Form of Statement of Network Development Plans - 2022 update

WS1B P5

Open Networks | WS1B P5
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DOCUMENT CONTROL

Authorities

Version	Issue Date	Authorisation	Comments
1.0	16/11/2022		Initial discussion with working group
1.1	29/11/2022		Update based on ESO-TOs subgroup
1.2	01/12/2022		Update from review with ESO, SSEN and NPG, and then WS1b group
1.3	01/12/2022		Update from review with UKPN, ENWL, NGED and SPEN
1.4	06/12/2022		Typos corrected after ESO and SPEN feedback

Related documents

Reference 1	Proposed DNO Standard Network Capacity Report - WS1B P5 - Nov 2020 https://www.energynetworks.org/assets/images/ON20-WS1B-P5%20Proposed%20Standardised%20Network%20Capacity%20Report-PUBLISHED.23.12.20.pdf
Reference 2	Proposals for the Form of Statement of Network Development Plans - WS1B P5 - Aug 2021 https://www.energynetworks.org/assets/images/Resource%20library/ON21-WS1B-P5%20Network%20Development%20Plan%20Form%20of%20Statement%20(19%20Aug%202021).pdf
Reference 3	Proposals for the Form of Statement of Network Development Plans – WS1B- Dec 2021 – *Approved for use in 2022 NDP* ON21-WS1B-P5 NDP Form of Statement Template and Process (22 Dec 2021) Published.pdf (energynetworks.org)

Distribution

e.g. Published on ENA website

Contents

Acronyms

CEP	Clean Energy Package
CIM	Common Information Model
DFES	Distribution Future Energy Scenarios
DNO	Distribution Network Operator
ECR	Embedded Capacity Register
EISD	Earliest in Service Date
ENA	Energy Networks Association
EREC	Engineering Recommendation
EVs	Electric Vehicles
FoS	Form of Statement
HPs	Heat Pumps
LCTs	Low Carbon Technologies
LTDS	Long Term Development Statement
NSHR	Network Scenario Headroom Report
NHR	Network Headroom Report
NDP	Network Development Plan
NDR	Network Development Report

Introduction to ENA and Open Networks

About ENA

Energy Networks Association represents the companies which operate the electricity wires, gas pipes and energy system in the UK and Ireland.

We help our members meet the challenge of delivering electricity and gas to communities across the UK and Ireland safely, sustainably and reliably.

Our members include every major electricity and gas network operator in the UK and Ireland, independent operators, National Grid ESO which operates the electricity system in Great Britain and National Grid which operates the gas system in Great Britain. Our affiliate membership also includes companies with an interest in energy, including Heathrow Airport and Network Rail.

We help our members to:

- Create smart grids, ensuring our networks are prepared for more renewable generation than ever before, decentralised sources of energy, more electric vehicles and heat pumps. Learn more about our Open Networks programme.
- Create the world's first zero-carbon gas grid, by speeding up the switch from natural gas to hydrogen. Learn more about our Gas Goes Green programme.
- Innovate. We're supporting over £450m of innovation investment to support customers, connections and more.
- Be safe. We bring our industry together to improve safety and reduce workforce and public injury.
- Manage our networks. We support our members manage, create and maintain a vast array of electricity codes, standards and regulations which supports the day-to-day operation of our energy networks.

Together, the energy networks are keeping your energy flowing, supporting our economy through jobs and investment and preparing for a net zero future.

About Open Networks

Britain’s energy landscape is changing, and new smart technologies are changing the way we interact with the energy system. Our Open Networks programme is transforming the way our energy networks operate. New smart technologies are challenging the traditional way we generate, consume and manage electricity, and the energy networks are making sure that these changes benefit everyone.

ENA’s Open Networks programme is key to enabling the delivery of Net Zero by:

opening local flexibility markets to demand response, renewable energy and new low-carbon technology and removing barriers to participation
providing opportunities for these flexible resources to connect to our networks faster
opening data to allow these flexible resources to identify the best locations to invest
delivering efficiencies between the network companies to plan and operate secure efficient networks

We’re helping transition to a smart, flexible system that connects large-scale energy generation right down to the solar panels and electric vehicles installed in homes, businesses and communities right across the country. This is often referred to as the smart grid.

The Open Networks programme has brought together the nine electricity grid operators in the UK and Ireland to work together to standardise customer experiences and align processes to make connecting to the networks as easy as possible and bring record amounts of renewable distributed energy resources, like wind and solar panels, to the local electricity grid.

The pace of change Open Networks is delivering is unprecedented in the industry, and to make sure the transformation of the networks becomes a reality, we have created six workstreams under Open Networks to progress the delivery of the smart grid.

2022 Open Networks programme Workstreams

- WS1A: Flexibility Services
- WS1B: Whole Electricity System Planning and T/D Data Exchange
- WS2: Customer Information Provision and Connections
- WS3: DSO Transition
- WS4: Whole Energy Systems
- WS5: Communications and Stakeholder Engagement

Our members and associates

Membership of Energy Networks Association is open to all owners and operators of energy networks in the UK.

- Companies which operate smaller networks or are licence holders in the islands around the UK and Ireland can be associates of ENA too. This gives them access to the expertise and knowledge available through ENA.
- Companies and organisations with an interest in the UK transmission and distribution market are now able to directly benefit from the work of ENA through associate status.

ENA members

BUUK infrastructure | Cadent Your Gas Network | electricity north west Bringing energy to your door | ESB NETWORKS | nationalgrid
nationalgridESO | Northern Gas Networks | Northern Ireland Electricity Networks | NORTHERN POWERGRID | Scottish & Southern Electricity Networks
SGN Your gas. Our network. | SP ENERGY NETWORKS | UK Power Networks Delivering your electricity | WALES&WEST UTILITIES

Executive Summary to the update of the NDP Form of Statement

In line with the 2015 Paris Agreement commitment to reduce greenhouse gas emissions, the EU Clean Energy Package has now been implemented in the legislation of England, Wales and Scotland. As a result, Ofgem required Distribution Network Operators (DNOs) under a new licence condition, namely SLC 25B, to publish a Network Development Plan (NDP) every two years to provide stakeholders with transparency on network constraints and needs for flexibility. Data and long-term forecasting are key enablers to facilitate the decarbonisation of the electrical grid, and with this in mind, the NDP has been created to present the 'best view' of planned asset based and flexible network developments over the five to ten-year period.

DNOs delivered their first NDPs in May 2022, based on a NDP Form of Statement (FoS) developed by the ENA's WS1B P5 working group with representation from all DNOs to ensure alignment and consistency with implementation. The FoS defined in December 2021 effectively supported the publication of the NDPs, and this report updates the FoS (see Appendix A) with minor amendments and clarifications based on experience of those first publications and stakeholder feedback.

The NDP comprises three standalone reports:

1) Network Development Report (NDR),
2) Network Scenario Headroom Report (NSHR), and
3) NDP Methodology.

The Network Development Report part of the NDP will serve to provide the reader with valuable additional information on key projects set for delivery in terms of new infrastructure to be installed and upcoming flexible services to be employed. Its aim is to provide utility to stakeholders on major developments for the years 1-10 so they can plan and forecast accordingly, its scope is broken down by flexibility services and new infrastructure and defined in Table 1:

Table 1: Network Development Report parameters

Flexibility services	New infrastructure
○ Magnitude; ○ Year of intervention, likely duration i.e. number of years in the future; ○ Location of the requirement; ○ Nature of requirement / flexibility product.	○ Timing and high-level scope of intervention; construction duration (start & finish); ○ Details of connectivity; ○ Asset quantities approx. circuit lengths, number of transformers etc. ○ Equipment ratings; ○ Approximate locations, where appropriate.

The main objective of the Network Scenario Headroom Report (name updated to include the word "scenario") in the NDP is to indicate where it is anticipated that there will be network capacity to accommodate future connections and where flexibility services may be required. It has been defined in the table overleaf as follows:

Table 1: Network Scenario Headroom Report parameters

Date range	Every year to be covered individually between 1-10 years.
	After the 10th year, this requirement moves to every five years up to 2050 or aligning with the final year of the DFES forecast.
Scenarios	DFES scenarios, plus a 'best view' scenario.
Network capacities and assessment methodology	Demand and generation headroom (unused capacity rather than contractually-available) in MW and/or MVA per reported year per scenario.
	Headroom calculations are considerate of financially approved network developments in delivery or planned for delivery, including asset-based enhancements and the use of flexibility services. This may include updates in network developments in the timeframe 0-5 years which were not included in the latest LTDS (November). If included, this must be stated in the accompanying notes and updated in the next LTDS (end May).
	Headroom calculations are considerate of thermal loading and fault level constraints as a minimum.
Coverage	Capacity information to be provided for substations where the greatest voltage is greater than 20kV, normally BSP and primary substations down to and including the primary secondary voltage, typically HV (20kV, 11kV or 6.6kV).
Format and publication	The format of the Network Scenario Headroom Report part of the NDP is tabular in nature, presented in Microsoft Excel or similar spreadsheet format. Interactivity can be added to the workbook to improve visualisation of the data. Guidance shall be included to explain the scope of the data workbook, define each data element and give user instructions. A contents and version control page is included to ensure that users are able to easily access data, accurately reference the report and view approvals. It also states the dates and versions of critical data sources including the LTDS and DFES.
	Licensees shall endeavour to refresh the Network Scenario Headroom Report with the latest Licensee's data annually, including the years in between publishing the whole NDP (which shall be published by 1st May every two years).
Information sources	Parameters for the existing network underlying the headroom calculations shall be based on the latest LTDS and incorporate a view of financially approved and planned interventions.
	Existing and future network demand and generation shall be based on the licensee's latest LTDS and DFES forecasts for demand and generation at the substation.
	It is expected that the flexibility services incorporated in the NSHR shall be in accordance with DNO Flexibility Procurement Statements and Reports or if not included in those reports, they must be stated in the accompanying notes. Publication of Flexibility Procurement Statements and Reports is a new Standard Licence Condition 31E, and reporting detail is yet to be finalised, but will likely include the location and magnitude of contracted and prospective flexibility services.

The Network Scenario Headroom Report part of the NDP is to be published yearly to maximise utilisation and align to the publication frequency of the LTDS, aligning to the previous November's full update of the LTDS. This will ensure a consistent set of data for capacity signposting is aligned annually.

Finally, the NDP Methodology serves to provide transparency for the calculations provided in the NDP. The NDP Methodology covers the end-to-end process which provides sufficient detail to allow stakeholders to understand sensitivities and extrapolate the NDP results.

Recommendations:

It is recommended that the governance of the NDP FoS continues through the ENA to allow for more reactive updates to reflect stakeholder feedback and adjustments to meet their new requirements. In the longer term, consideration should be given to making the NDP FoS a guidance document or instead defining the NDP FoS in an Engineering Recommendation, including it under the governance of the Distribution Code Review Panel by listing it as an Annex document.

However as the review of the LTDS has commenced and but is yet to finalise detailed proposals on the future scope of the LTDS and the statutory consultation is still perhaps more than a year away, it is recommended that the working group continue to consider the LTDS current make-up and alignment with the NDP and whether any efficiencies can be obtained by moving aspects of the capacity reporting to the NDP, or by moving some elements of NDP into the LTDS with a combined form of statement. Either way, the co-ordinated purpose and content of the NDP and LTDS should be clarified and communicated to ensure that users have a clear understanding of what is found where.

With some overlap in load and capacity data presented in both NDP and LTDS, there is opportunity for certain outputs from the 1 May NDP and the 31 May LTDS partial update to be aligned in one single publication. However the NDP form of statement cannot deliver this unilaterally, and this is subject to the outcome of the reform of the LTDS.

It was recommended from stakeholder feedback on the NDPs in 2022 and engagement in 2021 that the reporting of network capacity at distribution/transmission interface points is considered by DNOs, TOs and NGESO, to increase stakeholder utility by improving how distribution and transmission reports work together. A subgroup of WS1B with TO and NGESO reps has started work in this area and will conclude in Q1 2023.

1. Publication of the first NDPs in 2022

Network Development Plans were a new licence requirement (25B) which DNOs had to publish by 1st May 2022. In December 2021, the Open Networks product group finalised a 'form of statement'[1] (FoS) for the Network Development Plan (NDP), which set out the detailed requirements for the publication, beyond the high-level view in the licence condition. This built on stakeholder engagement and collaborative working between electricity licensees in 2020 and 2021 and addressed stakeholder feedback for standardisation of approach.

The form of statement sets out that the Network Development Plans comprise three standalone reports:

1) Network Development Report,
2) Network Scenario Headroom Report, and
3) NDP Methodology.

Using the original 2021 form of statement, all DNOs were able to successfully publish their NDP consultations in March 2022 for the required 28-day consultation period, and to publish their final NDPs by 1st May 2022. This indicated that the form of statement was fit for purpose. However DNOs have reflected on their experience from the first publications to review the form of statement.

Appendix A to this report provides the 2022 update of the NDP form of statement reflecting on experience from the first publications. Appendix B to this report sets out the background to the NDPs from the 2021 report.

1.1 Successful delivery of published Network Development Plans

All six DNOs subject to the LC25 licence condition published their draft NDPs for consultation in March 2022, to begin the required 28-day consultation period by each DNO. The scope of the NDPs and links to the consultation were presented at the Open Networks Dissemination Forum on 24th March 2022.

The NDPs for each licence area include a Network Development Report, Network Scenario Headroom Report and Methodology, as per the form of statement, starting from the network baseline as reported in the most recent Long Term Development Statement (LTDS).

Using the form of statement, all DNOs were able to successfully publish their NDP consultations in March 2022 for the required 28-day consultation period, and to publish their final NDPs by 1st May 2022. This indicated that the form of statement was fit for its purpose to guide those publications.

[1] ON21-WS1B-P5 NDP Form of Statement Template and Process (22 Dec 2021) Published.pdf energynetworks.org)

Figure 1: Distribution Network Operator Groups 1-6 published NDPs in May 2022

DNO Network Development Plans

Distribution Network	Link
1. Scottish and Southern	Network Capacity Information - SSEN [ssen.co.uk]
2. SP Energy Networks	Network Development Plan - SP Energy Networks [spenergynetworks.co.uk]
3. Northern Powergrid	https://www.northernpowergrid.com/network-data [northernpowergrid.com]
4. Electricity North West	https://www.enwl.co.uk/get-connected/network-information/network-development-plan/
5. National Grid Electricity Distribution	National Grid - Network Development Plan
6. UK Power Networks	Long Term Development Statement and Network Development Plan Landing Page — UK Power Networks

1.2 The NDP licence requirement and other planning publications

Article 32 of the Clean Energy Package (EU Directive 2019/944[2]) was implemented in UK law and mandates that distribution network operators publish a Network Development Plan (NDP) every two years to provide stakeholders with transparency on network constraints and needs for flexibility. The NDP is to present the 'best view' of planned asset based and flexible network developments over the five to ten-year period.

