ACER

European Union Agency for the Cooperation of Energy Regulators

Managing the ramp-up of electricity distribution investments to better serve grid users

ACER report on distribution system operator (DSO) revenue setting practices

14 April 2026

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Executive summary

1 to 40 million customers: DSO sizes vary widely across the EU

50% increase in distribution grid investment in 2024 (vs 2021)

~1/3 of EU countries introduced measures against CAPEX-bias

To meet the investment challenge, deliver better services and find efficiency gains, DSO size matters.

Visibility and better planning are key for efficient grid development.

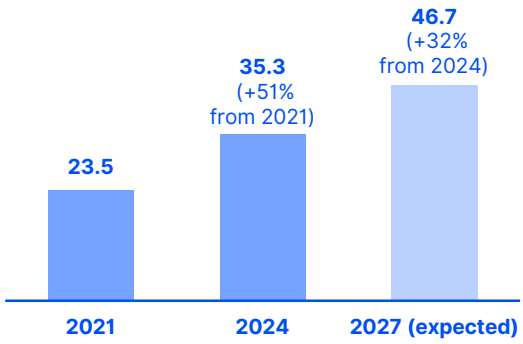
Broad consensus on the need for regulatory innovation, but limited progress in practice.

1 Distribution grids are going through a huge transformation enabling progress towards the EU's 2050 decarbonisation goals[1]. **Significant grid investments are a must** to keep pace with accelerated electrification and growth in renewable generation. EU legislation assigns **new roles for distribution system operators** (DSOs) as active system operators, market facilitators, datahubs, and innovation catalysts[2].

2 **The ramp-up of investments in electricity distribution grids** in Europe is already visible. Compared to 2021, annual distribution grid investments increased by over 50% in 2024 and are projected to double (from 2021) to 2027 (Figure I), approaching EUR 47 billion.

Electricity distribution grid investments are ramping up

Figure I: Total investment trends (billion EUR) covering 25 EU Member States (all, but Bulgaria and Denmark) and Norway and 191 DSOs with over 100,000 customers



3 **Europe shows uneven progress** in grids digitalisation, modernisation through technological advancements and unlocking flexibility via demand response as noted in 2025 ACER's reports on barriers to flexibility, retail monitoring and tariff practices[3]. These approaches complement traditional grid buildout and are crucial to help reduce price volatility, better accommodate renewable energy sources and increase cost efficiency and system resilience.

1 The European Green Deal is targeting a 55% reduction in greenhouse emissions by 2030 and climate neutrality by 2050. The corresponding action plans (REPowerEU, Grid Action Plan, Affordable Energy Action Plan, etc.) reinforced these targets and accelerated actions.

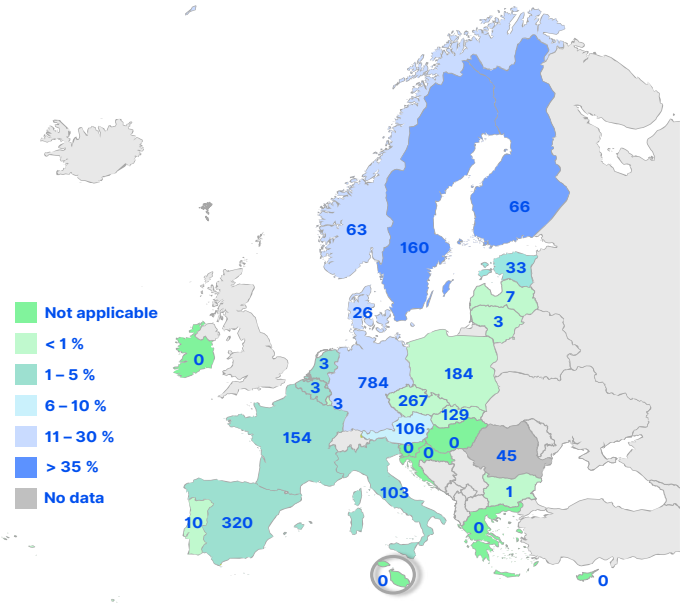
2 Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, amended by Regulation (EU) 2024/1747 as regards improving the Union's electricity market design.

3 ACER monitoring report on unlocking flexibility: no-regret actions to remove barriers to demand response, 2025 (p. 15), ACER monitoring report on rewarding flexibility: how retail contract choice can help unlock consumer flexibility, 2025 (p. 14), and ACER report on network tariff practices, 2025 (p. 38).

4 **With rising investments and uneven progress in adopting new solutions, are DSOs prepared to deliver high quality services to all customers?** The distribution landscape in Europe is highly diverse, with 2674 DSOs across 28 countries serving a wide range of customer bases, from as few as 1 customer to nearly 40 million (Figure II).

About 8% of European customers are served by DSOs with less than 100,000 customers (such DSOs make up 92% of the DSOs)

Figure II: Number of DSOs serving less than 100,000 customers ('small DSOs') and the share of customers connected to small DSOs in each country, 2024



DSO sizes affect the quality of distribution services to network users

5 **To ensure equal access to high-quality and cost-efficient distribution services for all customers, DSOs must be equipped to deal with evolving responsibilities in various areas:**

- DSOs must have robust **grid planning**[4], turning uncertain long-term needs into actual projects, bearing the highest societal value. However, almost two thirds of all DSOs in the EU have been exempted from the preparation of a network development plan[5] and even where they do prepare such plans, synergies are often not exploited by a holistic planning approach.
- DSOs must seek **flexibility solutions**, where they are more efficient, as alternatives to building new grids[6], while local markets for system operation services are still in the early stages in most Member States and grid tariffs provide no time-of-use in every third Member State.
- DSOs must enhance grid **digitalisation** to better integrate flexibility resources, strengthen system resilience, and provide detailed data for accurate assessments of grid-use and needs. Despite significant progress in smart meter roll-out, with a penetration level above 80% in most EU Member States, it still lags below 30% in six Member States.
- DSOs must address the **resilience** of critical energy infrastructure and services. This includes improving cybersecurity risk management and identifying risks for cross-border electricity flows[7]. Physical grid security matters too.

6 These responsibilities require new tools, new specialised skills and more coordination efforts. Adequately resourcing all European DSOs to deliver quality service could be challenging.

4 ACER sees better planning and applying the 'efficiency-first' principle to grid development as important measures for accelerating on-target grid investment while sustaining affordability and competitiveness. See ACER report on electricity infrastructure development to support a competitive and sustainable energy system, 2024 (p. 30).

5 Based information in the Annex to the 2025 ACER and CEER guidance on electricity distribution network planning, ACER observes that over 5% of the EU customers are served by DSOs without a distribution network development plan.

6 EEA/ACER report on flexibility solutions to support a decarbonised and secure EU electricity system, 2023.

7 Commission Delegated Regulation (EU) 2024/1366 of 11 March 2024 supplementing Regulation (EU) 2019/943 by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows.

Future-proofing DSOs

7 **DSO size should facilitate efficient grid investments and other distribution services.** Customers are more safeguarded being served by large DSOs, because some provisions on the new responsibilities are frequently applied only to them.

8 **DSO scaling should promote quality grid planning.** Robust system planning and efficient regulatory scrutiny should not be compromised by dispersed network development. Having a single distribution grid owner is not the only way; some already moved grid planning to a single entity while keeping multiple DSOs or asset owners (see national practice box for Slovenia and Flanders region of Belgium).

9 **DSOs should develop the network efficiently.** There is broad consensus among stakeholders on expanding the regulatory focus beyond cost reductions (grid investment efficiency) to promote high value (most efficient, grid or non-grid) solutions to address system needs. Reducing capital expenditure (CAPEX) bias, still present in several countries, is vital for improving regulatory regimes[8].

10 **Rigid expenditure caps should not block efficient investments needed to ensure the energy transition happens everywhere.** Caps may also hinder or distort investments when placing uncontrollable cost overrun risks on DSOs without any corresponding reward.

11 **Distribution grid use and planned development should be more transparent:** Mid-term CAPEX and OPEX trajectories should be made public in the interest of regulatory oversight and informing network users and manufacturers. Better use of the existing grid adheres to the efficiency-first principle and is essential to limit the need for new investments. Each DSO should monitor and analyse grid use to improve network planning, operation and maintenance.

Broad consensus on the challenges, limited and uneven progress in regulatory innovation

12 As the distribution system evolves, regulatory frameworks must adapt. Without regular assessment of DSO revenue methodologies and incentive schemes, there is a risk of 'navigating blindly' through the energy transition.

13 **National regulatory authorities (NRAs) have put forward several prospective practices to prepare DSOs for their new roles in the energy transition** – Table I presents some inspirational examples.

14 **This ACER report presents 10 recommendations for legislators, regulators and system operators to manage the ramp-up of distribution grid investment to better serve grid users. NRAs should consider these recommendations when setting or approving their distribution revenue methodologies.**

15 **National law should safeguard the independence of national regulators overseeing DSOs:** NRAs legal responsibility to set system operators' revenues, independently from any political body or other entity, should be ensured. Expenditure or revenue caps set by national legislation conflict with this principle and may be in breach of EU law.

16 **Finally, NRAs should focus on effective communication** when reforming their revenue-setting. Early engagement with affected stakeholders is instrumental for gaining acceptance of new revenue-setting practices.

8 CAPEX-bias is still a prominent issue in Europe, as several Member States apply rate-of-return regulation for CAPEX, which is often combined with incentive regulation for operational expenditure ('OPEX'). Recent information on DSO remuneration regimes is available in 2026 CEER report on regulatory frameworks for European energy networks 2025.

Table I: National practices for inspiration

Regulatory objective	Selected national practice
Increased efficiency arising from DSO landscape consolidation	**Austria, Italy and Spain:** incentives for DSO mergers (Section 2, p. 17)
Ensuring synergies of larger scale system planning	**Slovenia:** whole (DSO-TSO) system planning approach **Belgium:** multiple DSOs, but single operator in Flanders region for electricity and gas networks (Section 3, p. 22)
Mitigating CAPEX-bias and incentivising efficient network development	**Italy:** benefit-based incentives (Section 5, p. 27)
Forward-looking remuneration, fair redistribution of investment costs, facilitating DSO liquidity	**Austria, Germany, Italy, Portugal:** cost recognition based (partially) on planned expenditures (Section 6, p. 31)

Summary of ACER recommendations

Ensure adequate competences by

1. ensuring strong and effective NRA mandate on DSO revenue setting (see paragraph 58);
2. having adequately resourced NRAs and DSOs (see paragraph 59);
3. removing regulatory barriers and incentivising DSO mergers where better services or other efficiency gains are expected (see paragraph 60);
4. expanding DSO system planning to national or subnational level (see paragraph 79)).

Ensure proper transparency by

5. striving to publish yearly DSO capital- and operational expenditure estimates at least five-year ahead (see paragraph 78);
6. monitoring and reporting on existing and forecasted grid use (see paragraph 86).

