

# Let's connect

DSOs as key enablers for a competitive,  
green and resilient EU

DSO  
ENTITY  
DSOs FOR EUROPE

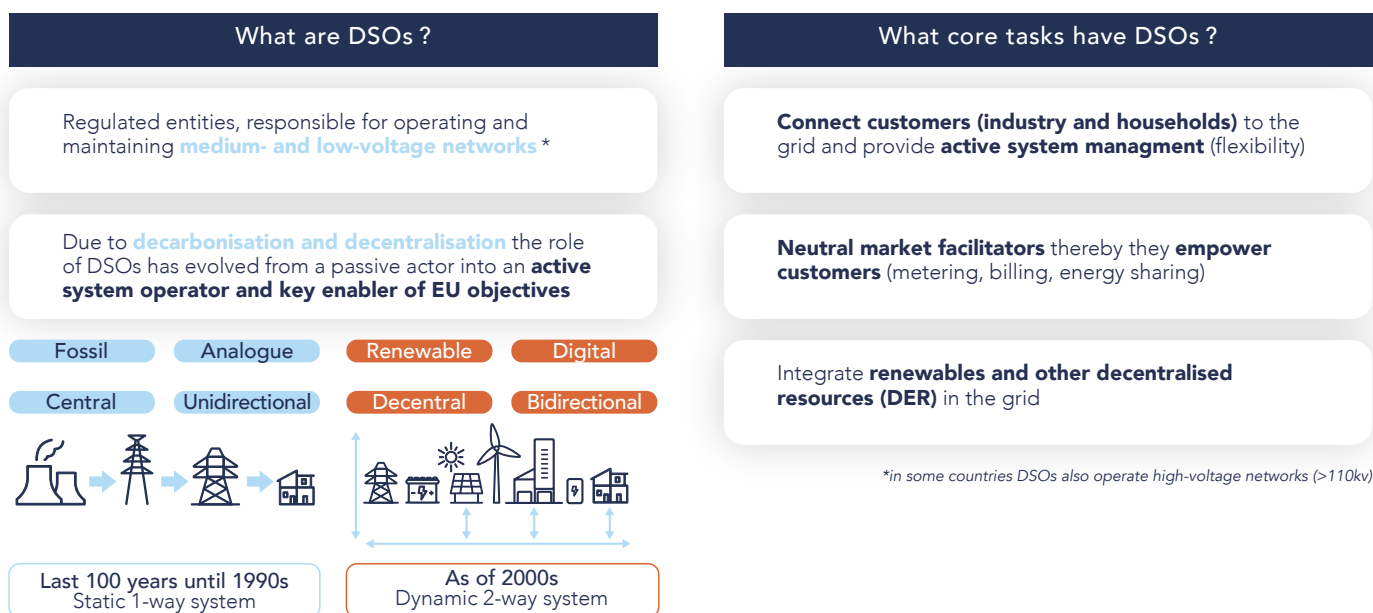


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DSOs as key enablers for a competitive, green and resilient EU

# All you need to know about DSOs and DSO Entity

## Role and tasks of DSOs



## Key figures about DSOs in the EU

> 250 million	connected customers (households and industries).
> 2.570	diverse DSOs in the EU.
18 million km	of cable and infrastructure of the EU's distribution network and 4 million distribution transformers.
835.000	direct and indirect jobs in electricity distribution in the EU <sup>1</sup> .
> €400 billion	investments in 10 years are needed in distribution grids for expanding, smartening and renewing the network with an annual average investment challenge of €61 bn between 2030 and 2050 <sup>2</sup> .

## DSOs are key for achieving the EU's energy and climate targets

42.5% RES	target by 2030 – 70% connected to DSO grid <sup>3</sup> .
3-4-fold increase	of connection requests for solar PV for DSOs from 2021-22: (+ 1400% Latvia; 750% Romania, 200% Poland, 160% Italy and Sweden) <sup>4</sup> .
30 million	EVs expected by 2030: (from 10.3 million today), with 85% charging at home, i.e. DSOs, and > 50% of EV charging during off-peak hours <sup>5</sup> .
10 million	more heat pumps by 2027 (from 19.7 million in 2022), with an estimated deployment of around 60 million heat pumps by 2030, i.e. primarily DSO grid <sup>6</sup> .
> 9000	energy communities in 2024, involving more than 1.5 million citizens, DSOs as facilitators with IT-/data infrastructure and > 40 GW of self-consumption i.e. DSO grid <sup>7</sup> .