The scope of the NDP includes:

a) parts of the distribution system most suited to new connections;
b) where reinforcement of the Distribution System may be required
c) sufficient information for secure and efficient operation, coordination development and interoperability of interconnected systems;
d) a reasonable number of future scenarios;
e) non-frequency ancillary flexibility services requirements

As part of the Clean Energy Package, Ofgem introduced licence change SLC 25B which relates to the publication of a NDP. The licence condition comprises six parts (A to F), four of which relate to NDP content and two with regards the processes for preparing and publishing the NDP as shown in Figure 2 overleaf. Parts

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944&from=EN

A to D define the necessary scope and content of the NDP and are therefore directly relevant to the NDP FoS discussed in this report, whilst parts E and F relate to the processes for consultation, publication and submission of the NDP.

Affecting network companies with over 100,000 customers, the scope of the NDP requirements defined in parts A to D include:

- Production of an NDP by each DNO (with >100,000 customers) from mid-2022 and every 2 years thereafter.
- NDPs would cover the 5-10 year ahead period and would follow on from the LTDS that covers 0-5 years.
- NDPs would report the network development requirements for new generation and load and highlight areas suitable for new connections.
- NDPs would be a “best view” of development covering all voltages down to 11kV inclusive.
- NDPs would also highlight the expected requirements for distribution flexibility services.
- The NDP methodology, including underlying data and assumptions.

The processes defined in parts E and F require the licensee to consult with interested parties on the proposed NDP for a period of at least 28 days before formal publication. Non-confidential consultation responses are to be published, along with a summary of the responses and how they were considered.

From this the Authority may within 28 days of the licensee publishing its NDP, issue a direction to the licensee that the NDP requires further development. This includes direction to revise the NDP, consult with interested parties, re-submit by a specified date and republish under the same process as above.

Figure 3 overleaf sets out how the NDPs exist in relation to other scenario and planning publications made by DNOs – in particular the Long Term Development Statement (LTDS), the Distribution Future Energy Scenarios (DFES), the Embedded Capacity Register (ECR) and heat maps (not currently a regulatory requirement, although these will become mandatory in future reform of the LTDS.

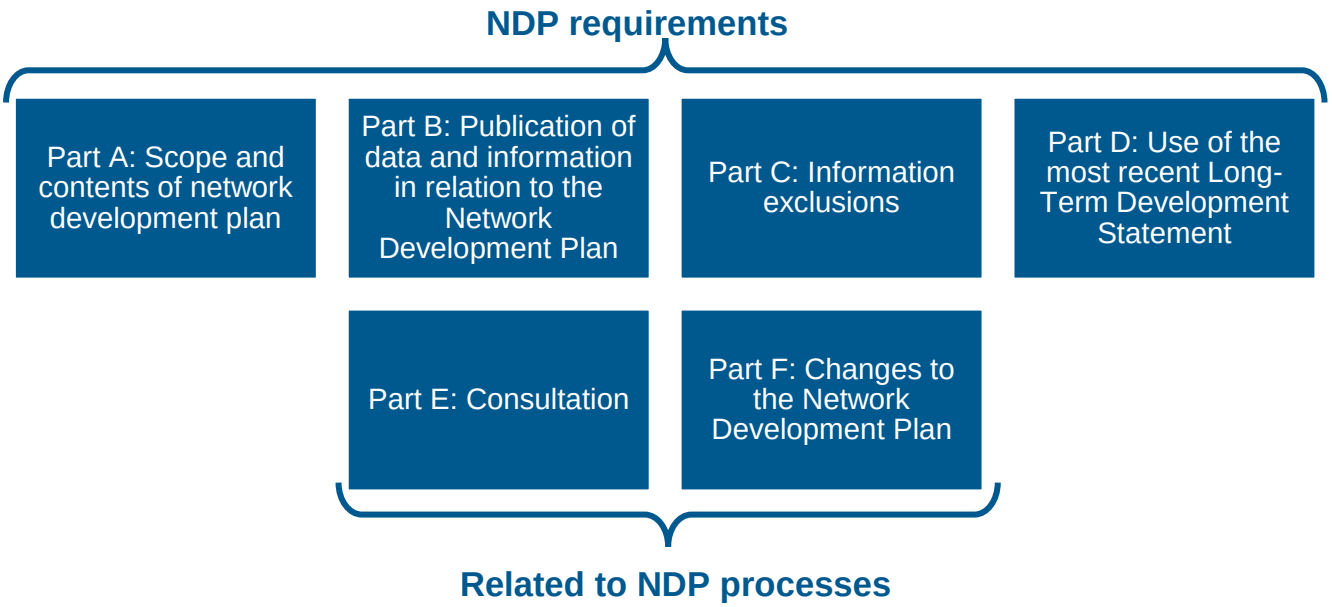


Figure 2: Standard Licence Condition (SLC) 25B overview

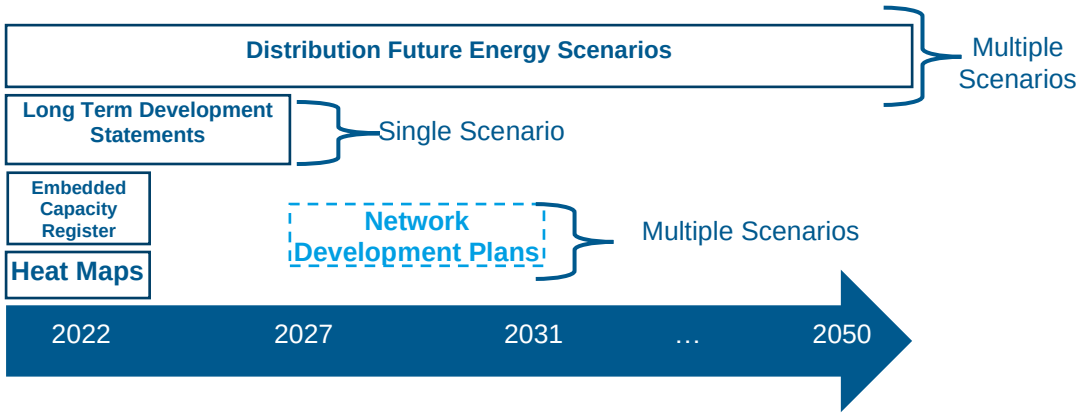


Figure 3: NDP in relation to other scenario and capacity reporting by DNOs (not to scale)

1.3 Learning from the experience of publishing the first NDPs

Via the working group and dissemination / engagement sessions by each DNO and facilitated by the ENA, DNOs identified a small number of areas of clarification in the form of statement in areas such as the headroom definition, the objective and the requirements of the consultation, scope of inclusion of infrastructure projects in the Network Development Report, and the interaction with transmission reports.

The following areas of clarification were identified in discussion within the P5 product group. These will be considered further by the product group as part of the final 2022 deliverable on future recommendations for the content and governance of the NDP Form of Statement. The updated version of the Form of Statement is shown in Appendix A of this report.

Definition of headroom as unused rather than contractually available capacity

For the Network (Scenario) Headroom Reports, all DNOs took an approach to interpreting **headroom as unused capacity, with a series of values over time in each scenario**. So for example, if demand was identified as 10MW peak in a given year and firm capacity was 20MW, the demand headroom would be identified as 10MW. Accepted contractual agreements to use 5MW in a future year (either from customers already connected or planned new connections) would not affect the unused substation capacity in that year.

However those contractual commitments would be an input to the demand scenarios in future years, affecting headroom in future years. An annual snapshot of connections activity provides an input to these scenarios, alongside the annual review of the demand and generation baseline and the (DFES) scenario assumptions. So if that accepted 5MW was expected to connect five years in the future and use its full capacity in its year of connection, the headroom would be zero five years ahead. DNOs typically applied a percentage figure to convert their pipeline of accepted connections into the expected uptake, with these percentages varying per technology and scenario, and with these assumptions specified in their NDP Methodology or DFES publications.

This unused capacity approach is equivalent to the demand and capacity definitions in LTDS Table 3, and provides an indication of unused capacity over time which is ideal to inform the need for flexibility services for example.

However this unused capacity interpretation of headroom means the **NSHR is not equivalent to an interpretation** of **headroom as a single latest value of contractually-available capacity**, typically in a heat-map style report. Many DNOs already produce heat maps, and an extension to the scope of LTDS to define common standards for heat maps is currently in development. The position for contractually-accepted connections can differ as customer acceptances and cancellations change, so will update more frequently than annually. Quotes for connections to the network will reflect this contractually-committed position, and the Network Scenario Headroom Reports should not be interpreted as where capacity is available for connections. They indicate unused capacity over time, so they provide evidence to support infrastructure and flexibility services plans as detailed in the Network Development Reports.

This difference in approach was implicit rather than explicit in the NDP form of statement. So while DNOs made this clear in their publications, we identified it could be clarified going forward in the form of statement, including in relationship to LTDS heat map definitions, and the key use-case of the Network Scenario Headroom Report in informing procurement activities for flexibility services.

Decision – The form of statement has been updated to include the following text in the description and Table 2 describing the report parameters.

> The Network Scenario Headroom Report is a representation of unused capacity for demand and generation in each annual update of an energy scenario, *not* a representation of contractually-available capacity as may be found in a heat map or a hosting capacity tool.
>
> Demand and generation headroom (unused capacity rather than contractually-available)

Decision – The product group also decided to change the name of the tables from Network Headroom Report in the December 2021 form of statement, to Network Scenario Headroom Report in this updated

2022 form of statement. This more clearly indicates the output is scenario-based and not indicating contractually-available capacity. This was confirmed with all DNO representatives in the product group.

Approach to consultation

In 2020 and 2021, the ENA Open Networks product group consulted to provide input to and refine the 'form of statement for the NDP'. However DNOs had a separate requirement in their electricity licence to consult on their NDPs. This requirement was to:

(a) consult interested parties on the proposed Network Development Plan for a period of at least 28 days before publishing as required by 25B.1; and

(b) publish the non-confidential consultation responses received, a summary of the responses and how it has taken them into account.

The form of statement did not cover the consultation requirement by DNOs on their Network Development Plan. DNOs have differed in their approach to the consultation as a result e.g., whether the whole NDP is published at consultation stage, how far ahead of the 1st May deadline their consultation closes, consultation format and questions, whether accompanied by a webinar. The objective of the consultation is unclear from the licence condition.

The form of statement could be extended to cover the consultation requirement and how it could be achieved e.g. either in a standalone document or in a section of the Methodology document.

We assume that the consultation will be repeated every two years on the full NDP (Network Development Report, Network Scenario Headroom Report and Methodology). The DNOs do not envisage there would be consultation on the Network Scenario Headroom Report tables to be updated annually.

Decision - The form of statement has been expanded to include the consultation requirement, at the end of the Methodology section.

At the Open Networks Dissemination Forum on 24th March 2022, one stakeholder raised whether a short NDP summary could be provided per DNO. The potential scope of this and its interaction with the consultation requirement have not yet been investigated by the product group. In 2022, there were significant interactions between the NDP and DNOs' ED2 business plan summaries which meant this could have added confusion to the publication landscape.

Clarifying the upper and lower voltage boundary in the NDP

The form of statement gives the scope of the Network Development Report as

> *High level plans for network interventions and flexible service requirements of 132kV networks to the lower voltage of primary substation…*

This definition does not reflect that 132kV is not a distribution network voltage for the Scottish distribution networks. The definition could be amended as follows for clarity.

> *High level plans for network interventions and flexible service requirements of the highest distribution network voltage (typically 132kV or 33kV) to the lower voltage of primary substation…*

The lower voltage boundary could also be more clearly shown in the form of statement.

Decision - This has been amended in the form of statement.

At the Open Networks Dissemination Forum on 24th March 2022, stakeholders asked questions on the lower voltage boundary of the report e.g. would interventions over the next 10 years on the high voltage 11kV and 6.6kV networks be detailed in the report, would secondary network substations be included?

Extension of the lower voltage boundary is outside the current scope of the LTDS, which sets the scope of the NDP. The baseline loading values for HV feeder and secondary substation loading are typically estimated per asset but only reliable in the medium-term at portfolio level – for individual assets, these are investigated further prior to any intervention. Establishing long-term scenarios for high-voltage network and secondary substations is less meaningful than for primary substations and above, due to the uncertainty in exact location of changes in customer activity such as low-carbon-technology uptake and new connections activity. Thus a systematic report across all HV feeder and secondary substations on a ten-year or 2050 horizon would give spurious accuracy. At primary substations and above, the aggregate changes over the area served mean that the report becomes meaningful.

Scope of infrastructure projects in the Network Development Report

The form of statement does not specify a minimum size of project (either in terms of financial value or impact on capacity) which should be included in the Network Development Report, simply the voltage range as noted above.

DNOs included in their NDPs all projects affecting firm capacity. However, there was some divergence on including infrastructure projects for asset condition when they do not increase firm capacity. For example, some DNOs included proposed condition-based reinforcements for switchgear and transformers in their Network Development Report as these provide capacity benefits, even though the firm capacity impacts have not yet been assessed.

DNOs typically only included projects with a material impact on capacity. DNOs varied in their approach to whether the NDP included projects with small impacts on headroom, such as HV transfers or those moving normal open points which might alter the future peak load and alter the transfer capacity between substations.

Decision - The form of statement has been amended to indicate that DNOs should clarify any minimum size criteria and the extent to which asset replacement projects are included.

Comparison between the LTDS, NSHR and NDR methodologies – stages in delivery lifecycle

The form of statement indicates that the NSHR reflects '*financially approved network developments in delivery or planned for delivery including asset-based enhancements and the use of flexibility services*'.

In contrast the NDR indicates projects at a range of stages in the delivery cycle (the statement suggests the following stages but is open to others: signposting, approved plan with secured financing, in delivery, planned for delivery etc). Some DNOs linked their delivery stages to their internal approval or gate stages for project delivery. However notably by including a range of stages in the delivery lifecycle, the NDR and LTDS differ in their scope, since the LTDS only includes interventions which are financially-approved for delivery. The scope of information required on infrastructure development proposals in the LTDS (0-5 years) and NDP (0-10 years with 5-10 year focus) are also currently different e.g. the NDP requests equipment ratings. Practically DNOs will gather information on these two regulatory requirements in parallel, particularly as some projects may cross the year-5 threshold.

Through discussion at the product group, we identified that 2 DNOs interpreted the form of statement by calculating headroom in their NSHR in their 2022 NDPs as only financially approved projects (whether in delivery or planned for delivery) – UK Power Networks and National Grid Electricity Distribution (formerly WPD at the time of publication). In this approach, the NSHR and LTDS are consistent – both reflecting financially-approved projects. The list of projects included in the NDR will be different. Although the NSHR is over a longer

timeframe to 2050, in practice the impacts on capacity from financially-approved projects in the next five years are similar to the five-year scope of the LTDS. However the list of projects included in the NSHR and NDR will differ, because earlier stage projects are included. This approach has the benefit of better demonstrating the justification via the NSHR for projects which have not yet been financially-approved.