Unlock efficient investments by

7. avoiding a grid build (capital expenditure) bias (see paragraph 93);
8. allowing DSOs to collect revenues partially based on their planned expenditure (see paragraph 112);
9. avoiding unjustified cost deferral that is not aligned with future utilisation (see paragraph 113);
10. eliminating rigid expenditure caps lacking adjustment mechanisms (see paragraph 114).

1. Introduction

17 Distribution grids are going through a huge transformation, enabling progress towards the EU's 2050 decarbonisation goals.[9] They are experiencing the acceleration of electrification, increased integration of decentralised energy sources and a rising need to increase flexibility to ensure a resilient power system.

18 Significant grid investments and significant modernisation and digitalisation are a must to keep pace with the aforementioned changes. Recent sector estimates project the current annual grid investment in Europe 'reaching up to EUR 100 billion until 2050, with lower estimates at EUR 75 billion'[10]. Two thirds of these investments are expected to take place in distribution.

19 As grid costs are expected to become a main driver of electricity costs, containing their rise is key for securing affordability of electricity and industry competitiveness.

20 In parallel, distribution system operators (DSOs) face several increasing challenges, including growing connection queues, grid congestion, grid stability issues, supply chain interruptions and skilled workforce shortage. DSOs must ensure efficient grid use and grid build-out, while the EU law has assigned DSOs new roles, positioning them as active system operators, market facilitators, datahub managers and innovation catalysts.

21 Mitigating the investment challenge and improving DSOs' abilities to be fit for their new roles requires rapid actions by policy makers, legislators and NRAs. The measures should facilitate optimising the utilisation of existing and future assets to lower the overall network costs and ensure efficient new grid investments.

22 Under EU law, NRAs shall take all reasonable measures 'in pursuit of ensuring that system operators and system users are granted appropriate incentives, in both the short and the long term', to increase efficiency[11]. Such measures encompass establishing the system operators' allowed or target revenues, as part of network tariff setting[12]. Explicit or implicit expenditure or revenue caps set by national legislation which unduly restrict regulators' legal duties conflict with this principle and may be in breach of EU law.

23 DSOs should receive fair remuneration for their network services, that reflects their actual costs and the risks they bear, to avoid underinvestment or inefficient grid investments. Regulatory design, including the allowed return, shall be calibrated so as to prevent distortive incentives, including over-capitalisation and capital expenditure (CAPEX) bias. Instead, it should ensure that DSOs put forward the highest value (most cost-efficient) solutions.

9 The European Green Deal is targeting a 55% reduction in greenhouse emissions by 2030 and climate neutrality by 2050. The corresponding action plans (REPowerEU, Grid Action Plan, Affordable Energy Action Plan, etc.) reinforced these targets and accelerated actions.

10 ACER report on electricity infrastructure development to support a competitive and sustainable energy system (December 2024, p. 5).

11 Cf. Articles 59(7), 58(f) and 59(1)(a) of Directive (EU) 2019/944 and Article 18 of Regulation (EU) 2019/943, amended by Regulation (EU) 2024/1747.

12 Pursuant to Article 59(1)(a) of Directive (EU) 2019/944, each NRA has the duty of fixing or approving network tariffs or their methodologies, or both. As described in the 2025 ACER report on network tariff practices (pp. 71-72), network tariff setting is the result of a three-step process: first, the allowed or target revenues of the system operators (including the remuneration method for TSO or DSO costs) are determined; second, the tariff structure is defined; third, the costs/revenues are allocated to each of the tariff structure's items (i.e. charges paid by network users). These three steps are closely linked, and the duty of the NRA pursuant to Article 59(1)(a) of Directive (EU) 2019/944 shall be read in conjunction with Article 18 of Regulation (EU) 2019/943 encompasses them all.

24 In particular, in rapidly evolving energy systems, incentive regimes may require dynamic adaptation, while maintaining an adequate level of stability and predictability. NRAs need to balance objectives to ensure long-term, stable, predictable frameworks, on the one hand, and flexible regulation (i.e. dynamically regulate adapting to the rapidly changing energy landscape) on the other.

25 In this regard, setting revenue methodologies for multiple years, providing for revisions under justified circumstances, and structured flexibility with clear mid-term adjustment rules is appropriate. However, a regular reassessment ('electricity-system fitness check') of whether the methodologies continue to be fit for purpose is essential. To this end, NRAs can draw inspiration from best practices in other countries.

26 Pursuant to the Electricity Regulation, ACER shall provide and update, at least every two years, a 'best practice report on transmission and distribution tariff methodologies while taking account of national specificities'[13]. NRAs 'shall duly take the best practice report into consideration when fixing or approving network tariffs or their methodologies'[14].

27 In its 2025 report on network tariff practices, ACER focuses on the definition of the network tariff structures and the way costs/revenues are allocated to each of the tariff structure's items; i.e. charges paid by network users[15]. The first step of the tariff setting process, i.e. the determination of the allowed or target revenues of the transmission system operators (TSO) and DSOs as well as the remuneration method for their costs, is addressed in this report, due to its distinct nature from network charging.

28 Electricity TSO revenue setting in Europe had been reviewed by ACER in 2023. ACER's 2023 report on investment evaluation, risks assessment and regulatory incentives for energy network projects focuses on risk-mitigation measures and regulatory incentives for transmission networks[16]. In early 2024, ACER and the Council of European Energy Regulators (CEER) carried out an additional assessment with a focus on anticipatory investments[17].

29 ACER's review has so far had a limited scope regarding DSO investments. DSOs differ from TSOs in various aspects – including number, governance, ownership and function giving rise to distinct challenges across the two sectors. Expanding the focus on distribution also appears appropriate in light of the priorities of the 2023 European Commission's action plan for grids, which underlines the pressing need for distribution network modernisation and calls for a number of actions[18].

13 Cf. Article 18(9) of Regulation (EU) 2019/943, amended by Regulation (EU) 2024/1747.

14 Cf. Article 18(10) of Regulation (EU) 2019/943.

15 ACER identifies and discusses various related tariff dilemmas faced by NRAs and puts forward its proposal on how to design network tariffs to be cost-reflective and increase efficient use of the existing grid by providing price signals for network users to adapt their behaviour.

16 The reports observe that most regulatory frameworks treat all approved transmission investments alike, providing systematic treatment of risks as well as same cost-recognition process, regulatory incentives and penalties. The reports highlight that 'CAPEX-bias' and inadequate network planning are prominent challenges in transmission.

17 ACER-CEER position on anticipatory investments, 2024.

18 The EU action plan for grids calls on the EU DSO Entity to support DSO grid planning by mapping distribution development plans. It also calls on EU DSO Entity and the European Network of Transmission System Operators to harmonise definitions for available grid hosting capacity, promote the uptake of smart grid, network efficiency and innovative technologies, collaborate with technology providers on common specifications and enhance the visibility of grid projects, facilitating investments in manufacturing capacity and secure supply chains.

30 This report investigates revenue setting and incentives for DSOs. In particular, ACER examines the recent and upcoming investment trends, the factors that potentially hinder efficient investments and ways how to improve the DSO's ability and the regulatory measures to unlock such investments.

31 This report is based on the input provided by NRAs between November 2025 and February 2026. The submissions were made for all 27 Member States and Norway[19]. In addition, ACER reused some information presented in other NRA reports such as the 2026 CEER report on regulatory frameworks for European energy networks 2025.

32 While the main report discusses the key findings on revenue-setting practices, the Annex provides detailed information on the national revenue-setting for DSOs as reported by NRAs.

33 The rest of this report is structured as follows:

- Chapter 2 presents findings on the changing role of European DSOs in a context of rapid electrification, integration of decentralised energy sources and need for more digitalisation and flexibility.
- Chapter 3 presents the recent and upcoming investment trends and underlines the need for enhanced transparency and a more robust large-scale approach to grid planning.
- Chapter 4 reviews national practices regarding monitoring network utilisation to evaluate the potential for better use of the existing grid instead of building new infrastructure.
- Chapter 5 recalls the importance of CAPEX-bias mitigation to increase efficiency of the investments and presents different regulatory practices to reduce CAPEX-bias.
- Chapter 6 defines other potential barriers to efficient investments, such as investment caps and liquidity constraints, that may impede the energy transition from materialising across all countries.
- Annex provides detailed country-specific data on various aspects of DSO revenue setting.

19 For Belgium, the data received for each region (Brussels, Flanders, Wallonia) separately has been aggregated.

2. Evolving roles for distribution requires evolving distribution system operators

Main findings

34 The pace of the transformation of distribution grids differs between countries, leading to varying degrees of technological advancement in distribution grids across Europe: in most Member States smart-meter rollout is above 80%, while others are laggers (i.e. smart meter roll-out is below 30% in six Member States)[20] and need to accelerate. Progress in grid digitalisation via advanced management systems and real-time grid monitoring have been also observed in several countries[21].

35 The uptake of flexibility instruments presents a similarly mixed picture; about one third of the countries, assessed in this report, have established local markets for system operation services, while most have not[22]. Further, two thirds of the countries have introduced time-of-use grid tariffs (some include spatial differentiation as well), but the remaining countries still apply flat grid tariffs[23]. Finally, ACER notes that in half of the countries flexible connection agreements are applied[24].

36 While the exact tools to achieve it may differ, the transformation and modernisation of distribution grids is inevitable for all. DSOs need to be fit for purpose and equipped with sufficient resources to deal with the growing challenges listed above.

37 EU legal framework increasingly recognises the central role of distribution grids, where much of the energy transition is expected to occur[25]. EU electricity market rules now include provisions on DSO governance, distribution network planning, and revenue-setting by NRAs[26]. The law assigns DSOs expanded roles as active system operators, market facilitators, data managers, and innovation enablers, including responsibilities related to energy communities, energy storage and the integration of electric vehicles (EVs) and heat pumps.

DSO landscape

38 EU rules and the evolving DSO roles have been introduced in a tremendously heterogenous distribution landscape, including 2674 DSOs in the EU and Norway. As shown in Figure 1, DSO numbers vary widely: third of the countries (9 out of 28) have over 100 DSOs, 50% (14 out of 28) have fewer than 15 (six with just one), and the remaining 18% (5 out of 28) have between 34 and 77.

20 ACER-CEER monitoring report on retail markets, 2025 (p. 6).

21 Real-time grid monitoring (e.g. Supervisory Control and Data Acquisition, Distribution Management System and Advanced Distribution Management System) was reported in 20 out of 25 countries (80%). For more information, please refer to Table 11 in the Annex.

22 Ten countries reported that at least one large DSO procures flexibility from local markets and additional three countries reported about preliminary arrangements or pilot projects for such services. In remuneration, these flexibility services costs are either treated as pass-through or as controllable OPEX without any prevailing practice. For more information, please refer to Table 4 in the Annex.

