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CEER Views on Electricity Distribution Network Development Plans

**Distribution Network Development Plans team
of the
Distribution Systems Working Group**

Ref: C21-DS-72-03

24 November 2021

INFORMATION PAGE

Abstract

This document (C21-DS-72-03) presents CEER's views on distribution network development plans. The document addresses aspects that distribution system operators should consider when preparing and consulting on their network development plans, as well as actions that national regulatory authorities could take to foster transparency and participation in distribution network planning processes.

Target audience

Electricity distribution system operators, electricity transmission system operators, consumer representative groups, other network users, academics and other interested parties.

Keywords

Network planning, network development, Clean Energy Package, distribution, network development plans, distribution system operators, electricity.

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Related documents

Council of European Energy Regulators (CEER) documents

- [CEER Paper on DSO Procedures of Procurement of Flexibility](#), 16 July 2020, Ref. C19-DS-55-05.
- [CEER Paper on Whole System Approaches](#), 30 June 2020, Ref. C19-DS-58-03.
- [ACER-CEER Position on Revision of the Trans-European Energy Networks Regulation \(TEN-E\) and Infrastructure Governance](#), 19 June 2020.

External documents

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EXECUTIVE SUMMARY

Background

Most European countries have already introduced network development plans (NDPs) for electricity distribution networks, to provide system users with adequate information regarding network expansions and better manage the increase of distributed energy resources. More recently, Directive (EU) 2019/944 introduced an EU-wide requirement for electricity distribution system operators (DSOs) to prepare and publish distribution network development plans (D-NDPs). Important reasons why this requirement was put in place are to support the integration of installations generating electricity from renewable energy sources, and to facilitate the development of energy storage facilities and the electrification of the transport sector.

Objectives and contents of the document

The objective of this paper is to provide European energy regulators' views on the content and process for the preparation of D-NDPs. It addresses aspects DSOs should take into account when preparing and consulting on their network development plans, as well as actions that national regulatory authorities (NRAs) could take to foster transparency and participation in distribution network planning processes.

Brief summary of the conclusions

Concerning DSOs' activities on electricity D-NDPs, CEER deems it essential that:

- The D-NDPs provide equity and transparency, so the planning methodology should be comprehensible. To this end, the methodology should be well understood by the stakeholders who receive it;
- The D-NDPs properly assess and explain the interactions between the planning methodology and procurement of flexibility options;
- The scenarios for all NDPs are transparent and developed in a non-contradicting way;
- There is an appropriate level of coherence between the scenarios considered in devising the D-NDP and other linked national scenarios for any sectors that interact with electricity, as well as between the D-NDP scenario data and any other network planning publications;
- To ensure transparency in the development of electricity distribution networks, different methodologies can be established to identify the D-NDP projects; and
- As part of the process of publishing public consultation results, DSOs should be able to justify how comments have affected D-NDPs, and if some responses have not led to changes.

In terms of NRA activities relating to electricity D-NDPs, CEER considers that:

- In cases where DSOs are exempted from D-NDPs, the NRA should be provided with the right to demand information on distribution network development from every DSO, and to request DSO development actions, as appropriate;
- A biennial frequency of D-NDPs is likely to allow more time for consultation and additional interactions with stakeholders. The additional time for NRAs to review D-NDPs and provide recommendations for improvements to DSOs may increase the quality of D-NDPs;
- A regulatory requirement for a central publication and communication platform for D-NDPs may offer considerable added value, in light of the number of DSOs; and
- A regulatory requirement to establish a common template with minimum information provided by the DSO can ensure that all D-NDPs are consistent and can be easily compared.

1 Introduction

To provide system users with adequate information regarding network expansions and to better manage the increase of distributed energy resources, most European countries have introduced NDPs for electricity distribution networks.

Directive (EU) 2019/944¹ introduced an EU-wide requirement for electricity distribution system operators (DSOs) to prepare and publish distribution network development plans (D-NDPs). Important reasons why this requirement was put in place are to support the integration of installations generating electricity from renewable energy sources, and to facilitate the development of energy storage facilities and the electrification of the transport sector.

The following table² provides an overview of the content of Article 32 of Directive (EU) 2019/944.

Electricity Distribution Network Development Plans in a nutshell
Obligation for all DSOs (Member States can decide about exceptions for DSOs < 100,000 connected customers).
Time horizon: At least every two years, looking to next five to ten years ahead.
Process: DSO to consult, publish and submit plan to the National Regulatory Authority (NRA). NRA may request amendments.
Aim: Transparency on medium- and long-term flexibility services, as an alternative to system expansion, including demand response, energy efficiency, energy storage or other resources.
Content: Emphasis on main distribution infrastructure required to connect new generation/loads, including recharging points for electric vehicles.

Table 1 – Overview of EU legal requirements for D-NDPs

The objective of this paper is to provide European energy regulators' views on the content and process for the preparation of D-NDPs. It addresses aspects DSOs should take into account when preparing and consulting on their NDPs, as well as actions that NRAs could take to foster transparency and participation in distribution network planning processes.

In CEER's view, distribution network development processes should:

- Account for national specificities, e.g. the number and heterogeneity of DSOs, high voltage (HV) networks being transmission or distribution networks, and the different relevance of planning drivers (such as demand patterns, electrification of demand, development of storage solutions, type and size of distributed energy resources, and potentially different priorities in setting the network planning objectives);
- Reflect the different national regulatory frameworks, for instance, the processes foreseen by incentive regulation (e.g. benchmarking), where applicable; and
- Account for the current status of maturity of NDPs under a 'continuous improvement' approach.

Therefore, the CEER views in this paper should not be seen as a 'one size fits all' approach.