However 4 DNOs interpreted the NSHR requirement in their NDPs as either financially approved developments or developments planned for delivery (which may not be financially approved). These DNOs were Electricity North West, Northern Power Grid, Scottish and Southern Energy Networks and Scottish Power Energy Networks. This approach would include for example planned projects in their ED2 business plan which were under review by Ofgem). In this approach, the NSHR and NDR are consistent, and the NSHR includes the impact on capacity of more projects than those in the LTDS. This approach also requires the capacity impacts of early-stage signposted projects (infrastructure and flexibility services) to be reflected in the NSHR while they are at a lower level of certainty to proceed. This approach has the benefit of better demonstrating how DNOs *could* respond to customers and network needs over the long-term. However it is more indicative in nature because it includes the impact on capacity of projects which have not yet been confirmed, committed and financially-approved.

Decision – No change has been made to the form of statement, but DNOs should make their approach clear in their publications.

Comparison between the NSHR and NDR methodologies – relationship and level of analysis

The form of statement and DNO methodology documents could make clearer the different level of analysis in producing the NSHR tables and interventions in the NDR.

The NSHR tables are an indication of likely network constraints in future years out to 2050 for all substations and scenarios – this methodology must be suitable to deliver this kind of bulk analysis but does not need to be comprehensive enough to accurately identify all investment decisions and may exclude specific intervention drivers such as voltage and additional risk analysis.

Conversely the projects in the NDR (infrastructure and flexibility services) are based on constraint identification aligned to NDO investment planning and operational processes, and are likely more computationally expensive with the use of detailed network modelling and customer data.

In particular, the headrooms identified in the NSHR tables will NOT be the ONLY justification of interventions in the Network Development Report, but an input to the interventions identified in the NDR.

Decision – The last sentence of this section has been added to the Methodology section of the form of statement, but otherwise no further change has been made to the form of statement. DNOs should make their approach to identifying interventions clear in their publications.

MW or MVA units in NSHR and NDR

The form of statement indicates that headrooms in the NSHR should be published in MW, but did not specify how capacity and rating information should be presented in the NDR. DNOs generally published in MW in the NSHR, but sometimes in MVA.

The form of statement could allow both approaches, consistent with DNOs' data sources, or could look ahead to consistency in the definitions and units of capacity and loading to be used in the reform of the LTDS in future years (i.e. aligning with appropriate CIM and CGMES data profiles).

Decision - As the future LTDS approach remains unclear, the form of statement has been updated to allow MW and/or MVA units. This decision should be kept under review.

2. Interaction with transmission network reporting

Indication of unused capacity on the transmission networks such as at Grid Supply Points (GSPs) is *outside the scope* of the Network Development Report which covers the distribution networks. This was clear in the licence condition and in the form of statement. Nevertheless, transmission network capacity can have a material impact on whether customers are able to connect to the distribution networks. For example, the NDP could show plenty of unused capacity on the primary distribution network, but due to constraints at the Grid Supply Point this capacity may not be available for use. It is also recognised that the delivery timeframes for transmission reinforcements are typically much longer than for distribution reinforcements.

For the transmission Grid Supply Point interfaces, the DNOs publishing the NDPs do not receive from NGESO or the transmission licensees equivalent forward-looking data on capacity, demand and generation per Future Energy Scenario or Distribution Future Energy Scenario. Typically, DNOs will produce their own scenarios per Grid Supply Point and use these to support the annual Week 24 Grid Code submission (single scenario, 8 years ahead).

It was recommended from stakeholder feedback on the NDPs in 2022 and engagement in 2021 that the reporting of network capacity at distribution/transmission interface points is considered by DNOs, TOs and NGESO, to increase stakeholder utility by improving how distribution and transmission reports work together. A subgroup of WS1B coordinated by NGESO with TO representatives has started work in this area and will conclude in Q1 2023.

In their NDPs, some DNOs may refer to information they have on contractually-available capacity e.g. via the Bilateral Connection Agreement Appendix G statements for generation which indicate headroom. However the Appendix G process[3] is not universally implemented across all DNOs and all GSPs within a DNO – only where the scale of generation connections has triggered this. Crucially this is a contractually-available snapshot, updated as contract variations are agreed between NGESO and DNOs. It is thus very different in scope from the unused capacity headroom approach in the NDP. Thus some DNOs have chosen not to refer to the Appendix G headrooms per GSP.

The Appendix G process itself is being updated and formally implemented by CUSC modification “CMP298: Updating the Statement of Works process to facilitate aggregated assessment of relevant and collectively relevant embedded generation” will formally update the process for aggregated assessment which is currently implemented as a long-term trial with the Appendix G statements. The final report is now with Ofgem for implementation decision.

On a contractually-available basis, prospective connections to the transmission network can access heat-map style reports of transmission network capacity, such as at the link below.

https://www.nationalgrid.com/uk/electricity-transmission/get-connected/network-capacity-map

Looking ahead – transmission capacity reporting

The transmission representatives on the product group have considered over 2022 whether additional visibility of unused transmission network capacity per scenario can be provided to complement the Network Development Plan’s information on the distribution networks.

Two aspects were being considered:

1. Improved view from a contracted capacity perspective so customers have the full transmission/distribution view of contractually available capacity (similar to a heat map)
2. As scenario-based unused-capacity approach that could be used to proactively identify where GSPs might require future reinforcement (similar to NDP). This aspect would facilitate a less reactive approach which develops network capacity in line with future needs. Some of this type of analysis is done by the TOs as part of their price control submissions, but is resource intensive.

TOs shared some of the work they had done to indicate GSP capacities based on contracted connections, and the importance of not just indicating capacity at the GSP but also constraints on the wider network. Past experience of trialling a range of approaches around communicating needs at the transmission interface meant that TOs have opted not to publish any GSP 'capacity' type data based on feedback received from their stakeholders on its accuracy. A qualitative red-amber-green criteria could be adapted to indicate limitations at sites however, issues were raised around the treatment of flexible technology like storage and about treatment of sites where capacity is limited by wider network limitations.

From a connections perspective, the challenge with communicating 'limits' or 'capacity' is that the data becomes obsolete as soon as published because the connections process is live and always changing. The purpose of the DNO Network Development Plan including headroom reports is focused on indicating areas where reinforcement and flexibility options would be valuable. The key gap identified by the DNOs was the lack of a view on transmission interface limitations at the point of publication of their headroom reports.

However, the group identified that that TOs already have their view for all GSPs of EISD (Earliest in service date) for demand and generation based on latest application. For example, EISDs are presented as a range of years in NGET's ConnectNow Research Assistant. An EISD should reflect both constraints at the GSP and on the wider transmission system affecting that GSP – whichever is the later.

As EISDs are already identified systematically by GSP, sharing that by GSP with DNOs for inclusion in the Network Scenario Headroom Reports would address the stakeholder ask for visibility of transmission constraints without significant additional work for TOs.

It was noted that by not doing this, because the NDP only indicates distribution constraints it is potentially misleading for stakeholders regarding capacity constraints and an additional view on transmission would give a fuller picture.

However any publication would need appropriate caveats about being an annual snapshot (same as NDP), that earliest connection date is for new applications only; actual connection may either be later once evaluated, or connections already applied may have earlier connection date. It would also note that data is from TOs and actual connection dates are subject to application.

The TOs agreed to go away and assess feasibility of providing a snapshot of demand / generation of EISDs for all GSPs on annual basis to DNOs for their NDPs (specifically to add to the Network Scenario Headroom Report tables). An output in March 2023 could potentially be used by DNOs to supplement their May 2023 Network Scenario Headroom Report tables. National Grid ESO is arranging a follow-up meeting for January 2023 to review feasibility.

There may be some limited cases where there is no EISD already calculated (no constraint, or not assessed for some time) or where the transmission constraint is under active review at the time of the annual snapshot of the EISDs. Earlier EISDs may be possible with non-firm connections or by agreeing other innovative connection approaches, as in the Regional Development Programme collaborations between National Grid ESO, TOs and DNOs across Great Britain. Appropriate messaging in all these cases is important.

Decision – The form of statement is expanded to indicate that such data may be provided in future, but not to make this a mandatory or required item.

Going forward, National Grid ESO is looking at ways to provide greater systematic visibility of transmission capacity (unused and contractually available). We envisage that this would be complementary and related to the NDP produced by DNOs, not extending the scope of the DNO publications. This links to work that the ESO is doing in relation to setting up Regional Development Programmes (RDPs). Over the next 12 months, NGESO will be working with others on a new ongoing process that could be established within the ESO to routinely and proactively examine the data from DNOs / TOs to determine future need for new solutions or identify where to implement an existing RDP tool. These forecasts of future needs would be for each GSP and would allow us to be more transparent with connecting customers as to what to expect when connecting in different areas.

Looking ahead – transmission-distribution data exchange for capacity analysis by DNOs

One area of potential improvement in DNOs' network analysis, which has been flagged in some DNO NDP methodology reports, is exchange of updated network models/ equivalents between TOs/DNOs.

This would allow for more accurate results when modelling fault level headroom and material changes on transmission networks that affect flows on distribution networks. This is of particular importance for networks which run with interconnected Grid Supply Points. Worst case network loading conditions could be due to 132 kV circuit through-flows, which could be triggered by outage combinations on the transmission network. For the transmission network equivalents, one methodology document included the point below as a modelling limitation.

To enable accurate analysis of the distribution network, a representative Transmission model is necessary. This Transmission representation is an equivalent of the full Transmission network and, when incorporated into the distribution network's power system model, approximates the network behaviour. This data is provided by National Grid as part of the Week 42 data exchange. The size of the equivalent model varies for each licence area, depending on the level of GSP parallel running and interconnection. Currently Transmission models are not provided for future years, scenarios and seasons, which could increase the accuracy of future headroom modelling.

Context from our 2021 report on existing transmission network capacity reports

National Grid ESO (with input from the TOs) publish a range of reports (as shown in Figure 2) to give a view of future requirements and the capability of the GB transmission network as well as recommendations on network development that should 'Proceed' during the coming year. There are similarities between the scope of the DNO and the National Grid ESO documents, but also differences in detail such as the timelines and the information they include.

Capacity to connect onto distribution networks can be affected by the availability of capacity on the transmission network. To understand the risks and opportunities of their projects, connecting customers need to understand the interaction between capacity on distribution and transmission networks because it can potentially be more expensive and take longer to resolve transmission constraints. For example, a customer would benefit from early indications if a potential connection to a distribution network would depend on replacement of transformers at the transmission interface which could take several years to complete.

Interaction with current/future transmission network reporting had been considered in the development of the NDP FoS. Future capacity at transmission interfaces was excluded from the NDP FoS because the NDPs will be DNO documents and DNOs are not able to judge the capacity at the interface points owned and operated by TOs and NGESO respectively. This mainly applies to the future demand capacity because many DNOs are including indications of the generation headroom currently available at transmission interface points as managed through the trial exchange of data with NGESO known as the Appendix G process. The CUSC Workgroup Meeting (CMP298) "Updating the Statement of Works Process to Facilitate Aggregated Assessment" raised by National Grid ESO aims to incorporate the Appendix G process in the CUSC. One

objective of the modification is to provide indications of realistic levels of available capacity rather than Appendix G's blocks of capacity which do not provide users with information as to what limits apply after this.

Figure 2: National Grid ESO data and capacity reports/information sources

*NOA Pathfinder projects are currently used to investigate solutions for specific network issues out with the standard NOA process, and therefore can also provide an indication of the capacity for the part of the transmission network under investigation.

The Future Energy Scenarios (FES), The Electricity Ten Year Statement (ETYS) and Network Options Assessment (NOA) reports all relate to transmission network planning processes. The ETYS identifies transmission network constraints based on power flow results based on FES forecasts, whilst the NOA presents Cost Benefit Analysis outcomes which justify network development decisions. However, they do not include current/future transmission network headroom or available network capacity for new connections at individual transmission sites. A transmission headroom report would fill the gap and stakeholders would have a more complete picture of the capacity available on distribution networks. Some TOs already publish voluntary reports on network capacity showing areas of available headroom on their network. However, consistency in reporting for all transmission networks would help stakeholders further.

There are processes for DNOs to commission bespoke assessments of transmission capacity to accommodate specific connections, but these take time and are subject to application fees. Readily available information in the form of heat maps, planning limits and forecast future headroom values, like the proposed NDP, could give customers a useful immediate indication. Headroom/capacity reporting could either be brought into an existing report or a new document created, if this is to be published by the ESO. Alternatively, each TO could publish their own network capacity and network development report.

It is recommended last year that reporting of network capacity at interface points is reviewed to provide consistency between DNOs and TOs/NGESO to increase stakeholder utility by improving how distribution and transmission reports work together. There is value in understanding where the interactions and touch points should exist between the transmission and distribution planning processes to ensure a continued focus on delivering whole system solutions where it is in consumers' interests to do so.

3. Interaction with timing and scope of the LTDS

The Network Development Plans / Network Scenario Headroom Reports are published by the 1st of May each year, using the previous end November update of the LTDS as their baseline. DNOs publish a further LTDS update at the end of May – this is typically a partial update for network data, prior to the annual review of network loading data published in November. The form of statement allows the NDP to reflect any changes which are due to published in the May LTDS, where this is clearly flagged.

The scope of information required on demand and capacity is also related but different e.g., in LTDS in a single scenario, Table 3 indicates peak demand and capacity, whereas the demand NSHR indicates for multiple scenarios capacity minus peak demand to indicate demand headroom. In addition, all DNOs publish DFES but this is not a regulatory requirement and the publication scope varies between DNOs with differing focus on underlying assumptions v. substation outputs.

There is potential to streamline the LTDS and NDP publications, both from a delivery perspective and from the perspective of stakeholders receiving the update. Options for consideration include LTDS refocusing on asset data rather than capacity or forecast elements, with DFES and NDP focused on capacity, loading and interventions. However, the LTDS and NDP reporting timelines are set by licence conditions, and the LTDS scope by Ofgem's direction, so the NDP form of statement has limited scope to alter timing or scope in isolation, and any detailed changes must be considered and co-ordinated with the ongoing work led by Ofgem on LTDS reform.

Context from the 2021 report relevant to the NDP in context of the LTDS review

Ofgem and the associated working group are currently reviewing the LTDS. Their objective is to update the LTDS by addressing the interoperability of network data to improve the sharing of planning data and so provide stakeholders with greater understanding of opportunities on the network.

