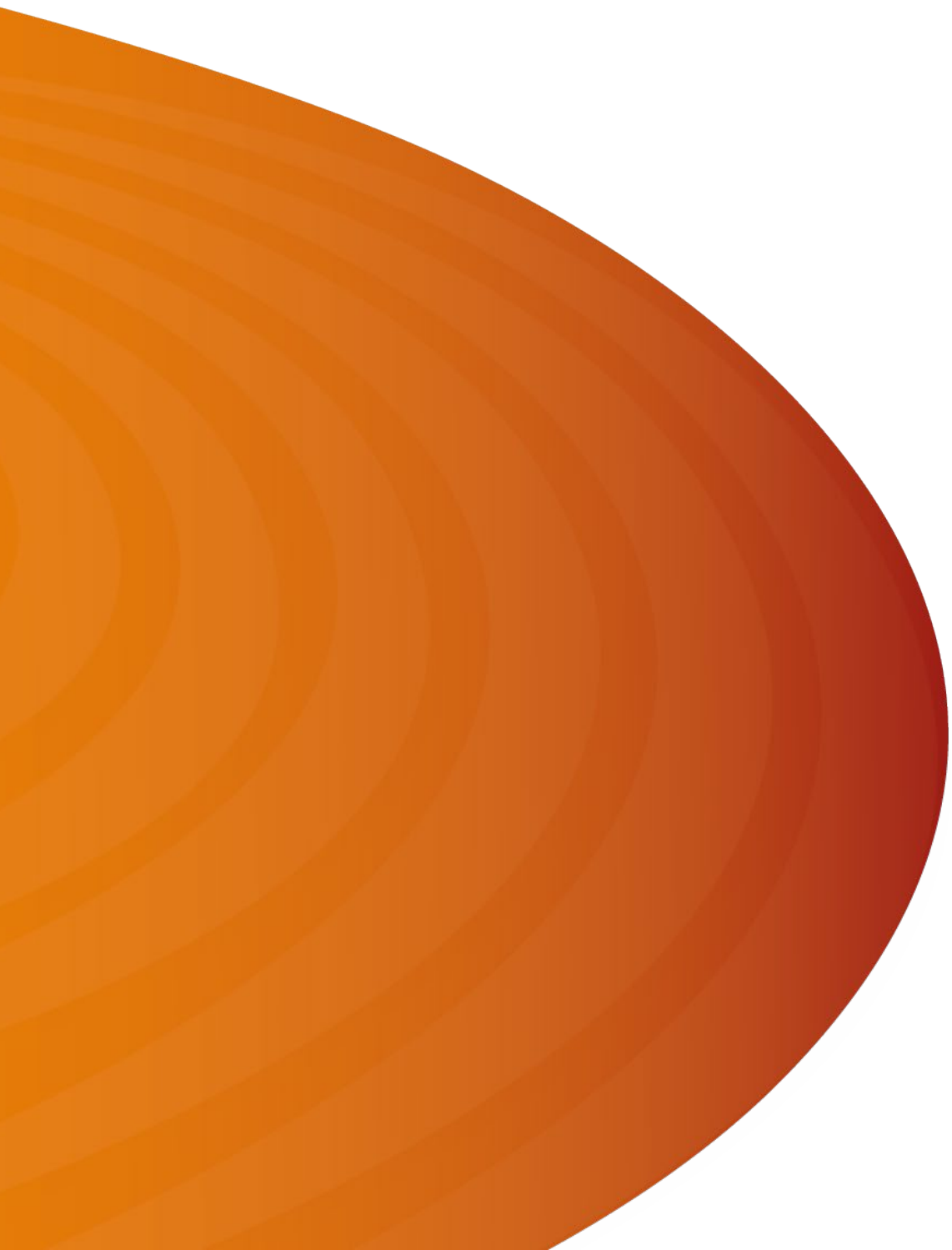
DNOA Methodology Enhancement

For consultation

November 2023



Contents

Glossary

Term	Description
CBA	Cost Benefit Analysis
CEM	Common Evaluation Methodology
CT	Consumer Transformation
DER	Distributed Energy Resources
DFES	Distribution Future Energy Scenarios
DNO	Distribution Network Operator
DNOA	Distribution Network Options Assessment
DSO	Distribution System Operator
EHV	Extra High Voltage
ENA	Energy Networks Association
EPN	Eastern Power Networks
ESO / NGESO	Electricity System Operator / National Grid Electricity System Operator
ETO	Electricity Transmission Owner
GB	Great Britain (incl. England, Wales and Scotland)
GDN	Gas Distribution Networks
GLA	Greater London Authority
GMT	Ground Mounted Transformers
HI	Health Index
HV	High Voltage
IT	Information Technology
LAEP	Local Area Energy Planning
LPN	London Power Networks
LV	Low Voltage
NGET	National Grid Electricity Transmission
PMT	Pole Mounted Transformers
RIIO-ED2	RIIO stands for: Revenue = Incentives + Innovation + Outputs ED2 stands for: Electricity Distribution 2
RDP	Regional Development Programme
SCR	Significant Code Review
SFS	Strategic Forecasting System
SPN	Southeastern Power Networks
SSEN	Scottish and Southern Electricity Networks
UKPN	UK Power Networks
WACC	Weighted Average Cost of Capital

Executive Summary

UK Power Networks' vision is to deliver a fit for purpose electricity network for the energy transition at the lowest cost to our customers. To do that, we set up GB's first independent Distribution System Operator this year with appropriate governance to ensure that decisions on provision of future network capacity are made in the interest of all UK Power Networks customers.

As part of our operating model, we have set up the DSO Supervisory Board, introduced the Distribution Network Options Assessment and we are publishing new granular data on our capacity needs and investment decision making.

In June 2023 we published our first Distribution Network Options Assessment (DNOA)[1] methodology. The document reaffirmed our RIIO-ED2 commitment to market-test all load related[2] network needs that would otherwise lead to capital expenditure (capex).

More specifically, it explains our governance framework that will enable us to deliver capacity at the lowest cost. This framework ensures that we set up a level playing field between network and market-based solutions. This will deliver on our commitment to deliver up to a £410m reduction in load related expenditure during RIIO-ED2 through increased competition and use of flexibility. Also, it will ensure that our network is optimally utilised to meet the needs of the transition towards Net Zero.

This consultation document expands the DNOA Methodology in key areas, such as our decision-making framework for low value reinforcement schemes, and further clarifies our approach to generation constraints. This will provide transparency to our stakeholders and customers on how we make investment decisions to manage network constraints from the Extra High Voltage (EHV) network areas down to Low Voltage (LV) network at street level. This document should be read in conjunction with the June 2023 publication and is assumed that the reader has previously read that document.