## ABOUT DSO ENTITY

DSO Entity is a technical expert body mandated by the Electricity Market Regulation (2019/943/EU) to promote the functioning of the electricity market and to facilitate the energy transition. DSO Entity is representing more than **830 diverse electricity Distribution System Operators (DSOs) connecting 250 million customers** to the electricity grid in 27 Member States. In line with the Regulation on the internal market for gases and hydrogen (EU 2024/1789) DSO Entity is currently **facilitating the integration of gas and hydrogen DSOs** into its structure.

## MANDATED TASKS AND ACTIVITIES

DSO Entity is closely working together with ENTSO-E and ACER and is supporting the European Commission with expert advice. DSO Entity's core tasks can be summarised in three pillars:

- **The development of technical rules** for the electricity system in the form of Network Codes (NC) and Guidelines. Ongoing work: NC Demand Response; NC Cybersecurity, amendments to existing Codes; Implementing Regulations on data interoperability, e.g. customer switching.
- **Close cooperation with ENTSO-E** to ensure a system-of-system view on almost all work-related aspects. Ongoing work: technical workstreams incl. the delivery of the Grid Action Plan.
- **Sharing good practices and knowledge** with members and external stakeholders: Platform of expertise and for exchange, e.g. development of a technical vision.

## THE GRID ACTION PLAN (COM 2023/757) AS HORIZONTAL WORK ASSIGNMENT FOR DSO ENTITY

DSO Entity was assigned with the delivery of 7 out of the 14 Action Points of the **Grid Action Plan**, mostly together with ENTSO-E. These tasks range from the development of technical proposals, such as a harmonised definition for available grid hosting capacity (AP6), over the provision of expert advice on financing and funding of the grids incl. anticipatory investments (AP3-4,8-10), to the sharing of good practices on permitting and civil engagement via the Pact for Engagement (AP11-12) and an active cooperation with the supply chains to reduce long lead times for equipment (AP13).

## CORE MEASURES TO BE IMPLEMENTED DURING THE NEXT FIVE YEARS

1. **Long-term, forward-looking regulatory frameworks with an anticipatory investment approach** are needed to keep pace with the energy transition and were partly encouraged in the latest reform of the electricity market design (EMD) (EU/2024/1747). Longer-term planning (10+) on the DSO-side combined with an anticipatory regulatory approach and a greater focus on DSOs in EU funding (loans, grants) is essential to connect RES on time and electrify transport and heating with positive long-term effects on energy prices. In many circumstances anticipatory investments will be more efficient and faster. Adequate compensation in combination with easier access to EIB and EU-financing to de-risk projects is central to acquire the required capital.
2. **The right instruments for active grid management** need to be established to enable DSOs to efficiently manage available grid capacity. More room should be given to DSOs for using implicit and explicit flexibility such as flexible connection agreements, more capacity-based tariffs and the development of local flexibility markets. Cost-reflectiveness and the remuneration of grid-friendly behaviour create additional incentives for an active consumer engagement. Positive provisions in the latest EMD-reform should be implemented fast and ongoing initiatives continued (Network Code Demand Response). The digitalisation of the grid is a prerequisite to enable most of these solutions and empower consumers.
3. **Active support to eliminate external factors to grid-build out** are central with a special focus on the acceleration of permitting processes, the simplification of public procurement, faster access to critical raw materials and supply chains and the promotion of a skilled workforce.

