ACER
European Union Agency for the Cooperation of Energy Regulators

CEER
Council of European Energy Regulators

ACER and CEER guidance on electricity distribution network planning

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Content

Executive summary

The need to modernise Europe's distribution networks planning

1 As electrification expands and power generation becomes increasingly decentralised, distribution networks are the backbone of the power grid, connecting renewables and supporting the decarbonisation of sectors such as transport and heating. Distribution networks must transform into modern and flexible systems that can integrate variable renewables, new forms of storage, and growing electricity demand. Such transformation requires substantial investment – estimated at more than EUR 50 billion annually by 2050. Emerging challenges such as the need to interact with multiple and diverse network users, growing grid connection queues, and supply chains constraints underscore the pressing need to evolve from traditional, reactive network planning approaches (which are no longer fit for purpose) to more proactive and structured planning at distribution level. Such planning should be in combination with other regulatory and policy improvements needed for the future energy system.

2 The EU has a highly diverse EU distribution landscape. Distribution system operators (DSOs) range in size from small rural utilities to large urban operators with varying capacities and structures, and operating under different regulatory frameworks. Some Member States have over 100 DSOs, while others have a single national DSO. As a result, how national network plans are conducted is very heterogeneous across Member States, and particularly challenging for smaller DSOs with limited resources.

This ACER-CEER guidance aims to strengthen distribution network planning

3 The Electricity Directive (2019) introduced the responsibility for DSOs to develop distribution network development plans (DNDPs) that identify medium- and long-term planned investments and flexibility needs over the next five to ten years. These plans should become a critical tool for informed decision-making, offering key insights to regulators, market participants, system operators, technology providers etc. For example, the DNDP is a key input for regulators as they consider the need to adjust (or not) the regulatory frameworks including remuneration regimes and associated incentives. Network planning inform network users on where and when they will be able to connect to the grid. With a good DNDP, other system operators, including transmission system operators (TSOs), can adjust their planning processes to ensure smooth coordination and technology providers can anticipate the needs across the entire supply chain.

4 The European Commission's Action Plan for Grids (2023) tasks the EU Agency for the Cooperation of Energy Regulators (ACER) and the Council of European Energy Regulators (CEER) with developing guidance for DSOs to promote consistency in distribution planning. This Guidance responds to that request. It complements the EU DSO Entity's collection of good practices on DNDPs (2024) by offering a broader perspective on existing practices and regulatory frameworks. It provides a set of recommendations to support consistency across the EU, covering the role of the regulators, transparency and stakeholder engagement, coordination and key elements of DNDPs. This guidance

aims to serve as reference point for enhancing DNDP practices towards accelerated, smart, and inclusive grid development. DNDP practices need strengthened regulatory oversight to ensure robustness and alignment with national and EU objectives.

Regulators' key recommendations for more effective distribution network planning

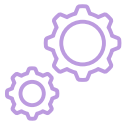
- **Address anticipatory needs** by adopting proactive and forward-looking approaches in distribution national development plans. For example, extending the planning horizon to at least ten years will help prevent networks from becoming bottlenecks in the energy transition and support timely, well-targeted investments.

- **Structure the planning approach** around three key pillars: scenario development, needs assessment and project identification. Such a holistic approach is essential for strategic, efficient and future-ready network planning.

- **Address flexibility needs** based on cost-effectiveness, aligning with the EU-wide flexibility needs assessment methodology[1] to achieve an optimal balance between network reinforcement and the use of flexibility solutions.

- **Improve transparency** through structured publication, open consultation and inclusive communication practices to facilitate stakeholder engagement and provide granularity of information to tackle supply chain challenges. These practices build trust, enhance coordination and accelerate implementation.

- **Improve coordination** among (distribution and transmission) system operators at national level to ensure harmonised and consistent planning across the entire electricity system, as well as alignment with national and local spatial planning strategies and scenarios across other sectors (including gas, hydrogen and heating and cooling). Coordinated efforts helps prevent redundancies and ultimately lead to more efficient planning.



[1] See Type and format of data and the methodology for TSOs' and DSOs' flexibility needs analysis, 2025.

1. Introduction to distribution network planning in the EU

5 This document aims at providing guidance on coordinated and robust distribution network planning in the framework of the action point 3 of the EU Action Plan for Grids[2]. This guidance is the product of close cooperation between ACER and CEER. It draws on valuable input collected during a dedicated stakeholder workshop held in November 2024, as well as responses from national regulatory authorities (NRAs) to a questionnaire conducted in February and March 2025[3]. This questionnaire gathered information on national distribution planning practices across the EU Member States. Country-specific insights and data are provided in the Annex to the guidance document.

6 This guidance is structured as follows: Chapter 1 outlines the role of DSOs in the energy transition, the purpose of DNDPs and the key challenges in planning, coordination and regulation. Chapter 2 details the role of NRAs in overseeing the DSOs' planning process to ensure efficient investments and promote harmonisation. Chapter 3 presents measures to enhance stakeholder engagement and ensure transparent and accessible DNDPs. Chapter 4 emphasizes the increasing importance of well-coordinated plans. Chapter 5 elaborates on the key elements of the DNDPs, focusing on the DNDPs' time horizon, frequency and the three main pillars of the network development process.

1.1. Distribution network development plans to help reach decarbonization and electrification goals

7 Distribution systems are fundamental to the EU's energy transition. They enable increased electrification of energy demand and shift from centralized fossil-based generation to decentralized renewable energy sources. Achieving EU's decarbonization and electrification objectives hinges on the transformation of distribution systems into modern, flexible, and resilient networks. The large-scale integration of renewable energy sources (RES) and the necessary non-fossil flexibility within the electricity system, such as energy storage, demand response and electrification of transport which are necessary to support high penetration of RES, will demand significant and sustained investment. Between 2025 and 2050, annual transmission and distribution investment needs are estimated to range from EUR 75 billion to EUR 100 billion, with approximately two-thirds of this investment required at the distribution level[4].

8 To meet these challenges, Directive 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (the Electricity Directive) mandates that DSOs regularly prepare and publish distribution network development plans (DNDPs). These plans must set out the planned investments over the next five to ten years, as well as provide transparency on the medium- and long-term flexibility services needed.