Overall, distribution networks investment varies in cost and delivery time depending on where it is needed in the network. Hence, the table below summarises how we are evolving our DNOA processes from 2023 to 2024.

	Typical substation capacity	Typical customers Served	Decision making process
Grid Level	100MVA	Tens of thousands	As outlined in DNOA 2023[1]
Primary Level	20MVA	Thousands	As outlined in DNOA 2023[1] plus DNOA 2024 - proposed approach is part of this consultation (Section 2.2.1)
LV network	Ground mounted: 500kVA Pole mounted: 50kVA	Range from a few to 1000	DNOA 2024 – proposed approach is part of this consultation (Section 2.3)
Generation	N/A	Usually affecting a limited number of customers	DNOA 2024 – proposed approach is part of this consultation (Section 2.2.2)

Table 1. DNOA methodology approach against system needs.

[1] https://www.ukpowernetworks.co.uk/our-company/distribution-network-options-assessment-dnoa
[2] The term often used is Load Related Reinforcement (LRR) and indicates investment to create new network capacity.

Furthermore, in this document we are presenting:

- Planned enhancements to the information we will be including in the DNOA 2024 reports (section 3.2).
- Additional detail on the mechanics of the DNOA Methodology, such as the implementation of the Common Evaluation Methodology and how it links to our flexibility tenders (section 2.4).
- How we are applying a DNOA framework to establish solutions that will deliver consumer benefits across the whole electricity system, such as our Regional Development Programme (RDP) with the Electricity System Operator (ESO) (section 2.5).
- A roadmap for further development of the methodology (section 4).

Our June 2023 document combined with the enhancements and changes proposed in this document will be merged with the consultation results to set the complete updated DNOA Methodology. This is the framework that ensures we will make capacity available to our customers to connect and use their assets in a timely fashion at the least possible cost to consumers.

We kindly ask you review the proposed changes and take a few minutes to provide feedback via the link or QR code below.

Link to the online form

If you have any questions, contact the DNOA team at NetworkOptionsAssessment@ukpowernetworks.co.uk .

1. Introduction

The purpose of our DNOA Methodology and Reports are to provide transparency to the industry on our governance process regarding the decisions we will take to meet the future capacity needs across our South East, London and East of England regions over the coming years.

Our annual DNOA process involves publishing two documents, the methodology document and the report pack containing the results for each license area.

Since our June 2023 publication we have been engaging with stakeholders and collating feedback. Additionally, we have also identified improvements that will provide more information to our customers and help stakeholders understand better our internal delivery processes and governance.

In the following chapters we present the enhancements and additions we plan to do to the June 2023 publication and seek stakeholder feedback. We present section specific questions at end of each section.

2. DNOA Methodology expansion

This section presents the additional content and processes we will add to the methodology document. Where we refer to 'the methodology', we refer to the methodology document published in June 2023.

	Typical substation capacity	Typical customers Served	Decision making process
Grid Level	100MVA	Tens of thousands	As outlined in DNOA 2023[1]
Primary Level	20MVA	Thousands	As outlined in DNOA 2023[1] plus **new in DNOA 2024** - proposed approach is part of this consultation (Section 2.2.1)
LV network	Ground mounted: 500kVA Pole mounted: 50kVA	Range from a few to 1000	**New in DNOA 2024** – proposed approach is part of this consultation (Section 2.3)
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Table 1 *(repeat)*. DNOA methodology approach against system needs.

2.1. High value schemes – Process & Recommendation steps

In our June 2023 publication we described the core of our DNOA process in chapter 7. In the diagram below we are presenting the process in a flowchart version. The flowchart provides additional transparency and clarity to that of our previous publication as it shows more information regarding the steps we follow after the DNOA outcome.

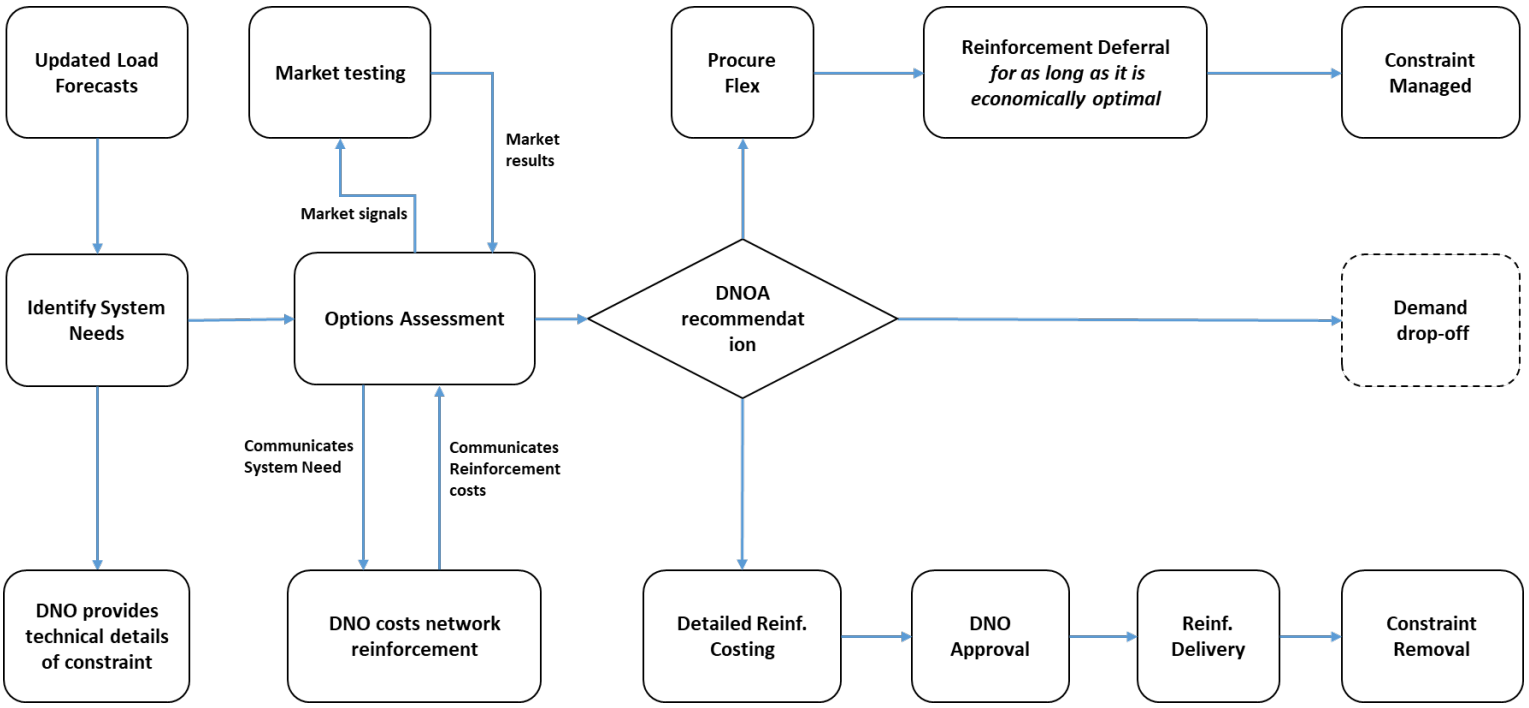


Figure 1. DNOA high value scheme process

Post DNOA recommendation actions

If the market-testing has been successful, the DNOA Methodology will recommend the award of flexibility contracts. If after repeated tenders, the flexibility tenders have not yielded sufficient flexibility to manage the constraints, the DNOA process will recommend that the Distribution Network Operator (DNO) progresses with an intervention. Lastly, in the scenario where after the annual iteration a forecasted constraint fades away, then the DNOA process will recommend pausing any intervention.