## KEY-PRINCIPLES TO BE FOLLOWED AT THE EU-LEVEL

- **Introducing a grid mainstreaming approach** to ensure DSOs' needs are considered in every new and revised regulation, and that grid expansion does not lag behind.
- **Ensuring timely national implementation**, especially on key topics such as the introduction of forward-looking regulatory frameworks, flexible connection agreements or permitting.
- **Advancing European solutions** to simplify procurement procedures, support the development of skilled-grid staff and manage long lead-times in supply chains for key grid technologies.

# 1. The energy system is changing: the EU relevance of DSOs is increasing

The mission of electricity distribution system operators has historically been to distribute energy from power plants and transmission networks to final customers. Yet, the setting of ambitious EU energy and climate targets and a more decentralised, decarbonised and digitalised energy system have led to a paradigm shift. Grid operators have developed into active Distribution System Operators with a grown portfolio of activities such as integrating an increasing amount of renewable (RES) and decentralised energy resources (DER), unlocking customer participation in electricity markets via the facilitation of flexibility services or energy sharing solutions while still ensuring a reliable electricity supply through a more active system management (see depictions).

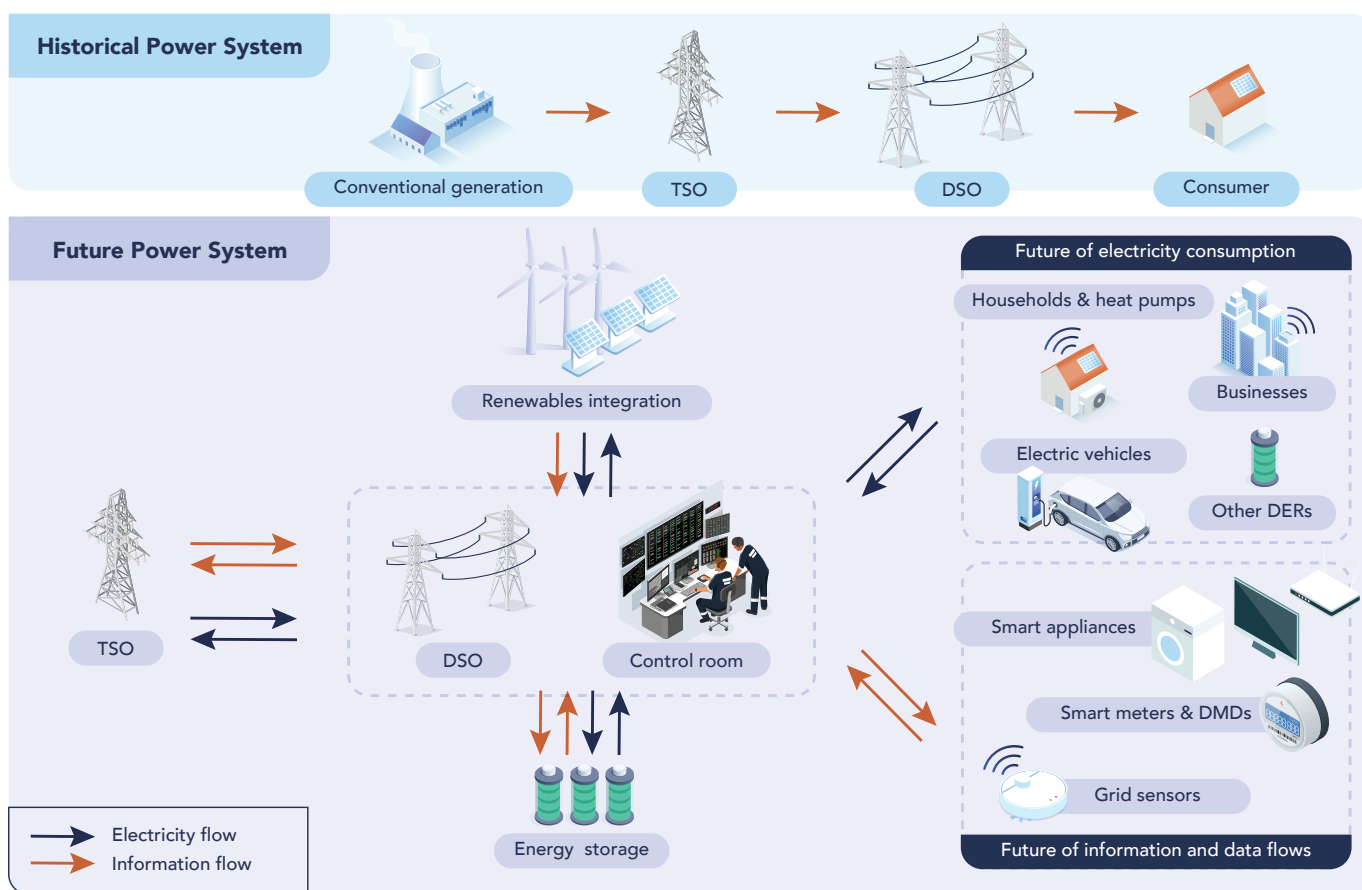


Figure 1: Historical and future power system comparison

## Roles remain the same but become more complex and system relevant:

Task	Past	Now (additional tasks)
<b>Maintenance &amp; Planning</b>	Ensure quality and continuity of supply by planning and investing in the grid	+ long-term planning in the form of network development plans (5-10y horizon) + increased digitalisation of grid; self-healing algorithm
<b>Connection</b>	Connect households and industry to the grid (demand only)	+ connect and integrate an increasing amount of decentralised energy resources (DER), both supply and demand
<b>Management &amp; Distribution</b>	Distribute electricity from central power plants & TSO-grid to end consumers (single direction)	+ active system management (intermittent and bi-directional energy flows, procurement of flexibility services) in close coordination with TSOs