23 ACER report on electricity network tariff practices, 2025.

24 Idem.

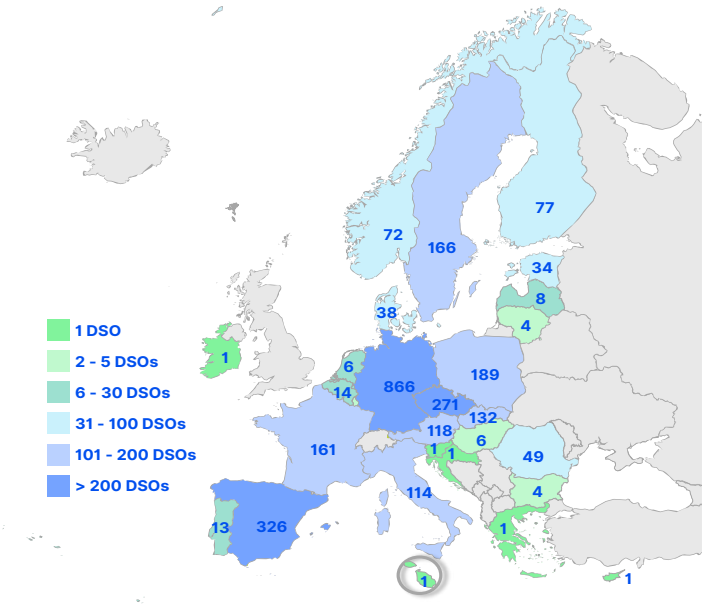
25 Cf. Regulation (EU) 2019/943, amended by Regulation (EU) 2024/1747.

26 NRAs shall recognise relevant costs as eligible, shall include those costs in distribution tariffs, and may introduce performance targets in order to provide incentives to DSOs to increase efficiencies in their networks, including through energy efficiency, flexibility and the development of smart grids and intelligent metering systems.

39 ACER observes a trend of electricity DSO mergers in Europe; almost half of the countries (i.e. 13 out of the 28) reported a decrease in the number of DSOs compared with 2019, while only three countries reported a slight increase. Overall, by end 2024 the number of DSOs is about 94 (4%) lower than in 2019[27].

40 Since only in a few instances have explicit regulatory measures been implemented to facilitate mergers, this development regarding mergers is likely to be primarily driven by changes in the electricity distribution sector.

Figure 1: Number of electricity DSOs by country, early 2025



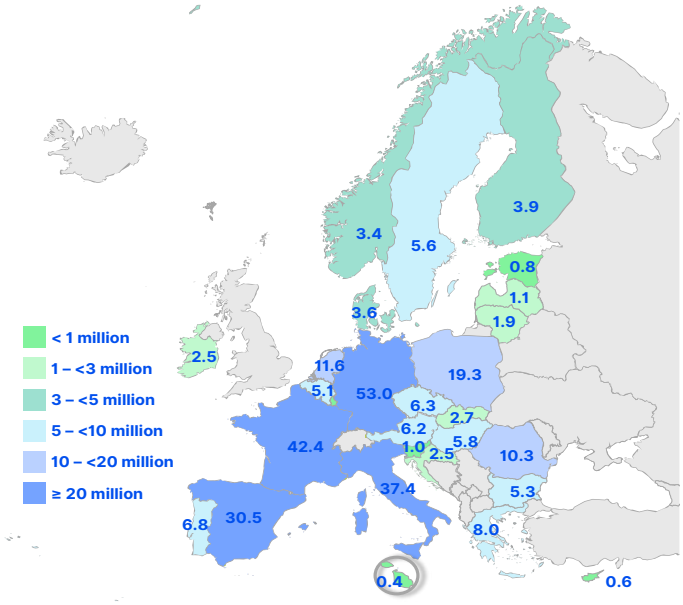
Note: Luxembourg has four DSOs[28]. In Belgium there is one DSO in Brussels region, five DSOs in Wallonia region and eight in Flanders region. In Slovenia, there is one certified DSO and five distribution infrastructure owner companies. The validity date of the values is early 2025, however it may slightly differ for some countries. For further details, please refer to Table 1 in the Annex.

41 ACER observes no close correlation between a country's number of DSOs and its customer base; for example, Czechia and Slovakia have a relatively high number of DSOs (i.e. 271 and 132, respectively, against an EU median value of 34), while the number of customers is relatively small (i.e. around 6.2 million and 2.7 million, respectively, against an EU median value of 5.6 million). In contrast, in Greece there is only one DSO serving all 8 million customers. For more information on the number of customers, please refer to Figure 2.

27 The recent (2025) mergers in Flanders region of Belgium have also been accounted for in these statistics.

28 Including the TSO, which also functions as the largest DSO.

Figure 2: Number of customers (in millions) connected at the distribution level by country, end 2024



Note: The values in the figure are rounded to one decimal place, for exact values see Table 2 in the Annex. For Luxembourg, the value is about 0.4 million.

42 For the purpose of this report DSOs serving at least 100,000 customers are referred to as 'large DSOs', while DSOs serving less than 100,000 customers (or being small isolated systems) are referred to as 'small DSOs'. The concentration of large and small DSOs within countries with multiple DSOs is without a clear pattern as well. In 18 out of 28 countries (64%) the number of small DSOs exceeds the number of large DSOs, often more than tenfold[29]. One country has the same number of small and large DSOs[30]. In the remaining nine countries (32%) there are more large DSOs than small ones (including seven without any small DSO).

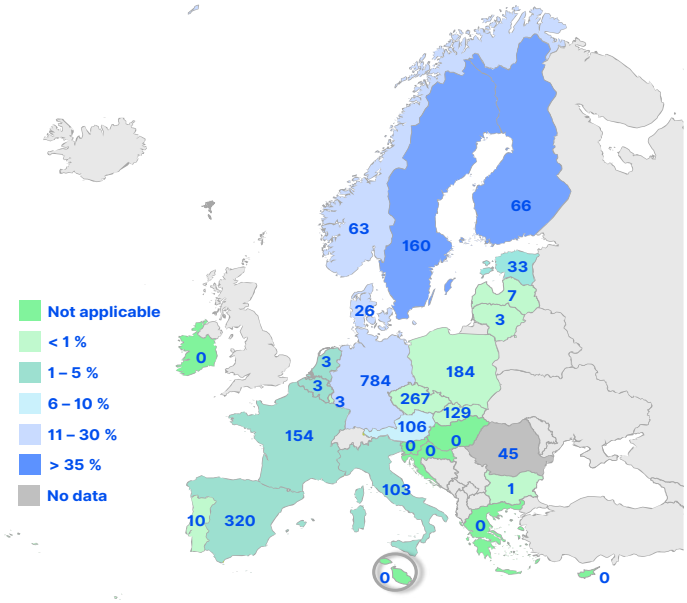
43 Figure 3 shows that the large majority of customers are connected to large DSOs: in 22 out of 27 countries (81%) at least 90% of customers are served by large DSOs[31] and there are only five countries (19%) where more than 10% of customers are connected to small DSOs.

29 Czechia, Estonia, France, Poland, Portugal, Romania, Spain, Slovakia.

30 In the Netherlands there are three small and three large DSOs.

31 In seven countries, only large DSOs operate; in eight countries, small DSOs serve less than 1% of customers; in five, 1–5%; and in two, 6–10%.

Figure 3: Number of DSOs serving less than 100,000 customers ('small DSOs') and the share of customers connected to small DSOs in each country, 2024



Note: No data for Romania on the number of customers connected to small DSOs. The values' reference date is 31 December 2024. However, some data may correspond to slightly different dates. For more information, please refer to the Annex.

44 Regarding the number of customers connected to an individual DSO, similar level of heterogeneity is observed. Some DSOs have fewer than 10 customers[32], while other DSOs serve millions of users; the largest one serves almost 40 million[33]. In 9 out of 27 countries (i.e. 33%) most customers of the country are served by the largest DSO[34]. For more information, please refer to Table 2 in the Annex.

45 Finally, ACER notes differences in DSO control and ownership structures as well. As shown in Figure 4, in about two thirds of the countries (17 of 26), none of the large DSOs are majority-owned or controlled by private entities. In five countries, this applies to less than half of the large DSOs; in one country, more than half; and in three countries, to all. Similarly, ACER finds a diverse mix of affiliations, including utilities engaged in electricity generation and supply, as well as other sectors (e.g. gas, heat, water, sewage, transportation). For more information on unbundling in each country, please refer to Table 3 in the Annex.

Figure 4: Majority control/ownership for DSOs with at least 100,000 customers (private versus public)

	None of the large DSOs	Less than half of large DSOs	More than half of large DSOs	All large DSOs
Majority-owned or controlled by private entities	AT, BE, BG, HR, CY, EE, FR, GR, IE, LV, LT, LU, SI, SK, NO, MT, NL	PT* (33%), SE (33%), FI (27%), CZ (25%), PL (20%)	HU (67%)	DK, ES, RO

(*) In Portugal, the large DSO on the mainland is private; the DSO in the Azores is more than 50% publicly owned; and the DSO in Madeira is 100% publicly owned.

Note: Countries abbreviated in accordance with ISO standards. In Germany, the information was not available for the NRA. For Italy, please refer to Table 3 in the Annex.

32 Number of customers connected to the smallest DSO of each country: 1 (Slovakia), 3 (Estonia), 6 (Latvia).

33 Number of customers connected to the largest DSO of each country: ~39 million (France), ~31,8 million (Italy), ~12,5 million (Spain).

34 In Croatia, Cyprus, Estonia, Greece, Ireland, Latvia, Lithuania, Malta, Slovenia either all or most customers are connected to one single DSO.

Derogations from EU law

46 EU law acknowledges the diversity of the DSO landscape by allowing derogations from certain provisions (e.g. based on the number of customers) and by empowering Member States to grant such exemptions.

47 The envisaged derogations[35] include exemptions from DSO requirements to provide system users with information on available capacity for new connections, to unbundle from non-distribution activities[36], to refrain from owning, developing, managing and operating storage facilities or electric vehicle (EV) recharging points, and to publish a network development plan at least every two years.

48 ACER observes that several Member States actually granted such derogations and exemptions:

- At least ten countries (about 40%) exempted (at least) some of the DSOs serving less than 100,000 connected customers from the obligations to prepare distribution network development plans (DNDPs)[37]. As a result, almost two thirds of EU DSOs are exempt from preparing an DNDP, leaving a remarkable part of the European power system outside standard planning. The exempted DSOs serve between 0.005% (in Lithuania) and around 25% (in Germany) of the country's customers[38]. Overall, at least 5% of EU customers (i.e. more than 14.6 million customers) are served by DSOs that are exempted from preparing a DNDP.

- At least ten countries transposed derogations allowing DSOs to own, develop, manage, or operate energy storage facilities or EV recharging points. However, only some of them have already actually granted them[39].

- At least four countries[40] provided exemptions to closed distribution systems from the EU rules on procurement of losses, system services, flexibility or tariff setting[41].

Efforts to strengthen DSO capabilities

49 EU law promotes digitalisation, flexibility, innovation and cost efficiency[42]. ACER observes NRAs' efforts in implementing measures and pilots to strengthen DSO capabilities in this regard (only a few countries reported no measures). The measures are mainly focused on digitalisation and innovation, but some also on flexibility. The measures are presented in Table 6 in the Annex.

50 In some instances, the measures are fixed (one-off, project based) budgets/funding for research and development or regulatory experimentations (e.g. regulatory sandboxes, pilot projects). These tools are deemed helpful at early development stages and for exploratory research, but they do not ensure the long-term, structural innovation needed for the energy transition and more stable actions are required.