Questions for stakeholders:

- Question 1: How effective do you believe are these processes in terms of ensuring efficient outcomes?
- Question 2: How can we improve any part of this process?

2.2. Low value scheme methodology description

In the June 2023 methodology document chapter 3.3 we explained how we tailor our approach depending on the voltage level and value of the scheme. The document focused on providing details on the DNOA process for high value schemes that relate to needs that are identified at the Extra High Voltage (EHV) and High Voltage (HV) parts of our network.

This section expands and provides more clarity on our processes for assessing low value schemes. These relate to schemes relating to either small components of the High Voltage (HV)[3] network or at Low Voltage (LV) parts of the network. The threshold for the distinction between low and high value schemes is £1.5 million and the majority of the schemes below 11kV and on our LV network will fall below this threshold.

2.2.1. Schemes relating to the HV network

This first category includes low value schemes to upgrade assets installed on the high voltage parts of the distribution network. These are reinforcement schemes that aim to resolve local constraints and are often driven by new customer connections. As these are driven by dynamic customer demand they rarely align with the annual forecasting process we described in our June 2023 publication. Typically, these are low in value and high in volume. Indicatively, on an annual basis we could progress more than 50 schemes with an aggregated budget of less than £50m. These schemes require a complimentary decision-making process to ensure deliverability is not compromised.

In order to achieve this, our DNOA process has adopted a rules-based review and recommendation approach. It uses a set of established criteria checked annually to provide a clear recommendation going forward, which includes the following:

a. What is the time required to deliver the connection? If the capacity need requires resolution within 12 months, then the reinforcement scheme will normally proceed. Flexibility tenders have a longer delivery timeframe from tendering to contract award and delivery of the flexibility solution. This applies especially to areas where a flexibility zone has not previously been established.
b. What are the technical aspects of the need? There are cases where flexibility is not technically feasible, for example when the constraint is fault related.
c. Does the need for the scheme remain? If the network can accommodate the new connection, the need for reinforcement dissipates. Hence, the scheme for asset intervention is withdrawn.

Figure 2 below provides the details of the process. The above checklist is applied during the “annual review of schemes” activity shown in the figure below. Based on the result, a recommendation is made. Where projects are tendered for flexibility and the market based solution is shown not to be economically optimal, these shall be progressed to reinforcement.

[3] For example, circuit breakers, isolators or cables.

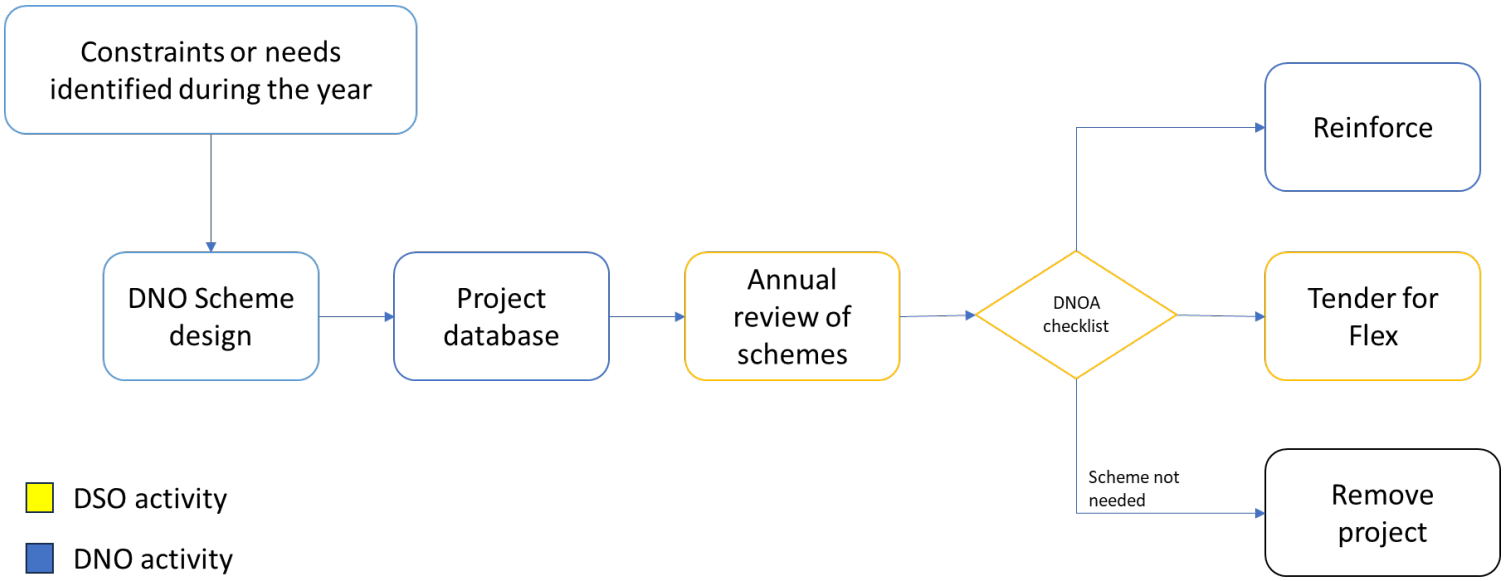


Figure 2. DNOA process to evaluate low value projects for High Voltage assets

2.2.2. Schemes relating to the secondary networks

Similar to our forecasting processes for EHV and HV networks, we are using our Strategic Forecasting System (SFS) to forecast peak loads on our Low Voltage (LV) network. These peak loads are then compared against the LV network's transformer capacities. These yield a utilisation output for the transformers on the LV network.

We have tailored our approach such that all Ground Mounted Transformer (GMT) sites with utilisation levels of more than 100% are included in our flexibility tenders, before being considered for any other type of intervention.

To ensure that we address the needs in a timely manner, we are informing interventions, including tendering for flexibility services one (1) year to two (2) years ahead of need.