¹ European Parliament and Council of the European Union. (2019). Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019L0944>.

² Source: [CEER Paper on DSO Procedures of Procurement of Flexibility](#) (p.12), 16 July 2020, Ref. C19-DS-55-05.

The paper is structured as follows:

- Chapter 2 provides insights on activities to be performed by DSOs;
- Chapter 3 gives an overview of actions NRAs could take, depending on their roles and other national specificities; and
- Chapter 4 presents some conclusions and recommendations.

2 What distribution system operators should do

2.1 The methodology to identify network development projects

A transparent NDP should explain how the DSO identifies network development projects. If required, DSOs should describe precisely and exhaustively the methodology they use to plan their network development projects (planning methodology). To ensure coherence, equity and transparency, it is important that this methodology is broadly consistent over time.

When considered appropriate, the DSO should include foreseen or possible evolutions in their planning methodology under a ‘continuous improvement’ approach, both in their NDP and their consultations.

Furthermore, **to provide equity and transparency, the planning methodology should be comprehensible. To this end, the methodology must be well understood by the stakeholders who receive it.**

The planning methodology can impact the way the DSO chooses between wire and non-wire options to support network development. Article 32(3) of Directive (EU) 2019/944 states that “[t]he network development plan shall also include the use of demand response, energy efficiency, energy storage facilities or other resources that the distribution system operator is to use as an alternative to system expansion”. **It is therefore useful to properly assess and explain the interaction between the planning methodology and procurement of flexibility options.**

The methodology enables DSOs to determine when a project improves the current situation of the existing network. For example, there could be application principles such as ‘reinforcement/optimisation before expansion’. More precisely, DSO projects in the distribution network, and non-wire alternatives, can be implemented to reduce congestion, failure time, electricity loss and production capping, and ensure renewable integration according to agreed scenarios.

The planning methodology – especially when integrated into the D-NDP process – should aim to integrate these characteristics accurately and to allow alternatives to investing, like flexibilities. To enable stakeholders to fully understand the planning methodologies used, DSOs within a country or a region (or initially some of them) could coordinate their processes and publications.

To improve their methodologies, DSOs could integrate a whole system approach, considering the consequences of their decisions on other actors in the value chain.³

The planning methodology needs to abide by the national regulations, and to comply with the aim stated in national programmes. In Finland, for instance, DSOs are compelled to develop the network so that by the end of 2036, power outages due to storms or snow load do not exceed six hours in cities and 36 hours in rural areas.

The planning methodology may vary because of technical reasons. Where a DSO also operates medium voltage (MV) and HV networks, the planning methodology can respond differently to the different challenges caused by MV, low voltage (LV), and power transformers. For instance, in many countries the MV network is mainly redundant, enabling it to withstand

³ See [CEER Paper on Whole System Approaches](#), 30 June 2020, Ref. C19-DS-58-03.

the loss of any one item (N-1 methodology) of the network (line, transformer, etc.), after quick reconfiguration actions. Therefore, regarding MV, the planning methodology may consider the situation with a loss of an item in addition to the normal use condition. This does not make sense in the LV network, which is not redundant.

The planning methodology can differ between European countries or even between different DSOs in the same country for regional, technical, legal, or economic reasons. Where deemed beneficial, to improve coherence, some exogenous parameters could be shared between operators and updated regularly:

- An important input for a planning methodology in the electricity network could be the value of lost load (VOLL). This value depends on consumers' evaluation of the inconvenience of having lost their electricity supply. Therefore, it hinges on the type of consumers connected to the network and can be different between operators. However, it is important that the methodologies from the different operators to calculate VOLL give similar results with comparable portions of network; and
- If NDPs include socio-economic analyses, the assumptions for the economic analyses could be duly aligned, where relevant, among transmission system operators (TSOs) and DSOs. Such assumptions could include the assessment lifetime, social discount rate, treatment of residual value, reference year for the presentation of economic results, and economic monetisation of some impacts such as interruptions for consumers⁴ and producers. This would ensure consistency and comparability of project assessments, especially where a DSO project and a TSO project, or another DSO project, can be substitutes for each other.

The planning methodology also depends on the operational characteristics of the network (e.g. the load profile and simultaneity of loads on the network), which requires making assumptions about the evolution of these operational characteristics. These characteristics can also vary along with the prospective scenarios regarding the development of the energy system. As a result, and if deemed appropriate, a detailed justification of the assumptions on which the NDP is based could be useful. Where applicable, these assumptions should also be consistent with the network development scenario (see section 2.2).

2.2 Scenarios for distribution network development plans and TSO-DSO cooperation in scenario building

The planning methodology should be applied to network development scenarios, which depict plausible prospective developments of the energy system.

As D-NDPs include projects that will be built in the subsequent ten-year period and will last for decades, a reasonable prospective would need to go sufficiently beyond the ten-year period, so the network reinforcement projects will be sufficiently future-proof against longer-term developments in network use. Regarding the short to medium term, D-NDPs should draw upon the most probable future energy scenarios, or 'best view' of future system developments, at least in the first five-year window. The methodology for defining a 'best view' should be provided by the DSO(s) and could take into account the 'best estimate scenario' approach used for transmission NDPs by the European Network of Transmission System Operators for Electricity (ENTSO-E) and many European TSOs.

⁴ It is acknowledged that different quantifications are possible due to different characteristics of network users in different network areas, but the methodological approach should ideally be common within each country.

Scenarios could encompass demand, storage, generation capacities by fuel type (e.g. gas, nuclear, oil, solid fuels, wind, solar, biomass, geothermal, hydro and other renewable technologies) and their geographical location, the composition of the distribution and, when relevant, the transmission network, fuel prices and carbon dioxide prices.