35 Article 31(3b), Article 32(5), Article 36(2), Article 38(2) of Directive (EU) 2019/944, amended by Directive (EU) 2024/1711.

36 Pursuant to EU law, where a DSO is part of a vertically integrated undertaking, the DSO must be independent at least in its legal form, organisation and decision-making from other activities not relating to distribution.

37 ACER and CEER guidance on electricity distribution network planning, 2025.

38 The share of customers served by DNDP-exempted DSOs is below 2% in five countries: Czechia (~62k), Estonia (~7k), Italy (~710k), Latvia (8k), Lithuania (~93); between 5-10% in two countries: Austria (~499k), Slovakia (~137k); and around 25% in Germany (~13,241k). This information is not available for France, Portugal, Romania. In Portugal all customers are served by DNDP at medium voltage level.

39 CEER Status review TSO/DSO unbundling, 2024 (pp. 17-19).

40 CEER Status review TSO/DSO unbundling, 2024 (pp. 16-17).

41 Cf. Article 38(2) of Directive (EU) 2019/944.

42 Cf. Article 58, Article 59 and Article 32 of Directive (EU) 2019/944, amended by Directive (EU) 2024/1711; Article 8 and Article 18 of Regulation (EU) 2019/943 amended by Regulation (EU) 2024/1747.

51 ACER calls for prudence with pilots and regulatory sandboxes; these should serve as proof-of-concept tools providing empirical results, and supporting regulatory learning and innovation, rather than "box-ticking" exercises that replace or delay reforms. While successful pilots may translate into stable and structural measures, pilots may also show that a tested tool is ineffective and should not be adopted as a regulatory practice.

ACER considerations

52 ACER considers that the EU law has taken a pragmatic approach by differentiating DSO responsibilities according to their size and allowing derogations, reflecting the highly diverse DSO landscape across the EU. However, this diversity may create a barrier for effective EU-wide regulation and can lead to arbitrary distinctions among DSOs and their obligations, irrespective of the overall share of the distribution sector they account for.

53 For example, a considerable share of the distribution sector is not subject to DNDP planning, even though together with NRA scrutiny, it is an important tool for ensuring that customers pay for efficient distribution network developments.

54 ACER acknowledges that unbundling of small DSOs may not always be efficient and DSO control over storage facilities and/or EV charging points may be beneficial in system operation. However, legislators and regulators must be cautious with derogation practices and assess their potential impacts upfront[43], including the potential barriers.

55 ACER stresses that all customers should have equal access to adequate quality (including cost-efficient and transparent) distribution services regardless of which DSO they are connected to, and this should not be compromised based on DSO size or other features, resulting in less regulatory scrutiny. In this regard, European customers are more safeguarded being served by large DSOs, because some provisions, as pointed out in this report, are frequently applied only to them.

56 Given the lack of scale advantages, small DSOs operating a marginal share of the distribution sector may face more difficulties in keeping up with the technical, financial and efficiency requirements (e.g. due to high transaction costs, limited access to financing). Further, DSO-DSO cooperation in network planning can be complex and time-consuming, even when cooperation is strong, while administrative effort and resource intensity of regulatory scrutiny grow with the number of regulated entities.

57 Legislation and regulation should focus on measures making DSOs capable to fit their evolving roles and ensuring service quality, even though introducing exemptions and tailored measures to some groups of DSOs may be inevitable in certain instances[44], especially in the short term. This requires removing undue regulatory barriers to the merger of DSOs and their functional tasks and such mergers should be incentivised in those instances where they generate better services or other efficiency gains. Further, DSOs should be equipped with the necessary financial and human resources to address their growing responsibilities and list of tasks.

43 For example, derogations can act as a barrier to the implementation of market-based tools (e.g. local markets for the procurement of congestion management services).

44 Fragmented DSO characteristics (size, ownership) in general should not lead to different DSO requirements. However, reduction of administrative burden on NRAs and the regulatory system has to be considered and may render exceptions unavoidable.

Recommendations

58 **Strong effective NRA mandate on DSO revenue setting should be ensured by removing any undue[45] restriction by national law.**

59 **DSOs and NRAs should be equipped with sufficient resources that are matching their new tasks and responsibilities under the energy transition.**

60 **Any undue regulatory barriers of DSO mergers should be removed. Mergers of DSOs should be incentivised where better services or other efficiency gains are expected from such mergers, without creating any discrimination across DSOs.**

45 That is, restrictions which would limit the fulfilment of their duties set by EU law.

National practices

Austria, Italy, Spain: incentives for DSO mergers

In Austria, the national law contains a specific provision in Section 60(4) (on the cost of capital) of the Electricity Act 2010[46] that addresses mergers of DSOs. This provision allows for regulatory recognition of an increase in the capital base when network operators merge and the merger produces synergy effects that directly reduce overall costs. This recognition aimed to incentivise consolidation, as merged entities can potentially benefit from a higher regulatory asset base (RAB), provided they demonstrate a reduction in costs. Based on the new Austrian Electricity Act, entered into force at the end of 2025, the national regulatory authority may issue more detailed provisions regarding this matter.

Since 2019, the number of Austrian DSOs has decreased from 122 to 117, by virtue of large DSOs buying up small DSOs. For the prohibition of multiple-earning of investments, the buying company is only allowed to put the book-values of the assets of the selling company in the RAB – independently of what they have paid for it. For the calculation of the synergy effect the actual cost of the sold company is compared to planned cost of the buying company for this part of the business. With the difference a net present value is calculated and part of this taken as a virtual RAB for the buying company. The planned costs of the buying company are checked with actual costs and if they are higher than the planned, the surplus is not part of the cost basis of the company. Without this additional incentive probably, no merger would have happened. Of course, there were efficiency gains but as the sold companies only had costs of some thousands EUR, their relevance for the overall system costs is very small.

In Italy, the regulatory framework provides two incentives that favour DSO mergers.

On one hand, in 2019 an incentive was activated for the aggregation of small DSOs (below 25,000 customers), based on a specific evaluation of the RAB and OPEX. In particular, the specific evaluation of the RAB aims to overcome the issue of missing representation of capital investment in the RAB by smaller DSOs.

In January 2024, a second incentive was introduced, favouring the scaling up of medium DSOs (between 25,000 and 100,000 customers) or mergers of such DSOs with large DSOs, so that the merged DSO would reach at least 100,000 customers. The reward is based on the number of customers which become served (and safeguarded) by a DSO over 100,000 customers. This incentive aims to rise a proper DSO size for energy transition purpose, allowing greater transparency and major disclosure about expenditure information and investment plans[47]. Since 2019, the number of Italian DSOs has decreased from 126 to 114 (at the end of 2024). This trend increased during 2025.

In Spain, the new regulatory model, applicable from the 2026 remuneration period onward (Circular 8/2025 of 22 December)[48], includes specific incentives for such mergers (additional provision eight).

Under this methodology, the OPEX term is established based on the number of consumers connected to the grid of each distribution company, reflecting that DSOs with less consumers should have a higher revenue per customer due to limited economies of scale. To incentivize the merger of small distribution companies within the same corporate group, the regulation establishes a three-year transitional period (2026–2028), during which merged companies will not experience a reduction in their OPEX. For the calculation of remuneration in this first half of the regulatory period, the OPEX of each company is computed separately, considering the sum of the R terms (operation and maintenance retribution for y 1) of each company. From the second half of the regulatory period, all DSOs forming part of a corporate group will have a reduction in their OPEX revenue, as the OPEX remuneration for DSOs within the same corporate group will be calculated as the arithmetic mean between the OPEX value corresponding to the individual DSO's actual number of consumers and the OPEX value based on the total number of consumers of the corporate group (sum of all member companies' consumers). For the next regulatory period (from 2032), the number of consumers considered for OPEX purposes will fully correspond to those of the parent corporation.

46 Federal Act Providing New Rules for the Organisation of the Electricity Sector (Electricity Act 2010) Original text: BGBl (Federal Law Gazette, FLG) I no 110/2010 (National Council: GP XXIV RV 994 AB 997 p. 86. Federal Council: 8420 AB 8421 p. 791).

47 For further details see https://www.arera.it/atti-e-provvedimenti/dettaglio/23/616-23.

48 Circular 8/2025, de 22 de diciembre, de la Comisión Nacional de los Mercados y la Competencia, por la que se establece la metodología para el cálculo de la retribución de la actividad de distribución de energía eléctrica.

3. Increasing investments urge better system planning

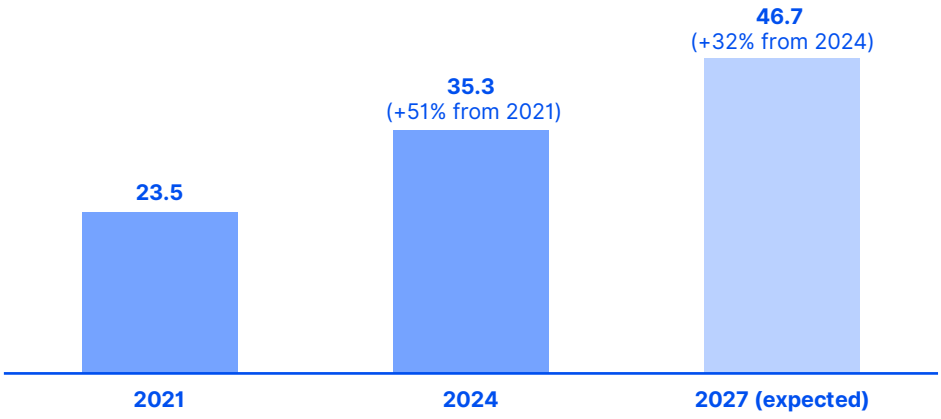
Main findings

61 As transmission grids are the backbone, distribution grids are the veins of the European power system, connecting locally produced renewable energy, batteries and new demand (e.g. EVs, heat pumps).

62 Distribution networks require substantial investments to meet the growing demand for grid capacity in some areas. In parallel, they must also transform into modern and flexible systems to manage larger supply and demand volatility as well as to efficiently accommodate the more variable forms of network use patterns, including active customers, batteries and energy communities.

63 As shown in Figure 5, ACER finds that compared with 2021, the annual distribution grid investments increased by 51% in 2024 (from about EUR 23.5 billion to about EUR 35.3 billion), and a further increase of 32% is expected by 2027 (up to EUR 46.7 billion). While the assessment covers only selected years[49], the results underpin that distribution investments in Europe are ramping up, which is also in line with sector projections[50].

Figure 5: Total investment trends (billion EUR) covering 26 countries and 191 large DSOs



Note: The total investment values include all EU Member States, except Bulgaria and Denmark, as well as Norway. The total investment value only considers large DSOs (i.e. DSOs with at least 100,000 customers). For the calculation of total investments in 2027 ACER used a simple yearly average for Germany as the information was provided for a multiyear period; this should be interpreted cautiously, given the non-linear nature of this trajectory. In the absence of a 2027 estimate, the investment estimate for 2026 was used for Czechia.