The table below illustrates the intervention activities per asset type and utilisation level:

		Forecasted Utilisation Band			
		0-80%	80-100%	100-120%	>120%
PMT	Capacity	No action	No action	Reinforce	Reinforce
	Visibility	Install sample monitoring	Install sample monitoring	Install monitoring	Install monitoring
GMT	Capacity	No action	Expression of Interest for flex	Procure flex	Reinforce
	Visibility	Install sample monitoring	Install sample monitoring	Install monitoring	Install monitoring

Table 2. Intervention option per utilisation level

The overall process is shown in the diagram below.

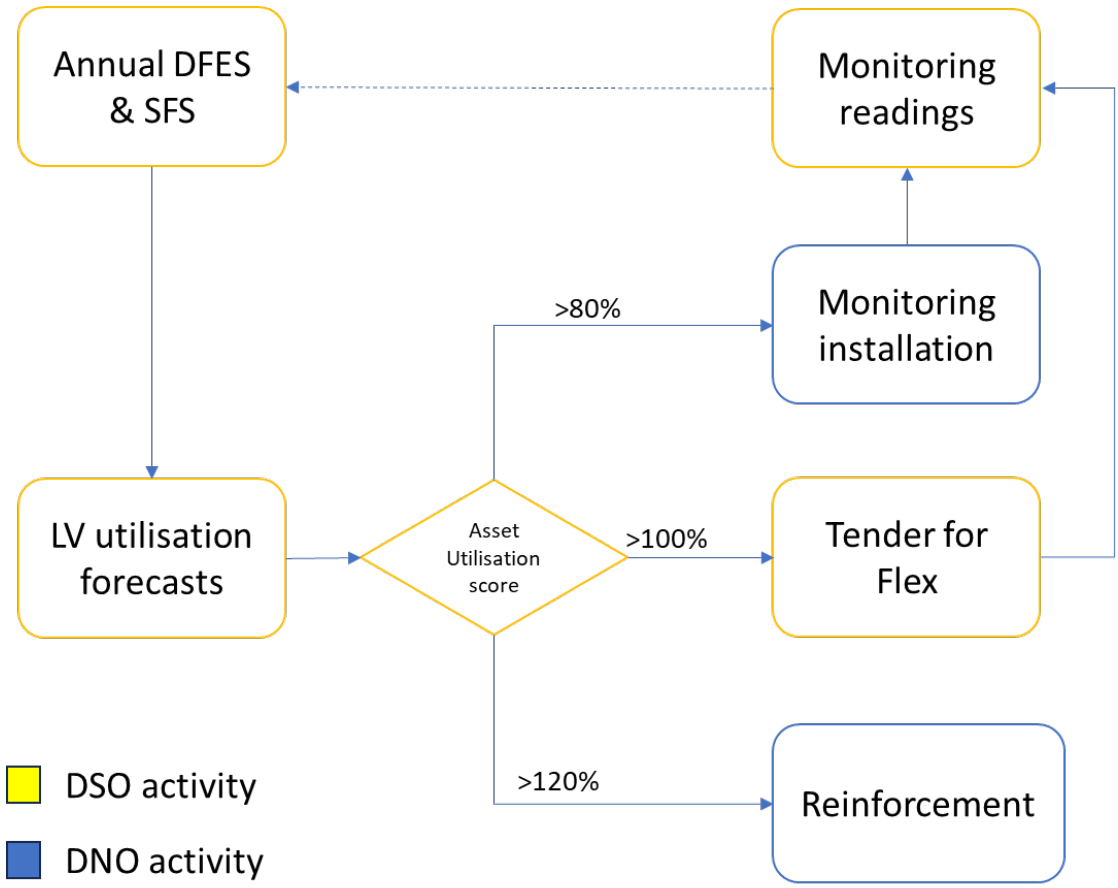


Figure 3. DNOA low value low voltage scheme process

Questions for stakeholders:

- Question 3: What else do you expect to see in the above processes?
- Question 4: How effective do you believe are these processes in terms of ensuring efficient outcomes?

2.3. Generation constraints methodology

Our June 2023 document focused on explaining our approach to tackle areas that faced demand constraints. We are following a similar process for sites where we anticipate generation constraints. These are caused when local generation, esp. generation from renewables, such as solar and wind, create reverse power flows that exceed network capacity.

The DNOA process involves the following steps:

a. The DSO forecasts the volume of constraints that are expected in the next 2-3 years.
b. The DNO provides the cost of reinforcement to remove the constraint.
c. The DSO uses the CEM CBA to establish the flexibility budget.
d. The DSO market tests for flexibility.
e. The DSO provides a recommendation based on the results of market testing.

As generation constraints are driven by weather patterns predominantly, market testing involves seeking flexibility services through the dynamic product. This means that we will dispatch flexibility services only when we have closer to real time forecasts that will inform dispatch decisions. We will repeat the process annually so we can always have up to date information on where the constraints are and the capacity required to manage them. This will also link into the work we are planning under our future development's roadmap.