The introduction of the NDP and update of the LTDS provide an opportunity to bring together sharing of network capacity information to optimise stakeholder utility and deliver efficiencies in their reporting. The expected LTDS updates have much synergy with the NDP objectives and therefore it is important to consider the way that the LTDS and NDP work together. Duplication and potential contradictions in reporting network capacity must be avoided to prevent confusing stakeholders.

The development of the NDP FoS has identified how the NDP overlaps and dovetails with the scope of the LTDS content based on the current FoS as shown in the next figure**Error! Reference source not found.**. Consideration of where there are matches highlights potential for simplifying reports, avoiding repetition, merging reports and layering information. The development of the NDP FoS has considered the LTDS to ensure coordination, however, the LTDS review can consider further holistic network capacity reporting.

The five to ten-year network development reporting within the NDP clearly follows on from the nought to five-year period covered by the LTDS. Also, both require identification of network capacity, so there is overlap because we are proposing that the NDP FoS covers the whole period for consistency. The network parameters detailed in the LTDS are key to understanding the network capacity reporting within the LTDS and therefore it is critical that the NDP is matched to the latest LTDS as required by the new licence condition. It may be appropriate to merge some aspects of the LTDS and NDP to provide users with one comprehensive source of information. Despite overlapping the LTDS, the proposed NDP FoS goes beyond the requirements of the licence condition, for example by giving network capacity values from year 1 to up to 2050, so that users don't have to access two sources of information.

DNOs are currently required to publish their LTDS by the end of November and partial updates are provided in May each year. Whereas, the NDP Licence condition requires its publication before 1 May every two years from 2022. Availability of a complete year of network data covering the period of winter maximum sets the natural

heartbeat to annual DFES forecasting and the subsequent network analysis utilising these forecasts as shown in **Error! Reference source not found.**. The NDP fits with this timeline because the future network capacity reporting element requires the latest DFES forecasts and enough time must be allowed for the mandated engagement. Future network development reporting is built on network assessments which also require consideration of forecasted demand and generation levels even though network planning is an ongoing process due to the continuous nature of customer connections and new asset health information.

The publication timescales of network capacity reports should be co-ordinated to allow for the efficient flow of data from the FES, through the DFES and utilisation in the NDP and LTDS network capacity reports. The LTDS network data changes less quickly and therefore the month that it is reported each year is less critical. In future, the 1 May NDP and 31 May LTDS partial update timelines could be aligned in a single publication, subject to the outcome of the LTDS review.

The mismatch between the requirement to update the LTDS every year and the NDP every second year is partially addressed in our proposed NDP FoS by suggesting that the network capacity (headroom) reporting part of the NDP is updated annually.

LTDS

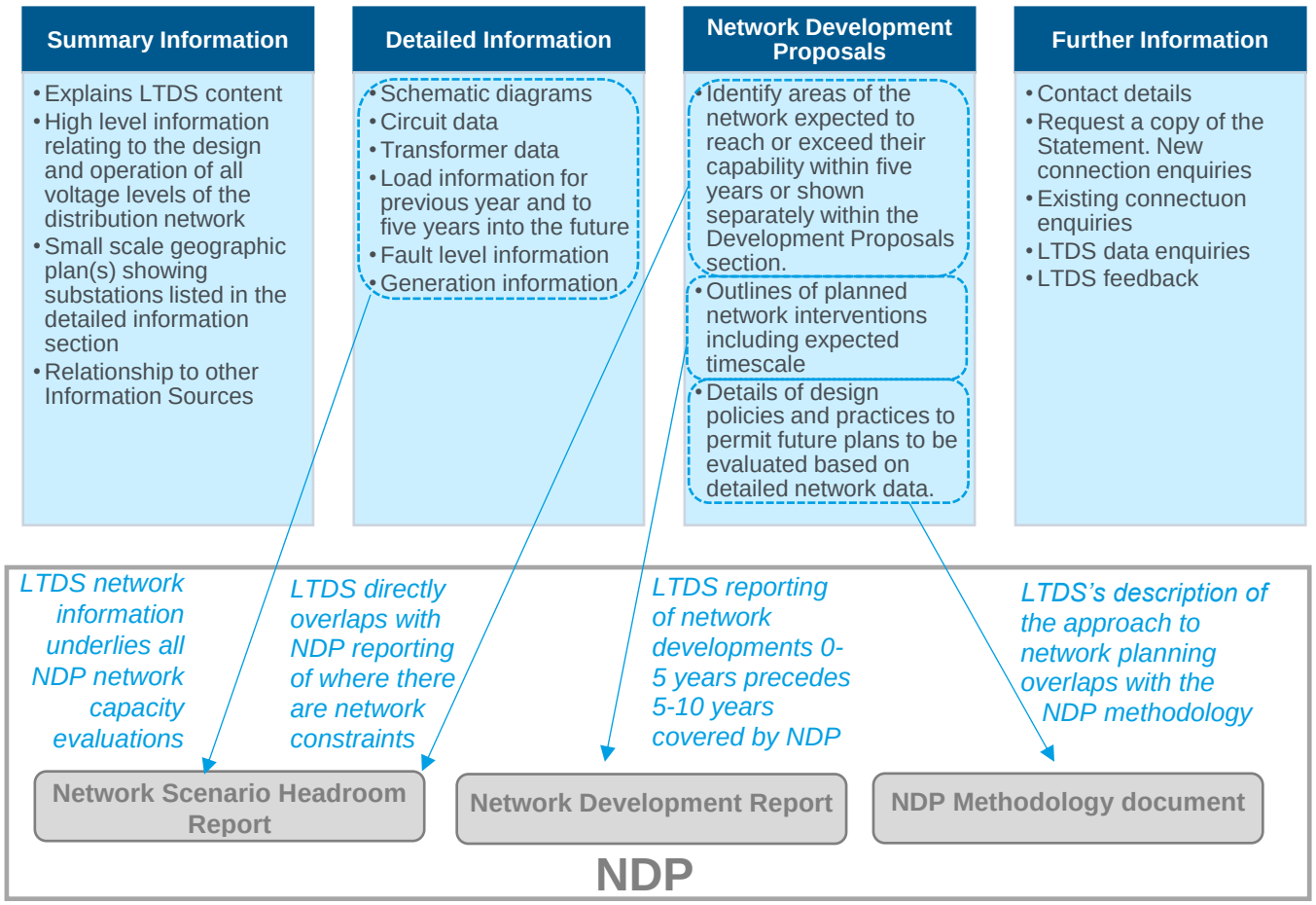


Figure 5: LTDS content based on current FoS and relationship with NDP

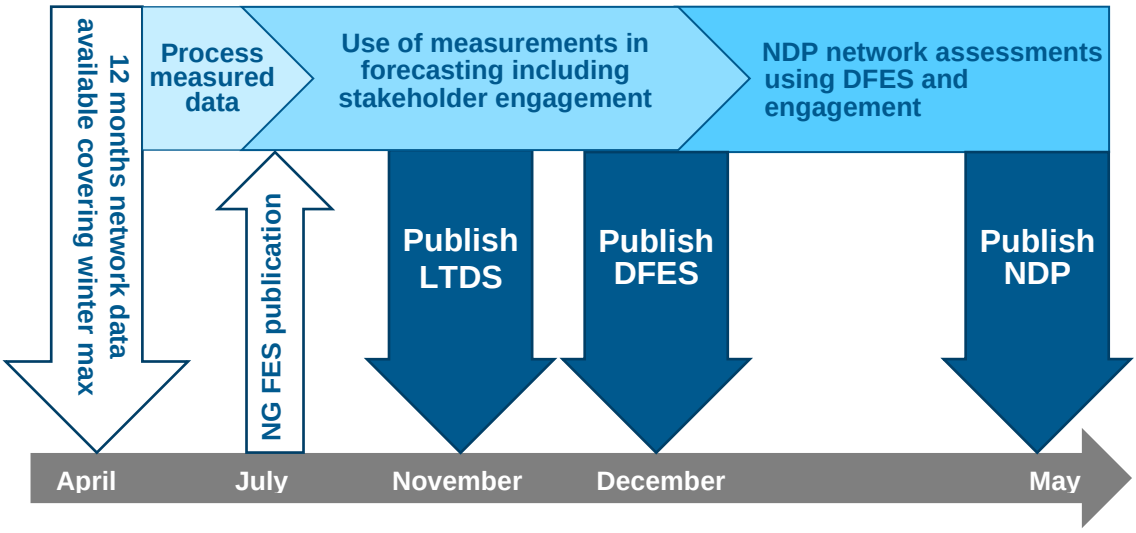


Figure 6: LTDS, DFES and NDP timeline.

4. NDP Form of Statement (FoS) - description

4.1 Overview of the content

The NDP form of statement is provided in the Appendix A to this document.

To deliver the licence requirement for the NDP, the FoS has been broken into three standalone reports as shown in Figure 3, namely:

1) Network Development Report,
2) Network Scenario Headroom Report, and
3) NDP Methodology.

The rationale behind our proposals for the NDP FoS as these three reports are presented in this section. The full NDP FoS is presented in Appendix A , with the final part of the appendix covering the inclusion of customer specific information based on the same approach included in the LTDS FoS.

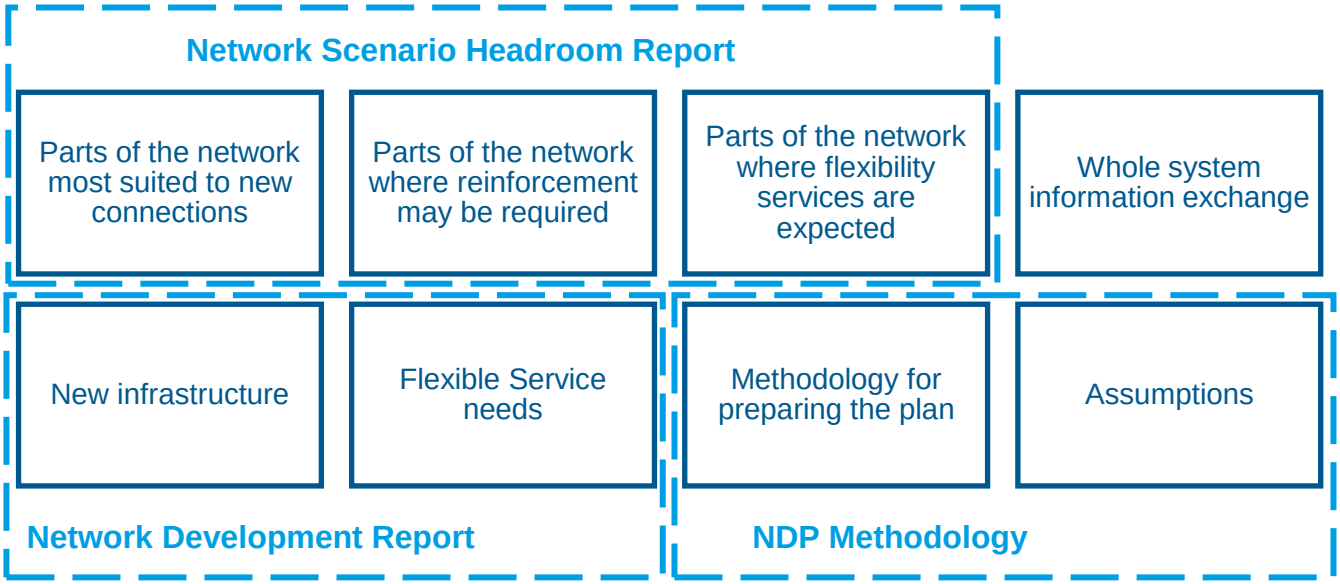


Figure 3: Parts of the NDP FoS

4.2 Network Scenario Headroom Report

The main objective of the Network Scenario Headroom Report element of the NDP is to indicate where it is anticipated that there will be network capacity to accommodate future connections, where further capacity may be necessary and where flexibility services may be required. It is expected that other more up to date sources of information on current network loading, such as heat maps, will be signposted for users seeking information on immediate connections.

Open Networks WS1B P5 shaped a standardised Network Capacity Report in 2020 prior to awareness of the NDP requirements. However, the NDP encompasses reporting on network capacity and therefore P5's previous learning and outputs were useful in the development of the NDP FoS. All DNOs committed to the discretionary publication of a Network Capacity Report in 2021 with the objective of gathering stakeholder feedback to help refine the NDP FoS and on the understanding that it would be consumed within the NDP going forward.

The Network Scenario Headroom Report element of the NDP FoS has been developed building on the P5's previous standardised Network Capacity Report. The Network Capacity Report was published as a one-off document in August 2021, prior to May 2022 to allow stakeholders feedback on the information provided and its value in decision making.

This part of the NDP will provide significant value through the additional information to major stakeholders and provide forward visibility of network opportunities. The scope and format of the proposed Network Scenario Headroom Report part of the NDP is given in

Table 2 in Appendix A.

Table 2: Network Scenario Headroom Report parameters

Scope of Network Scenario Headroom Report	Deliverable
Date range	Every year to be covered individually between 1-10 years
	After the 10th year, this requirement moves to every five years up to 2050 or aligning with the final year of the DFES forecast;
Scenarios	DFES scenarios, plus a 'best view' scenario;
Network capacities and assessment methodology	Demand and generation headroom (unused capacity rather than contractually-available) in MW and/or MVA per reported year per scenario.
	Headroom calculations are considerate of financially approved network developments in delivery or planned for delivery, including asset-based enhancements and the use of flexibility services. This may include updates in network developments in the timeframe 0-5 years which were not included in the latest LTDS (November). If included, this must be stated in the accompanying notes and updated in the next LTDS (end May).
	Headroom calculations are considerate of thermal loading and fault level constraints as a minimum.
Coverage	Capacity information to be provided for substations where the greatest voltage is greater than 20kV, normally BSP and primary substations down to and including the primary secondary voltage, typically HV (20kV, 11kV or 6.6kV)
Format and publication	The format of the Network Scenario Headroom Report part of the NDP is tabular in nature, presented in Microsoft Excel or similar spreadsheet format. Interactivity can be added to the workbook to improve visualisation of the data.
	Guidance shall be included to explain the scope of the data workbook, define each data element and give user instructions.
	A contents and version control page is included to ensure that users are able to easily access data, accurately reference the report and view approvals. It also states the dates and versions of critical data sources including the LTDS and DFES.
	Licensees shall endeavour to refresh the Network Scenario Headroom Report with the latest Licensee's data annually, including the years in between publishing the whole NDP (which shall be published by 1st May every two years).
Information sources	Parameters for the existing network underlying the headroom calculations shall be based on the latest LTDS and incorporate a view of financially approved and planned interventions.
	Existing and future network demand and generation shall be based on the licensee's latest LTDS and DFES forecasts for demand and generation at the substation.
	It is expected that the flexibility services incorporated in the NSHR shall be in accordance with DNO Flexibility Procurement Statements and Reports or if not

	included in those reports, they must be stated in the accompanying notes. Publication of Flexibility Procurement Statements and Reports is a new Standard Licence Condition 31E, and reporting detail is yet to be finalised, but will likely include the location and magnitude of contracted and prospective flexibility services.