64 ACER notes that, in some countries, DSOs' expected investment costs are not publicly available, and in a few instances neither shared with NRAs[51]. In some other countries the estimations were made for multiple years, without indicating the distribution of the investment costs across those years.

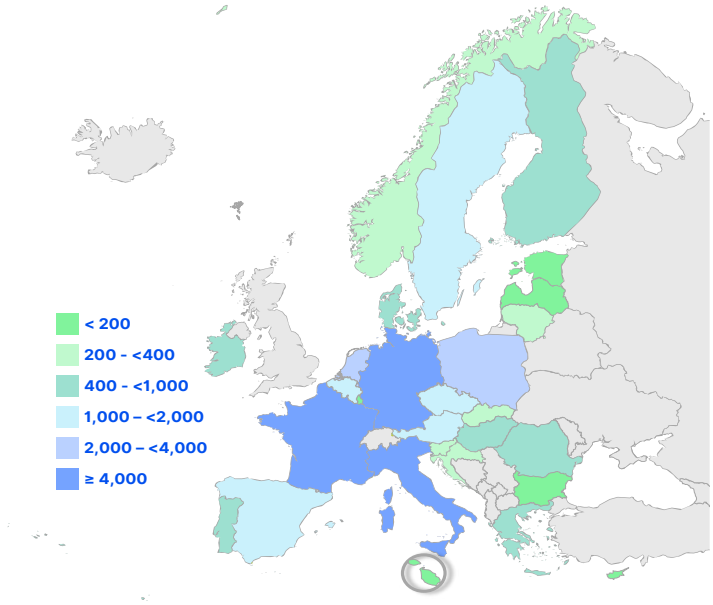
65 Figure 6 shows the total investments for large DSOs in 2024 for each country individually; Germany, France and Italy have invested the highest amounts, each exceeding EUR 4 billion. Investments in approximately 25% of the countries ranged between EUR 1 and 4 billion, while the remaining countries reported investments below EUR 1 billion.

49 That is, years 2021, 2024 and 2027, as opposed to each year within the period from 2021 until 2027.

50 ACER report on electricity infrastructure development to support a competitive and sustainable energy system, 2024 (p. 30).

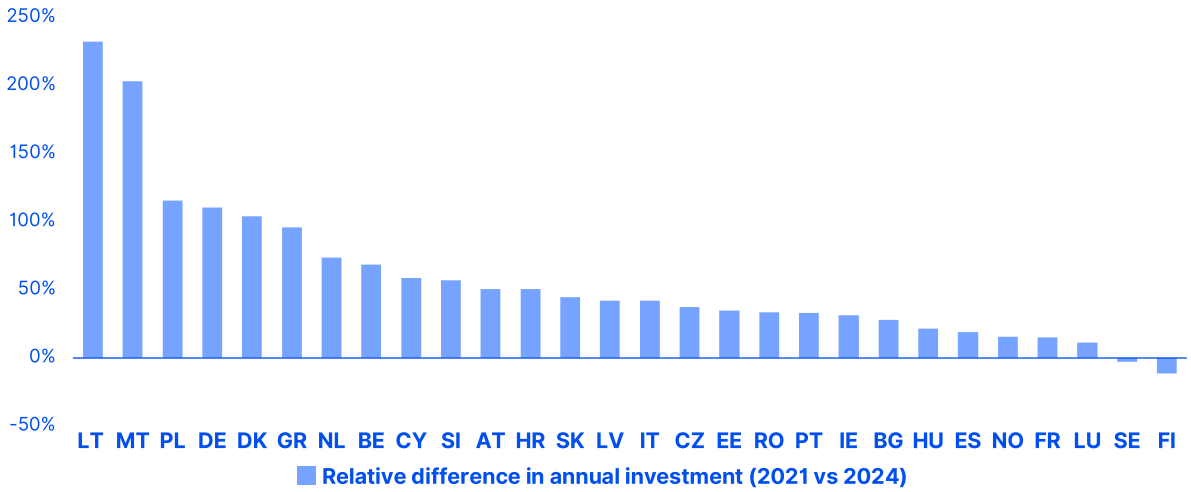
51 For more information, please refer to 7 in the Annex.

Figure 6: Total investments (million EUR) of large DSOs in 2024 per country



66 Figure 7 shows that the vast majority of the countries (26 out of 28) experienced an increase in annual investment in 2024 compared to 2021 (the increase was about 63% on average); with the highest increase in Lithuania and Malta (both over 200%). In the remaining two countries (Sweden and Finland), the annual investment slightly decreased in 2024 compared to 2021, 3% and 11%, respectively.

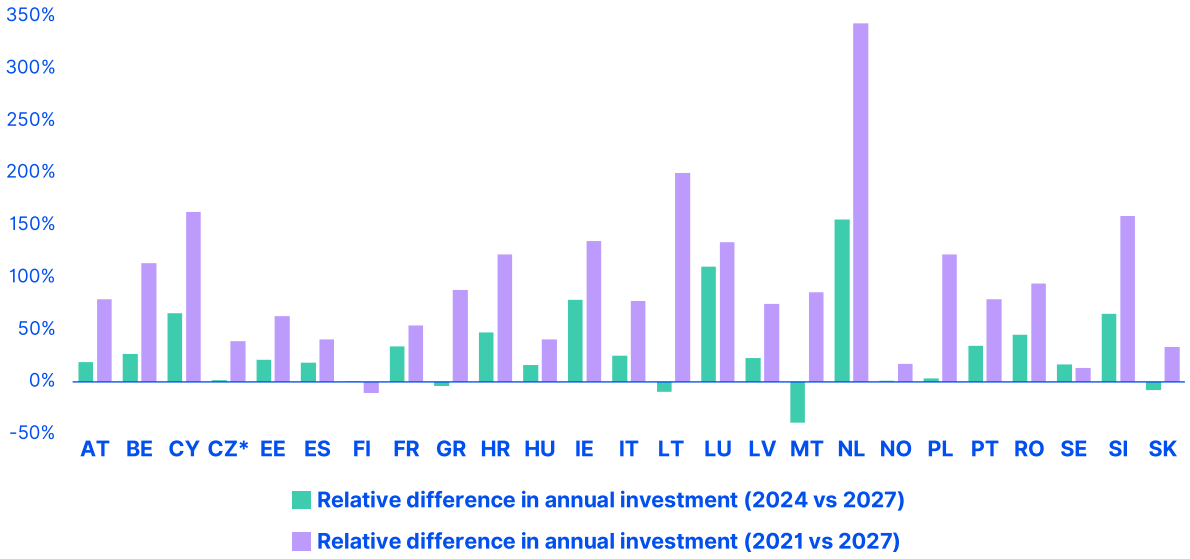
Figure 7: Annual investment differences in relative terms between 2021 and 2024



67 When looking ahead, a similar trend is observed; 22 out of 26 countries (85%) estimate higher annual investments in 2027 than in 2024 (on average by 37%) and 25 out of 26 countries (96%) estimate higher annual investment in 2027 than in 2021 (on average by 93%). The highest relative increase is expected in the Netherlands with 2027 investment projected at 2.5 times higher than in 2024 and over four times the 2021 level. In four countries[52] the annual investment in 2027 is estimated to be lower than in 2024, but still higher compared to 2021. For the estimated relative investment increases in individual countries, please refer to Figure 8.

52 Greece, Lithuania, Malta, Slovakia

Figure 8: Annual investment differences in relative terms (2024 and 2027; 2021 and 2027)

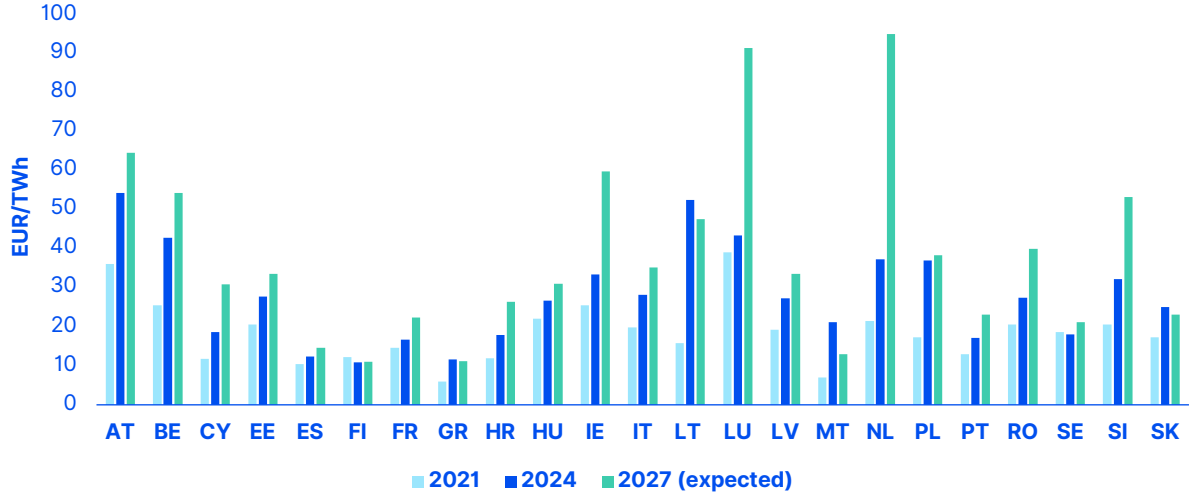


(*) For Czechia, the expected annual investment volume in 2027 was not available, instead the expected annual investment in 2026 was used as a proxy for calculating the relative difference.

Note: For Germany, the relative difference was not calculated as only an aggregated value (2024-2028) was available without an annual breakdown. For Bulgaria and Denmark, no data for 2027 was provided.

68 As shown in Figure 9, when investment values of large DSOs are normalised by available final electricity consumption data (resulting in some proxy EUR/TWh values per year), ACER finds that the upward trend in investment is ongoing but with some changes in the order of highest investors[53, 54].

Figure 9: Investments of large DSOs normalised by available proxy for final electricity consumption by distribution-connected users (EUR/TWh)



Note 1: The total investment value of large DSOs (i.e. with at least 100,000 customers) was normalised with the average of the approximate final electricity consumption by distribution-connected users (2015-2024) for each country, estimated using Eurostat data as the following: sum of 'Final consumption – other sectors – commercial and public services – energy use [FC_OTH_CP_E]' and 'Final consumption – other sectors – households – energy use [FC_OTH_HH_E]' (Eurostat, 'Supply, transformation and consumption of electricity', https://doi.org/10.2908/NRG_CB_E). The results must be interpreted and used with caution, as this simplified approach has inherent limitations. For example, it does not account for population density (inhabitants per square kilometre), demand features (heavy industrialisation versus rural areas), or for different classification of voltage levels. Further, the consumption data are not limited to customers connected to large electricity DSOs (unlike the investment data); they include all consumption at distribution level and a (likely small) part of the consumption at transmission level.

53 For example, with such an estimate, in 2024, Austria, Lithuania and Belgium become the highest investors in EUR/TWh.

54 It should be noted that the scope of voltage levels in distribution networks differs between jurisdictions: in some countries, certain voltage levels are part of distribution networks, whereas in others, they fall under transmission.