9 By offering a detailed view of current and future distribution network needs, DNDPs serve as a critical tool for enabling informed decision-making. NRAs, TSOs, DSOs, market participants, and stakeholders across the energy sector can all benefit from the insights provided in these plans.

1.2. Emerging challenges for DSOs and NRAs

10 NRAs report several common challenges in the assessment of DNDPs. These include varying levels of detail, clarity, and transparency in the submitted plans, along with inconsistencies in data and assumptions. They see coordination between DSOs and TSOs complex, particularly in aligning scenarios and planning timelines, and they see room for greater harmonisation of the planning methodologies. NRAs also highlight differences in the capacity and preparedness of DSOs for advanced, long-term planning. In addition, limited resources, short consultation periods and evolving

[2] According to action point 3 of the EU Action Plan for Grids, NRAs should, in cooperation with ACER and CEER, provide guidance to DSOs on planning and promote consistency among plans.
[3] NRAs of all EU Member States except Ireland participated in the survey.
[4] See the ACER report on electricity infrastructure development to support a competitive and sustainable energy system, 2024.

legal frameworks can make timely and thorough reviews more demanding. Rising costs and the pace of the energy transition further add to the complexity of planning for future network needs.

11 As reported by NRAs, DSOs also face a broad range of challenges in network planning, many of which are increasingly pressing in light of the energy transition. The most frequently reported issues include delays in permitting, supply chain disruptions, and a shortage of skilled workforce, all affecting the timely delivery of projects. DSOs also highlight difficulties in translating long-term assumptions into concrete capacity needs, especially under uncertainty about the pace of electrification and deployment of distributed energy resources. Coordination with TSOs, particularly where delayed transmission projects limit grid hosting capacity, adds further complexity. Additional challenges include access to financing, adapting to new technical and regulatory requirements (e.g. smart grids, digitalisation, and flexibility integration), and lack of data and forecasting tools to support robust long-term planning. Several DSOs also note the absence of a structured planning approach until recently, with efforts now underway to build internal expertise and standardise DNDP processes.

12 A further challenge is aligning forward-looking network planning with remuneration frameworks. Without proper incentives, DSOs may have limited scope to consider non-wire alternative solutions that could improve efficiency and optimise network development. In addition, the growing issue of connection queues is putting pressure on the traditional first-come-first-served principle which may lead to grid congestion and delayed projects. This approach is increasingly questioned, with recent discussions across the EU exploring more effective models for grid access prioritisation and reforms beyond the EU.

1.3. Highly diverse DSOs operating, maintaining and developing EU's distribution networks

13 The EU's energy transition is taking place across a highly diverse landscape of distribution networks. Contrary to the relatively low number of TSOs[5], there are nearly three thousand DSOs in the EU.[6] Operating networks of rural areas with small population density, highly populated bustling urban centers or both, they range from small utilities serving a low number of end users to large companies serving millions of customers. Furthermore, they are not only strongly diverse in size and geographical area covered, but also in terms of organizational structures and regulatory frameworks applied.

14 More than half of DSOs in the EU are in Czech Republic, Germany and Spain and there are six additional Member States with more than 100 DSOs. On the contrary, in five countries, one DSO operates the distribution system of the whole country.[7] Furthermore, in more than two-thirds of the Member States, DSOs do not only operate low- and medium-, but also parts of the high-voltage grid.[8]

15 DSOs in the EU operate under different models determining their allowed revenues, often including incentives for cost efficiency and quality of service. In half of the participating NRAs' Member States, the so-called revenue cap applies; it sets the limit on the total allowed revenue that the DSO can collect over a certain period. The remaining half apply either a cost-plus model that allows DSOs to recover actual costs plus a fixed return on its invested capital, a price cap model that limits the maximum price per unit that the DSO can charge to customers or a hybrid type of model.

2. Role of the national regulatory authorities

16 The Electricity Directive tasks DSOs to submit their DNDPs including results of the consultation process to the NRA and it grants the NRA the right to request amendments of the DNDP[9]. ACER and CEER note that in all except five Member States the NRAs have already been given at least such level of power. Additionally, twelve NRAs are empowered to approve DNDPs, and three NRAs have been

[5] There are 31 TSO in the EU.
[6] The NRAs participating in the survey reported in total 2606 DSOs.
[7] 271 DSOs in Czech Republic, 866 DSOs in Germany, 326 DSOs in Spain; above 100 DSOs in Austria, France, Italy, Poland, Slovakia and Sweden; 1 DSO in Croatia, Cyprus, Greece, Malta and Slovenia.
[8] The highest voltage level operated by the DSO is 380 kV in Austria, followed by 220 kV in Malta and Sweden.
[9] Article 32(4) of the Electricity Directive.

entrusted with the power to amend DNDPs. Several NRAs have also additional scrutiny rights, for example to issue a non-binding act, specify the minimum requirements, form, content or type of DNDPs, to demand individual DNDPs more frequent or to set out how the plan is submitted to the NRA and how the public consultation conducted.[10]

17 The Electricity Directive allows exemptions from the obligation to prepare a DNDP for DSOs serving less than 100.000 connected customers or small isolated systems.[11] In vast majority of the Member States, the DNDP-related provisions have already been transposed into the national legislation and such exemptions have been applied in 10[12] Member States. Almost two thirds of all DSOs in the EU have been exempted from the preparation of a DNDP, ultimately resulting in a need to develop in total 957[13] DNDPs in the EU[14]. The exempted DSOs serve between 0.005 % in Lithuania and around 25 % end users in Germany. In almost half of the Member States with exemptions applied, network development of the exempted DSOs is also scrutinised.[15]

18 Especially in Member States with multiple DNDPs, regulatory scrutiny over DNDPs can be particularly challenging in terms of resource-intensity and this complexity is further compounded by limited human resources that have already become a widely shared issue among NRAs. Ensuring the NRAs are adequately supported is therefore critical to maintaining and ensuring robust oversight.