A detailed explanation / justification for this approach is provided below:

4.2.1 Date Range

It is proposed that Network Scenario Headroom Report covers the date range to 2050, or aligning with the final year of the DFES forecast if that differs.. This date range goes beyond the 5-10 years of the mandated NDP date range as justified on the following basis:

- Consideration to 2050 matches the DFES date range and so can reflect the uncertainty on long-term network impacts.
- Customers' adoption of low carbon technologies and transition to active networks into the long term means that there will be value in reporting network capacity beyond the current position and the short-term future covered by most of the existing network capacity reports.
- Reporting the network headroom within the NDP for just up to 10 years was considered but discounted because adopting 10 years would not go much further than the five years currently covered by the LTDS. Proven value is presently obtained from network capacity indications for the current year in heat maps and Embedded Capacity Registers, and LTDS and calls for flexibility services covering the short-term future. Other stakeholders, including Local Authorities and large developers, are interested in network capacity beyond ten years in the future.
- Restricting the capacity reporting to 10 years was also considered inappropriate because developers of potential flexible services require visibility beyond this especially because their development and construction phases can take a number of years.

It should be noted that the Network Scenario Headroom Report is not intended to provide a customer about to submit a connection application with a latest indication of currently available capacity headroom to connect or to reflect the current status of connection offers, but to provide visibility of the distribution network's medium-term and longer-term capacity needs. It is expected that other more up to date sources of information on current network loading, capacity and headroom, such as heat maps, will be signposted for users seeking information on immediate connections.

This is because the forecasted levels of demand and generation already reflect prospective new connections and so the given headroom values may already factor in the capacity needed for the customer's application. For context, each DNO DFES forecast is a combination of:

- the pipeline of known accepted connection projects – in which accepted projects may be scaled by contribution factors reflecting the technology and scenario,
- forecast projects which have not yet been accepted for connection,
- insight regarding the past network loading and the aggregate demand and generation of existing and future customers.

As an example, from around 2023-2035, the further changes in the DFES generation scenarios predominantly reflect forecast connection projects which are not yet accepted for connection.

4.2.2 Reporting Granularity

It is proposed that the Network Scenario Headroom Report will be for every year for the first ten years, and every five years beyond that to the end of the date range. Five-year reports shall "snap" to the years ending in five or zero for simplicity and reflect the indicative nature of the report. The proposed years to be reported is justified on the following basis:

- Reporting every year for the first ten and every five years thereafter matches the needs of different stakeholders.
- Reporting network capacity for every year for only the first five years matching the current LTDS provision was discounted as it doesn't match with the NDP date range.
- Reporting every year for more than ten years was discounted because analysis workload is greater and not justified by increased benefits.
- Ten years matches the period that DNOs undertake detailed analysis to refine investment plans and roughly aligns with design and build timescales.
- By factoring in the connection pipeline, forecasts have an element of assurance up to approximately ten years because this encompasses the typical build period of known projects in the pipeline and Embedded Capacity Register (formerly the System Wide Resource Register) reports on quoted and accepted connection offers.
- Flexibility stakeholders are interested in detailed short-term requirements, so they target developments in the right places.
- Timescale aligns with the DFES and reporting for each year matches the LTDS and other network capacity reports such as EREC P2/7.
- Reporting for every five years after the first ten years matches the longer period and illustrates greater tolerance and divergence in DFES forecasts reflecting uncertainty in network needs.
- Reporting every five years to the end of the date range provides flexibility providers with indications of the longevity of network needs.
- The proposed simple approach is efficient when considering multiple scenarios.
- Snapping to the years ending in five and zero shows the uncertainty in the results rather than appearing precise.
- The reason for discounting reporting every year to 2050 was the larger volume of data leading to an unmanageable report. Also, future uncertainty means that there is no benefit from reporting for every year up to 2050.

4.2.3 Forecast scenarios

It is proposed that the Network Scenario Headroom Report will be based on the DFES scenarios, plus a 'best view' scenario. Inclusion of multiple scenarios goes beyond the requirements of the licence requirement and is justified on the basis of:

- Reporting data for multiple DFES scenarios is beneficial because they are used in DNOs planning of network developments included in the NDP.
- The DFES scenarios plus a best view scenario is appropriate because it matches the view from Ofgem that the NDP should be the DFES with purpose.
- Some DNOs already identify a separate 'best view' scenario and this situation is likely to evolve following WS1B P2's work defining the methodology for creating such a scenario.

The requirement to use the most recent version of the LTDS when developing the NDP and potentially a single scenario as included in the initial drafting of the NDP Licence condition has been acknowledged by WS1B's P2 working group working on principles for distribution network forecasts. They are considering how a single 'best view' scenario is created for DNOs to produce consistent forecasts to feed into the network capacity reporting parts of their NDPs.

Although a single 'best view' scenario may avoid confusion in some stakeholder communities by simplifying the presentation to the highest certainty forecast, it shall be made clear that the 'best view' network development plan is also informed by other network factors including asset health and all other DFES scenarios that provide insights into the range of future uncertainties to avoid foreclosing development options. Forecasts with less certainty can help DNOs understand network requirements under more extreme conditions and so prepare the network for the next development stage.

4.2.4 Network coverage

It is proposed that the Network Scenario Headroom Report will include as a minimum the following components of distribution networks:

- Substations where the greatest voltage is more than 20kV, normally:
    - Bulk Supply Points, BSPs (typically 132/33kV or 132/66kV), and
    - Primary substations (typically 33/11kV or 33/6.6kV).
- Exclude information on individual customers to comply with Licence condition 25B.6.
- In Scotland, 132/33kV substations are known as Grid Supply Points (GSPs) rather than BSPs, due to the lower transmission/distribution boundary and would therefore be excluded from the network capacity reporting part of the NDP.
- Where distribution networks are run interconnected with other DNOs, assumptions on how the interconnected networks have been modelled should be included in the accompanying guidance document.

Network Scenario Headroom Reporting will focus on BSPs and primary substations for the following reasons:

- Aligns with the Licence condition clause 25B.3 requirement to cover the “11kV network and above”.
- Data is most readily available for BSPs and primary substations although it is recognised that some DNOs may report on capacity of lower voltage networks if they already have data or if it becomes available in the future.
- Range of network components matches published DFES forecasts.
- Detailed reporting of LV network capacity was discounted because there is currently insufficient accurate visibility of LV distribution/secondary substation loading. DFES publications don’t yet present LV distribution/secondary substation forecasts and it was judged that reporting down to this level could lead to an unmanageable report.
- It was decided that DNOs should not report on GSP capacities in the NDP as true understanding of the capacity of the transmission-distribution interface requires assessments involving the transmission network owner and Electricity System Operator. Close collaboration on how the power system is operated, running arrangements and short-term asset ratings are required to study the distribution to transmission boundary, especially when considering combinations of arranged outages/faults for contingency analysis. Further consideration of how capacity could/should be reported across the transmission and distribution interface is required and needs input from the ESO, TOs and DNOs.

4.2.5 Capacity parameters

It is proposed that the Network Scenario Headroom Report shall include network capacity in terms of demand and generation headroom for the following reasons:

- Net zero requires new low carbon demand and generation technologies.
- Network investments are driven by demand and generation requirements.
- Meets the needs of different stakeholders who are interested in both generation and demand future connection capacity.
- Aligns with heat map reports.
- Reporting of demand or generation alone was disconnected because it would not meet stakeholder needs and for the converse of the reasons explained above.

Each DNO will clarify whether the given headroom values are for firm or flexible connections.

A positive value in the capacity headroom tables indicates that there is generally expected to be sufficient network capacity for the forecast demand or generation, either due to existing capacity or planned load transfer or planned reinforcement with high confidence of progression in the area. Each DNO’s table will explain the extent to which capacity headroom reflects capacity in the last LTDS, or also approved network changes.

A negative value in the capacity headroom tables indicates that there is generally not expected to be sufficient network capacity for the forecast demand or generation as appropriate, and that the DNO would be expecting to seek flexibility services or develop reinforcement plans in this scenario and timeframe.

These headroom figures will support the 1-10 year plans for reinforcement and flexibility services in the NDP.

4.2.6 Assessment parameters

It is proposed that the Network Scenario Headroom Report will reflect thermal loading, fault level and voltage constraints if practical. Justification of this proposed approach includes:

- The proposed Network Scenario Headroom Report is based on thermal and fault level parameters to adequately reflect significant constraints on demand and generation headroom respectively.
- Consideration of fault level was included because it is a major constraint on generation connections. However, it is recognised that fault level indications must be accompanied with a clear description of the assumptions adopted in the assessment.
- Consideration of voltage rise, and drop was not mandated because of the strong dependency on where connections occur in the network and because voltage issues can be managed for example by restricting a generator's power factor. It is preferable that short-term analysis is based on studies which assess voltage where possible. Where detailed analysis of short-term conditions has shown voltage issues, then the Network Scenario Headroom Report may indicate capacity based on this constraint. Such reporting will highlight the issue to advertise, in advance of a formal flexible services tender, the potential for flexible solutions to alleviate voltage constraints.

4.2.7 Assessment methodology

It is proposed that the Network Scenario Headroom Report will be based on detailed (network modelling) analysis for the short term where practical, and simple tabular comparisons for the longer-term to 2050:

- Capacity on distribution networks not only depends on local conditions, such as the rating of local assets, their configuration and local flexibility services, but also the capacity of interconnected networks. For example, the capacity of a primary substation to accommodate additional demand connections may depend upon the available capacity of the upstream circuits and BSP which supplies power to the primary substation. Another example is where capacity at a primary substation to accept additional generation depends on a restriction due to the fault level rating of equipment downstream of the primary substation.
- The proposed methodology for reporting network headroom in the Network Scenario Headroom Report reflects constraints across the wider network where possible. This is likely to be achieved through power system studies, but they may not be practicable in all cases, for example when future forecast loading is such that power system analysis of the present network is numerically impossible.
- Methodologies applied in the derivation of the NDP will be explained to ensure good understanding of the sensitivities of reported network capacity headroom or deficit. We recognise that it is important that stakeholders understand when the reported network capacity could be further limited by constraints on interconnected networks.
- Network capacity assessments will consider appropriate interactions between forecast generation and demand capacities. For example, demand assessments of primary demand capacity may consider demand to be offset by export from forecast additional small LV embedded generation but may not consider export from forecast HV generation to account for this being realised in a single unit which could be out of service. Similarly, generation capacity assessments may consider the corresponding forecast demand at the time of peak generation export, to reflect the counterbalancing effect of future EVs, heat pumps, new domestic/I&C connections.

Network capacity headroom reporting within the NDP will be based on detailed network analysis for the short-term because this greater level of detail is essential within planning to justify network investments and is justified as follows:

- Simpler tabular comparisons of loading versus firm capacity was deemed to be acceptable for the long term to 2050 as detailed analysis is not warranted due to the uncertainty. Also, the conditions in some scenarios may be so extreme that power flow analysis may not converge.
- Application of a tabular approach is not preferred for the first ten years as firm capacity can be an oversimplification not fully representative of complex networks.

4.2.8 Format and publication

It is proposed that the Network Scenario Headroom Report is presented in an Excel workbook format hosted on DNO webpages. This approach is justified on the following basis:

- It is accessible to many users.
- A tabular format facilitates presentation of headroom of multiple indications of how much additional demand and generation can be accommodated on the network. Table headings shall be as shown in Table 3, with the headroom values being given for each scenario and year covered by the report.

Table 3: Network Scenario Headroom Report headings

Substation Name	Voltage kV	BSP Group	GSP	Substation location	Demand Headroom MW	Generation Headroom MW

The relevance of the reported parameters shall be described along with the underlying methodologies and assumptions in the NDP Methodology document. Likely content shall include;

- Reference to the DFES document giving full descriptions of the background to the scenarios underlying the forecasts considered in the network capacity evaluations,
- Explanation of how headroom values have been calculated,
- Description of the studies employed to determine headroom values,
- Details of the network limitations considered in the evaluation, and
- What network interventions are included and when.

All nomenclature used in the Network Scenario Headroom Reporting shall be consistent with that used in the LTDS data tables.

Justification for presenting the Network Scenario Headroom Report in Excel report format incudes the following reasons:

- The tabular format is efficient and simply understood.
- Tabular formats are less likely to require IT investment and significant investment is not warranted until the enduring NDP requirements are finalised.
- Ofgem's have accepted retaining the Excel format for the LTDS in recent correspondence.
- A map-based reporting style was discounted at this stage because it would require specialist IT software and could be more difficult to interpret and use due to there being multiple layers.
- It is recognised that an Excel workbook and accompanying document have deficiencies when reporting future network capacity and developments respectively. Although use of the Common Information Model (CIM) standard would offer advantages through the inclusion of many different datasets, the system is not yet defined for the NDP use case, fully harmonised or widely used. However, CIM is expected to be adopted in the future after further development and when more stakeholders can take advantage of the benefits on offer.

Clarity on the requirements of the NDP is essential for consistency across the DNOs as there is room for interpretation on how the requirements of the CEP and Licence condition could be delivered. Previous work to define the format of the standardised Network Capacity Report has concluded that presentation of network capacity in a tabular format is a simple way to signpost parts of the network which are suitable for new connections and provide the necessary justification for the NDP. Although tables work for the presentation of long-term network capacity for multiple scenarios, they may hide the complexity of network constraints. Therefore, it is recommended that a method of recognising these in the NDP be considered to ensure that stakeholders are not misled by reporting of simplistic network capacity headroom values.

Publication of DNO standardised Network Capacity Reports in 2021 has been used to check stakeholder opinion and inform the NDP template. Recognising that the focus of the NDP is up to 10 years and the DFES forecasts extend to 2050 at the moment, the utility of future network capacity predictions has been examined to inform the duration of the network capacity report accompanying the NDP. In addition to informing the scope of the NDP, production of the standardised Network Capacity Report in 2021 provided an opportunity to test the process for producing the data and share best practice to drive consistency in DNO approaches.

The Excel workbook will include a contents and version control page to ensure that users are able to easily access data, accurately reference the report and view approvals. It shall also state the dates and versions of critical data sources including the LTDS and DFES.

The workbook shall be accompanied by a short guidance document containing sufficient information to enable users to understand the scope of the information contained within the network capacity report. This will signpost the NDP Methodology and Network Development Report parts of the NDP, but not overlap. It may also explain how users can use any interactivity features included in the data workbook.