ACER considerations

69 A lack of adequate transparency of the investment trends, including sufficiently granular (i.e. yearly) cost estimation over the mid-term, can hinder well-informed decision making by policy makers, legislators, NRAs and manufacturers.

70 The importance of robust and transparent DNDP planning over at least a ten-year time horizon was underlined by the ACER and CEER DSO planning guidance[55]. However, as pointed out in Section 2, almost two thirds of all DSOs in the EU are exempt from the preparation of a DNDP, often for pragmatic reasons. Even where DNDPs are prepared, practices regarding the level of detail and public availability of investment costs vary across the EU[56].

71 CAPEX and OPEX forecasts are essential as input for evaluating the need to adjust (or not adjust) the regulatory frameworks including remuneration regimes and associated incentives. Information on investment costs would also allow better prediction of the network tariff implications. Such trajectory of the investment costs can be included in the DNDPs or in the company's business plans (especially where DNDPs are limited to a subset of distribution investment categories).

72 The June 2025 European Commission notice on a guidance on anticipatory investments for developing forward-looking electricity networks states that "Further efforts are also needed to coordinate among the respective layers of network planning, to ensure assets are planned in a cost-efficient way. This can be done by Member States or NRAs on a national level and, as much as possible on a regional level, for instance by requiring alignment in terms of timing of the NDPs [network development plans] or coordination of inputs (scenarios) used across the planning levels."

73 ACER underlines that spatial fragmentation of network planning creates inefficiencies in coordination and consultation between DSOs and between DSOs and TSO(s); and complicates regulatory supervision. While provisions of a single network development plan per Member State (already in place for gas transportation pursuant to Article 55 of Directive (EU) 2024/1788) may be difficult to apply, especially in very fragmented DSO landscapes, single-DSO planning (meaning separate/individual planning by an unmanageable number of DSOs) cannot exploit synergies across different DSO areas, including assessment of needs for new infrastructure and local flexibility. The lack of holistic planning ultimately leads to investment inefficiencies[57]. Addressing this issue is particularly important in the context of rising investment trends.

74 In countries where the DSO landscape is fragmented, and coordination across several DSOs is inefficient, the creation of independent or collaborative company structures (e.g. special purpose vehicle) at subnational or national level, to perform certain DSO functions for better service and/or other efficiency gains is favourable[58].

55 The guidance proposes including, in the planning, scenario development, needs assessment, and identify projects/investments at least over a ten-year time horizon (with EU law requiring it over the next five to ten years). The guidance also calls for transparency of medium- and long-term flexibility services.

56 Annex to ACER and CEER guidance on electricity distribution network planning, 2025 (pp. 10-12)

57 In the 2025 ACER/CEER guidance on electricity distribution network planning (p. 5), NRAs report several common challenges in assessing DNDPs, including uneven levels of detail and transparency; inconsistencies in data and assumptions; complexity in coordination between DSOs and TSOs, particularly in aligning scenarios and planning timelines. NRAs also note differences in DSO's capacity and preparedness for advanced, long-term planning. Limited resources, short consultation periods, evolving legal frameworks, rising costs and the pace of the energy transition further add to the complexity of planning for future network needs.

58 Such company structures could act like independent system operators or regional coordination centres.

75 Shifting suboptimal single-DSO planning (likely focused on own grid and featuring a "silo effect") to a whole-grid planner would increase efficiencies, mitigate administrative costs, while also reducing the CAPEX-bias problem observed in several regulatory regimes[59].

76 Synergies could be further enhanced by treating transmission and distribution networks at equal footing to improve system-integrated (joint TSO-DSO) planning. Better coordination across energy network industries (e.g. natural gas, hydrogen) further facilitates consistent planning and highest societal welfare gains coming from efficiency[60].

77 More centralised planning would facilitate NRAs' supervision and enable more effective measures in cases where a one-size-fits-all approach for a diverse group of DSOs is not appropriate. Finally, it is important to stress that such transition does not require change in asset ownership per se.

Recommendations

78 **DSOs should strive to provide estimations of the network costs, including CAPEX and OPEX at least over the next five years[61], where possible separately per each year, and make such information publicly available.**

79 **Where distribution landscapes are fragmented, distribution network planning should be more coordinated and expanded to a national or at least a subnational level. Joint transmission-distribution planning may be considered too. For efficiently performing planning at a national or subnational level, ACER puts forward several options in this report, including independent or collaborative company structures.**

59 If a solution is chosen where the system planner has no asset, and thus no vested interest in the asset remuneration.

60 Trinomics report on advancing cross-system solutions to address electricity network challenge, 2024; CEER paper on whole system approaches, 2020.

61 Alignments with the regulatory periods and/or network planning horizons may be considered when setting the time horizon for the required cost estimations.

National practices

Slovenia: whole (TSO-DSO) system planning approach

Historically, distribution activity was carried out by five local electricity distribution companies, who owned and operated the distribution network. After EU internal market rules, the concession for the provision of public service was granted to a separate company (SODO) until October 2023, when the Slovenian transmission system operator (ELES) completed a merger with the distribution system operator (SODO). Following the favourable decision of the district court in Ljubljana[62], ELES ('operator of the combined electricity transmission and distribution network') became the legal successor of SODO. The owners of the distribution infrastructure are the electricity distribution companies with which DSO ELES concludes contracts for the lease of infrastructure and the provision of services.

The development plans for the transmission and distribution systems are still separate, as stipulated by the national Electricity Supply Act, but planning is more coordinated, as the responsibility for preparing the distribution development plan lies with ELES. ELES collects the development plans of five local distribution companies, which must be coordinated with each other and with the development plan for the transmission system.

The development plan, published by ELES, for the distribution system from 2025 to 2034 and the development plan for the transmission system from 2025 to 2034 provide a detailed investment cost trajectory over ten years (2025-2034) with an annual break-down, including for different investment categories. Investments in the distribution network over the next decade are estimated at EUR 3.95 billion as changes in electricity consumption and generation, including increased share of distributed energy sources, heat pumps and EVs, pose a particularly significant challenge to the distribution network.

For more information, see https://www.eles.si/medijsko-sredisce/sporocila-za-javnost-in-obvestila/sporocila-za-javnost/ArticleID/21895 and https://www.eles.si/Portals/0/ELES_RNDS_celota_digital_spreads_1.pdf.

Belgium: multiple DSOs, but single operator in Flanders region for electricity and gas networks

In Flanders region of Belgium one system operator named Fluvius System Operator (FSO) is responsible for the operation of the electricity and gas distribution networks and other utilities such as sewerage, public lighting and district heating. The operating area of FSO includes 285 cities and municipalities.

FSO is the operating company of nine Flemish intermunicipal asset companies (eight DSOs for electricity and gas and one sewer network operator) that make up Fluvius Economic Group. These intermunicipal asset companies have full ownership of their network infrastructure and their core business is fully regulated (for distribution of electricity and gas, and for sewerage); they also guarantee on a many-to-one basis the debt incurred by FSO.

The company ensures that an efficient operating system is implemented by leveraging the pooling of personnel and all operational, financial and management activities within the operating company. FSO is responsible for general strategy and policy, financing and corporate matters.

On 1 July 2018, the regional regulator (VNR) investigated the savings potential of the merger of the two former operating companies active in Flanders region (Eandis and Infrax) into FSO. Based on that investigation, the regulator estimated that the net savings potential by 2024 amounted to EUR 109 million, or EUR 73 million for electricity distribution and EUR 36 million for gas distribution. These savings were stimulated by means of an additional x' factor, on top of the standard x factor of the income regulation (CPI-X) applied by VNR, which reduced the allowed incomes of the distribution system operators in the period 2019-2024 in line with a linear savings path during this period. Since the full net cost savings would be realised by the end of 2024, no additional savings resulting from the merger will be imposed in the 2025-2028 regulatory period. The NRA is currently investigating whether the merger savings have actually been realised.

While consolidating DSOs under a single operating company improves efficiency, the 2025–2028 tariff methodology (paragraph 20) notes some drawbacks: fewer independent DSOs limit benchmarking and reduce competitive pressure under yardstick regulation, making inefficiencies harder to detect and address. To mitigate this, the regional regulator has introduced a 'frontier shift' efficiency incentive in addition to the x and x' factors from 2021.

For more information, see Decision BESL-2018-73, and more specifically Appendix 12 which was added to the 2017-2020 tariff methodology; Decision BESL-2024-41, and more specifically Section 5.2.1.1.3 of the main text of the 2025-2028 tariff methodology; FSO, Investor presentation October 2025.

62 ELES notice of merger and changes to the company, 2023.

4. Enhanced monitoring of distribution network utilisation to reveal existing grid potential

Main findings

80 Stakeholders broadly agree on the need to improve grid utilisation in certain areas of the existing grid. It can replace or postpone the need to build new infrastructure, as better grid utilisation covers gaps in capacity and mitigates costs for network users.

81 ACER notes that multiple tools are applied by DSOs to monitor the use of their networks and collect some knowledge about the historical, current and/or expected utilisation of the networks[63]. Load flow studies or other relevant simulations on expected grid utilisation or grid constraints are used at least by some DSOs and/or at some network levels in the vast majority of the countries.

82 However, ACER notes that the public availability of such information at the European level is limited and, in almost half of the countries (i.e. 12 out of 26), DSOs have no national legal or regulatory requirements to monitor the utilisation of the grid. Such national provisions are implemented in the other 14 countries.

83 In order to promote higher utilisation, it is essential to know the degree to which the existing assets are utilised and how much additional capacity is available at various locations. Forecasting the expected future utilisation of the grid is important for obtaining a more robust and forward-looking view.

84 Monitoring data can be translated into certain key performance indicators (KPIs) or other metrics[64], which can be used when drafting, revising or approving DNDPs and potentially linked to regulatory incentives.

85 Keeping track of the available hosting grid capacity for production, load or both (i.e. with regularly updated hosting capacity maps) by reflecting current grid saturation is an EU-level requirement[65] and has already been implemented in about two thirds of the countries[66]. They are using different levels of granularity and update frequency as the requirements are not centralised. Forecasting grid saturation would bring additional useful information to network users that are planning to connect in the coming years and have some flexibility in selecting the connection point.

Recommendations

86 **Require DSOs to regularly monitor the current utilisation of the grid and forecast future utilisation via relevant studies and simulations. DSOs should share information about existing and forecasted spare capacity and the location of heavily congested areas and regularly update it.**

63 For more information, please refer to Table 11 in the Annex.

64 For example, the Portuguese NRA defined some KPIs regarding network utilisation and observability, e.g. adoption of network studies using real load diagrams rather than assumed profiles. In Slovenia, KPIs encompass network capacity utilisation and hosting capacity of distributed elements, among others.

65 Article 31(3) of Directive (EU) 2019/944, amended by Directive (EU) 2024/1711. 2025 Commission guidance on efficient and timely grid connections calls for speeding up the implementation of publication hosting capacity maps, collecting existing maps on a common platform, setting format and minimum information content and regularly updating them. The same guidance also notes the problem of virtual grid saturation by revisiting the first-come-first serve principle and applies stricter eligibility criteria and fees at application stage to discourage speculative requests, milestone-based requirements (e.g., permits, construction start) for maintaining reservation rights, prioritising "ready-to-build" projects that show maturity.