2.1. Regulatory scrutiny to the benefit of consumers

19 NRAs are crucial in the network development process, as their role is to assess the economic and technical aspects of DSOs' investments to ensure alignment of future network development with the national policy objectives including RES integration and quality of service. ACER and CEER believe that NRAs are best positioned to ensure that DNDPs achieve a sufficient quality standard and are fit for delivering robust infrastructure development.

ACER and CEER recommend:

- NRAs are given strong scrutiny powers over DNDPs.
- Where DSOs are exempted from the obligation of preparing DNDPs, NRAs should have the authority to request information on network development and take actions, if necessary.

2.2. Harmonized content and structure of distribution network development plans for better consistency and facilitated scrutiny

20 ACER and CEER welcome the use of a common template with a predefined structure for DNDPs in several Member States with multiple DSOs. This promotes harmonisation on a national level, facilitates NRA scrutiny and enables potential benchmarking, in particular by applying consistent criteria and a standardised framework for evaluating whether DNDPs align with national and EU objectives. National

[10] Power to request amendments: the Flemish and Walloon regions in Belgium, Cyprus, Croatia, Estonia, Finland, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Portugal, Romania, Slovenia, Sweden; Power to approve: the Flemish region in Belgium, Croatia, Czech Republic, Cyprus, Greece, Hungary, Latvia, Lithuania, the Netherlands, Poland, Romania, Slovenia; Power to amend: Estonia, Greece, Slovakia; Power to issue a non-binding act: the Brussels region in Belgium, Cyprus, Luxemburg, Portugal; Power to specify the form, content, type or set minimum requirements for DNDPs: Finland, Germany, Italy, Slovenia; No scrutiny power over DNDPs: Austria (according to the draft of the forthcoming electricity act, the NRA will have the power to request amendment), Denmark, France, Spain (in Spain, DNDPs must be endorsed by the relevant Autonomous Regions and the Ministry approves DNDPs); Other powers: Finland (power to specify how DNDPs are submitted to the NRA, power to specify how public consultation is conducted), Germany (power to demand individual DNDPs more frequent).

[11] Article 32(5) of the Electricity Directive.

[12] Czech Republic, Estonia, France, Germany, Italy, Latvia, Lithuania, Portugal, Romania, Slovakia.

[13] Considering that 8 DSOs in the Flemish region in Belgium prepare one joint DNDP (with annexes per DSOs).

[14] In most Member States, the DSOs already prepare a DNDP. In several cases, the DNDPs have been developed for the first time in the recent years.

[15] Germany: power to request a report on the grid status and implementation of a DNDP, specifying also the deadline, form, content and type of submission of the report; Latvia: NRA carrying out inspections to verify the legally required quality of their service; Lithuania: submission of investments for approval by the NRA; Slovakia: requirement to comply with quality standards incentivising them to invest in the distribution system.

harmonisation of DNDPs has also been addressed in numerous other Member States with multiple DSOs, in particular by setting minimum content or quality-related requirements and/or issuing guidelines for preparing DNDPs. ACER and CEER also positively note that similar harmonisation efforts are planned in Bulgaria and Czech Republic.[16]

21 In nearly all Member States where one DNDP is prepared, content-related requirements or a template have also been introduced.[17] These tools help clarify expectations regarding the content and minimum quality of the plans, while also facilitating effective NRA scrutiny.

ACER and CEER recommend NRAs to provide guidance on DNDPs at national level, including, for example, a template and a set of requirements that all DNDPs are expected to meet.

2.3. Monitoring of implementation of distribution network development plans to track investments' progress

22 ACER and CEER welcome that in most Member States monitoring of implementation of DNDPs is already carried out or planned to be carried out, although the Electricity Directive does not provide for such a requirement.[18] In most cases, monitoring is done by the DSO submitting a report on the progress of investments to the NRA (either as a separate activity or as part of the next edition of the DNDP) and by the NRA reviewing it.

23 Monitoring implementation of DNDPs, with particular attention to the progress of planned investments and the reasons behind any delays or rescheduling, is an important element of effective distribution network development. It helps ensure that network planning process remains aligned with the objectives, promotes transparency and accountability and enables timely adjustments. The monitoring process relies on clear information about any deviations from the most recent DNDP along with explanations of the underlying reasons.

ACER and CEER recommend NRAs to monitor the implementation of DNDPs. This exercise should take place at least in the years between two successive DNDPs or be integrated into the next edition of the DNDP.

[16] A common template with a predefined structure: Austria, the Flemish and Walloon regions in Belgium, Denmark, Finland, Spain, Sweden; Minimum content and quality-related requirements: Germany, Hungary, Italy, the Netherlands (set by the ministry), Poland, Romania, Slovakia; Guidelines: the Walloon region in Belgium, Luxemburg (non-binding principles under development), Sweden.
[17] Content-related requirements: the Brussels region in Belgium, Croatia, Estonia, Latvia, Lithuania, Slovenia; Template: Greece.
[18] Carried out in Belgium, Croatia, Cyprus, Germany, Denmark, Estonia, Finland, Greece, Hungary, Italy, Latvia, Lithuania, Luxemburg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain; Planned to be carried out in Austria, Bulgaria, Czech Republic, France and Sweden.

3. Transparency and stakeholder engagement

3.1. Transparent and accessible distribution network development plans to build trust and support decision-making

24 The Electricity Directive tasks DSOs to publish their DNDPs[19]. ACER and CEER find that in all but two[20] Member States where the DNDPs have already been prepared, DNDPs are published. In seven[21] Member States, they are also collected and published jointly on an NRA's or common DSOs' website.[22]

25 Noting that especially in Member States with multiple DSOs and DNDPs, users of DNDPs might be facing difficulties in accessing a specific DNDP, a central publication platform for DNDPs could offer a considerable added value. Considering the current heterogeneous publications on various homepages, such nationwide presentation would significantly improve transparency of distribution network development and add to the digitalization, potential use of benchmarking as well as to an increased cooperation of DSOs.

26 ACER and CEER note different practices are applied in the EU as regards granularity and public availability of investment costs. Project-specific costs are publicly available in 16 Member States, either per project or as aggregates[23].