Licence clause 25B.1 (b) requires the NDP to be published every two years. As part of the recommendations from this report, it is proposed that the Network Scenario Headroom Report element of the NDP is refreshed annually to maintain consistency with the annual publication of the LTDS. As both the NDP and LTDS are to provide an outlook for actual plans and delivery, an annual publication helps ensure information provided to stakeholders is as consistent and accurate as possible.

4.2.9 Information sources

It is proposed that the network headroom values within the Network Scenario Headroom Report are evaluated based on data taken from the latest LTDS and DFES. This approach is justified on the following basis:

- Use of the latest Long Term Development Statement is specified in Licence condition clause 25B.7.
- Publication of the NDP in May allows use of the latest DFES published in the previous December.

4.3 Network Development Reporting

Alongside network capacity headroom reporting, network development reporting within the Network Development Report element of the NDP will serve to provide the reader with valuable additional information on key projects set for delivery in terms of new infrastructure to be installed and upcoming flexible services to be employed. The information is provided with the objective of providing users with foresight whether network plans may impact on theirs and signpost requirements for flexibility services so users can target developments.

The proposed scope of the Network Development Report is to provide a list of high-level plans for network interventions and flexible service requirements, specifically:

- For the years 1-10;
- Location of the intervention, covering whole network down to primary substation HV bars;

- Justification for the need for network developments, including the nature of any constraints and the created benefits;
- Development requirements for flexibility services and new infrastructure (see Table 4);
- Where a part of an interconnected network is expected to be constrained this may be highlighted as requiring further study to evaluate whole systems approaches, such as a Regional Development Plan;
- Where it resides on the delivery lifecycle (signposting, approved plan with secured financing, in delivery, planned for delivery etc.)

Table 4: Scope of the Network Development Report

Flexibility services	New infrastructure
○ Magnitude; ○ Year of intervention, likely duration i.e. number of years in the future; ○ Location of the requirement; ○ Nature of requirement / flexibility product.	○ Timing and high-level scope of intervention; construction duration (start & finish); ○ Details of connectivity; ○ Asset quantities approx. circuit lengths, number of transformers etc. ○ Equipment ratings; ○ Approximate locations, where appropriate.

Reporting of network developments shall be complementary to existing reporting of planned network interventions in LTDS and Embedded Capacity Registers (ECRs) by focussing on anticipatory network interventions in addition to planned interventions likely to be delivered in the period five to ten years in the future.

The LTDS includes a Network Development Proposals section providing the following details on network development proposals within five years of publication and for which finance has been secured:

- Work to be carried out
- Expected timescale
- Impact on the distribution network

The Network Development Report element of the NDP works well with this in that the focus is later, but it is likely that the NDP will reflect planned schemes in that they will be factored into the capacity underlying the assessments reported in the Network Scenario Headroom Report.

The ECR includes descriptions of planned network reinforcements required to connect customers of 1MW or more, along with their completion date. Both general and connections driven reinforcements are listed if a connection is contingent of completion of the work. Covering all voltages, the monthly update of the ECR is well suited to the shorter time required to complete reinforcement of lower voltage distribution networks and the frequency that reinforcements are needed to accommodate new connections. Longer time between updates would be less suitable because modifications to 11kV distribution networks are typically completed within months. The Network Development Report's focus on development plans for higher voltage networks and the biannual refresh is aligned with the years typically taken to design and construct 33kV and 132kV network reinforcements.

It is proposed that the format of the Network Development Report:

- Includes an introduction to the purpose of the NDP in accordance with Licence condition 25B;

- Includes accessible high-level descriptions of plans for network interventions and flexible service requirements;
- Has clear association of where the named schemes and services reside in terms of geography and network connectivity;
- Groups development proposals by grid supply point;
- Is likely to be in a pdf document format, possibly interactive, but always accessible to many parties;
- Uses nomenclature consistent with the LTDS data tables and schematics.

Alternatives will be reviewed with the ambition of future use of CIM;

The Network Development Report will be prepared every other year.

4.3.1 Future options

The use of a CIM model was proposed for future releases of the report but this would need to be on the basis of redacted data for private customers. As this technology has not been fully adopted by stakeholders, it is outside the scope of this current proposal.

4.4 NDP Methodology Reporting

In accordance with licence condition 25B.4, the NDP must provide transparency in how it provided its outcomes. Each DNO must:

- Produce a methodology document to cover the end-to-end process
- Provide sufficient detail to allow stakeholders understand sensitivities and extrapolate NDP results

The objective of the NDP is to be an integral part of DNO network planning and development, rather than simply being numbers produced for publication. Therefore, it is expected that the methodology used to prepare the data underlying the NDP shall be business as usual. Network assessment and planning practices shall be explained in sufficient detail to assist users understand developing plans by undertaking their own evaluations of the detailed information within the NDP Methodology.

It is proposed that the scope of the NDP Methodology to accompany the NDP includes:

- Description of the end to end process shown in Figure 4.
- Assumptions, for example those on the export from existing and accepted generation connections;
- References to published data and network parameters;
- DFES/”best view” forecast methodologies;
- Network analysis and assessment methodologies;
- Standard network design and operation of all voltage levels and the nature of alternative network interventions including typical equipment ratings.

The format will consist of the following:

- Readily accessible data in a manner coordinated with other network operators;
- Standalone document which is set up to not require significant updates each year.

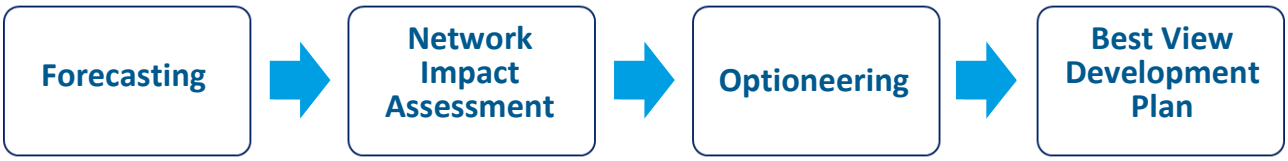


Figure 4: Network planning end-to-end process

4.4.1 Forecasting

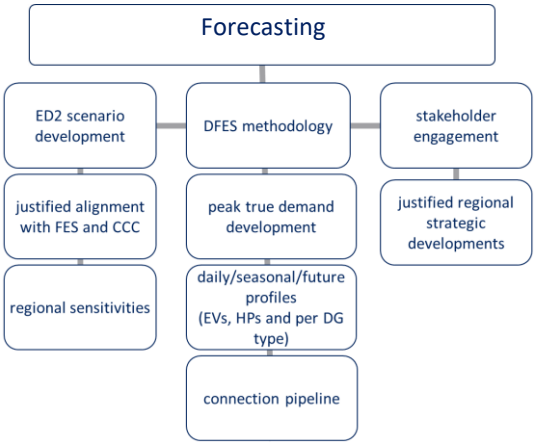


Figure 5: High-level components of forecasting methodology

The NDP Methodology will explain how DNO regional forecasts are developed and describe the building blocks that underlie the forecasting approach. The NDP Methodology document is expected to cover the high-level aspects of how forecasts are created as shown in Figure 5.

The NDP Methodology shall explain what parameters are forecast, the steps taken to create the forecasts and how they are informed, alongside descriptions of the adopted scenarios. It shall detail what differentiates a “best view” forecast from those which define the range of an uncertain future, in particular how policy, stakeholder engagement and local characteristics are considered.

Electrical demand forecasts are particularly important for informing network development plans and therefore it is also important that their creation is thoroughly explained. Daily and seasonal profiles for assumed electrical consumption and generation shall be detailed alongside the process of converting predicted volumes of new Low Carbon Technologies (LCTs) into additional electrical power flows. Description of the forecasting methodology shall also include how connection pipelines of accepted connection offers not yet connected or realised are included in forecasts.

Where appropriate, reference should be made to published DFES reports for efficient description of DFES methodologies.

4.4.2 Network Impact Assessment

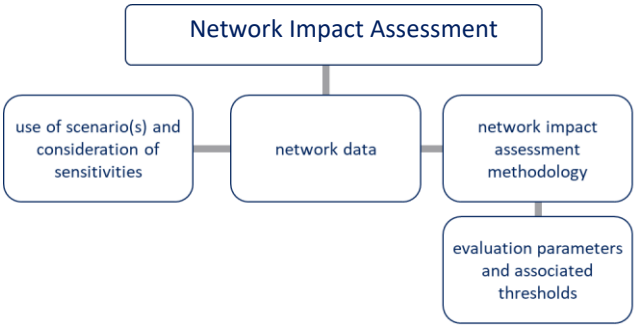


Figure 6: High-level components of network impact assessment processes

The NDP Methodology shall explain how forecasts are applied to understand whether the forecast electrical needs of customers can be accommodated within existing distribution networks. Figure 6 shows the high-level components of network impact assessments that are expected to be covered in the NDP Methodology document.

The parameters evaluated during network analysis and pertinent network data which have a significant impact on assessment outputs shall be described at a high level, including reference to data publications where relevant, recognising the benefits of transparency. Use of monitored network parameters and smart meter data shall be explained alongside key assumptions used in the absence of measurements. Factors used to identify the need for network interventions shall be detailed along with the associated thresholds.

4.4.3 Optioneering

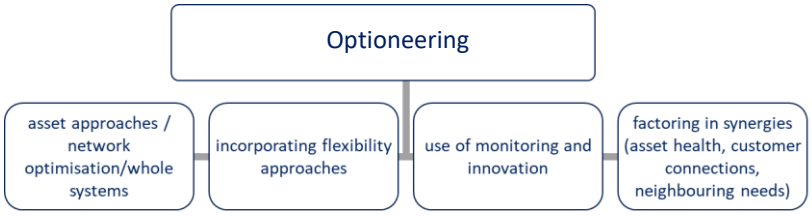


Figure 7: High-level components of optioneering processes

The overarching approach to network reinforcement should be described, drawing out how this manages the range of possible future demand scenarios and the associated network impacts. Figure 7 shows the high-level components of the optioneering process that are expected to be covered in the NDP Methodology document.

The process for identifying and assessing credible network reinforcement options to address fault level, voltage, power quality and thermal issues will be described. All solution types should be included for example, the use of flexible services to postpone upgrading equipment and the application of innovation and monitoring to provide data to inform subsequent more substantial intervention at an appropriate time to avoid asset stranding. This section of the NDP Methodology should include discussion of solutions benefits, timing and risks.

4.4.4 Best View Development Plan

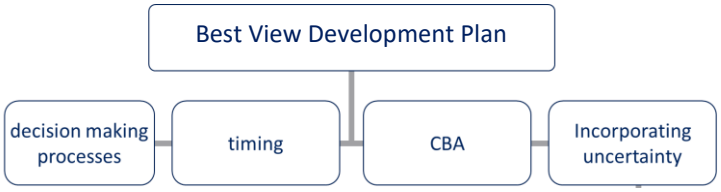


Figure 8: High-level elements of network development planning process

Alternative options for what solutions to apply to our network are assessed and compared to decide the most appropriate solution and what is included in the “best view” network development plan. The NDP Methodology shall cover the high-level components of this network development planning process as shown in Figure 8.

It will be explained how the “best view” and other scenarios are used together in the development of robust network development plans. This shall include how consideration of the “best view” forecast and other scenarios are used to ensure that options for responding to an uncertain future are not foreclosed but avoiding stranded assets and investing too early. Approaches for the development of optimal development plans considering synergies with other load and non-load network needs will be explained. This description should include how plans are created to avoid inefficient disruptive piecemeal development.

5. NDP FoS Governance

Governance of the NDP FoS is required to ensure consistency in future DNO reports. This is particularly important during a period of evolution of how networks are operated including customer participation. Stakeholder feedback on the 2022 NDPs emphasised that consistency was welcome.

Experience from 2022 shows that the NDP FoS can be enhanced and modified going forward to reflect stakeholder feedback and could in future be adjusted to meet new requirements. Other enhancements could come through the incorporation of new DNO data, such as data for lower voltage networks, and new capabilities, such as the use of CIM for sharing future network configurations in model format.

The expectation that the NDP FoS needs to change over time means that the associated governance must permit this flexibility to quickly deliver benefits from advancements in DNO capabilities, incorporate further stakeholder needs and make changes incorporating learnings from the stakeholder engagement required by Standard Licence condition 25B. The governance needs to allow the NDP FoS to be agile and should not involve lengthy change processes.

Ofgem are responsible for the LTDS FoS through its association with Standard Licence condition (SLC) 25. Consequently, there is a formal and lengthy process for updating the LTDS FoS. Such a governance process may be a barrier to the agile development of the NDP FoS and therefore is not ideally suited.

It is recommended that the governance of the NDP FoS continues through the ENA to allow for more reactive updates to reflect stakeholder feedback and adjustments to meet their new requirements.

Governance through the ENA is a preferable alternative because it would allow changes to be made more quickly whilst involving all DNOs through a working group. In the longer term, consideration should be given to defining the NDP FoS in an Engineering Recommendation, including it under the governance of the Distribution Code Review Panel by listing it in an Annex or instead making it an ENA guidance document which continues to be owned and kept under reviewed as an Open Networks project product.

However as the review of the LTDS has commenced and but is yet to finalise detailed proposals on the future scope of the LTDS and the statutory consultation is still perhaps more than a year away, it is recommended that the working group continue to consider the LTDS current make-up and alignment with the NDP and whether any efficiencies can be obtained by moving aspects of the capacity reporting to the NDP, or by moving some elements of NDP into the LTDS with a combined form of statement. Either way, the co-ordinated purpose and content of the NDP and LTDS should be clarified and communicated to ensure that users have a clear understanding of what is found where.

Appendix A Form of Statement of Network Development Plans

This form of statement relates to the Network Development Plan (the "NDP") published in accordance with standard distribution licence condition 25B.

Changes relative to the December 2021 version of the Form of Statement are shown in yellow highlight.

The "NDP" comprises three standalone reports:

1) Network Development Report,
2) Network Scenario Headroom Report, and
3) NDP Methodology.

All parts are published free of charge on the Licensee's website without the need for registration of user details. Together the parts provide comprehensive information on future distribution networks with sufficient background to understand the scope of the information and how it was prepared, thus allowing further analysis.

Content of the NDP

Network Development Report

The Network Development Report section of the NDP describes parts of the network requiring intervention in the next five to ten years, in particular upcoming flexible services to be employed and options for new infrastructure. For context, it may need to recap the developments up to five years ahead as described in the last Long Term Development Statement (November), or highlight changes in capacity or developments about to be published in the update to Long Term Development Statement (May).

The Network Development Report section includes an introduction to the purpose of the NDP in accordance with Standard Licence Condition 25B.