The definition of scenarios should consider the national energy and climate plans (NECPs), introduced by Regulation (EU) 2018/1999.⁵ This aspect gains importance when considering an efficient development of the grid, so that the grid ensures enough host capacity of projected new generation capacity and new loads in a cost-effective way. Additionally, the NECPs are correlated to specific national scenarios for any sector that interacts with electricity, such as energy storage strategies, plans for the development of recharging points for electric vehicles, or energy efficiency objectives established at a national and/or regional level.

DSOs and TSOs shall cooperate with each other in planning their networks, pursuant to Article 57 of Regulation (EU) 2019/943.⁶ In particular, DSOs and TSOs shall exchange all necessary information and data regarding generation and demand.

Further requirements for TSO-DSO cooperation in defining scenarios for network development planning are set by Regulation (EU) 347/2013⁷, which includes scenario data specifications for transmission-NDP scenarios.⁸ CEER and ACER observed in their position paper on TEN-E governance that “*looking back at TYNDPs [Ten-Year Network Development Plans] over the past decade, ACER has repeatedly underlined the shortcomings of the ENTSOs’ [the European Networks of Transmission System Operators for electricity and for gas – ENTSO-E and ENTSOG] approach to scenario building in terms of stakeholder involvement and transparency*”.⁹

Although the aforementioned quotation applies to TSOs only, some general conclusions can be drawn. In this respect, CEER deems it important that **the scenarios for all NDPs are transparent and developed in a non-contradictory way**. In addition, there should be no contradictions between the D-NDPs and other relevant planning publications by DSOs.

⁵ European Parliament and Council of the European Union. (2018). Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ:L:2018:328:TOC&uri=uriserv:OJ.L_.2018.328.01.0001.01.ENGRegulation.

⁶ European Parliament and Council of the European Union. (2019). Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0943>.

⁷ European Parliament and Council of the European Union. (2013). Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on Guidelines for Trans-European Energy Infrastructure. Retrieved from: <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=celex%3A32013R0347>.

According to Annex V(12) of the TEN-E Regulation, TSOs and DSOs shall exchange the information necessary for the elaboration of the TYNDP cost-benefit analysis methodology, including the relevant network and market modelling.

⁸ Annex V(1) of the TEN-E Regulation specifies the following scenario data for the electricity sector: scenarios for demand, generation capacities by fuel type (biomass, geothermal, hydro, gas, nuclear, oil, solid fuels, wind, solar photovoltaic, concentrated solar, other renewable technologies) and their geographical location, fuel prices (including biomass, coal, gas and oil), carbon dioxide prices, the composition of the transmission and, if relevant, the distribution network, and its evolution, taking into account all new significant generation (including capacity equipped for capturing carbon dioxide), storage, and transmission projects for which a final investment decision has been taken and that are due to be commissioned by the end of year n+5.

⁹ [ACER-CEER Position on Revision of the Trans-European Energy Networks Regulation \(TEN-E\) and Infrastructure Governance](#), 19 June 2020.

Besides joint preparation of scenarios by electricity and gas TSOs, due involvement of DSOs in scenario building is needed to ensure the coherence and robustness of scenarios for transmission and distribution network development planning.

The scenario assumptions and the data used should be made publicly available, in easy and accessible formats. This would allow any interested stakeholder to undertake further analysis. This may include publishing associated data tables or network models, while taking into account any potential confidentiality concerns, for example, by proper data aggregation. The most suitable format may evolve and develop through time as more advanced data sharing and digitalisation techniques become available.

In their update to the Copenhagen Energy Infrastructure Forum of October 2020 on improving scenario building, the European Federation of Local Energy Companies (CEDEC), European Distribution System Operators (E.DSO), ENTSO-E, Eurelectric and GEODE indicated the following topics to be jointly investigated: prosumer behaviour, deployment of renewable energy sources, integration of electric vehicle charging, and deployment of heat pumps. CEER deems that DSOs are well placed to give inputs on these developments, regarding energy uses and users connected to LV and MV networks.

There must be an appropriate level of coherence between the scenarios considered in devising the D-NDP and other linked national scenarios for any sectors that interact with electricity, such as energy storage strategies, plans for the development of recharging points for electric vehicles, or energy efficiency objectives established at a national and/or regional level. In this context, with important synergies between sectors, coordination with the competent authorities and other parties involved in the different scenario developments plays a key role. DSOs should commence this coordination prior to the formal consultation process.

In some cases, especially in Member States (MS) with a large number of small DSOs, particularities of the sector may hinder the transference of nationwide assumptions to the local level, ensuring consistency. Local and regional authorities may play an essential role in establishing delimited objectives, integrating zonal needs and specific restrictions with general targets established at national level.

2.3 Presentation and monitoring of distribution network development projects

To ensure transparency in the development of electricity distribution networks, different methodologies can be established to identify the D-NDP projects. The level of detail and aggregation of the information included in the plans can vary among Member States, but a clear distinction between asset categories and other resources used by DSOs as an alternative to system expansion is necessary to ensure a proper level of transparency.

In this sense, different categories of projects should be clearly differentiated in the D-NDP:

- Solutions based on flexibility, where a clear definition of the proposed solution and the possibly-avoided network alternatives they replace should be included;
- In the case of HV projects, or HV/MV substations, an individual file for each project, including the description and the corresponding code, would be useful to identify each planned development. In line with most transmission NDP practices, for the sake of transparency, fundamental data like project status, expected commissioning date(s), costs, expected impacts and – where applicable – benefits should be provided;
- For LV projects, aggregated information would be enough, subject to a clear identification of the geographical area affected, including information about the total amount of

investment required and general information about assets, such as new kilometres of LV lines to be installed or new MV/LV capacity required; and

- Regarding MV projects, a combination of alternatives between aggregated and individual information could be implemented, according to the characteristics of the assets.