<b>Metering and Billing</b>	Metering and billing of consumed electricity	+ facilitate self-consumption, energy sharing, energy communities, data management and interoperability
<b>Communication</b>		+ information about RES integration, connection of electric vehicles (EVs), energy sharing, customer services for more flexibility and awareness on grid-friendly customer behaviour



Consequently, the relevance of DSOs for all three EU energy objectives has increased:

### **SUSTAINABILITY: DSOs ARE THE TECHNICAL ENABLERS OF THE EU ENERGY AND CLIMATE OBJECTIVES**



- Enabling the decentralisation of the energy system with more RES, EVs and HPs connected, thereby, contributing not only to the EU's net-zero target but also to its strategic (energy) autonomy.
- Empowering consumers in the energy transition with the facilitation of self-consumption, energy communities and energy sharing.

### **COMPETITIVENESS: DSOs ARE A PREREQUISITE FOR A COMPETITIVE EUROPEAN ECONOMY**



- Providing the precondition for a functioning EU energy market and competitive economy with most industries and all households connected to the DSO grid, thereby, fuelling European small- and medium-sized enterprises.
- Acting as an important economic factor in terms of investments in the EU (supply) industry and as a reliable employer; driving positive impacts on GDP through strategic grid investments.
- Facilitating (innovative) market solutions such as enabling flexibility services.

### **RESILIENCE & SECURITY OF SUPPLY: DSOs ARE A GUARANTOR OF SECURE ENERGY DISTRIBUTION**



- Fundamentally changing the grid whilst supporting system stability and guaranteeing security of supply in close cooperation with TSOs with more DER connecting to the distribution grid.
- Adapting to climate change by strengthening internal resilience strategies and emergency response to safeguard grids against extreme weather events as negative effects of climate change.
- Preparing to prevent and to be ready to react to growing external cyber- and/or physical threats in an increasingly unstable geopolitical environment.