ACER and CEER recommend better accessibility to DNDPs with a step-wise approach:

- A first step is each DSO's publication of its DNDPs along with all related official documents (e.g. decisions, opinions, recommendations, monitoring results).
- A second step is collection and publication of all national DNDPs in a single national platform, for example on the website of the NRA or on a DSOs' platform.
- As a third step, EU DSO Entity should gather DNDPs from such national platforms and map them on a dedicated EU-wide space.

ACER and CEER also see it important that planned costs are published in DNDPs, subject to the level of project aggregation applied.

3.2. Proactive stakeholder engagement as an important element of the network planning process

27 Stakeholder engagement plays an important role in distribution network planning. Proactive engagement with stakeholders helps DSOs better understand the network users' needs and gain insight into local conditions and specific challenges. It also builds mutual trust and educates, both resulting in increased public acceptance of infrastructure projects and ultimately in their faster implementation due to smoother permitting and fewer delays. To ensure early, regular and meaningful stakeholder engagement in grid development, the European Commission launched a Pact for engagement as part of its EU Action Plan for Grids in 2023. To advance one of its objectives[24], the European Commission, ACER and the Renewables Grid Initiative established a partnership, aiming to address public

[19] Article 32(3) of the Electricity Directive.
[20] Denmark, Spain; In Spain, the provisions relevant to Article 32 of the Electricity Directive have not yet been transposed into the national legislation.
[21] NRA website: the Flemish region in Belgium, Estonia (website of the Estonian Competition Authority's website), Greece, Slovakia, Sweden; Common DSO website: Austria (https://www.ebutilities.at/informationen/VNEP), Germany (VNBDigital.de).
[22] The Spanish NRA explains the NRA publishes total results of the investments planned by each DSO.
[23] Public availability of project-specific costs (for at least some investments): Brussels region in Belgium, Czech Republic, Germany, Greece, Italy, Latvia, Lithuania, Portugal, Slovenia, Sweden (investment costs made public in the revenue cap, i.e. outside the DNDP); Aggregated costs publicly available: the Flemish region in Belgium, Finland, France, Hungary, Malta, the Netherlands, Spain.
[24] to foster open dialogue between ministers, regulators and TSOs and DSOs on regulatory support for effective stakeholder engagement supported by dedicated chapters in national development plans

engagement in energy infrastructure development. Within this workstream, an idea of public engagement plans has been introduced where engagement activities across the key stages of network development are to be outlined. By structuring and detailing these activities and associated costs, such plans could also facilitate greater regulatory recognition of public engagement costs by NRAs.

ACER and CEER recommend DSOs to plan their public engagement-related activities by introducing public engagement plans either as chapters within DNDPs or as standalone documents.

ACER and CEER recommend EU DSO Entity to identify and promote good practices the DSOs across the EU apply with regards to an effective and successful stakeholder engagement.

28 According to the Electricity Directive, DSOs are obliged to consult their DNDPs with all relevant system users and the relevant TSOs and publish the results of the consultation process[25]. ACER and CEER welcome that public consultation is carried out across most Member States. In several cases, NRAs and/or DSOs conduct both public and targeted consultations.[26] ACER and CEER also note positively the involvement of specific stakeholder groups, as their contribution often brings valuable, context specific feedback. As regards transparency, summaries of consultation comments and responses are published in four Member States, while in almost all remaining countries there are DNDPs with comments and answers published in full.

29 Consultation of DNDPs is typically conducted by DSOs, though in some cases it involves or is led solely by NRAs[27]. In most Member States, draft DNDPs are consulted, while in five, there are also separate consultations on assumptions or scenarios held at an earlier stage, facilitating timely and meaningful consideration of stakeholders' inputs[28]. Consultation periods vary, ranging from ten working days in Slovakia to eight weeks in Malta, with one month being the most common duration.

ACER and CEER recommend:

- each DNDP proposed by a DSO undergoes a public consultation of at least six weeks* prior to its adoption;
- stakeholders' comments and the corresponding responses to be published either in full or in the form of a summary;
- for more advanced stakeholder engagement, where feasible, a separate consultation on key network planning pillars, such as scenarios, and targeted consultations with specific stakeholders (e.g. municipalities, NRAs, TSOs, government bodies, network users, civil society and other DSOs);
- the use of user-focused engagement practices, such as dedicated webinars, presentations and online or in-person exchanges, meetings or surveys to reach a broad and diverse audience.

*In line with ACER Recommendation No 01/2025 on Demand Response Network Code.

[25] Article 32(4) of the Electricity Directive.
[26] Public consultation: Belgium, Croatia, Cyprus, Czech Republic, Finland, Greece, Italy, Latvia, Lithuania, Luxemburg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden.
Public and targeted consultation: the Flemish region in Belgium, Denmark, Estonia, Germany, Hungary.
Targeted consultation: Malta.
No consultation: Austria (public consultation foreseen in the forthcoming electricity act) and Spain.
[27] Consultation involving the NRA: Croatia, Czech Republic, Greece, Hungary, Romania.
Consultation led by the NRA: Denmark (for some DNDPs), Latvia, Portugal.
[28] Additional consultations on scenarios: the Flemish region in Belgium, Croatia, Hungary, Luxemburg, Malta.
Only scenarios consulted: Lithuania.

4. Coordinated distribution network development plans

30 Multiple national planning instruments exist in the Member States and their alignment is key to ensure that national targets are met, as in lack of alignment, resources may be spent inefficiently. In addition to a need for strongly aligned energy sector-related planning instruments such as DNDPs and transmission NDPs, it is also important that these plans are prepared in consideration of other relevant national and/or local planning processes, for example with the spatial and urban planning that also capture energy demand patterns and may facilitate or constrain infrastructure buildout, deployment of renewables and electrification of the transport.[29]

31 Regulation 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (the Electricity Regulation)[30] requires DSOs and TSOs cooperation in network planning, by exchanging all necessary information and data regarding the performance of generation assets and demand side response, the daily operation of their networks and the long-term planning of network investments.