When costs of individual projects or project aggregates are published in the D-NDPs, there should be coherence in cost data reporting, e.g. splitting of capital expenditures (CAPEX) and yearly operational expenditures (OPEX), and use of real values relating to the year of preparation of the D-NDP.

Where relevant, network development options under consideration (which may become NDP projects in the next NDP edition or may be replaced by flexibility-related alternatives) could be included for information purposes.

A unique coding system for the statement of projects could be an appropriate method to facilitate tracking projects over time. This would facilitate the verification of compliance of actual projects with the estimates included in previous D-NDPs.

The coding methodology established for D-NDPs, whether by identifying individual projects or in an aggregated way, must be aimed at facilitating implementation tracking and justification of project amendments over time. It could also be a tool to implement changes after the consultation process, and to allow third parties to identify alternatives to physical projects.

For the purpose of project monitoring, the D-NDP should provide the progress of projects compared to the expected implementation plan and, where applicable, the reason(s) for project delays (due to exogenous reasons) or project rescheduling (voluntary postponement by the network operator). The D-NDP should also indicate the measures already taken to mitigate the risk of further delays. Where applicable, possible measures to mitigate [future] delays could be suggested in the D-NDP.

A standard coding system for all DSOs in a MS could be established to facilitate the analysis and digital processing of the D-NDPs. In this case, rules for projects and project codification should be published far enough in advance and, where applicable, should be coherent with other regulatory processes, such as regarding DSO revenues.

To support monitoring the progress of projects, a common identification of the network planning stages could be applied, e.g. 'under consideration', 'planned but not yet in permitting', 'in permitting', 'under construction' and 'commissioned'.

2.4 Visualisation of results of distribution network development plans

Article 32(3) of Directive (EU) 2019/944 stipulates that the distribution system shall be based on a '*transparent*' D-NDP. The results that must be achieved through establishing the D-NDP are:

- Providing transparency about the medium- and long-term flexibility services needed;
- Setting out the planned projects for the next five to ten years, with particular emphasis on the main distribution infrastructure that is required to connect new generation capacity and new loads, including recharging points for electric vehicles; and
- Including the use of demand response, energy efficiency, energy storage facilities or other resources that DSOs are to use as an alternative to system expansion.

Regarding visualisation, further preparation of the results would provide an easier and deeper insight for third parties. In this context, there are a variety of possibilities, for example, visualising congestion areas in maps, requiring DSOs to fill their answers in a questionnaire to provide conformity and comparability, or an additional evaluation report of the D-NDP by the NRA. Whichever implementation option is chosen (and improved over time), the results should be easily accessible for stakeholders.

2.5 Consultation on distribution network development plans

Article 32(4) of Directive (EU) 2019/944 includes a requirement for DSOs to consult all relevant system users and the relevant transmission system operators on their D-NDPs. Directive (EU) 2019/944 does not establish who should be considered as relevant system users, and this leaves options to determine how the consultation process should be conducted.

Consultation can be either public or targeted or include both. All stakeholders can participate in public consultation, which gives all customers and stakeholders an equal opportunity to voice their views. This is preferable as it creates more transparency in the distribution network development, and increases the dialogue between DSOs and stakeholders.

Targeted consultation can be either bilateral or multilateral with one or more stakeholder groups. In targeted consultation it is important to define which groups are consulted and ensure that all relevant system users are included. In this case the lawmaker or NRA could determine which stakeholders at a minimum should be consulted in the process. For example, as Directive (EU) 2019/944 aims to promote use of flexibility as an alternative to network investments, flexibility providers could be a one stakeholder group included in targeted consultation.

In both types of consultation, CEER deems that the consultation practices should be of an adequate duration, and clearly provide all information needed to allow stakeholders to make informed contributions.

The results from the consultation must be published along with the NDP. Directive (EU) 2019/944 does not establish how the results of this consultation should be treated. Defining the more precise form of how the results are published is left to the discretion of the MS.

Before publishing the consultation results and submitting them together with the D-NDP to the NRA, DSOs must go through the comments made in the consultation process, evaluate how the comments should be taken into consideration in their D-NDPs, and make any necessary changes.

As part of publishing the consultation results, DSOs should be able to justify how comments have affected D-NDPs, and if some responses have not led to changes.

3 What national regulatory authorities can do

As mentioned in chapter 1 of this paper, in CEER's view, distribution network development processes should account for national specificities, reflect the different national regulatory frameworks, and account for the maturity of NDPs in each country.

The role of the NRA affects the possibilities and opportunities for NRAs to act regarding electricity D-NDPs. For example, whether the NRA has duties and powers to consult on, to approve and/or to monitor implementation of plans according to national legislation, compared to having a role that is limited to the possibility of requesting DSOs to make amendments in line with Directive (EU) 2019/944.

This chapter introduces a range of actions that NRAs could take. These may differ from country to country, considering the aforementioned specificities, the level of NRA experience with dealing with D-NDPs, and/or the number of DSOs and D-NDPs.

3.1 Possible derogations for DSOs with fewer than 100,000 customers

The obligation to establish a D-NDP generally applies to all DSOs. Demanding NDPs from all DSOs ensures that all customers are on equal footing regardless of the distribution area in which they live, as they can participate in the development of the network in their residential area through the consultation process.