66 In 9 out of 28 countries (32%) DSOs do not publish (yet) hosting capacity maps (for neither production nor load). For more information, please refer to Table 11 in the Annex.

5. Mitigating capital expenditure bias is key to more efficient investments

Main findings

87 In particular, at times of ramping-up investments, it is of utmost importance that investments are efficient and the projects bringing the highest societal value are prioritised by DSOs. In this regard, there is a broad consensus among several stakeholders, that the focus of regulation should expand from cost-reductions-only regulation and focus more on promoting high value (efficient) solutions to address system needs and achieving set outputs/performance the most efficient way.

88 Based on CEER's recent findings[67], CAPEX-bias is still present in several countries, due to more favourable remuneration schemes for capital expenditures; CAPEX is often reimbursed with rate of return, while some caps, together with efficiency requirements, apply to controllable OPEX. Non-controllable OPEX is often a pass-through.

89 Removing CAPEX-bias is vital for improving regulatory regimes and there appears to be a growing momentum for regulatory reforms. For efficiency, CAPEX–OPEX neutrality should be ensured so DSOs are financially indifferent as to how to address an investment gap and they choose the most efficient technical and operational solutions (e.g. deploying flexibility instead of building new asset). A short summary of the regulatory mechanisms to remove or reduce CAPEX-bias is presented in Figure 10.

90 More than one third of the countries (i.e. 11 out of 28) reported that they have put in place some regulatory measures to remove or reduce any expenditure bias. ACER observes among the practices TOTEX-based approaches, partial OPEX capitalisation, TOTEX benchmarking and output-based incentives, as presented in Table 5 in the Annex. In most countries (i.e. 17 out of 28), there is no mechanism in revenue setting to remove or reduce CAPEX-bias. However, it is not reviewed in this report whether CAPEX-bias is actually present in each of these countries.

91 ACER recalls that it advocates benefit-based incentives for electricity transmission infrastructure if the regulatory tools currently in place are insufficient for efficient use of the existing grid and efficient grid build-out. Direct application of those practices for distribution may be challenging, but they can serve as inspiration.

92 ACER notes that while (estimated) benefit-based incentives are rather rare, (actual) performance-based incentives are applied in several countries, in particular for losses and quality of supply. (see national practices boxes below).

67 CEER report on incentives in regulatory frameworks with a focus on OPEX/CAPEX Neutrality, 2025.

Figure 10: Regulatory mechanisms to remove or reduce CAPEX versus OPEX biases when the DSOs choose between building infrastructures and deploying flexibility

Regulatory mechanisms to remove or reduce CAPEX-bias	Brief explanation/features of the tool
TOTEX-based approaches including partial OPEX capitalisation	Allocating a share of OPEX into the RAB or treating it as CAPEX and allowing a return on this share (either the same or different return as for CAPEX) Fixed OPEX/CAPEX share treats all expenditures alike, irrespective of their OPEX or CAPEX nature, and sets an equivalent and fixed OPEX share ("fast money") and a complementary and fixed CAPEX share ("slow money").
Efficiency requirement on CAPEX (in addition to existing ones on OPEX) or TOTEX	Rather than benchmarking only controllable OPEX costs, both OPEX and CAPEX costs are subject to an efficiency target.
TOTEX benchmarking for the identification of efficiently incurred cost	Comparison of a regulated company's total expenditures with those of similar companies to estimate its efficient costs.
Output-based regulation, including shared cost-saving mechanism, with caps on reward/penalty levels	Incentives are tied to achieving predefined outcomes (typically estimated benefits or performance targets) rather than to the amount of capital invested. The shared savings mechanism allows DSOs to retain a share of cost savings when implementing a cheaper solution than the default option.

Source: Derived from 2025 CEER report on incentives in regulatory frameworks with a focus on OPEX/CAPEX Neutrality.

Recommendations

93 **Where NRAs conclude that CAPEX-bias is present in the regulatory framework, NRAs should mitigate it. NRAs may choose from the following practices or a mix of them:**

- **TOTEX-based approaches including partial OPEX capitalisation;**
- **efficiency requirement on CAPEX (in addition to existing ones on OPEX) or TOTEX;**
- **TOTEX benchmarking for the identification of efficiently incurred cost;**
- **output-based regulation, including shared cost-saving mechanism, with caps on reward/penalty levels.**

National practices

Italy: benefit-based incentives

Since 2024, the Italian NRA (ARERA) has introduced a reward mechanism based on benefits of individual projects. The main precondition is that the benefit of the network investment is higher than its costs. The list of benefit categories is defined in ARERA regulatory order 296/2023[68] and includes (i) reduction of interruption for customers during heatwaves; (ii) reduction of interruptions for customers due to local extreme events; (iii) reduction of other (ordinary) interruptions for customers; (iv) avoided DSO-side costs during interruptions; (v) reduction of interruptions (all types) for producers and prosumers; (vi) reduction of severe voltage dips; (vii) reduction of post-interruption repair actions and related costs, (viii) avoided operation and maintenance costs on specific DSO assets; (ix) avoided costs and avoided emissions when connecting isolated users or interconnecting islands to the main grid; (x) avoided costs and avoided emissions due to expected reduction of losses; (xi) reduction of RES [renewable energy sources] disconnections due to voltage variations; (xii) reduction of grid congestion (due to injections, i.e. towards the transmission grid); and (xiii) reduction of grid congestion (due to loads). The metrics and the detailed calculations for each benefit category and subcategory are set out in the Annex to ARERA regulatory order 112/2025[69].

Some examples of performance-based incentives

In France, incentives for efficiency and service quality (bonuses and penalties): 80% of the difference between actual performance and the benchmark trajectory is recovered, with the network operator exposed to the remaining 20%. The French DSO regulation framework for 2025-2028 also includes a benefit-sharing incentive to the development of flexibility solutions, where it is more efficient than CAPEX.

In Portugal, a set of incentives that goes beyond cost control is applied:

- Incentive for loss reduction in distribution networks. Objective: encourage investment and operational decisions aimed at reducing grid losses.
- Incentive for innovation and new services in low voltage installations. Objective: encourage the low voltage DSO to develop and provide services that enable integration of installations into smart grids.
- Incentive for service continuity improvement. Objective: promote the overall continuity of electricity supply and improve service quality for the worst-served customers.
- Incentive to promote the availability of non-firm connections to grid users. Objective: postpone costly grid reinforcements while maintaining high service standards.

In Slovenia, a number of KPIs are set for specific thematic areas[70], from which an umbrella efficiency KPI is calculated for an individual company for a particular calendar year that corresponds to the underlying KPI data acquired. A relative difference to the umbrella efficiency KPI of the previous year (baseline) is then calculated. For the DSO, the calculated relative difference to the umbrella KPI of the previous year is also weighed against the KPI Deviation of preparedness from minimum standards of ensuring data quality and data service quality. Their weighted sum is then multiplied by a capping factor, the WACC and the company's TOTEX for that particular calendar year. Thus, yielding the achieved monetary incentive for that particular calendar year, which can be either positive (incentive) or negative (penalty).

Quality and losses related incentives are applied in several countries, for example in Spain. These incentives typically adjust DSOs revenues based on their performance (i.e. DSOs are rewarded or penalised depending on how the actual network losses or reliability indicators (e.g. duration of outage events) compare to ex-ante predefined efficiency targets derived from sectoral benchmarking values.[71]

For additional countries' regulatory practices see the 2022 CEER-ECRB benchmarking report on quality of supply and the 2025 CEER report on power losses.

68 https://www.arera.it/fileadmin/allegati/docs/23/296-23ti.pdf.

69 https://www.arera.it/fileadmin/allegati/docs/25/112-2025-R-eel-ALLEGATO_A.pdf.

70 DSO-relevant thematic areas encompass KPIs: flexibility utilisation, network capacity utilisation, hosting capacity of distributed elements, level of integration of distributed elements, exploitation of the distributed elements potential in active grid control, voltage quality, losses, asset operability status, openness to third party innovation and viability of pilot projects.

71 In case of Spain, the DSOs individual evolution is also considered and may represent up to 50% of the total incentive. Maximum upward/downward adjustments are set at ±4%. Besides, to limit the overall impact of the incentive scheme, a sector wide cap of ±2% applied.

6. Unlock the energy transition everywhere

94 DSOs may face various constraints and limitations regarding increasing distribution investments, including:

- investment caps, which can potentially limit higher volume of DSO grid investments where investment needs exceed the caps;
- DSO liquidity constraints due to insufficient operating cash flows and access to external financing to cover upfront capital expenditures;
- insufficient return on investments, which can result in suboptimal grid build-out and shifting capital to other investment segments of vertically integrated corporate groups despite the application of the unbundling provisions.

95 Supply chain disruptions and a lack of raw materials, manufacturing capacity and/or skilled workforce may also limit investments[72]. They are, however, not further investigated in this report.

DSO investment caps

96 The vast majority (75%) of the countries apply some ex-ante (annual or multi-year) budget approvals or caps for DSOs' (total or part of) costs, revenues or charges (i.e. 21 out of 28), while in the remaining seven countries no budget limits or other caps are set on the relevant expenditures.

97 Ex-ante or ex-post adjustments for CAPEX, OPEX and/or TOTEX caps are commonly envisaged, for example, due to unforeseen events beyond the control of the DSOs (e.g. legislative changes) or in cases where the cost overruns could not reasonably have been expected to be identified by the DSO despite due diligence.

98 However, in some instances these caps are more rigid, set by law or regulation, without envisaging any ex-post adjustments, reopener mechanisms and/or pass-through above caps, such as in Bulgaria or Croatia. In Spain, there is a cap on investment in the distribution network set by government at 0.13% of the gross domestic product (although it can be increased in the event of unforeseen circumstances). The level of the cap is currently under revision in order to introduce flexibility and incentivise priority investments[73].

99 Non-adjustable caps risk significant welfare loss by preventing DSOs from making investments despite the confirmed need and/or by discouraging investments in most cost-efficient innovative technologies (e.g. in cases with higher costs for operation and maintenance that cannot be covered by the existing OPEX caps). They also leave the risk of cost overruns with the DSO, regardless of whether the overruns are incurred due to unforeseen events beyond the control of the DSOs and/or due to insufficient diligence of the DSOs. This can significantly increase DSOs' and investors' perception of risk, thereby reducing DSOs willingness to invest, particularly, in higher risk projects even when those projects deliver greater societal benefits.

72 As recognised in the 2025 action plan for affordable energy, the massive demand for distribution investments has exposed severe vulnerabilities in manufacturing capacity and raw material supply chains, leading to long lead times for essential components. In response, the EU is moving away from national specifications towards grid equipment standardisation allowing manufacturers to move from small-batch custom orders to high-volume mass production. Further, the legislative framework promotes joint actions at the regional and EU levels to streamline grid deployment and de-risk the procurement of raw materials. The Critical Raw Materials Act encourages DSOs to perform supply chain risk assessments, while the 2025 grids package facilitates demand aggregation., strengthening purchasing power to secure strategic materials at stable prices.

