacity needs can sometimes be managed using operational network solutions such as moving load between neighbouring substations.

4.4. Factoring in long-term capacity needs

Electricity demand forecasts are based on load and generation growth fundamentals. The DNOA uses this to initiate interventions required in the near term (up to five years ahead) to meet incremental high-confidence growth. This has served us well during a period of relatively low demand with ample capacity headroom across our network. There is now a need to prepare for a paradigm shift where more proactive investments are needed in the face of far greater demand growth.

Strategic developments

The RESP will define strategic developments required to meet wider policy objectives such as driving economic growth. These strategic needs will be additional to what the DNO and DSO would conventionally plan for but will need to be considered alongside our other interventions through the DNOA to ensure deliverability and optimisation.

When considering accelerated network investment, we have not explicitly factored in indirect societal impacts that we cannot quantify with confidence, such as the impact on economic growth or health. Doing so in the absence of an accepted regulatory framework would conflict with our current RIIO-ED2 DSO role, by increasing the risk of mistargeted network investment. We are working with the RESP who has a remit to define such a framework. The DNOA Methodology will be updated once this becomes clearer.

Ensuring deliverability

Our current understanding is that the RESP will specify a 10-year regional energy pathway that our network investments will need to deliver against. The higher volumes of investments in future means that there is a need to not only consider individual site interventions but also understand the implications at the portfolio level across all sites and over a longer time horizon. Through engagement with a DSO from the Netherlands we validated the value of smoothing out future

reinforcements to optimise delivery, reducing future peaks in reinforcement volumes by bringing forward a proportion of these.

Whilst investing against a pathway to ensure deliverability we also believe that future uncertainty should continue to be managed to realise option value. We are also working with the RESP to understand the approach and the DNOA Methodology will be updated when more information becomes available.

Figure 3 shows how these considerations factor into our DNOA Methodology, alongside other updates that we've made so far.

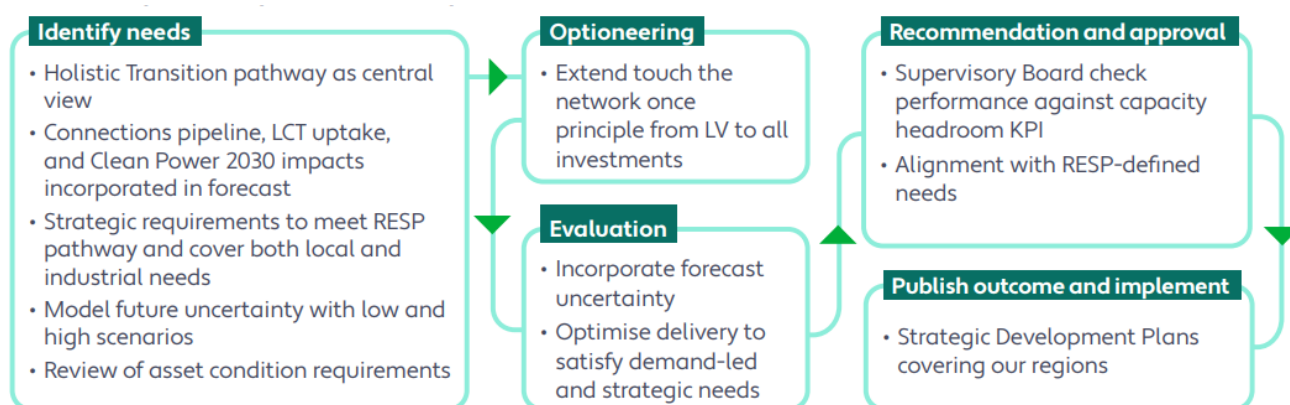


Figure 3: Updates to our DNOA, including factoring in long-term needs

5. Optioneering, evaluation & recommendation

5.1. Introduction to optioneering

After the identification of capacity needs, the optioneering process involves laying out all options of delivering the capacity including reinforcement and flexibility. A baseline intervention is defined and costed, generally this is network reinforcement which is the addition or replacement of transformers and cables to add large blocks of capacity. Reinforcement has high upfront costs and takes several years to complete. The cost estimates for reinforcement are provided by the DNO.

Flexibility services are a non-network solution whereby distributed energy resources are incentivised to change their behaviour to create network capacity on demand. Flexibility generally has low upfront costs and is quick to deploy. The cost of flexibility is determined by market testing, in which flexibility providers bid for contracts. There is a ceiling price set based on the maximum benefit that can be achieved by avoiding the baseline intervention for a period. If flexibility can be procured below the ceiling price, then it is efficient relative to the baseline reinforcement.