32 The survey investigated the level of cooperation among DSOs and between DSOs and TSOs in the network planning process. The alignment of plans is particularly high in the three Member States where joint plans are prepared[31]. In all the remaining Member States, each DSO prepares its individual DNDP[32]. Where individual DNDPs are developed, common scenarios involving DSOs and TSOs are developed in some Member States. Other joint activities include investigating the need for additional network capacity, exchanging the data regarding distributed generation, energy storage or demand response and investigation of infrastructure investments.

33 Close cooperation, both among DSOs and with TSOs, has become increasingly critical in light of the emerging challenges, new roles and responsibilities DSOs have been entrusted with on the EU's energy system decarbonisation path. One task that exemplified the need for a strong collaboration is the assessment of flexibility needs. Under the Flexibility needs assessment methodology (FNAM)[33], DSOs may delegate all or part of their responsibilities to other DSOs or a TSO. This arrangement goes beyond the exchange of information and good practices, enabling one DSO to conduct analyses and provide data on behalf of another.

Recognising the efforts already taken, ACER and CEER recommend DSOs to further increase their cooperation and coordination with other national DSOs and with the TSO(s).

[29] See the IEA Empowering Urban Energy Transitions, 2024.
[30] Article 57(1) of the Electricity Directive.
[31] In the Flemish region of Belgium, a joint DNDP is prepared for all eight DSOs. In Estonia and Hungary, a joint national development plan of TSO and DSO(s) is prepared (in Estonia, in addition to the joint plan, there are also separate DSO's and TSO's plans).
[32] In Slovenia, the TSO and the DSO were merged in 2023 and ELES became the operator of the combined transmission and distribution system. A similar practice is applied in Luxembourg where the TSO and the biggest DSO are merged.
[33] See Type and format of data and the methodology for TSOs' and DSOs' flexibility needs analysis, 2025.

5. Key elements of distribution network development plans

5.1. Time horizon – need for forward-looking distribution network development plans

34 The Electricity Directive requires a time horizon of five-to-ten years for DNDPs and ten years for transmission NDPs[34]. The NRA survey results show that most Member States apply at least a ten-year time horizon for DNDPs[35], while the remaining countries apply a time horizon between five and ten years.[36] In DNDPs with longer (e.g. at least ten years) time horizons, it is common for long-term projects to be presented with less details and lower granularity compared to short-term projects. In some cases, only qualitative information is provided for long-term investments or it is noted that for the short-term ones, the financial information provided is more realistic.

35 As distribution networks undergo fundamental changes, adopting a forward-looking approach is becoming increasingly important. EU distribution grids must be prepared to accommodate growing and shifting electricity demand, new generation patterns and integrate emerging technologies like rooftop solar, heat-pumps, electric vehicles and batteries. A long-term perspective enables DSOs to move beyond short-term needs and proactively plan the grid, preventing distribution grids from becoming bottlenecks in the energy transition.

ACER and CEER recommend DSOs to adopt a time horizon of at least ten years in their DNDPs while ensuring an adequate level of granularity.

5.2. Network planning process

5.2.1. Biennial frequency for greater alignment and harmonization

36 The Electricity Directive sets out a minimum two-year frequency for the elaboration of DNDPs.[37] Results of the survey show that in vast majority of the Member States, biennial frequency has already been or is planned to be applied[38]. Regarding transmission NDPs, ACER and CEER note that most transmission NDPs are prepared on a biennial basis.[39]

37 Building on ACER's experience with transmission NDPs, ACER and CEER note that annual DNDPs may encounter more challenges related to delays during the preparation and/or scrutiny process in comparison to less frequent plans. On the other hand, biennial publication cycle reduces procedural burdens and allows adequate time for the preparation of the DNDP, including proper interaction with stakeholders, consultation of the draft DNDP and effective consideration of its results. It also supports more harmonised planning and facilitates effective cooperation among DSOs and between DSOs and

[34] Articles 32(3) and 51(1) of the Electricity Directive.
[35] Ten-year time horizon: the Flemish region in Belgium, Croatia, Cyprus, Denmark, Estonia, Finland, Latvia, Lithuania, Malta, the Netherlands, Romania, Slovenia, Sweden; Longer than ten-year time horizon: Hungary (15 years), Germany (by 2045). In Italy where the 5-year time horizon is used, network development scenarios go beyond 5 years, and some DSOs decide their major investments based on the analysis for the tenth year.
[36] With the exception of Spain where the provisions relevant to Article 32 of the Electricity Directive have not yet been transposed into the national legislation and the three-year time horizon is used.
[37] Article 32(3) of the Electricity Directive.
[38] Biennial frequency: Austria, the Flemish region in Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Italy, Lithuania, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden.
[39] See ACER Opinion on the electricity national development plans, 2025.

TSOs. Time-aligned plans also help prevent discrepancies and reduce the risk of relying on outdated data, thereby improving the overall effectiveness of network development planning.

ACER and CEER recommend that DNDPs are prepared biennially and meaningfully time-aligned with TSOs' NDPs.

5.2.2. Three main pillars of the network planning process

38 Network planning typically involves the following three essential pillars:

- Scenario development represents the first major step of the network development process. It involves exploring and evaluating the possible evolution of electricity demand and supply, considering factors such as population growth, societal changes, economic development and technological advancements. The scenarios are a basis for identifying future capacity needs and solutions addressing them.
- Identification of grid capacity needs is the second major step of the network planning process and involves determining where and when additional grid capacity may be required to ensure the grid can accommodate projected demand and supply. This subprocess builds on the existing grid infrastructure and considers scenario inputs to forecast and locate capacity gaps.
- As the third major step of the network planning process, project identification and selection subprocess aims to develop the optimal solution to an identified need. Solutions may include reinforcement of grid by either building new or upgrading existing infrastructure or other non-wire solutions.

ACER and CEER recommend that DSOs incorporate three fundamental pillars into their network development process: scenario development, identification of grid capacity needs and project identification and selection.

5.3. Comprehensive, consistent and transparent scenarios

39 Scenario building process forms the first main pillar of network development. Survey results show that in almost all Member States, DNDPs are based on scenarios that are aligned with TSOs' scenarios to varying degrees[40]. Encouragingly, DSO scenarios are already publicly available in almost half Member States.