Directive (EU) 2019/944 stipulates that MS may decide not to apply the obligation to integrated electricity undertakings that serve fewer than 100,000 connected customers, or that serve small, isolated islands. This exemption leaves room for MS to limit the administrative burden proportionately.

If a MS has a very high number of DSOs, it can be helpful to apply the exemption. However, if a Member State has a very high number of DSOs that serve fewer than 100,000 connected customers, the use of exemptions may leave a large number of distribution networks outside of any NDPs. **In cases where DSOs are exempted from D-NDPs, it is recommended that the NRA is provided with the right to demand information on distribution network development from every DSO, and to request DSO development actions, as appropriate.** In this way, administrative burden could be limited but the required transparency is also ensured.

3.2 Frequency of distribution network development plans

Article 32(3) of Directive (EU) 2019/944 sets out that DSOs shall publish a transparent NDP at least every two years. When the frequency of the D-NDPs is not explicitly fixed by national laws, it may be up to the NRA to define such frequency or to give advice to policymakers on it.

Factors that may be relevant include for example, whether D-NDPs were introduced after Directive (EU) 2019/944 or there are long-established NDP processes, and the administrative burden for DSOs and NRAs. Consulting all relevant stakeholders may provide useful national insights on the opportunities of a yearly compared to biennial frequency of NDPs, as well as views on timing interactions with the transmission NDPs.

Some general considerations may also be relevant. As indicated in chapter 2, scenarios of the different NDPs should be non-contradictory. The scenario building processes are likely to take place every two years, as they are intrinsically linked to the scenario building for the purpose of the European TYNDP, which is run with a two-year frequency. It is possible that DSO scenario building processes may follow the TSO scenario building process, to consider local specificities and tuning of some nationwide assumptions to the local level. This would suggest a two-year frequency for the D-NDP scenario, also because scenarios would not change significantly during a one-year period.

CEER and ACER also recommend that “*national [transmission] network development plans should be defined and published on a biennial basis*”. This recommendation may account for the delays that are experienced in some national processes, where a yearly frequency of transmission NDPs is adopted.¹⁰

A biennial frequency of D-NDPs is likely to allow more time for consultation and additional interactions with stakeholders. Such a (longer) time period contributes to increasing the quality of D-NDPs when DSOs prepare the NDPs and NRAs review them and provide recommendations for improvements.

In CEER’s view, the choice of a two-year frequency would ideally be accompanied by the necessary flexibility to amend the planned projects due to justified reasons. For instance, in Finland, DSOs are required to inform the NRA if they have to substantially deviate from the plan, with due justifications, before the next NDP is delivered.

3.3 Options to improve publication and project monitoring

Article 32(3) of Directive (EU) 2019/944 stipulates that the DSO shall publish the NDP at least every two years and submit it to the NRA. This leaves room for national discretion on specifications for publishing the plans.

On the one hand, it is possible to provide for publication for example on the DSOs’ own internet homepages. However, this could result in plans that are difficult to find, and difficult to compare as they are heterogeneous. This could particularly be the case in countries with many DSOs. When NDPs and underlying data are published on DSOs’ websites, this should be done in a manner that allows stakeholders to easily access them.

But this lack of transparency does not do justice to the growing importance of distribution system operators in the energy transition. **A central publication and communication platform for D-NDPs offers considerable added value.** This is especially the case in countries with many DSOs. A nationwide presentation could significantly improve the transparency of distribution network development, compared to heterogeneous publications on various homepages.

¹⁰ ACER. (2019). Opinion No 13/2019 of the Agency for the Cooperation of Energy Regulators of 22 May 2019 on the National Electricity Network Development Plans and their Consistency with the EU Ten-year Network Development Plan. Retrieved from: https://documents.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2013-2019%20on%20national%20electricity%20TYNDP-NDP%20consistency.pdf.

The cooperative creation and joint publication of D-NDPs could serve to standardise D-NDPs. Such a joint platform could represent a further, valuable part in the digitisation of distribution system operators. The central platform simplifies the transmission of information and thus offers greater usability for readers. It also supports the monitoring of plans over the years and ensures a flow of information that can be viewed over the long term. In addition, the jointly operated internet platform at national level reflects the promoted cooperation of distribution system operators.

It is important to monitor the progress of projects. NRAs must have the possibility of receiving further information and additional explanation if any statement is implausible. Good communication structures must be established and should give NRAs the opportunity to request necessary information if questions arise.

3.4 Amending distribution network development plans

This step of the process allows the NRA to check distribution network plans against pre-existing requirements. For example, the NRA may have to request further detail regarding the forecasted flexibility services, or the projects necessary to connect new loads and injection capacities.

Where applicable, the NRA may also check that the draft version of the plan complies with national and regulatory requirements. For example, NRAs may request amendments if draft plans are not consistent with national energy and climate plans, or if do not fulfil the initial instructions established by the NRA (in terms of content, platforms, or frequency; see sections 3.2, 3.3 and 3.5 of this paper). In particular, the NRA should take into account consistency between scenarios during the evaluation of D-NDPs. The lack of coherence with national objectives could be a reason to request amendments to the plans.

Finally, there may be issues with the consultation process, including but not limited to: poor communication with stakeholders, limited access to relevant information, limited clarity of the information shared, or plans submitted to NRAs containing insufficient consideration of contributions to the public consultation. In that case, the NRA can request further and improved consultation with stakeholders, or amendments to improve justification or adjust the content of the plan based on the elements pointed out by contributors. For example, if a contributor contests an economic or technical hypothesis, the NRA can ask for an explicit answer in the plan.

Some countries like Portugal integrate a specific consultation of other public authorities and elected bodies (national or local). Depending on how the consultation process is organised, NRAs can also request amendments to better integrate these specific contributions.