Note that reinforcement may be the only option in some instances where capacity needs are driven by strategic reasons or accelerated to ensure future deliverability.

5.2. Evaluation and recommendation

The options are evaluated using all the information collated from the optioneering phase. Solutions that need to be market tested for flexibility services are valued using the Common Evaluation Methodology CBA (CEM CBA)⁵. This is based on the Ofgem CBA⁶ which converts costs and benefits of an activity through the regulatory model into the impact on consumers. It also discounts future costs and benefits into present value terms reflecting the social time preference and allows for comparisons between different activities or strategies. The CEM CBA tool builds on this with additional functionality including the consideration of different scenarios, which will affect how much flexibility needs to be procured, and the relevant ceiling prices and the option value. However, we understand that the functionality to investigate uncertainty has not been widely used to date, if at all.

Option value is the capability to course-correct an investment decision in light of new and better information. If load increases quickly then flexibility can be deployed, and if growth continues and network reinforcement is required, then flexibility can provide capacity until reinforcement can be completed. The CEM CBA approach to option value stipulates the use of scenarios as snapshots of future uncertainty⁷ as discussed in section 4.2. The cost and benefit of each scenario is evaluated in turn, before finally being amalgamating into a single set of parameters for decision making.

The evaluation stage also considers the technical as well as economic factors of meeting the site and portfolio requirements. Having identified and selected the optimum solution that will address the need, the recommendation is reviewed by the DSO Supervisory Board for approval.

5.3. Touch the network once

We explained in section 4.4 how the DNOA has been updated to enable more proactive investments based on longer term needs. In the same way, DNOA will also consider the benefits of upsizing reinforcements to meet forecasted long-term needs to 2050. Indeed, we already take this approach at some larger capital projects and low voltage works, which minimises site revisits, costs and disruption. This not only applies to load-driven reinforcements, but also condition-related works (such as the age of the asset) which DNOA will also consider.

To evaluate the value of upsizing we compare the incremental cost to meet the larger capacity needs out to 2050, if not already achieved by the baseline reinforcement, against the potential for carrying out additional works in future. Forecast uncertainty will need to be assessed especially when looking out by 25 years. There may also be alternative options for smaller investments that does not meet the full needs but allows for easier future expansion. The details of this approach will be developed with the DNO based on what options are feasible.

6. Tracking the deliverability of our investment portfolio

The capability to deliver a large-scale investment programme is important to ensure we are not a blocker to Net Zero. Site-level optimisations, as covered in the evaluation section, will be extended to include overall deliverability.

The introduction of a Key Performance Indicator (KPI) to track the year-on-year change in total capacity headroom

⁵ ENA Common Evaluation Methodology - <https://www.energynetworks.org/publications/common-evaluation-methodology-tool-and-supporting-materials>

⁶ Ofgem CBA - <https://www.ofgem.gov.uk/consultation/rrio-ed2-data-templates-and-associated-instructions-and-guidance>

⁷ CEM Consultation Webinar Slides, 08 Mar 2022, explains use of scenarios - [https://www.energynetworks.org/publications/on22-ws1a-p1-цем-consultation-webinar-slides-\(08-mar-2022\)](https://www.energynetworks.org/publications/on22-ws1a-p1-цем-consultation-webinar-slides-(08-mar-2022))

(network capacity minus demand) will serve as a leading indicator of our progress in delivering capacity. This KPI will be factored into the DNOA. Where the KPI is below target, it signals more headroom is required. The DNOA will then evaluate the most efficient means of creating the required additional headroom, which may involve revisiting site-level assessments to find the optimum overall solution. The minimum acceptable level of capacity headroom is set on the basis of ensuring that any credible demand increase can always be satisfied. Looking forward to RIIO-ED3 we believe this approach could be formalised into an output incentive that addresses Ofgem's concern that sufficient capacity headroom levels need to be maintained throughout the 2030s and 2040s.

The target level will be set to reflect the best capacity delivery profile that minimises exacerbating resource limitations. The level is set using forecasts, the DNO's capability to deliver network reinforcements over a set timeframe, and the extent to which flexibility can provide headroom. Hence, the target level will change over time. Figure 4 demonstrates schematically the Headroom KPI.