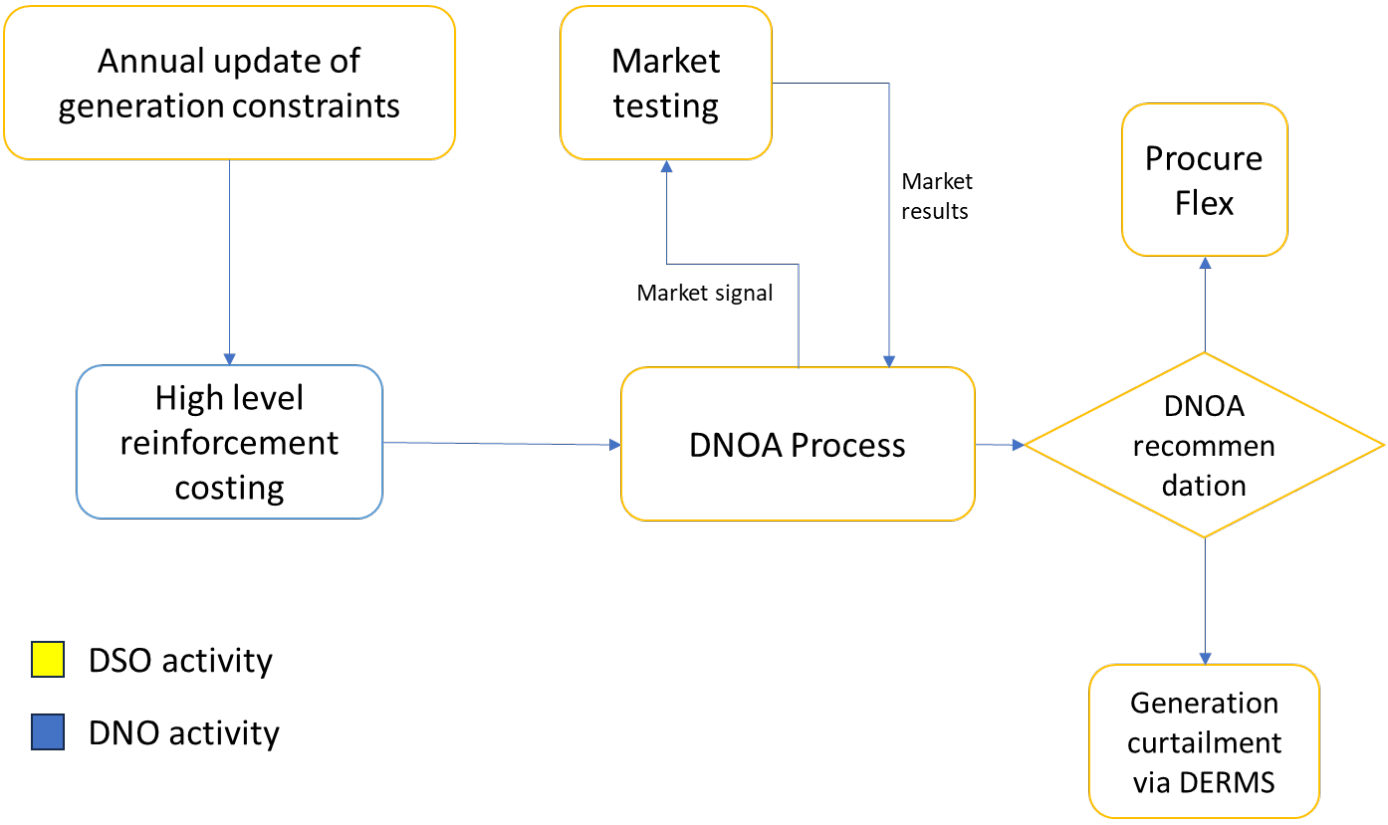


Figure 4. DNOA Generation constraint process flow

Questions for stakeholders:

- Question 5: What else would you expect to see as part of this process?

2.3.1. Generation reports

In the next publication of DNOA reports in the first quarter of 2024, we will include reports for generation constraints, in the same manner as demand constraints.

2.4. CBA Worked example

Following our publication of the first version of the methodology, stakeholders asked us to provide an example of how the CEM CBA is used to estimate the flexibility budget that is available for each area. The tool is based on Microsoft Excel and estimates the net present value of the deferred capital expenditure for a defined period. After the estimation of the flexibility budget, we publish the information on our website[4] alongside with each live flexibility tender to inform flexibility providers about the revenue opportunities in each area. For future flexibility tenders, i.e. from Spring 2024, we will be publishing the aggregated deferred capex we estimate consumers will see as the direct benefit from the procurement of flexibility services. In order to assist flexibility providers, the advertised revenues take into consideration key parameters around the expected utilisation of flexibility services for each area.

We provide a worked example of the CBA in Appendix A. If stakeholders require further information, please refer to the ENA's publicly available links to the actual methodology[5] and the information we publish in our website for each flexibility tender.

Questions for stakeholders:

- Question 6: What other information could we provide in relation to the functionality of the CEM CBA?

2.5. Using a Networks Options process for Whole system issues

As a DSO our role is to coordinate effectively with other energy vectors, and other sectors within the electricity whole system, e.g. Electricity Transmission Owners (ETOs) and other DNOs. This coordinated approach aims to support both the efficient use of existing network capacity across distribution and transmission networks and identify opportunities for whole system solutions to be developed and delivered. By working with a whole system approach we will drive overall societal benefits and help to accelerate the Net Zero transition.

This process involves working collaboratively with Local Authorities, other utilities, system operators and network owners, to establish robust future energy scenarios. These allow us and other organisations to identify emerging issues, such as wider system constraints. We then work in tandem with these organisations to analyse in depth the technical issues. This enables us to jointly develop a portfolio of options that are informed by all parties with the aim to address these issues in the most optimal way. Such options include network build solutions, establishing markets and various operational solutions, as well as hybrids of these. We then collate all relevant information and data to help us evaluate the costs and benefits of each option. Options are then taken forward based on driving the right whole system outcome.

[4] Tender library - UKPN DSO (ukpowernetworks.co.uk)
[5] ON22-WS1A-P1 Common Evaluation Methodology (CEM) and Tool v2.1- User Guide (14 Jan 2022) – Energy Networks Association (ENA)

Figure 5 below shows schematically the process.