In Portugal, the NRA (ERSE) is responsible for holding a public consultation on the draft D-NDP, but also consults its own Tariff and Advisory Councils to ensure that main stakeholders are consulted, as both councils include representatives of producer and consumer associations, suppliers, and network operators (transmission and distribution), among others. This interaction with both councils has been crucial in the last decade, allowing ERSE opinions to become more balanced with regard to consumers' and operators' interests, resulting in a more robust opinion and a better draft NDP.

The possibility of requesting additional information is aimed at checking that the plan is compliant with national laws and requirements, and satisfactorily integrates consultation contributions, in the interest of network users. As a result, any amendments NRAs may require should be properly taken into account by DSOs.

3.5 Other possible NRA activities relating to network development plans

Depending on the number of DSOs subject to network development planning responsibilities, the size of each network, and pre-existing jurisdiction by NRAs over distribution network investments, NRAs could promote a process for DSOs to elaborate on D-NDPs to ensure that DSO planning methodologies are transparent, easy to understand and promote network efficiency.

As a result, NRAs may want to anticipate the elaboration of plans and establish minimum requirements for DSOs to follow. These requirements could concern the planning methodology (including for instance a requirement to separately consult on the methodology or purpose-specific methodologies for the identification of some distribution network investments), as well as the content of plans. NRAs may also consider establishing requirements relating to the format of NDPs, including considering digitalisation techniques such as sharing network models in the common information model format, to allow advanced evaluation and analysis of D-NDPs.

For instance, stand-alone methodologies could address improved integration of energy storage or electromobility or ensuring network resilience against extreme events. **In countries with many DSOs, establishing a common template with minimum information to be provided by the DSO can ensure that all D-NDPs are consistent and can be easily compared** and could possibly be merged into a joint report. Common methodological approaches (prepared jointly by DSOs or by a DSO association) can serve the same purpose.

Finally, the elaboration of NDPs could provide an opportunity to lead DSOs into integrating complementary approaches in the way their investments are managed. For example, if considered needed by NRAs, elements of cost-benefit analysis could be part of D-NDPs, e.g. NRAs could ask for this analysis for larger investments and innovative solutions, above a pre-defined cost-limit. In the countries where HV grids are operated by DSOs, DSO planning methodologies should not contradict the TSO methodology for transmission investments. Alternatively, a 'reference cost benefit analysis' for reference distribution network conditions¹¹ (calculated with typical distribution grid configurations and reference network users) could facilitate the identification of network investments.

¹¹ For instance, a first objective could be that the 'reference networks' (rural/urban networks, high/low renewables, high/low electric vehicle recharging, etc.) allow representing more than half of the variety of distribution grids.

4 Conclusions

Concerning DSOs' activities relating to electricity D-NDPs, CEER deems it essential that:

- The D-NDPs provide equity and transparency, so the planning methodology should be comprehensible. To this end, the methodology should be well understood by the stakeholders who receive it;
- The D-NDPs properly assess and explain the interactions between the planning methodology and procurement of flexibility options;
- The scenarios for all NDPs are transparent and developed in a non-contradicting way;
- There is an appropriate level of coherence between the scenarios considered in devising the D-NDP and other linked national scenarios for any sectors that interact with electricity, as well as between the D-NDP scenario data and any other network planning publications;
- To ensure transparency in the development of electricity distribution networks, different methodologies can be established to identify the D-NDP projects; and
- As part of publishing public consultation results, DSOs should be able to justify how comments have affected D-NDPs, and if some responses have not led to changes.

In terms of NRA activities relating to electricity D-NDPs, CEER considers that:

- In cases where DSOs are exempted from D-NDPs, the NRA should be provided with the right to demand information on distribution network development from every DSO, and to request DSO development actions, as appropriate;
- A biennial frequency of D-NDPs is likely to allow more time for consultation and additional interactions with stakeholders. Such a (longer) time period contributes to increasing the quality of D-NDPs when DSOs prepare the NDPs and NRAs review them and provide recommendations for improvements;
- A regulatory requirement for a central publication and communication platform for D-NDPs may offer considerable added value, in light of the number of DSOs; and
- A regulatory requirement to establish a common template with minimum information provided by the DSO can ensure that all D-NDPs are consistent and can be easily compared.

Annex 1 – List of abbreviations

Term	Definition
ACER	European Union Agency for the Cooperation of Energy Regulators
CAPEX	Capital expenditures
CEER	Council of European Energy Regulators
D-NDP	Distribution network development plan
DSO	Distribution system operator
ENTSO-E	European Network of Transmission System Operators for Electricity
EU	European Union
HV	High voltage
LV	Low voltage
MS	Member State
MV	Medium voltage
NDP	Network development plan
NECP	National Energy and Climate Plan
NPV	Net present value
NRA	National regulatory authority
OPEX	Operational expenditures
TEN-E	Trans-European Networks for Energy
TSO	Transmission system operator
TYNDP	Ten-year network development plan
VOLL	Value Of Lost Load

Annex 2 – National methodologies and approaches for electricity distribution network development plans

This Annex presents some national practices regarding D-NDPs and related activities.

Other national practices are described in Annex 3 to the CEER Paper on DSO Procedures of Procurement of Flexibility.

A1 – Italy and the D-NDP part regarding resilience against extreme weather events

ARERA, the Italian NRA, defined some high-level rules for NDPs in August 2010, via its decision 125/2010. That decision requested DSOs with more than 100,000 customers to prepare and publish D-NDPs every year, by 30 June. It focused the D-NDPs on HV and MV network developments, particularly taking into account expected generation development.