High level plans for network interventions and flexible service requirements of the highest distribution network voltage (typically 132kV or 33kV) to the lower voltage of primary substation, are to be described including;

- Justification for the need for network developments, including the nature of any constraints and the benefits provided by interventions;
- Where each development resides on the delivery lifecycle (signposting, approved plan with secured financing, in delivery, planned for delivery etc.);
- Where a part of an interconnected network is expected to be constrained, this may be highlighted as requiring further study to evaluate whole systems approaches, such as a Regional Development Plan;
- Necessary details of the best view requirements for flexibility services and new infrastructure developments are tabulated below.

Flexibility services	**New infrastructure**
• Magnitude • Expected timescale • Voltage • Location of the requirement • Nature of requirement / flexibility product type, for example post or pre-fault	• Expected timescale • Details of connectivity including voltage • Asset quantities approx. circuit lengths, number of transformers etc • Equipment ratings • Approximate geographical locations and options for possible circuit routes

• Nature of the service, for example demand-side response, energy efficiency, or other alternative to asset-based reinforcement	

Network Development plans shall be grouped by Grid Supply Point and use nomenclature consistent with the LTDS data tables and schematics. The Network Development section is published in a format suitable for use by other parties, typically Adobe PDF format, possibly with interactivity to improve user access.

DNOs should be clear on any definition of a minimum size of project to be included in the Network Development Report, and whether asset-replacement projects are included or excluded and in what circumstances.

Network Scenario Headroom Report

The Network Scenario Headroom Report part of the NDP indicates where it is anticipated that there will be network capacity to accommodate future connections and where flexibility services may be required. The Network Scenario Headroom Report is a representation of unused capacity for demand and generation in each annual update of an energy scenario, *not* a representation of contractually-available capacity as may be found in a heat map or a hosting capacity tool.

Presented in tabular form, it is defined as follows:

Date range	Every year to be covered individually between 1-10 years.
	After the 10th year, this requirement moves to every five years up to 2050 or aligning with the final year of the DFES forecast.
Scenarios	DFES scenarios, plus a 'best view' scenario.
Network capacities and assessment methodology	Demand and generation headroom (unused capacity rather than contractually-available) in MW and/or MVA per reported year per scenario.
	Headroom calculations are considerate of financially approved network developments in delivery or planned for delivery, including asset-based enhancements and the use of flexibility services. This may include updates in network developments in the timeframe 0-5 years which were not included in the latest LTDS (November). If included, this must be stated in the accompanying notes and updated in the next LTDS (end May).
	Headroom calculations are considerate of thermal loading and fault level constraints as a minimum.
Coverage	Capacity information is provided for substations where the greatest voltage is greater than 20kV. This is normally BSP and primary substations down to and including the primary secondary voltage, typically HV (20kV, 11kV or 6.6kV).
Format and publication	The format of the Network Scenario Headroom Report part of the NDP is tabular in nature, presented in Microsoft Excel or similar spreadsheet format. Interactivity can be added to the workbook to improve visualisation of the data. Guidance shall be included to explain the scope of the data workbook, define each data element and give user instructions. A contents and version control page is included to ensure that users are able to easily access data, accurately reference the report and view approvals. It also

	states the dates and versions of critical data sources including the LTDS and DFES.
	Licensees shall endeavour to refresh the Network Scenario Headroom Report with the latest Licensee's data annually, including the years in between publishing the whole NDP (which shall be published by 1st May every two years).
Information sources	Parameters for the existing network underlying the headroom calculations shall be based on the latest LTDS and incorporate a view of financially approved and planned interventions.
	Existing and future network demand and generation shall be based on the licensee's latest LTDS and DFES forecasts for demand and generation at the substation.
	It is expected that the flexibility services incorporated in the NSHR shall be in accordance with DNO Flexibility Procurement Statements and Reports or if not included in those reports, they must be stated in the accompanying notes. Publication of Flexibility Procurement Statements and Reports is a new Standard Licence Condition 31E, and reporting detail is yet to be finalised, but will likely include the location and magnitude of contracted and prospective flexibility services.

The format of the Network Scenario Headroom Report is to be consistent with the table below for each scenario and year covered by the report.

Substation Name	Voltage kV	BSP Group	GSP	Substation location	Demand Headroom MW	Generation Headroom MW

Subject to confirmation of data availability, caveats and timescales provided by Transmission Operators, from 2023 the Network Scenario Headroom Report tables may be further supplemented by a column indicating 'Earliest in Service Date' for new applications for connection of demand and generation at each GSP, or the tables may signpost TO publications with this data.

NDP Methodology

The NDP Methodology explains how the headroom in the Network Scenario Headroom Report was calculated and how network requirements in the Network Development Report are decided. It describes the business-as-usual end-to-end processes underlying the NDP as an integral part of DNO network planning and truly reflective of best view developments. Sufficient detail is provided to allow stakeholders to understand sensitivities and extrapolate the NDP results. This includes details of the assumptions made by the licensee in preparing the NDP.

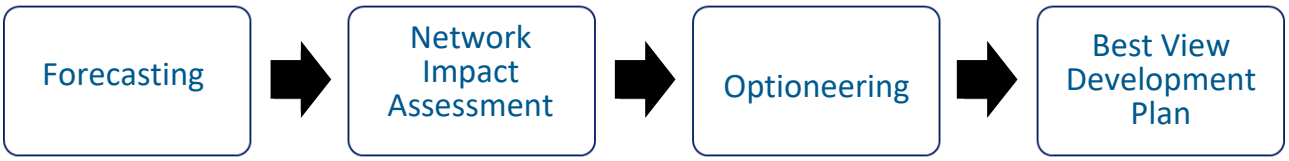
The NDP Methodology is a standalone document which may not require significant update at each publication. It will be in a format suitable for use by other parties, typically Adobe PDF format.

At a high level, the scope of the NDP Methodology includes:

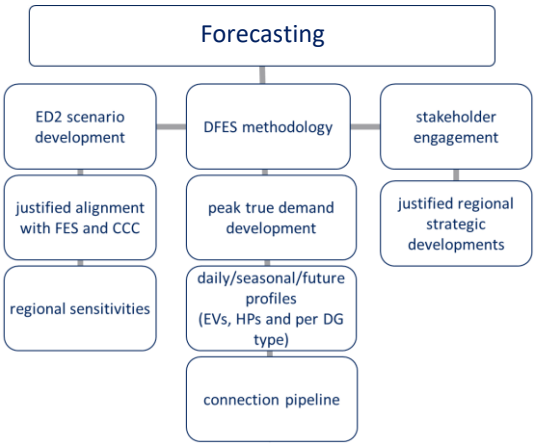
- Relevance of the reported parameters;

- Description of the end to end process shown below;
- References to published data and network parameters;
- Assumptions, for example those on the export from existing and accepted generation connections;

Network planning end-to-end process:



Forecasting

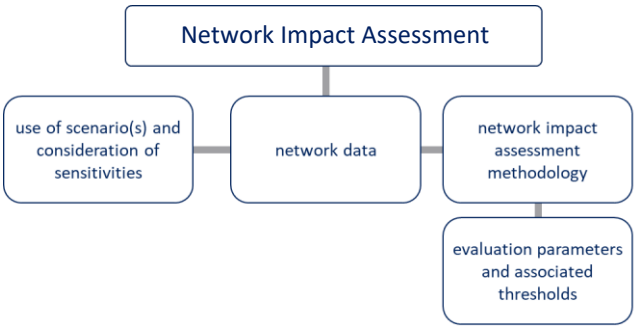


The NDP methodology explains how DNO regional forecasts are developed and describes the building blocks that underlie the forecasting approach covering the high-level aspects of how forecasts are created as shown above. Specifically this includes; what parameters are forecast, the steps taken to create the forecasts and how they are informed, alongside descriptions of the adopted scenarios. It details what differentiates a “best view” forecast from those which define the range of an uncertain future, in particular how policy, stakeholder engagement and local characteristics are considered.

Daily and seasonal profiles for assumed electrical consumption and generation are detailed alongside the process of converting predicted volumes of new Low Carbon Technologies (LCTs) into additional electrical power flows. Description of the forecasting methodology also includes how connection pipelines of accepted connection offers not yet connected or realised are included in forecasts.

References to published DFES reports may be made for the efficient description of DFES methodologies.

Network Impact Assessment

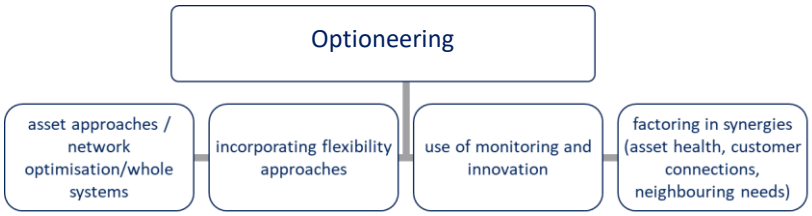


The NDP Methodology explains how forecasts are applied to understand whether the forecast electrical needs of customers can be accommodated within existing distribution networks. The high-level components of network impact assessments shown above are expected to be covered.

The parameters evaluated during network analysis and pertinent network data which have a significant impact on assessment outputs are described at a high level, including reference to data publications where relevant. Use of monitored network parameters and smart meter data is explained alongside key assumptions used in the absence of measurements. Network limitations used to identify the need for interventions are detailed along with the associated thresholds.

In particular, the headrooms identified in the NSHR tables will NOT be the ONLY justification of interventions in the Network Development Report, but an input to the interventions identified in the NDR.

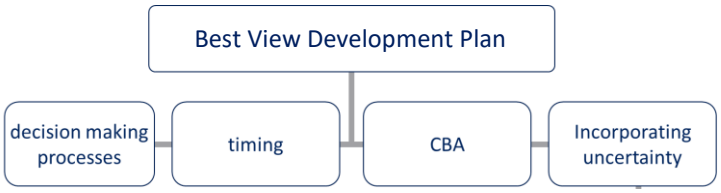
Optioneering



The overarching approach to network reinforcement is described based on the high-level components of the optioneering process as shown above, drawing out how this manages the range of possible future demand scenarios and the associated network impacts.

The process for identifying and assessing credible network reinforcement options to address fault level, voltage, power quality and thermal issues is described. All solution types are included for example, the use of flexible services to postpone upgrading equipment and the application of innovation and monitoring to provide data to inform subsequent more substantial intervention at an appropriate time to avoid asset stranding. This section of the methodology includes discussion of solutions benefits, timing and risks.

Best View Development Plan



The NDP Methodology covers the high-level components of how best view development plans are created as shown above. It explains how alternative network solutions are assessed and compared to decide the "best view" network development plan.

It explains how the "best view" and other scenarios are used together in the development of robust network development plans. This includes how consideration of the "best view" forecast and other scenarios are used to ensure that options for responding to an uncertain future are not foreclosed but avoiding stranded assets and investing too early. Approaches for the development of optimal development plans considering synergies with other load and non-load network to avoid inefficient disruptive piecemeal development are explained.

Standard network design and operation of all voltage levels including typical equipment ratings are detailed.

Consultation requirements

In 2020, 2021 and 2022, DNOs via the ENA Open Networks product group consulted to provide input to and refine the 'form of statement for the NDP'. However DNOs also have a separate requirement in their electricity licence to consult on their NDPs. This requirement is to:

(a) consult interested parties on the proposed Network Development Plan for a period of at least 28 days before publishing as required by 25B.1; and

(b) publish the non-confidential consultation responses received, a summary of the responses and how it has taken them into account.

The results of the consultation can either be published as a section in the NDP Methodology or as stand-alone document alongside the NDP. DNOs may take a variety of forms to their consultations including questionnaires, webinars and workshops, but must publish the non-confidential responses received and how this relates to other consultation activities on similar topics.

The consultation must be repeated every two years on the full NDP (Network Development Report, Network Scenario Headroom Report and Methodology) e.g. 2022, 2024 and 2026. In the years when a full NDP is not required, there is no expectation of consultation on the Network Scenario Headroom Report data tables being updated annually e.g. 2023, 2025, 2027.

Process for assessing treatment of customer-specific information

The following process is taken from Ofgem's LTDS direction and should be adopted for information that the licensee considers to fall into the categories referred to in standard licence condition paragraph 25B.6;

- "seriously and prejudicially affect the commercial interests of the licensee or any third party"

- "breach of standard condition 42 (independence of the distribution business and restricted use of confidential information)"

Q1. Does the information need to be disclosed by the licensee to fulfil the obligations under SLC 25 of the distribution licence? **YES** Not in breach of Section 105 of the Utilities Act 2000 or SLC 39 of the distribution licence **NO** Omit the information from the Statement
Q2. Does the information relate to an individual (i.e. not to a company)? **NO** Data Protection Act does not apply **YES** Licensee must be satisfied that disclosure of the information complies with the Data Protection Act
Q3. Does the customer object to disclosure of the information? **YES** **NO** Include the information in the statement
Q4. Can the customer's objection be resolved by the licensee presenting the information in a different format in the Statement? **NO** **YES** Include the information in the Statement in that format
Q5. Would the customer accept that the information would be made available following a specific request from a user of the Statement? **NO** **YES** Reference information in the Statement and provide it to any user who specifically requests it
Q6. Refer matter for determination by the Authority under paragraph SLC 25B.6 of the distribution licence providing details of the specific issue and discussions between licensee and customer. In considering its decision, the Authority may choose to contact the customer directly.

Note:
Where such information may be involved, it is essential that this process is started early enough to enable any issues to be resolved without causing a delay to the publication of the Statement.

Appendix B - Background to the Network Development Plans

This content is repeated from the December 2021 proposals for the form of statement (reference 3).

2. Development Methodology

2.1 Step by step approach

Error! Reference source not found. shows the seven-step methodology for the development of the NDP FoS. This clearly defined process was adopted to ensure comprehensive assessments were undertaken to provide the necessary understanding and justification to shape the NDP for optimal utility.