40 Being the core strategic document in the Member States, National energy and climate plans (NECPs) define how a country intends to achieve its energy and climate objectives. ACER and CEER welcome that in vast majority of the Member States, DNDPs consider or are based on NECPs.[41]

41 Local specificities play an essential role in shaping network needs, especially with the rapid decentralisation of the energy system. ACER and CEER recognise that DSOs' scenarios are particularly exposed to uncertainties, as planning needs hinge on local specificities that are harder to predict and trend aggregation is less helpful.

42 It is important that scenario development at the distribution level integrates both overarching system-wide perspectives and local-level insights. Building on national policy targets and TSO scenarios, which provide a comprehensive framework reflecting broader energy system objectives, helps maintain

[40] E.g. in Germany, DSOs in a planning region shall, with the involvement of the TSO, draw up a regional scenario which forms the common basis for the respective DNDPs. In Italy, country-wide scenarios are prepared jointly by electricity and gas TSOs in a process where DSOs are consulted. DSOs are expected to implement the common scenarios including the local specificities as foreseen in the distribution criteria. In the Netherlands, the TSOs and DSOs jointly set up the scenarios.
[41] Austria, the Brussels and Flemish regions in Belgium, Croatia, Cyprus, Estonia, Finland, Germany, Greece, Hungary, Italy, Lithuania, Latvia, Luxemburg, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain.

alignment across different planning levels. At the same time, incorporating local inputs, such as local demand forecasts, distributed energy resource projections or municipal development plans, ensures that scenarios capture unique characteristics and local realities.

43 To achieve decarbonisation goals in a coordinated manner, distribution system scenarios must also be coordinated with national scenarios across other sectors. Distribution system plans for gas[42], hydrogen[43] and heating and cooling[44] shall be developed in a close cooperation with distribution system operators for electricity. This requires early coordination and proactive stakeholder engagement, ideally starting before formal consultations to ensure timely, inclusive, and realistic scenario development.

44 To build trust and accountability with society, and encourage meaningful stakeholder engagement in the planning process, transparency and public access are essential. Any potential confidentiality concerns may be addressed through proper data aggregation.

To ensure credibility, effectiveness and transparency of DNDPs, ACER and CEER recommend:

- DSOs' scenarios consider NECPs* and are aligned with the most recent policy targets;
- DSOs develop their scenarios by aligning with TSOs' scenarios. This can be done, for example, by building on TSOs' scenarios, translating them to the distribution level, and tailoring them to local conditions and specificities;
- DNDPs and DSOs' scenarios are coordinated with scenarios across other sectors and relevant national and local spatial planning strategies and scenarios;
- DNDPs are based on publicly available and easily accessible scenarios;
- DNDPs include a detailed description of the scenarios building methodology, clear documentation of the data sources and assumptions used as well as an explanation of the modelling approach employed.

*In line with ACER Recommendation No 01/2025 on Demand Response Network Code.

5.4. Identifying grid capacity needs

45 Identification of grid capacity needs represents the second major pillar of a holistic planning approach. Once future demand and generation developments are defined within the scenario building process, DSOs need to assess where and when additional grid capacity is needed to be able to serve the needs of the network users.

46 When forecasting future capacity needs in a holistic manner, long-term scenarios serve as inputs and the existing grid is taken as a starting point and built upon. In doing so, the relevant planning requirements within the respective area have to be considered. These include regulatory frameworks, national targets, technical standards and planning criteria. For example, DSOs often need to design and shape their future capacity needs to meet the target values of quality-of-supply indicators such as SAIDI, SAIFI and ENS. Typically, they also have to ensure contingency criteria is met to ensure future system will remain reliable even if one of or two key components fail (i.e. N-1 or N-2 criteria). Another important planning requirement to be considered when identifying future capacity needs involves adhering to the operational limits.

47 The planning requirements can also differ within a country or the DSO area, for instance, different SAIDI and SAIFI targets may be set for urban and rural areas, while N-1 is typically required at high and/or medium voltage levels.

[42] Article 57 of Directive (EU) 2024/1788.
[43] Article 56 of Directive (EU) 2024/1788.
[44] Article 25(6) of Directive (EU) 2023/1791.

48 Survey results indicate that in most Member States, DSOs identify capacity gaps by forecasting power flows and voltage conditions across their networks[45], often using load flow simulation. The remaining DSOs rely more heavily on their expert-based judgement.

49 ACER and CEER note that the accuracy of capacity gap identification exercise is closely tied to the availability and quality of data, including load forecasts and grid topology. This means results may be influenced by the DSOs' technological advancement and the level of digitalisation applied. ACER and CEER recognise that the use of proper tools in network planning is becoming increasingly important and growing complexities require DSOs to move beyond traditional planning methods. The ongoing digitalisation, increased observability and controllability of distribution networks play a key role by enabling the use of real-time data.

50 In relation to grid capacity gaps, ACER and CEER also note that DSOs in several Member States publish, either within DNDPs or separately, data on the number of network connection requests received, approved and/or denied over a given period.[46] Additionally, in multiple countries, DSOs visualise and publish available grid capacity on maps, using different levels of granularity and update frequency[47]. These maps typically reflect current grid saturation, however, some NRAs report inclusion of forecasted future saturation or available grid capacity, providing stakeholders forward-looking insights. ACER and CEER recognise this transparency as an important element in promoting efficient grid planning. By making information on available grid capacity accessible, DSOs help network users make more informed decisions, reduce uncertainty and manage expectations. This is particularly important in the context of growing connection queues where clear, sufficiently detailed and timely information can improve the planning and coordination of new projects and help alleviate pressure on the grid connection process.

ACER and CEER recommend DSOs to:

- develop a process to identify network capacity needs by using long-term scenarios as inputs, building upon the existing grid infrastructure and considering the regulatory frameworks, relevant national targets, technical parameters and planning criteria;
- provide in their DNDPs a clear and comprehensible explanation of how capacity network needs have been identified including a detailed description of the regulatory frameworks, national targets, planning criteria and technical parameters considered;
- adopt data-driven network planning approaches, supported by the systematic use of robust analytical techniques. This preferably includes the application of more advanced methods such as load flow simulations and probabilistic assessments to evaluate a broad spectrum of operating conditions.