After extreme weather events which caused very long interruptions for some network users, the NRA defined minimum requirements (by its decision 31/2018 of 25 January 2018) regarding D-NDP interventions to improve resilience against extreme weather events.

The extreme weather events and additional risks addressed by the D-NDP projects could be:

- Heavy snow and in particular the “wet snow” effect;
- Floods and brakes originated by heavy rain;
- Heat waves;
- Windstorms; and
- Falling trees (outside the corridor of the line) due to heavy snow/wind.

DSOs with more than 100,000 customers, and other DSOs directly connected to the transmission network, are required to include a resilience-related section in their D-NDP. This should include a list of network development projects to increase network resilience and, for each project (or group of investments):

- Name and unique identifier code;
- Main risk factor addressed;
- Short description;
- Location (at least the NUTS-3¹² districts¹³);
- Type (new asset or upgrade);
- Length of lines, broken down by voltage (MV or LV) and by line type (overhead line, overhead cable, underground cable);
- Number of network users affected by the increased resilience;
- Values of the IRE resilience index without-project and with-project, where $IRE = 1 / (F * NUD)$, F is the expected yearly frequency of interruption due to the risk factor and NUD is the number of users expected to be interrupted;
- Total estimated CAPEX;
- Incurred CAPEX by 31 December of the year before the preparation of the D-NDP;
- Estimated CAPEX for each year of the NDP and, when relevant, after the end of the period addressed by the NDP;
- Expected or actual start of construction;
- Expected commissioning date; and

¹² NUTS is Nomenclature of Territorial Units for Statistics – for more on this, see <https://ec.europa.eu/eurostat/web/nuts/background>

¹³ Italy includes 107 districts according to the European NUTS-3 classification.

- Reasons for missing completion of works within the previously expected commissioning date, specifying whether this was due to a DSO-external delay or to rescheduling decided by the DSO.

Furthermore, for each network development project, each DSO is requested to communicate to the NRA:

- Expected benefits;
- Net present value (NPV) of costs (CAPEX and OPEX);
- NPV of benefits; and
- Status of the project as of 31 December of the year before the preparation of the D-NDP ('planned but not yet in permitting', 'under design', 'in permitting', 'under construction' or 'commissioned').

The benefit categories are:

- B1 – fewer interruptions for network users due to extreme events (resilience-related events);
- B2 – lower costs due to the reduction of DSO emergency actions following interruptions due to extreme events;
- B3 – fewer interruptions for network users due to ordinary (non-resilience-related) events;
- B4 – reduction of DSO operational costs following ordinary interruptions; and
- B5 – other benefit categories, as long as they are not double counted with any of the above.

The economic analysis to calculate NPVs adopts the following assumptions:

- Discount rate: 4% real;
- Economic lifetime: 25 years of operation; and
- No residual value.

A2 – the Netherlands

Full implementation of Directive (EU) 2019/944 – including the articles concerning D-NDPs – is currently under way in new legislation referred to as Energy Law 1.0 (*Energiewet 1.0*). This new law replaces the current Electricity Law and Gas Law and implements EU legislation. It currently has a draft/consultation status.

Current Dutch legislation already contains an obligation for DSOs to develop so-called 'investment plans', which closely resemble D-NDPs. New legislation requiring DSOs to publish investment plans every two years came into force in 2018 and the first round of investment plans were published in July 2020.¹⁴ The next round of investment plans will need to be submitted by 1 January 2022 (and every two years following this). Both the required content of the investment plans as well as the required process to be followed are similar to the requirements for NDPs in Directive (EU) 2019/944.

In their biennial investment plans DSOs need to include or reflect on the following elements:

- A report on the status of ongoing network investments;
- A description of energy market developments and other factors affecting the operation and design of the network, including a scenario analysis of those developments;

¹⁴ Before the implementation of legislation of investment plans in 2018, Dutch legislation had in place requirements for DSOs to report on the quality and capacity developments of their networks in the upcoming years. These were reported in so-called Quality and Capacity Documents (*'Kwaliteit- en capaciteitsdocumenten'*).

- An overview of planned network investments that are required to continue to fulfil future obligations regarding network management, including;
 - A qualitative description of replacement and expansion investments in the next ten years; and
 - A quantitative overview of replacement and expansion investments in the next three years; and
- An explanation of changes in the investment plan, if deviates from former investment plans.

As the NRA, ACM is required to evaluate whether the DSOs have adopted a reasonable approach in projecting future investments in their network on the basis of currently available information and possible scenarios for the need for capacity in the future. After evaluating the investment plans, ACM submits its opinion to the Ministry of Economic Affairs on whether the plans fulfil all legal requirements. In the process of developing their final investment plans, DSOs need to publish a consultation version and take into account all input from stakeholders. ACM monitors whether the DSOs have sufficiently implemented stakeholder input on the consultation version of the investment plans, in their final versions.

A3 – Portugal

In Portugal, Decree-Law no. 76/2019 of 3 June (which amended former Decree-Law no. 172/2006 of 23 August) established the legal regime applicable to the activities of production, transportation, distribution and electricity commercialisation, in line with principles contained in Decree-Law No. 29/2006 of 15 February (republished by Decree-Law no. 215-A/2012 of 8 October).