## **Relevance of grid investments on affordability and competitiveness**

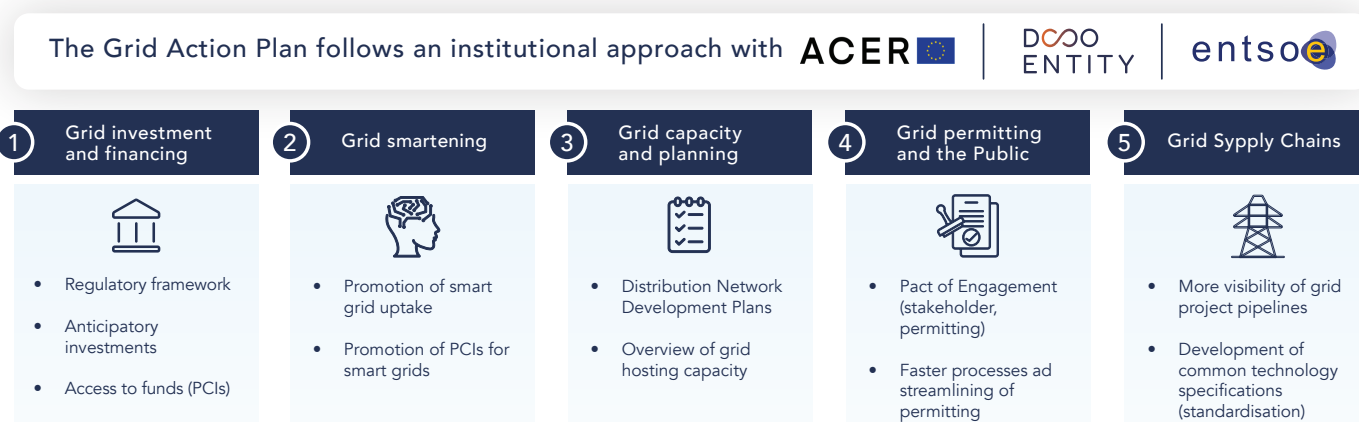
Investments in grids are a **growth factor** for the EU society and industry and not a cost. They are vital to decrease energy prices in the mid- to long-term by connecting renewables to the grid - the cheapest source of energy –, enabling and facilitating increased decentralised production by end-consumers. Neglecting grid investments would further increase re-dispatch costs, continue the curtailment of RES, escalate stranded RES investments and increase power failures. Today the costs of managing electricity grid congestion in the EU has rising up to EUR 4.2. billion in 2023<sup>8</sup>. Also, investments in smarter grids and the IT-infrastructure are a precondition for active system management and prosumer engagement for e.g. energy sharing, energy communities, usage of flexibility services. By enabling the decentralised energy transition, DSOs actively support the reduction of the EU's dependence on fossil fuels and **enhance the EU's strategic autonomy**.

## 2. Challenges for DSOs in the current regulatory framework

In a more decentralised energy system, DSOs become core players: not only for connecting and integrating volatile renewable energy resources but also for actively managing a more complex grid and guaranteeing a reliable distribution for citizens and industries. Ambitious renewable and climate targets in the Green Deal and Fit for 55 package, a fast phase-out of Russian gas in the EU in REPowerEU, a more challenging geopolitical environment leading to supply chain delays and increased (cyber-)security threats as well as more frequent extreme weather conditions due to climate change put strain on DSOs.

While the (energy) system has rapidly changed, **the rules and frameworks governing grids have not yet been adapted to meet the new system needs but lag behind**. Below a short overview of the EU regulatory developments most relevant for DSOs (for more details, see Annex).

- **The Fit for 55 proposals (2021-23)** largely overlooked the key-role of grids in realising the energy transition and put the focus primarily on increasing the share of renewables and abating emissions without having the closely linked infrastructure needs in mind.
- **REPowerEU (2022-23)** further accelerated the objective of home-grown decentralised electricity production to phase out Russian gas and integrated some grid concerns. For instance, in the area of permitting, specific needs for grid infrastructure permits are further considered with the introduction of designated dedicated grid areas and the extension of the “overriding public interest” in REDIII which now need to be implemented.
- **The EMD (2023-24)** included some positive proposals for grids, especially in the area of investments with the highlighted need for incentivising regulatory regimes incl. anticipatory investments and that by 06/2026 the EC will revise the suitability of current financing framework for DSOs to deliver the EU targets.
- **The GAP (2023)** rightly highlighted core grid challenges and proposed 14 action points which should often be delivered by core institutional actors (EC, ACER, DSO Entity, ENTSO-E). The focus was non-legislative by providing guidance or sharing practises, i.e. a good start to incite cooperation among all the relevant (national & EU) actors but tangible actions will be needed.