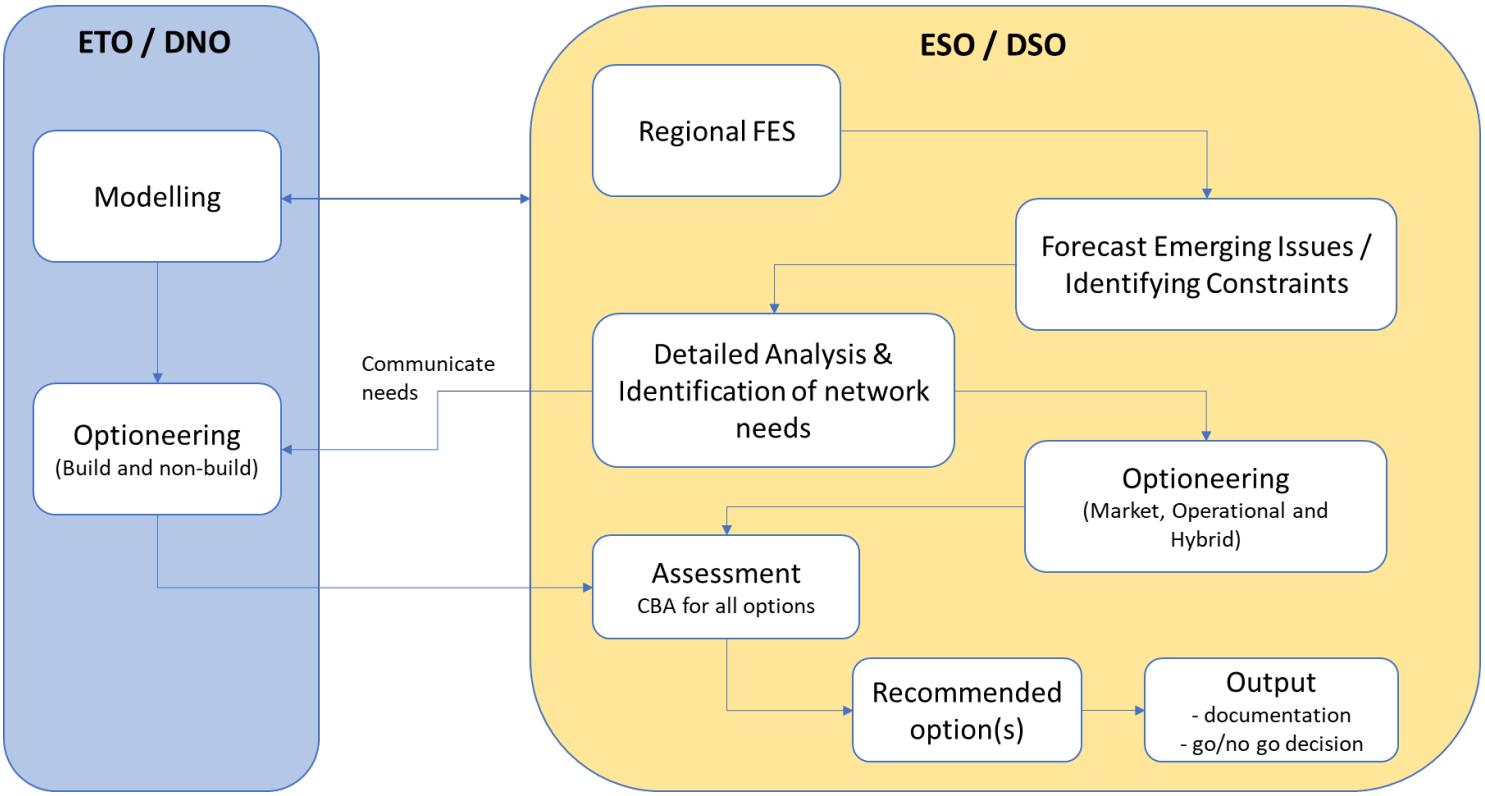


Figure 5. Whole system high level process

Below we provide a number of examples of some of the work we are doing to better inform whole system solutions.

2.5.1. Working with Local Authorities and other utilities

Local Area Energy Planning (LAEP) is a data-driven and evidence-based approach for the whole energy system that explores potential decarbonisation pathways and sets out implementation plans to achieve Net Zero for the local area.

By looking at a range of different possible routes, LAEP enables local stakeholders to identify and make an informed decision on the preferred decarbonisation pathway for their local area. Early engagement with Local Authorities on their local Net Zero plans helps us to ensure that we remain a facilitator to help Local Authorities achieve their decarbonisation pathways. In addition, we can ascertain that our network planning and investments support their plans beyond the immediate future. In practice this involves engagement with the Gas Distribution Networks (GDNs), our DNO peers, and National Electricity and Gas Operators.

We have 133 Local Authorities across our three licence areas that we are engaging with alongside other utilities to better understand their Net Zero plans and where these are not fully formed, we are supplying support services and tools to aid development.

The outputs from this work are helping to provide a clear line of sight to when capacity is needed, and this is being used as an input directly into our SFS to ensure the networks are Net Zero ready.

2.5.2. West London

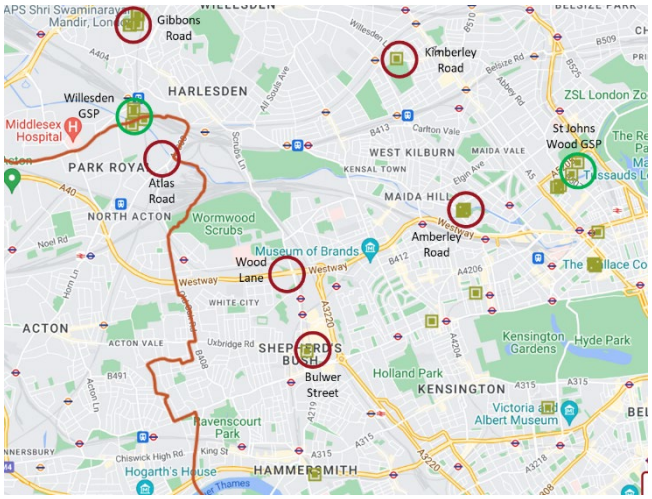
We have been working closely with SSEN (Scottish & Southern Electricity Networks), the GLA (Greater London Authority), West London Local Authorities, National Grid Electricity System Operator (NGESO), National Grid Electricity Transmission (NGET) and impacted customers on potential solutions to alleviate the current constraints on network capacity in the Willesden area.

SSEN have reported a significant increase in large demand connections within the SSEN network which has driven the need to reinforce the local transmission system. This has meant that much smaller connections are seeing significant lead times to connect within SSENs network.

Our approach to date has been to work closely with our stakeholders to identify opportunities for developers to work together in connecting into our region.

We are creating additional capacity within West London ahead of these long term reinforcement works being delivered at Willesden by National Grid. We will do this in three phases:

1. Procurement of flexibility – this area was included within our last flexibility event in 2023 and will continue to be included in future rounds
2. Transfer of load away from constrained areas of West London
3. Installation of additional capacity through unconstrained Grid Supply Points



We will be providing further updates with respect to this issue through our DNOA reports.

2.5.3. Regional Development Programmes (SPN and EPN)

We have been collaborating with the ESO since RIIO-ED1 across several areas. Our ongoing partnership with the ESO on the RDP for the South East is an excellent example of whole systems collaboration to deliver lower costs for the consumer. More specifically, the South East Coast RDP between ESO and UK Power Networks, covering the areas of Kent and Sussex, is developing new markets for transmission thermal constraint management services. This is a ground-breaking whole system programme that will help optimise the flexibility markets and investment plans across transmission and distribution to secure the efficient operation of the South East Coast area whole electricity system over the next 10 years.

As part of this programme, we are progressing jointly with the ESO the development of a co-ordinated IT solution that will deliver:

- Visibility and data exchanges in both directions to facilitate efficient service coordination.
- Management of Distributed Energy Resources (DER) to allow constraints on transmission and distribution networks to be managed efficiently, whilst ensuring the safe operation of the distribution network.
- A coordinated service and dispatch methodology allowing DER to participate in new markets and ensure that we have identified the cheapest solution for the GB consumer.
- Coordination and service conflict resolution methodologies.

The RDP's framework is allowing us to address other future issues during RIIO-ED2. Hence, we have also expanded this approach to deliver similar solutions in our Eastern Power Networks area. Overall, these optioneering processes that deliver continuous engagement with the ESO and our customers are helping us unlock £130m of benefits over the current RIIO-ED2 period.

2.5.4. Industry Engagements

We have actively collaborated with industry on a number of key areas to better inform GB wide solutions to emerging issues.

Since its inception back in 2017 we have been working alongside other network companies, utilities and impacted stakeholders on the Open Networks Project. We have been leading yearly on a number of new products and have informed across all workstreams. Notably we led on the development of the Whole Electricity System Investment Planning guidance which has been used as a basis across various industry pathfinding initiatives.

Back in 2022 the Strategic Connections Group was formed to consider the emerging issues arising across GB. A number of high priority areas were identified as needing urgent attention. Three areas were identified, alongside Connections Reform, which needed prioritising.