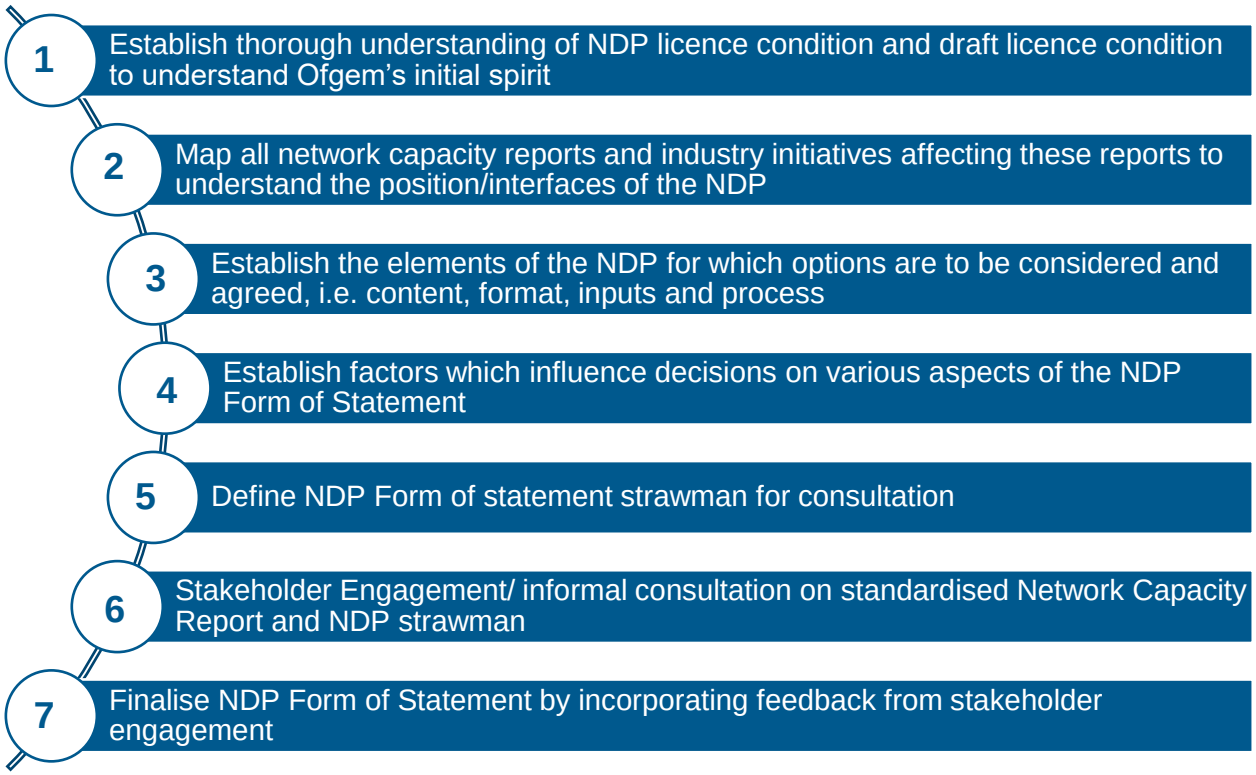


Figure A: Step-by-step methodology for development of the NDP FoS

3. NDP FoS influences

The initial steps of the methodology for developing the NDP FoS were associated with understanding the landscape and requirements of the NDP to ensure that it complemented other network information sources and optimised stakeholder utility.

3.1 Licence condition requirements

Our first step in the methodology adopted to develop the NDP FoS was to thoroughly understand the NDP obligations through examination of the CEP and subsequent licence condition.

New standard licence conditions[4] incorporating the requirements of the Clean Energy Package came into force on 31st December 2020 following informal consultation on the proposed changes. Draft wording of the proposed modification was circulated for feedback via the ENA Electricity Regulation Group on 5th August 2020. This was following an Ofgem/BEIS led meeting introducing their CEP implementation plans to the ENA held on 30th June and after a wider workshop for DNOs hosted by BEIS on 13th August 2020 covering the draft licence conditions. The final NDP licence requirement differs from the draft. Original details on the nature of the NDP and what would be usefully included in the NDP were subsequently omitted from the new licence condition. However, Ofgem have indicated to the ENA that they expect NDPs to align with the spirit of the original drafting.

The content of the original drafting subsequently removed from the final Licence condition includes:

- Publication of a DFES with a reasonable number of scenarios;
- Obligation to use the scenarios for preparing the NDP;
- Model a high confidence forecast;
- Requirement to explain differences between each previous NDPs and observed conditions reported in subsequent LTDS from the third NDP publication.

4 https://epr.ofgem.gov.uk/Content/Documents/Electricity%20Distribution%20Consolidated%20Standard%20Licence%20Conditions%20-%20Current%20Version.pdf

3.2 Coordination with other related DNO Reports

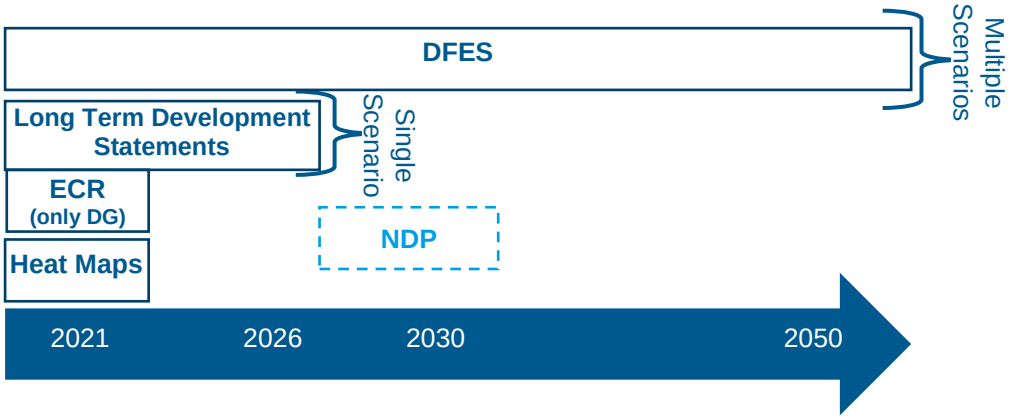


Figure B: Timeline of existing network capacity, demand and generation reports (not to scale)

Our second step was to establish other DNO reports on and related to current and future network capacity, review their objectives and establish interfaces with the NDP to ensure the coordination of the NDP FoS as mentioned in section 3.3.

The NDP's timeline of 5-10 years is already defined in the licence condition, following on from the time period covered by the LTDS as shown in **Error! Reference source not found.**. Consideration of other aspects of the existing network reports can inform the NDP FoS to provide consistency, for example the range of scenarios, area of network coverage and what parameters are included. The LTDS currently focusses on reporting demand from which users can infer network capacity for new loads, but it does not include generation volumes, so it is more complex for stakeholders to understand the capacity available for further generator connections.

LTDS requirements are expected to change as a result of Ofgem's review which commenced in summer 2021. This means that the NDP FoS should be agile and able to adjust to remain complementary to the LTDS.

3.3 Anticipated NDP use and value

To understand the impact of the NDP and how it will produce maximum impact, we undertook an assessment of the proposed audience and major stakeholders. Table 4 summarises how a range of stakeholders are expected to utilise the NDP and how this impacts the FoS.

Table 5: Stakeholder uses of NDP and what they mean for the FoS

Stakeholder	Utility(expected use and value)	What does this mean to the FoS?
Developers Property/Building, Generation, Industrial customers, Generation customers	- Understand future network constraints and plans for new capacity to signpost when and where connections will be most suitable (noting that indication of currently available capacity would not be by NDP but by other indications such as DNO heat maps)	- Developers need detailed information in accessible format - Likely not to be models, but some may be able to use them - Location of assets to be included - Flexible connection curtailment rates to be included - Dispatch rates to be included for flex services
Local Authorities (LA) / Government organisations	- Understand whether the electricity supply network will provide opportunities or will be a barrier to their advancement of their initiatives, especially decarbonisation or economic stimulus of typically larger areas and requiring greater capacities compared to individual customers	- Accessible format - They are interested in smaller capacities at lower voltages, EV connections, hubs etc - For local authority public sector software limitations (make it compatible with older versions of Excel) - With relation to new housing developments – headroom on EHV networks as affected by larger connections - Breakdown of where electrical infrastructure is within a LA
Interconnected electrical network operator e.g. IDNOs, TO and ESO	- Understand future needs for considering alternative or whole system solutions - Understand how constraints are proposed to be managed to understand impacts on their network to adjust their assessments accordingly - Identify synergies in their development for efficient delivery (can work be scheduled at the same time or to avoid conflicts in scheduling and associated risk to security of supply	- Accurate evaluation of the capacity on any interconnected network is only possible with greater transparency of capacity on all networks - This means that transfer of models would be convenient
Other network operators • Transport • Gas network • Water network	- Whole energy wider system analysis - Policy optimisation - Study the impact of electrification policy - Co-ordinate or avoid overlap of works	- Same format from all DNOs will facilitate whole GB analysis - Accessible

Stakeholder	Utility(expected use and value)	What does this mean to the FoS?
Flexibility Service providers	- Understanding network needs for existing/future service providers - More notice of requirements and therefore time to prepare to participate - Understanding the location, year of need, longevity and extent of the requirement	- Developers need detailed information in accessible format - Likely not to be models - NCR would be considered for strategic and longer-term decisions and the Flex data details delivered via the Expressions of Interest. The flexibility opportunities will be sign posted in the NCR/NDP e.g. website.
Community Energy	- Inform connection opportunities and constraints	- Accessible format
Universities	- Provide resources and understanding for further analysis	- All assumptions and approaches to be well explained to support detailed evaluation and extrapolation of analysis and proposals.

4. Stakeholder Engagement and Feedback

Our proposals for the NDP FoS were developed through the WS1B P5 working group involving all DNOs and representatives from the ESO and TOs, with all parties helping to shape the proposal to maximise stakeholder value and to ensure deliverability.

Further review and feedback has also been sought from a range of stakeholders. The NDP FoS has been shared with the Open Networks Steering Group and Advisory Group, along with engaging with wider stakeholders as shown in **Error! Reference source not found.**.

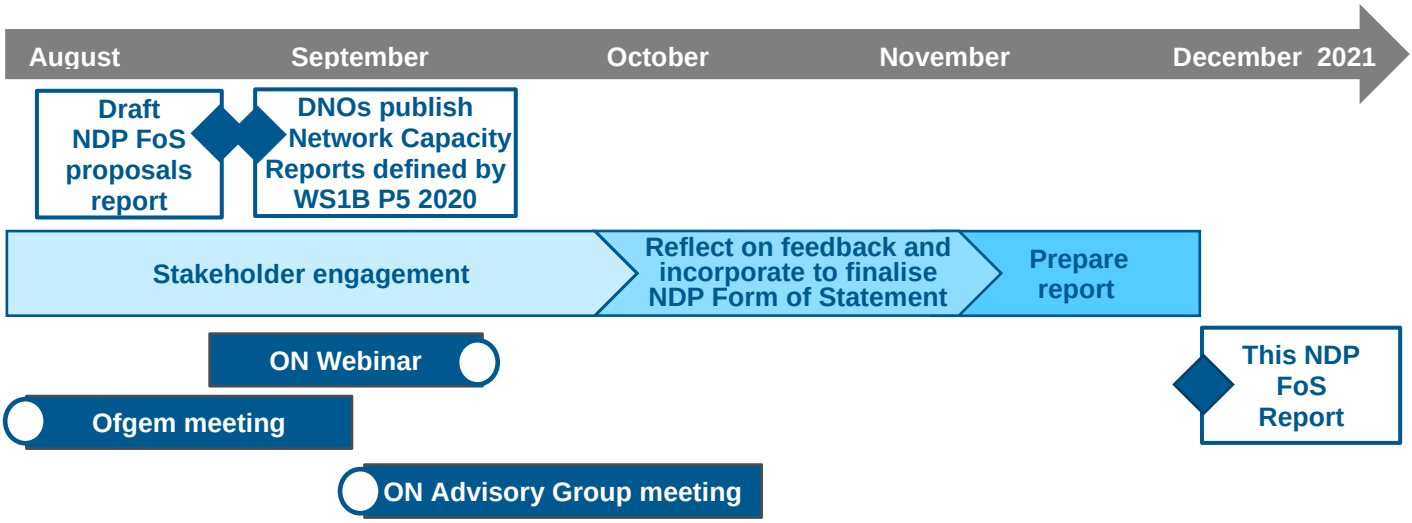


Figure 9: WS1B P5 stakeholder engagement programme

All DNOs published their Network Capacity Report by the end of August 2021 in accordance with the commitment made last year through WS1B P5. Engagement around these publications was used as an opportunity to seek feedback on the proposals for the NDP FoS.

In addition to this, a number of activities were undertaken in parallel to maximise stakeholder benefit and allow for feedback on the development of the NDP FoS:

- The proposed NDP FoS was presented to the Open Networks Advisory Group and ON WS1B committee.
- A webinar was hosted through the ENA in September 2021, signposting the 'Proposals for the Form of Statement of Network Development Plans' report and highlighting each DNO's respective Network Scenario Headroom Report
- A Microsoft form was sent to all attendees detailing questions relevant to the FoS to allow for stakeholder feedback

To ensure that the feedback received was constructive and relevant, the following questions were asked to stakeholders based on the Network Scenario Headroom Report (NSHR), Network Development Report (NDR) and NDP Methodology elements of the NDP. A summary of the feedback based on these questions is provided in **Error! Reference source not found.**.

Table 6: Stakeholder feedback questions

Number	Question	Summary of feedback received
1	NSHR: Is there value in of reporting network capacity to 2050?	Reporting network capacity to 2050 is valuable if all network investments and methodology are transparent.
2	NSHR: Are there advantages in reporting network capacity for multiple scenarios?	Yes, if they come with corresponding stated assumptions on the network investment needed and the

		inputs on which those investment decisions and costs were based.
3	NSHR: Is it useful to update the NSHR annually in accordance with the DFES?	Yes, an annual update is useful or corresponds with other published reports
4	NSHR: Is there enough clarity and awareness of how the various capacity reporting work together?	More clarity is required in terms of the nature of the constraint and the affected asset. HV feeder headroom would be useful.
5	NSHR: What are your views on an Excel format and the future implementation in CIM?	This is the right format at present due to the universal nature of the application.
6	NDR: Does the proposed reporting of larger scale interventions (primary and above) meet your requirements for long-term visibility of network and development planning?	A high-level overview of larger scale interventions is appropriate but local benefits come from understanding constraints at the HV feeder level.
7	NDR: Is it clear how this part of the NDP fits in with embedded capacity register/LTDS/flexibility service tenders etc?	The methodology document will need transparency on where the figures have come from and how the respective reports fit together.
8	NDR: Does it provide adequate instruction/detail of proposed interventions?	Yes, this detail is adequate
9	NDP Methodology: What do you want out of the proposed Methodology part of the NDP?	How a DNO's understanding of network data and customer behaviour are being applied in the methodology and how these influence network plans.
10	NDP Methodology: Can variances in DNO approaches due to software and data availability be accommodated if well explained in the methodology?	Not yet clear, once the NDP's have been published the delta maybe understood.
11	Do you see any further opportunities for the detailed scope of the NDP?	The scope of the NDP should be reviewed with Stakeholders during years 1 and 2 so reactive updates can be applied.

The overall feedback from stakeholders was positive around what the NDP is trying to achieve and provide in terms of stakeholder value. Stakeholders view that a key part of success for the NDP is the quality of the NDP Methodology and how it informs stakeholders of the decision-making process and what has been considered. Standardisation in approach between DNOs was welcomed/ Visibility further downstream of the lowest voltage at primary substations was also mentioned and a commitment has been given to review this in further iterations of the NDP FoS in the future.

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