For the time to come, the most crucial point will be the **fast implementation at the Member State level which lags behind**. Just one example: in September 2024 the EC induced infringement procedures against 26 out of 27 Member States for non-compliance with the permitting rules in RED III (i.e., Art. 15e and 16f).



### 3. Recommendations

Empowering consumers, guaranteeing a stable electricity distribution, connecting renewables to a modernised grid while keeping energy prices at an affordable level is one of today's core challenges. DSOs are a key actor to achieve these goals but will need the right regulatory conditions to deliver.

#### Key measures to be implemented:

- 1. Regulatory Framework, anticipatory investments, planning:** The transformation of the European energy system towards a decarbonised, decentralised and digitalised one requires significant investments in the expansion, renewal and smartening of the distribution grid where 2/3 of the investments are needed. In this changing environment, regulatory frameworks need to adapt towards a more long-term, forward-looking and anticipatory approach as already encouraged in the latest EMD reform (Art. 18(2), 69 (2024/1747)). Longer-term planning (10+) on the DSO-side combined with an anticipatory regulatory approach and a greater focus on DSOs in EU funding guarantees electrification of transport and heating as well as that renewables can be connected on time and that positive (price) effects from cheap renewables will be felt in the medium- and long-term. In many circumstances anticipatory investments will be more efficient and faster. Adequate compensation in combination with easier access to EIB and EU financing to de-risk projects is central to acquire the required capital.
- 2. Instruments for active grid management, market facilitation and consumer engagement:** To ensure active grid management, DSOs need to be equipped with the right tools to efficiently manage available grid capacity. In that regard, more room should be given to DSOs for using implicit and explicit flexibility solutions such as flexible connection agreements, more capacity-based tariffs and the development of local flexibility markets. Such solutions support DSOs in efficiently using existing grid capacity and can contribute to reducing the need for immediate infrastructure investments. At the same time, consumers are made aware of grid needs and can earn monetary remuneration for a more grid-friendly behaviour. Also, in this respect, the latest EMD-reform contained important improvements that will need to be implemented in a fast pace at the national level (2024/1711), and the Network Code Demand Response which should provide for an equal level-playing field between DSOs and TSOs, aiming to remove barriers to entry and facilitate equal opportunities for all market participants. The digitalisation of the grid is a prerequisite to enable most of these solutions and empower consumers.
- 3. Active support to eliminate external factors to grid-build out** are central with a special focus on the acceleration of permitting processes, the simplification of public procurement, faster access to critical raw materials and supply chains and the promotion skilled workforce. First political steps were taken with the Net-Zero Industry Act (NZIA) and recent announcements to revise and simplify the Public Procurement Directives. However, fast implementation and a collective effort from the EU and national level will be central in managing these complex external factors.

#### Three core principles should guide EU-activities on grids:

- Introduce a **grid mainstreaming** approach
- Ensure timely **national implementation**
- Advance **European solutions** on strategic topics

The following table provides greater detail on the proposed measures and principles.