[45] Belgium, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Portugal, Romania, Slovenia, Spain, Sweden.
[46] Austria, Belgium, Croatia, Cyprus, the Netherlands, Portugal, Romania, Slovenia, Spain.
[47] Austria, Belgium, Czech Republic, Cyprus, Denmark, Finland, Germany, Italy, Latvia, the Netherlands, Slovenia, Spain, Sweden.

5.5. Planned projects including flexibility

51 The third main pillar of the network process is selection of projects. At this stage, candidate solutions are identified in response to the identified need and prioritization of investments is made based on the criteria applied. Several NRAs reported planning approaches being shaped by the principle of least costs and prioritising the most economically efficient solution.

ACER and CEER recommend DSOs to develop a process for selecting the optimal network development solution to address identified gaps and include it in their planning methodology. This process should be based on cost-effectiveness.

5.5.1. Assessing flexibility needs

52 As weather-dependent energy sources rapidly penetrate the local level and electrification accelerates, electricity flows at distribution level are becoming more variable and less predictable. Increasingly flexible grids will be needed for DSOs to be able to efficiently cope with these challenges and maintain a stable system while also preventing congestions and voltage issues in their grids.

53 Survey results reveal that in almost three quarters of participating Member States, DSOs consider flexibility useful for addressing congestions caused by renewable energy generation, indicating a need for downward flexibility in the distribution networks. In about two thirds, flexibility is seen as beneficial for managing load-driven congestions, highlighting a need for upward flexibility within their networks. In roughly half of the Member States, DSOs consider flexibility useful to mitigate voltage-related issues. In Austria, DSOs also see flexibility useful as temporary service during maintenance.[48] In line with the operational needs, NRAs of five countries report having already introduced regulatory incentives to support the use of flexibility by DSOs, for example by recognising the costs of flexibility services or by incentivising them to procure flexibility in a purely market-based manner. ACER and CEER emphasize that by establishing appropriate incentives and cost recovery mechanisms for DSOs to use flexibility within their networks, NRAs can facilitate the development of more cost-efficient networks.

54 DSOs are required by the Electricity Directive to include an assessment of medium and long-term flexibility needs in their DNDPs.[49] The Electricity Directive positions flexibility as a complementary element in the distribution network planning process. In this context, flexibility solutions should be assessed alongside conventional investments as part of an integrated planning approach that identifies the most effective mix of solutions to address network capacity gaps. Although network reinforcement is expected to remain the key path to ensure long term system adequacy, flexibility solutions can help address capacity gaps by either reducing or deferring the need for network reinforcement until planned reinforcements are in place, thereby enabling earlier connection of network users.

55 ACER and CEER observe that in most countries, DSOs consider flexibility in their DNDPs or intend to do in the next edition.[50] However, only in Denmark, Portugal, Slovenia and Sweden DNDPs include quantified flexibility needs, either in terms of power or both power and energy. Except for Sweden where some DNDPs indicate flexibility needs for one direction, all other provide both downward and upward directions of needs. Furthermore, the level of spatial, voltage and temporal granularity of this information varies significantly across DNDPs. The Portuguese DNDP provides the most detailed data, disaggregated by voltage level and geographical area, and specifying the time-blocks during which flexibility is planned to be utilised. DNDPs in other countries present less granular information, typically

[48] RES-driven congestions: Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Latvia, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Sweden.
Load-driven congestions: Austria, the Brussels and Flemish regions in Belgium, Croatia, Denmark, Finland, France, Germany, Hungary, Latvia, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Sweden.
Voltage issues: Croatia, Czech Republic, Denmark, Estonia, Finland, Hungary, Latvia, Malta, Poland, Portugal, Slovakia, Slovenia, Sweden.

[49] Article 32(3) of the Electricity Directive.

[50] Considered by all DSOs: the Flemish region in Belgium, Croatia, Denmark, Estonia, Finland, Hungary, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden; Considered by some DSOs: Austria, Germany; Planned for next iterations: Czech Republic, Italy, Luxemburg.

aggregating values across voltage levels and geographical regions and with annual or multi-annual temporal granularity[51]. ACER and CEER acknowledge that in three out of the four Member States with quantified flexibility needs in DNDPs, the use of flexibility solutions and grid reinforcement are compared using a cost-benefit analysis.

56 ACER and CEER find it important that DNDPs include sufficiently detailed assessment and description of the flexibility that DSOs are planning to use. In particular, flexibility needs in DNDPs should be quantified in terms of energy and power and, for the sake of transparency, assessed and presented with the highest possible level of details. While these assessments should cover the entire time horizon of the DNDP, for each planned flexibility solution identified, DNDP should provide at least:

- direction (upward or downward) of the planned use;
- the expected area/location of use and the corresponding voltage levels[52];
- the expected time of use, specified with the highest level of details feasible[53];
- the expected contractual arrangements to access flexibility (e.g. market-based flexibility, flexible connection agreements); and
- the competing alternative network reinforcement solution, if it exists, along with the analysis supporting the cost-effectiveness of the selected option.

DNDPs should also provide the reasoning for the flexibility needs and description of how they have been assessed.

57 The Electricity Regulation assigns DSOs the responsibility to provide data and analyses for the preparation of the biennial national report on the estimated flexibility needs, in accordance with the provisions of the FNAM.[54] The FNAM identifies DNDPs as the primary source of DSOs' data and analyses. Therefore, it is important that DNDPs comply with flexibility-related information and analytical requirements set out in the FNAM[55]. Aligning DNDPs with these requirements can help DSOs reduce administrative and computational efforts, ensure consistency across the two interrelated processes and enhance regulatory efficiency[56].

[51] In Denmark, some DNDPs also provide information per voltage levels. In Sweden, some DNDPs also provide information per geographical regions.
[52] Preferably, flexibility needs in DNDPs are disaggregated per voltage levels.
[53] Preferably, hourly time-blocks are provided. As a minimum, yearly values are provided.
[54] Article 19e(3) of The Electricity Regulation.
[55] For example, by using the template outlined in Table 15 in Annex 2 of the FNAM.
[56] NRAs play a role in the implementation of the FNAM. For example, the use of data from sources other than DNDPs by DSOs shall be agreed by the NRA.