73 In the new approved methodology in Spain, additional costs can be considered due to new obligations which can arise during the regulatory period subject to approval by the NRA.

100 NRAs reported no explicit debt ceilings or other limits for DSOs to access external financing. However, some NRAs pointed out certain financial parameters which can indirectly limit exposure to debt[74]. In addition to caps imposed on the DSOs, companies may face investment limitations due to own internal reasons (e.g. resource allocation within vertically integrated companies).

DSO liquidity constraints

101 More than one third of the countries reported remunerating work-in-progress capital by allowing a return on expenditures for investments that have not yet been commissioned, either with or without depreciation[75]. Some countries allow cost recognition and remuneration on planned investments with ex-post reconciliation mechanism vis-à-vis actual values. (For some examples, see the national practices box below). Both practices facilitate short-term cash flow.

102 Recognition of efficiently incurred expenditures before commissioning of a project and allowing some (typically lower) remuneration on those amounts may be particularly justified, where there is an increasing trajectory of expected investment costs and where the expected expenditure is very large compared to the size of the DSO. However, ACER also stresses that recognition before commissioning is much less relevant for distribution-level projects compared to transmission-level projects, given the considerably shorter construction times at the distribution level.

103 The promotion of anticipatory investments and forward-looking network planning creates difficulties when aligning remuneration schemes, triggering valid discussions on their RAB inclusion, efficiency checks and the inter-temporal redistribution of costs. ACER urges a cautious approach to make sure that network reinforcements are paid by those to whom those costs attributed and in whose interest they are incurred. Shifting remuneration - and thus network tariff impacts of the required network reinforcement - far into the future, for social policy purposes, requires careful evaluation.

DSO risks and/or insufficient returns

104 The timely and efficient development of the necessary energy infrastructure strongly depends on national regulatory frameworks, including their applied risk-mitigation methods.

105 DSOs may face various risks (cost-overrun, time-overrun, underutilised or stranded assets, inefficient costs, liquidity risks) which are addressed by risk-mitigation and/or regulatory incentives. Practices vary across Europe[76].

106 National regulatory frameworks should strive to put in place appropriate regulatory risk mitigation and incentive measures; DSOs should receive fair remuneration for their network services, that reflects their actual costs and risks they bear. Regulatory design, including the allowed rate of return, shall be calibrated so as to prevent distortive incentives, including over-capitalisation[77] and related capital expenditure (CAPEX) bias.

107 For instance, where an approved investment has been included into the RAB and the connected assets (e.g. power plants) unexpectedly are not built, this risk should be either mitigated (e.g. not considering it inefficient and not removing it from the RAB) or the regulatory framework should sufficiently reward the corresponding risk of stranded assets.

74 In some countries the gearing ratio is fixed ex-ante or capped and certain deviation is affecting remuneration (e.g. penalty, lower WACC).

75 For more information, please refer to Table 10 in the Annex.

76 CEER report on regulatory frameworks for European energy networks 2025, 2026.

77 This refers to the Averch-Johnson effect, where a regulated firm is incentivised to engage in excessive capital accumulation to expand its regulatory asset base and maximise total returns.

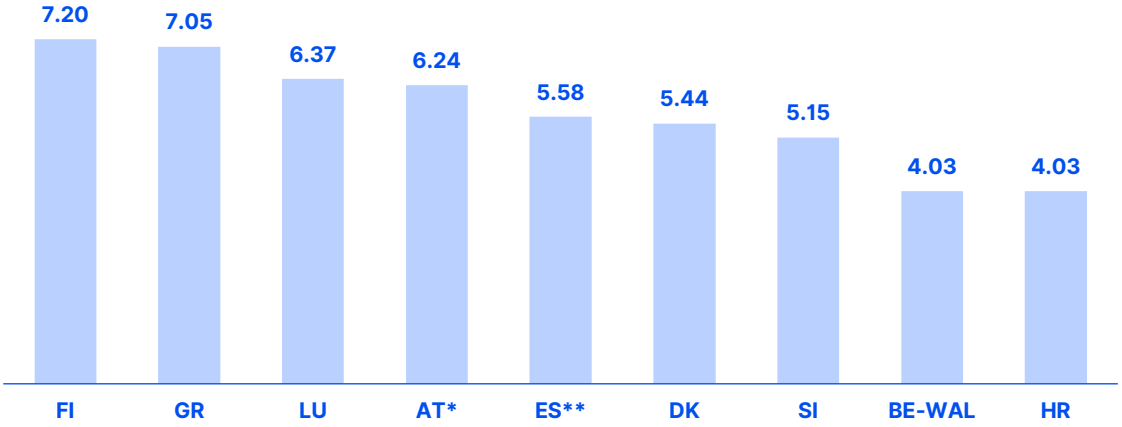
108 ACER considers that the current national regulatory frameworks, which systematically mitigate risks are generally fit for purpose with respect to risk mitigation, where a predictable and risk-reflective Weighted Average Cost of Capital (WACC) is set based on transparent methodologies.

109 While the value of WACC is a key parameter of DSO remuneration, it is not the only one. The fitness of the regulatory system as a whole may need to be evaluated considering, for example expected return, risk-mitigation and incentive mechanisms, alignment of the RAB and depreciation with real costs and asset lifetimes.

110 While DSO benchmarking is an important tool to judge efficiency, caution is required. Comparison must consider the applicable risk mitigation and incentives regime. Direct comparison of WACC levels across countries can be misleading unless the underlying regulatory context[78] and methodological differences[79] are explicitly taken into account. The structural features materially affect the resulting WACC and explain much of the cross country dispersion observed in Europe.

111 For nominal, pre-tax WACC values in some of the EU countries and jurisdictions, please refer to Figure 11.

Figure 11: Nominal, pre-tax Weighted Average Cost of Capital (WACC) for DSOs in 2025 (%)



(*) It applies only to new investments in 2025 (separate rates for investments until end 2023, in 2024 and 2026 onwards)
(**) For the period 2026-2031 the nominal, pre-tax WACC is 6.58%.
Source: Mostly derived from CEER report on regulatory frameworks for European energy networks 2025, 2026

Recommendations

112 **Forward-looking revenues partially based on planned expenditure, combined with an ex-post adjustment based on economically efficient real values, should be allowed in justified cases.**

113 **Remuneration schemes should avoid inter-temporal re-distribution of costs by pushing network costs remuneration to the far future unless such re-distribution is justified (e.g. by corresponding network utilisation patterns).**

114 **Application of rigid (non-adjustable) CAPEX, OPEX and/or TOTEX caps made irrespective of the value of additional investment would bring to society should be avoided. Possibility of ex-ante or ex-post adjustments[80] should be allowed in justified cases.**

78 Including predictability of regulatory decisions and the 'strength of incentive regulation'.

79 For example, pre-tax or post-tax, nominal or real, and whether it is fixed for the whole regulatory period or subject to intra period revisions, and the duration and starting year of the regulatory period. In certain jurisdictions, the actual rate of return on fixed assets is calculated as the weighted average of different rates depending on the investment periods.

80 The adjustments should be set carefully (e.g. after cost evaluation, including benchmarking of the set of indicators) to avoid burdening network users with the risk of inaccurate cost forecasts, especially concerning proven technologies.

National practices

Austria, Germany, Italy, Portugal: cost recognition based on planned expenditures
In Austria, planned CAPEX is currently recognised with an annual actual-cost reconciliation. During their current 5th regulatory period, a fundamental change was made to the recognition of planned CAPEX with subsequent planned/actual roll-up. Capital costs are therefore no longer recognised based on a t-2 time lag but will be recognised in advance based on planned investments and subsequently rolled up with actual investments. This system change is intended to synchronise the compensation of capital costs. The reason for the adjustment is the increase in network investments.
In Germany, investments (including anticipatory investments) can be remunerated on a planned basis (under the so-called CAPEX mark-up, see Section 10a Incentive Regulation Ordinance (ARegV), including assets under construction. DSOs can adjust their allowed revenue for CAPEX from planned investments when calculating tariffs. The planned CAPEX has to be submitted ex-ante in year t-1 for new investments in year t to the NRA in advance. The German NRA (BNetzA) calculates and approves the adjustable CAPEX based on the planned investments submitted by the DSOs. Planned CAPEX and CAPEX from actually implemented investments are reconciled ex post through the regulatory account which is approved by the NRA. This provides for a favourable investment environment for DSOs. They receive cash flows from their investments without any time lag. Completed assets are depreciated immediately. Assets under construction become part of the RAB immediately, but are not yet depreciated. The imputed return on equity for new assets under the CAPEX markup is adjusted annually using a variable base interest rate plus 3 percentage points risk premium. These investments are included in the RAB on a planned basis and remain exempt from efficiency benchmarking until the next base year, provided they are operationally necessary. In the subsequent base year, all investments are then reviewed and assessed within the TOTEX benchmarking framework. This mechanism also supports anticipatory investments, as the efficiency assessment takes place at a later stage. DSOs can invest ahead of demand and demand subsequently has up to several years to materialise before CAPEX is included in benchmarking. The benchmarking process is a general tool to ensure efficient investments and protects grid users from overinvestments. If anticipatory investments lead to overinvestment this risk should be borne by the DSO through a lower efficiency score. This balances the opportunity of timely remuneration of anticipatory investments for DSOs with efficiency and consumer protection. For more information, see BNetzA, Adjustment of capital expenditure (description CAPEX mark-up electricity); and BNeztA, Capex mark-up under section 4(4) para 1 in conjunction with section 10a of ARegV (description CAPEX mark-up gas which is systematically identical).
In Italy, investments under construction are not included in the RAB (i.e. no depreciation) but they receive a separate remuneration. As a separate instrument, for each DSO above 25,000 customers, planned expenditures for the next two years - while not remunerated - are included (together with expenditures in the last two years) in the definition of the fixed OPEX and CAPEX share required by TOTEX approach. This choice accounts for the increasing investment trend.
In Portugal, a "TOTEX light" approach is applied, under which the same efficiency targets (RPI-X) are imposed on both OPEX and new CAPEX. The specific characteristics of OPEX and CAPEX are also considered: (i) the OPEX baseline takes into account companies' performance in the previous regulatory period, with the resulting efficiency gains or losses shared with consumers; (ii) the CAPEX baseline is based on an estimate of annual CAPEX over the four-year regulatory period, derived from ERSE's (the Portuguese NRA) assessment of operators' business plans and network development plans. Building blocks were converted into an equivalent constant annual payment using the regulatory WACC as the discount rate. This approach was complemented by a profit/loss sharing mechanism. The objective of the mechanism is to minimise the risk of excessive deviations from the baseline return, protecting both companies and consumers against potential imbalances arising from the calibration of the TOTEX methodology. The mechanism is calculated one year after the end of the regulatory period to which it applies, using audited actual values for each year and comparing predefined returns with the returns actually achieved by the company.

List of figures