# Annex

Investment, funding, planning Challenge		Implementation of existing EU-rules	New EU initiatives	National level (NRAs, MS)
Investments	Unprecedented investment needs to facilitate the energy transition require changes in regulatory frameworks. 2/3 of the investment needs are in the DSO grids	<ul style="list-style-type: none"> <li>- Art. 18(2) (2024/1747) on the inclusion of anticipatory investments in the tariff methodologies</li> <li>- GAP AP 4: EC guidelines for conditions to approve anticipatory investments</li> </ul>	<ul style="list-style-type: none"> <li>- Art. 69 (2024/1747) obliges EC to investigate the <i>suitability of current financing frameworks</i> for DSOs to deliver EU targets.</li> </ul>	<ul style="list-style-type: none"> <li>- NRAs: Implementation of more <i>forward-looking regulatory frameworks</i> with an <i>anticipatory investment</i> approach with long-term planning horizon (+10 years)</li> </ul>
Funding	Lack of easily accessible EU funds and regulatory barriers to external funding for DSOs	<ul style="list-style-type: none"> <li>- GAP AP 3&amp;10: Ensure more smart grids projects (DSOs) under the existing CEF</li> </ul>	<ul style="list-style-type: none"> <li>- Create a <i>dedicated Grids Facility for DSOs</i>, possibly within the MFF (Competitiveness Fund)</li> <li>- Introduce <i>ear-marked funds for DSOs</i> and dedicated programs</li> </ul>	<ul style="list-style-type: none"> <li>- NRAs: <i>Eliminate regulatory barriers</i> that hamper external funding for DSOs,</li> <li>- MS: Greater focus on DSOs in funding</li> </ul>
Financing	Increased uncertainty and high investments needs might constrain access to capital for grid operators. Some structural characteristics (e.g. size, public ownership) also affect the capacity to raise finances	<ul style="list-style-type: none"> <li>- GAP 9: EC to identify tailored financing models and strengthen dialogue to address obstacles to private financing</li> </ul>	<ul style="list-style-type: none"> <li>- Easier access for DSOs to <i>EIB and EU financing</i> to de-risk their projects</li> </ul>	<ul style="list-style-type: none"> <li>- NRAs: <i>Adequate compensation</i> and predictability about future earnings</li> <li>- Consideration of investments in the RAB with minimum delay</li> </ul>
Tools for active system mgmt, market facilitation Challenge		Implementation of existing EU-rules	New EU initiatives	National level (NRAs, MS)
Active system management	DSO role in active system management has increased i.e. managing congestions and voltage control, supporting TSOs in balancing, handling an increasing amount of data, facilitating market and consumer needs.	<ul style="list-style-type: none"> <li>- Amendment and implementation of Grid Connection Codes (RfG)</li> <li>- GAP AP 14 common technical requirements for generation and demand connection in revision of NC RfG and DC</li> </ul>	–	<ul style="list-style-type: none"> <li>- NRAs: Right conditions and incentives for DSOs to research and test grid forming capabilities incl. islanding, incentivise smartening of grids</li> </ul>
Data management / Energy sharing	Due to digitalization and the establishment of energy sharing, handling vast amounts of data is a critical aspect of managing energy systems, involving not only efficient data creation, storage, and analysis but also ensuring system stability and responsiveness to evolving demands.	<ul style="list-style-type: none"> <li>- Art. 7b (2024/1747) enshrines a <i>clear distinction</i> between smart meters and dedicated measurement devices (DMDs) which ensures accurate metering</li> <li>- Art. 24 (2019/944) ensures interoperability of access to data (<i>implementing acts ongoing</i>)</li> </ul>	–	<ul style="list-style-type: none"> <li>- NRA: <i>Recognition of the means needed</i> for the implementation of energy sharing in EMD-reform (Art. 15a 2024/1711)</li> <li>- NRA: Cost-reflective grids tariffs</li> </ul>
Implicit and explicit flexibility	DSOs are key partners in <i>optimizing customer participation</i> across electricity markets, enabling consumers to adjust their energy usage in response to various price signals.	<ul style="list-style-type: none"> <li>- Art. 18(2) (2024/1747) on <i>flexible connection agreements</i></li> <li>- Development and implementation of the Network Code Demand Response providing for an equal level-playing field between DSOs and TSOs (ongoing)</li> </ul>	–	<ul style="list-style-type: none"> <li>- NRAs: <i>Incentives for grid-supportive behaviour</i> for consumers and/or developers (use of network &amp; connection charges)</li> </ul>