Action 1: Managing the Distribution Queue migrating pre 2017 offers to milestones contracts, and first ready, first connected at distribution level.

Action 2: Changing how T & D coordinate the queue by creating clear and consistent technical boundaries and equitable re-allocation of capacity.

Action 3: Changing how battery storage connects to the network by developing tactical and longer term solutions to better enabling battery connections and the networks' ability to manage capacity efficiently.

UK Power Networks has actively participated across all three workstreams to drive a suite of solutions that are already benefiting our customers. We have taken a leading role in delivering on Action 2 and through effective collaboration with all distribution and transmission companies have defined a solution that has this year unlocked c.30GW of capacity across GB, of which 4GW will directly benefit UK Power Networks customers.

Questions for stakeholders:

- Question 7: What level of detail would stakeholders like to see on whole system optioneering?

3. DNOA documents changes

In this chapter, we explain the improvements we will be making compared to the previously published DNOA documents.

3.1. Summary table removal from methodology document

In chapter 10 of the June 2023 methodology, we presented a results summary table. The DNOA Methodology sets the enduring principles that will be relevant to future outcomes, therefore we will move the summary table to the report files and use it as the introduction to the report pack.

3.2. Improvements to the DNOA Reports

We will enhance the data and information provision in the DNOA reports. The improvements relate to the areas below.

3.2.1. More details on constraint and results

In the first DNOA publication we used standardised text to explain the system need and the results of the DNOA process. In the next revision that will be published in the first quarter of 2024, we will add more details to explain the technical issues to stakeholders for each constraint area.

3.2.2. Flexibility procurement progress

In the first DNOA publication reports we showed a single percentage number for the flexibility procurement progress. This represented the progress on procuring flexibility for the first year of need. In the next reports publication, we will publish the procurement progress for each year. We will also indicate our consideration for future decisions if flexibility procured volumes are low. The benefit for flexibility providers is that they will have a better view of our future needs. This will help flexibility providers target the development of their services more accurately.

3.2.3. Revenue ranges instead of flexibility value band

We will change the “Flexibility value band” metric to show the revenue ranges that are published alongside our latest tender event.

3.2.4. Number of customers served

We will add the number of customers that are served in each constrained area. The benefit for flexibility providers is that they will be able to understand the potential of each area to support the development of their flexibility solutions, e.g. through aggregated residential flexibility.

3.2.5. Supply area instead of UKPN Map

We will provide a more accurate depiction of the constrained area by using the supply area maps from our Open Data Portal. This essentially matches the way flexibility tenders areas are shown in the Piclo website.

4. Roadmap for the DNOA development

The June 2023 document and the previous section of this consultation set the basis for our DNOA Methodology. We are committed to continuing to evolve our methodology in line with industry and emerging areas. Below we elaborate on some key areas that we are looking to develop further in 2024. We are seeking stakeholders' feedback on these so that we can prioritise accordingly.

4.1. Flexibility solutions for asset health

To date we have used flexibility products to resolve constraints caused by the additional demand and generation on our network. These would nominally require load related capital expenditure to resolve or flexibility to defer investment.

UK Power Networks DNO has an ongoing responsibility to ensure that our asset portfolio is effectively maintained. Asset health indices (HIs) for each asset are being used to inform where interventions are needed. A low asset health index means the asset is newer and/or in good condition. A high asset health index indicates that the asset is close to end of life and requires intervention, i.e., replacement.

We have been considering how flexibility can support the deferral of asset health expenditure. The defined use case relates to substations with multiple transformers, where one or more of them needs replacement. We will examine the maximum demand observed and forecasted in that substation. We will compare these with the substation's firm capacity if the transformer in need of replacement was removed instead of replaced. Where the transformer's removal is likely to result in the peak load being near or exceeding the substation's firm capacity we can market test flexibility to see if the excess demand above firm can be managed by flexibility. If that can be achieved, then we can then potentially defer the immediate need for the replacement of that transformer.

4.2. Add benefits methodology and results

In 2024 we will be reporting the benefits of the deferred capex due to flexibility.

4.3. Option value of flexibility

Flexibility provides option value by allowing us to defer irrevocable investment decisions. We explore key options, such as procuring flexibility to manage forecasted constraints, on the basis of a particular Distribution Future Energy Scenario (DFES). Our best view scenario is the Consumer Transformation (CT). The choice of a scenario has a direct link to the type of flexibility products we are procuring through our tenders. More specifically, we are procuring the standardised Secure product for constraints forecasted under the CT scenario.

Stakeholders suggested that other pathways to Net Zero may become more relevant. Therefore, we consider that an area to explore is the development of a more advanced approach to the procurement of flexibility against multiple scenarios. The latter could involve developing a more probabilistic methodology to evaluate flexibility against future network constraints.

4.4. Progressing DNOA to enable advanced optioneering evaluation

Ofgem's recent Significant Code Review decision (SCR) has affected the way we approach and budget connection driven reinforcement. In order to identify the most cost-efficient way to develop our network we consider that we need to enhance our DNOA Methodology to incorporate options around the cost of curtailment and hybrid solutions including the market-based operation of DER over several years.

Questions for stakeholders:

- Question 8: Are these the right areas we should consider for further development?
- Question 9: Which other areas should we consider for further development?
- Question 10: Which area do you believe is the most important?

5. Next Steps

This section provides some additional questions and explains how stakeholders can engage with us over the next few weeks.

5.1. Consultation feedback – Questions

We are publishing this document and seeking feedback on our approach and suggestions for improvements. We have some additional guiding questions for feedback below.

- Question 11: Is there any additional data or information that you would benefit from being included in future DNOA reports?
- Question 12: How can we improve the methodology in any way?
- Question 13: How can the DNOA process be more transparent?
- Question 14: Have you got any other general feedback on the DNOA process?
- Question 15: How would you rank this consultation document on a 1 to 10 scale?

We have collated all questions from the main body of document in Appendix B. Please use the linked form below to provide feedback.