According to current legislation (DL 76/2019), Portuguese DSOs must prepare a five-year development and investment plan for the respective HV and MV networks every two years (in even years) by 30 April. This is to be based on system needs identified by the DSO from analysing both the current and the previously approved distribution network plan from a technical perspective, and also based on supply and demand scenarios for the five-year period (as set in NECPs):

- When drafting its D-NDP, the DSO must comply with the Portuguese Distribution Code and planning methodology and standards. It must address system needs on security of supply to consumers connected to the HV and MV networks, as well as system operation needs regarding new challenges imposed by the integration of local renewable generation and changing past transit patterns between distribution and transmission network. Therefore, it is mandatory that the TSO and the relevant DSO cooperate with each other and aim for an integrated planning exercise.
- Recently, the main drivers for investments have been improving quality of supply to those consumers and areas that show worse indicators, as well as investing in refurbishment and renewal of the existing network to ensure that current national quality of service indicators keep meeting standards (issued by ERSE).
- It is expected that in the near future, the operation of distribution networks with intermittent renewable generation located close to loads will result in a more dynamic network operation. This will bring new challenges and a need for more investments in digitalisation and real-time communication between network elements.

The resulting draft proposed NDP prepared by the DSO shall be submitted at the same time to a Governmental Energy Agency (Directorate General for Energy) and to the NRA (ERSE). ERSE will then hold a public consultation, for a minimum of 30 working days, under the terms of article 40-A of Decree-Law no. 172/2006 of 23 August, as amended by the Decree-Law No. 76/2019 of 3 June.

In the 30 working days following the end of the public consultation, ERSE will analyse the draft NDP and take into consideration the contributions and recommendations of each participant. ERSE will then issue its non-binding opinion, submitting it to the DSO together with a report on public consultation with all received comments. Both documents are also sent to the Portuguese Government (DGEG¹⁵ and the Ministry responsible for the energy sector).

During the preparation of its opinion on the draft NDP, ERSE shall also consult both its Tariffs and Advisory Councils, to ensure that main stakeholders are consulted, as both councils include representatives of producer and consumer associations, suppliers, and network operators (transmission and distribution), among others. This interaction with both councils has been crucial in the last decade, allowing ERSE opinions to become more balanced with regard to consumers' and operators' interests, resulting in a more robust opinion and a better draft NDP.

The DSO shall then redraft and amend the NDP, considering ERSE's recommendations, and submit the final version of NDP to the Ministry who has the final responsibility for approving it, after consulting the Portuguese Parliament.

ERSE is also obligated to oversee the implementation of approved NDPs. This is both in terms of schedule and investment costs. ERSE will identify any commissioned projects and costs that do not comply with the approved NDP, and not include those costs in the regulated asset base.

A4 – Spain

In Spain, article 40 of the Act of the Power Sector (Act 24/2013 of 26 December¹⁶) establishes that DSOs must submit their annual and medium-term¹⁷ NDPs to the competent Ministry for Energy (currently, the Ministry for the Ecological Transition and the Demographic Challenge) by 1 May each year, and also to the regional authorities where the DSOs carry out their activity. The NDP must include, at a minimum, information about projects data, including each project's main technical characteristics, budget and implementation calendar.

The procedure for NDP approval is set out in Royal Decree 1048/2013¹⁸. According to this Royal Decree, the approval of NDPs requires a positive report from the competent regional authority. The NRA (CNMC) has the duty to provide an individual and a global analysis for the whole sector, considering the information submitted by DSOs. CNMC must provide the result of this analysis to the Government, who is responsible for approving the estimated investment costs included in the plans. The individual administrative resolution for each DSO must include the maximum amount of investment to be considered in year n, linked to the remuneration that will be received in year n+2.

¹⁵ *Direção-Geral de Energia e Geologia* – Directorate-General of Energy and Geology

¹⁶ [Act 24/2013, of 26th December](#)

¹⁷ Considering the next three years.

¹⁸ [Royal Decree 1048/2013](#)

It is important to point out that the Government establishes a total amount of investment to be considered in the remuneration of the distribution activity, although it can be modified in case of economic or technical unexpected circumstances.

CNMC is obligated to oversee the implementation of approved NDPs. Circular 6/2019¹⁹, which establishes the methodology for calculating the remuneration applicable to electricity distribution, sets out that every three years, DSOs must submit a report about the degree of implementation of their NDP in years n-4 to n-2. After CNMC's analysis of the implementation of the plans, DSOs with an important deviation with respect to the approved investment values can get a reduction in their remuneration.

¹⁹ [Circular 6/2019](#)

Annex 3 – About CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national energy regulators. CEER's members and observers comprise 39 national energy regulatory authorities (NRAs) from across Europe.

CEER is legally established as a not-for-profit association under Belgian law, with a small Secretariat based in Brussels to assist the organisation.

CEER supports its NRA members/observers in their responsibilities, sharing experience and developing regulatory capacity and best practices. It does so by facilitating expert working group meetings, hosting workshops and events, supporting the development and publication of regulatory papers, and through an in-house Training Academy. Through CEER, European NRAs cooperate and develop common position papers, advice and forward-thinking recommendations to improve the electricity and gas markets for the benefit of consumers and businesses.

In terms of policy, CEER actively promotes an investment friendly, harmonised regulatory environment and the consistent application of existing EU legislation. A key objective of CEER is to facilitate the creation of a single, competitive, efficient and sustainable Internal Energy Market in Europe that works in the consumer interest.

Specifically, CEER deals with a range of energy regulatory issues including wholesale and retail markets; consumer issues; distribution networks; smart grids; flexibility; sustainability; and international cooperation.

CEER wishes to thank in particular the regulatory experts of the Distribution Network Development Plans Team (Michael Berger, Nina Ganchou, Lisa-Katharina Gebhart, Rebecca Heide, Lena Jaakonantti, Maija Laine, Maxime Lancelot, Miriam Salguero Mayoral and Riccardo Vailati), and the NRAs providing contributions on national experiences for their work in preparing this report.

More information is available at www.ceer.eu.