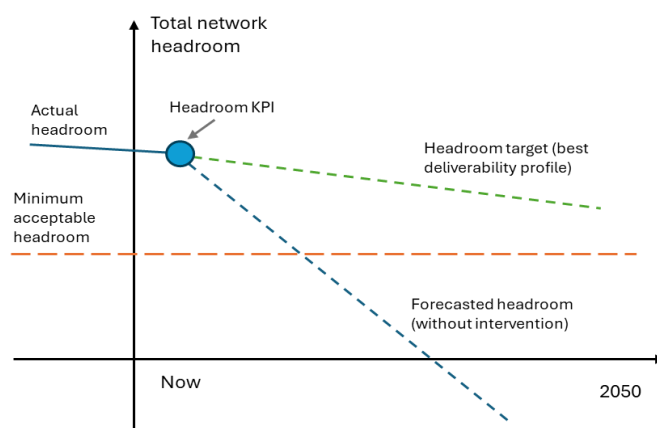


Figure 4: Using a headroom metric to ensure deliverability of our investment portfolio

We also publish quarterly performance against our KPIs and our methodology of reporting DSO benefits on our website⁸.

Our Network Scenario Headroom Report⁹ is published annually showing forecasted capacity headroom out to 2050 across our Primary and Grid sites. Currently, these reports only factor in reinforcements in delivery and therefore beyond the near term they show a reduction of capacity headroom as there is no impact from interventions. As part of giving greater confidence to customers we will continue to be open to updating our approach to show the impact of interventions based on the principles being established in our DNOA. We have also now published a long-term system needs register to 2050¹⁰ which will be updated quarterly.

7. Improving governance arrangements

The DSO is legally separate from the DNO and oversight is provided from an independent DSO Supervisory Board that reviews and approves our methodology and DNOA recommendations. We are committed to continuously ensure our governance arrangements support the development of well justified investment recommendations.

⁸ KPI report and benefits methodology - <https://dso.ukpowernetworks.co.uk/resource-centre/publications-and-useful-links>

⁹ Network Scenario Headroom Report - https://ukpowernetworks.opendatasoft.com/pages/ltts_ndp_landingpage/

¹⁰ Long-term system needs register - <https://www.ukpowernetworks.co.uk/our-company/distribution-network-options-assessment-dnoa>

- The key roles and interactions between the DSO and the DNO within the DNOA process are described in our DSO:DNO Operational Agreement¹¹. This will be updated following regular review to ensure it continues to reflect any change or clarifications in roles and responsibilities.
- We have appointed an independent auditor to review our processes, the key exchanges of data and their accuracy, as well as how we develop recommendations prior to our submissions to the DSO Supervisory Board. The auditor will report on their findings and help identify potential areas for improvement. This builds on existing arrangements, whereby the DSO Supervisory Board reviews the supporting evidence underpinning the investment recommendations, challenges assumptions and provides feedback, as well as undertaking or commissioning audits.

8. Planned outage needs

Planned outages are required as part of normal network operations, for example to undertake maintenance, network upgrades, and customer connections. However, outages could reduce network capacity temporarily, which could impact on customers. The DSO is using innovative approaches already to minimise customer impacts, such as through use of short-term forecasting to optimise the scheduling of works. This approach will deliver more benefits to customers as the volume of works increases towards Net Zero.

The DNOA Methodology has a role in setting out how options such as flexibility services are considered as part of outage planning, including the process, valuation, and governance. Using flexibility services for outage planning will differ to using flexibility to support long term load growth due to the different benefits that it provides to the network and the shorter timescales involved. An agile DNOA process will support this using existing responsive capabilities, such as operational forecasting and day-ahead flexibility auctions. The process and commercial offerings will need to be further developed with flexibility providers.

9. Next steps

This DNOA Methodology document sets out the principles of how we will develop a network that enables Net Zero. We recognise that currently they remain relatively high-level but will be developed into detailed implementations and communicated through an updated DNOA Methodology to be published later in 2025/26. One of the main reasons for this are the significant dependences on industry developments which are still ongoing such as the Regional Energy Strategic Planning (RESP) outputs and Ofgem's RIIO-ED3 framework.

We expect a transitional RESP to be available by early 2026, although a draft may be available earlier in 2025, whilst Ofgem's RIIO-ED3 regulatory framework development will continue with the Sector Specific Methodology Consultation in Q3 2025¹². This means that future updates to the DNOA Methodology will be required to ensure it remains fit for purpose. Even though RIIO-ED3 does not start until April 2028, the nature of long-lead time network investments will require development ahead of time.

Thank you for engaging with our DNOA methodology document. If you wish to discuss this in more detail or provide feedback you can contact us at networkoptionsassessment@ukpowernetworks.co.uk

¹¹ DSO:DNO Operational Agreement - <https://d11f1oz5vvd9r.cloudfront.net/app/uploads/2023/11/1011184-UKPN-DSO-Operational-Agreement-FINAL-1.pdf>

¹² Ofgem's ED3 framework decision - <https://www.ofgem.gov.uk/decision/framework-decision-electricity-distribution-price-control-ed3>