Link to the online form

5.2. Feedback inclusion and final publication

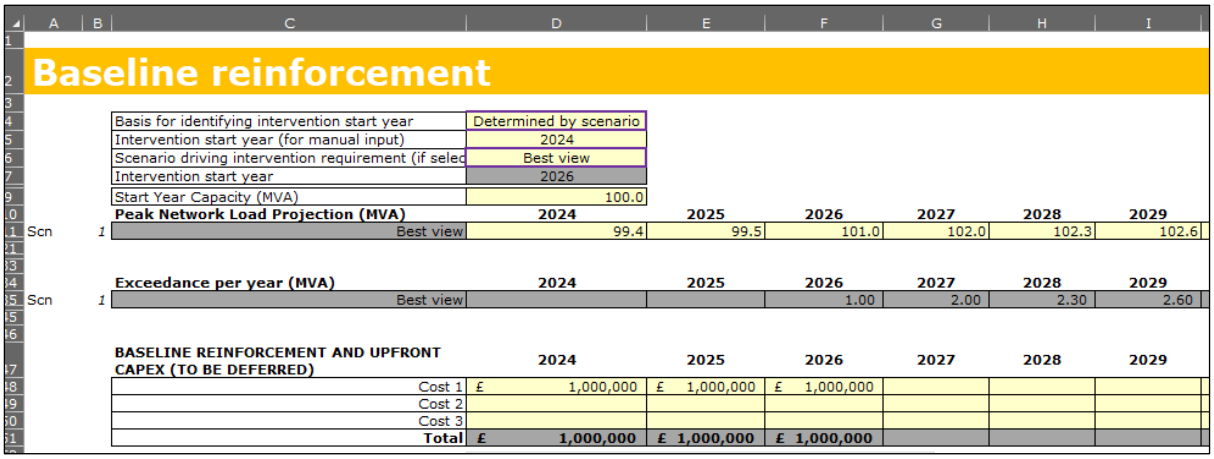
This document is published for public consultation until the 8th of December 2023. Following the completion of the consultation, we will incorporate feedback and publish the entire methodology document. Lastly, in the first quarter of next year, we will publish the DNOA reports as per the annual plan.

A. Appendix – CEM CBA Worked Example

The CBA requires some basic entries in order to estimate the available flexibility budget. These are the:

i. Forecasted constraint year. This is provided by our forecasting system. For the example below we assume that the constraint will occur in 2026 according to the Consumer Transformation scenario.
ii. Cost of reinforcement scheme to resolve the constraint. This is provided by the DNO. For the example below we assume that the cost is £3m.
iii. Time to deliver the works. This is provided by the DNO. We assume that in the example below it is 2 years, i.e. that works will start in 2024 in order to relieve the constraint in 2026.

We use the above information to populate the "Baseline Reinforcement" tab of the CEM tool.



Baseline reinforcement

Basis for identifying intervention start year	Determined by scenario
Intervention start year (for manual input)	2024
Scenario driving intervention requirement (if selec	Best view
Intervention start year	2026
Start Year Capacity (MVA)	100.0

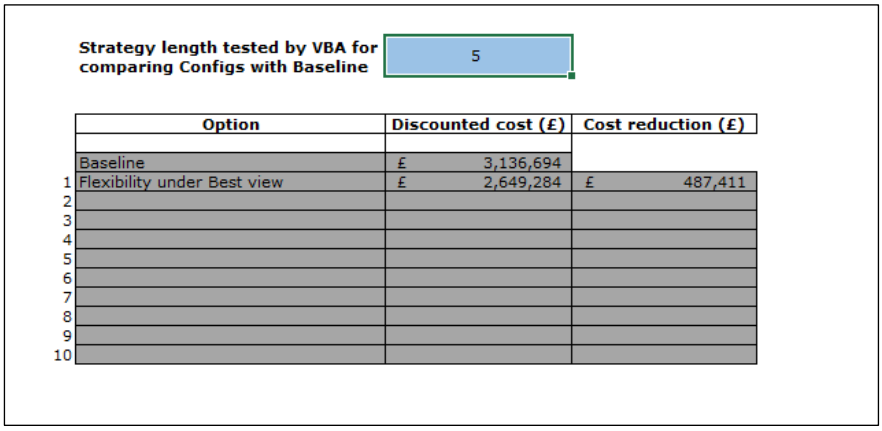
Peak Network Load Projection (MVA)		2024	2025	2026	2027	2028	2029
Scn 1	Best view	99.4	99.5	101.0	102.0	102.3	102.6

Exceedance per year (MVA)		2024	2025	2026	2027	2028	2029
Scn 1	Best view			1.00	2.00	2.30	2.60

BASELINE REINFORCEMENT AND UPFRONT CAPEX (TO BE DEFERRED)	2024	2025	2026	2027	2028	2029
Cost 1	£ 1,000,000	£ 1,000,000	£ 1,000,000			
Cost 2						
Cost 3						
Total	**£ 1,000,000**	**£ 1,000,000**	**£ 1,000,000**			

Figure 6. CEM CBA tool example: "Baseline Reinforcement" tab

1. In order to convert the reinforcement costs to present value, we need to input some of our financial funding rates in another tab called "Fixed Inputs". There we provide capitalisation rates and Weighted Average Cost of Capital (WACC) as agreed in our RIIO ED2 settlement.
2. We can then go to the "Comparison" tab. In this tab we need to provide our deferral target. Our target is to defer reinforcement for at least 5 years. We input this number in the appropriate cell.



Strategy length tested by VBA for comparing Configs with Baseline 5

	Option	Discounted cost (£)	Cost reduction (£)
	Baseline	£ 3,136,694	
1	Flexibility under Best view	£ 2,649,284	£ 487,411
2			
3			
4			
5			
6			
7			
8			
9			
10			

Figure 7. CEM CBA tool example: "Comparison" tab

3. The tool provides us with the cost reduction. We use this cost reduction as target for the cost of flexibility.
4. Market testing later on will confirm if we can achieve this target and confirm that flexibility is the economically optimal solution.

This cost reduction is the target budget for flexibility over the five years of deferral. Therefore, we will appropriately distribute the sum between the five years. That eventually leads to the published revenue ranges alongside the flexibility tenders shown in our flexibility hub[6].

We recommend that stakeholders go through the CEM CBA supporting material, in order to explore further details regarding the functionality of the tool.

[6] https://dso.ukpowernetworks.co.uk/flexibility

B. Appendix – Consultation questions

In this appendix we have collected all the questions presented throughout the document for ease of use by the reader. In addition, we repeat the link to the online form.

Link to the online form

DNOA methodology consultation questions

High value scheme process questions
Q1: How effective do you believe are these processes in terms of ensuring efficient outcomes?
Q2: How can we improve any part of this process?

Low value scheme process questions
Q3: What else do you expect to see in the above processes?
Q4: How effective do you believe are these processes in terms of ensuring efficient outcomes?

Generation constraint process question
Q5: What else would we need to capture in this process?

CBA example question
Q6: What other information could we provide in relation to the functionality of the CEM CBA?

Whole systems process question
Q7: How can we improve the coordination with the ESO?

Roadmap questions
Q8: Are these the right areas we should consider for further development?
Q9: Which other area should we consider for further development?
Q10: Which area do you believe is the most important?

General feedback questions
Q11: Is there any additional data or information that you would benefit from being included in future DNOA reports?
Q12: How can we improve the methodology in any way?
Q13: How can the DNOA process be more transparent?
Q14: Have you got any other general feedback on the DNOA process?
Q15: How would you rank this supplementary document on a 1 to 10 scale?