ACER and CEER recommend DSOs to:

- systematically embed the assessment of flexibility needs into their respective planning methodologies;
- develop methodologies for evaluating potential and cost-effectiveness of flexibility solutions, considering the regulatory framework applied;
  - If flexibility is considered a permanent solution, the methodology should consider and provide at least:
    - how costs of the considered flexibility solutions and network alternative are determined, including costs for network users providing flexibility (e.g. potential loss of revenues for generators with flexible connection agreements);
    - how benefits of the considered flexibility solutions and network alternative are determined, including potential revenues for consumers providing flexibility;
    - how uncertainties of the considered flexibility solutions and network alterative are taken into account.
- ensure that the flexibility needs assessment in DNDPs is sufficiently detailed* and complies with information and analysis- requirements stipulated in the FNAM.

*Further information on the recommended level of details is provided in paragraph (56).

58 The results of the NRA survey indicate that the Portuguese DNDP[57] is particularly advanced when it comes to assessing flexibility needs. While the FNAM was not yet adopted when the survey was conducted, the Portuguese DNDPs appears to be broadly aligned with the FNAM requirements. This DNDP uses probabilistic analysis to identify network constrains (the network capacity gaps) and evaluates flexibility as alternative solution to conventional investments through the cost-benefit analysis. Its results indicated that traditional solutions frequently offer broad system-wide benefits, such as enhanced security of supply, reduced losses, and improved quality of service. At the same time, flexibility solutions can prove to be the more efficient choice in certain contexts, particularly where they enable targeted, timely, and cost-effective responses to specific network needs.

5.5.2. Project inclusion and project-related information

59 ACER and CEER observe that in most Member States, DNDPs include not only traditional infrastructure projects (e.g. overhead lines, cables, transformers), but also a range of other project categories. The most frequently included are non-copper infrastructures such as SCADA, digital twins, ICT or cybersecurity measures, followed by smart grid projects and reactive compensation devices. Additionally, DNDPs in some Member States include DSO-operated storage projects and other supporting infrastructure required for the DSOs' operational activities like control centres, buildings or vehicles. [58]

60 DNDPs typically present different levels of project detail depending on the voltage level. High-voltage projects are generally described with greater precision[59]. In contrast, medium-voltage projects are often presented either with less detail or in aggregated form, while low-voltage projects are reported as

[57] See Type and format of data and the methodology for TSOs' and DSOs' flexibility needs analysis, 2025.
[58] Non-copper infrastructure (e.g. SCADA, digital twins, cybersecurity measures): the Brussels and Flemish regions in Belgium, Croatia, Cyprus, Denmark, Greece, Italy, Latvia, Lithuania, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain; Smart grid projects: the Flemish region in Belgium, Croatia, Cyprus, Denmark, Finland, Greece, Latvia, Lithuania, Poland, Portugal, Romania, Slovenia, Spain; Reactive compensation devices: Croatia, Cyprus, Denmark, Italy, Poland, Portugal, Slovenia, Spain; DSO-operated storage: Denmark, Poland, Spain; Other categories: Greece (new control centres), Malta (new centres and control rooms), Slovenia (e.g. buildings, vehicles).
[59] High voltage level projects specified in details: Austria, Belgium, Croatia, Denmark, Germany, Hungary, Italy, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain; Medium voltage level projects listed and specified: Belgium, Denmark, Estonia, Germany, Italy, Malta, the Netherlands, Poland, Portugal, Romania, Spain, Sweden (some DSOs); Medium voltage level projects aggregated: Austria, Cyprus, Finland, Greece, Latvia, Lithuania, Slovakia, Slovenia, Sweden (some DSOs).

aggregates. The difference in granularity is mostly explained by greater uncertainties on the local level scale.

ACER and CEER observe that DNDPs in several Member States provide project-related information in a worksheet format and/or apply unique coding of projects.[60] They further welcome the use of a standardised coding system across all DNDPs in Denmark and Spain. ACER and CEER consider these practices beneficial, as they facilitate monitoring, digital processing, and improve data interoperability and consistency.

ACER and CEER recommend:

- DNDPs include project categories such as smart grids, non-copper infrastructure (e.g. SCADA, digital twins, cybersecurity, ICT), DSO-operated reactive compensation devices and, where relevant, DSO-operated storage*;
- DNDPs provide sufficiently detailed information about the planned projects:
  - high and, where meaningful, high/medium voltage projects should be detailed by at least project description, location, technical specification, advancement status, expected commissioning date, estimated costs and progress update;
  - for low and medium voltage projects, aggregation is sufficient. However, including more detailed information, particularly for medium voltage projects, adds value. Aggregations may be presented as programs per area, broken down by project type and include metrics such as number of components per area, overall capacity and total costs.
- DNDPs provide project-related information in a worksheet format in addition to any other formats;
- a unique project coding system is applied in DNDPs and, for Member States with multiple DNDPs, establishment of a nationally standardised coding system;
- DNDPs adopt a common terminology for projects stages to reflect project maturity, preferably aligned with the planning stages used in TSOs' NDPs.

*Without prejudice to Article 36 of the Electricity Directive providing that DSOs shall not own, develop, manage or operate energy storage facilities unless allowed by the Member States.

ACER and CEER recommend that EU DSO Entity, in cooperation with DSOs and technology providers, explore ways to help address emerging supply chain challenges, e.g. through the inclusion of aggregated information on equipment needs in DNDPs. If considered useful and feasible, EU DSO Entity is invited to develop a template for DSOs to report anticipated equipment needs in their DNDPs.

[60] Unique coding of projects: Austria, the Flemish and Walloon regions in Belgium, Denmark, Greece, Hungary, Italy, the Netherlands, Portugal, Slovenia, Spain, Sweden; Worksheet format to provide project-related information: the Flemish and Walloon regions in Belgium, Croatia, Denmark, Estonia, Germany, Greece, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Spain.