External factors to grid build-out Challenge		Implementation of existing EU-rules	New EU initiatives	National level (NRAs, MS)
Permitting	DSOs are facing complex and protracted permitting procedures (e.g. special rules for public roads, railways, simultaneous authorisation of permits; access to land) with notably various local authorities involved.	<ul style="list-style-type: none"> <li>- Art. 15b, 15c, 15e, 16f of Renewables Directive III (2023/2413) setting <b>overriding public interest and dedicated grid infrastructure areas</b></li> <li>- GAP AP 11, 12 Pact for engagement</li> </ul>	<ul style="list-style-type: none"> <li>- Additional EU measures to support DSOs with grid permitting procedures, especially to encourage <b>one-stop shops</b>, should be further considered beyond TEN-E Regulation.</li> </ul>	<ul style="list-style-type: none"> <li>- MS: <b>Faster implementation</b> of RED III provisions.</li> <li>- MS: Incentives for <b>dedicated grid areas</b> and one-stop shops.</li> </ul>
Resilience	Increased external challenges, such as climate change or geopolitical threats, directly impact the DSOs' business and operations.	<ul style="list-style-type: none"> <li>- <b>Sufficient time</b> implementing the recently published Cyber-related legislation (e.g. NC Cybersecurity, NIS II (2022/2555))</li> </ul>	—	<ul style="list-style-type: none"> <li>- NRA: <b>Recognition of costs</b> for cyber legislation compliance, the implementation of resilient measures and climate adaptation</li> </ul>
Staffing	DSO labor shortages are caused by the increase of staff needed to facilitate the transition, the transformation of jobs due to digitalisation and high competition for workers in energy.	<ul style="list-style-type: none"> <li>- <b>Active inclusion</b> of DSOs in existing EU initiatives for (re-) skilling of the workforce (e.g. EU Pact for Skills; NZI academies)</li> </ul>	<ul style="list-style-type: none"> <li>- Launch a <b>European Grid Academy</b> within the framework of the EU's Net-Zero Industry Academies</li> </ul>	<ul style="list-style-type: none"> <li>- MS: <b>Support for cooperation</b> between DSOs and the educational sector (universities, schools) to proactively tackle staff shortages.</li> </ul>
Supply chains Procurement	DSOs encounter challenges in sourcing key-components, driven by factors like strained supply chains, manufacturing shortages, cross-sector competition for components such as chips or affordable raw material and complex procurement provisions.	<ul style="list-style-type: none"> <li>- Net Zero Industry Act (2024/1735) acknowledgement of grid technologies as <b>strategic net-zero technologies</b></li> <li>- GAP AP 13 – collaboration between system operators and supply side</li> </ul>	<ul style="list-style-type: none"> <li>- Revision and simplification of the <b>Public Procurement Directives</b> (2014/23-25)</li> <li>- Measures to increase <b>EU manufacturing capacity</b> (NZIA Implementing Acts)</li> </ul>	<ul style="list-style-type: none"> <li>- MS: remove potential obstacles to joint <b>procurement initiatives</b></li> </ul>

1. Eurelectric (2024). Distribution Grids: A Eurelectric Handbook, p.5. [Available online](#)
2. Eurelectric (2024). Distribution Grids: A Eurelectric Handbook, p.7. [Available online](#)
3. Directive (EU) 2023/2413 of 18 October 2023, the promotion of energy from renewable sources, | Eurelectric (2024). Distribution Grids: A Eurelectric Handbook, p.4. [Available online](#).
4. DSO Entity (2023). DSOs fit for 55 report. [Available online](#)
5. Communication COM/2020/789 of 9 December 2020 "Sustainable and Smart Mobility Strategy". | European Commission (2024). European Alternative Fuels Observatory, 2024. [Available online](#). | Eurelectric (2022). Power sector accelerating e-mobility: Can utilities turn EVs into a grid asset?, p.27. [Available online](#).
6. Communication COM/2022/230 of 18 May 2022, "REPowerEU Plan". | EHPA (2023). European Heat Pump Market and Statistics Report 2023. [Available online](#). | European Commission (2024). Impact assessment "Securing our future Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society », Figure 44, p. 55 (data relayed by EHPA). [Available online](#).
7. Interreg Danube Region (2024). "Recent Survey Highlights Potential of Energy Communities in the EU". [Available online](#). | Eurelectric (2024). Distribution Grids: A Eurelectric Handbook, p.4. [Available online](#).
8. ACER (2024) : Market Monitoring Report 2024.

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EU DSO Map



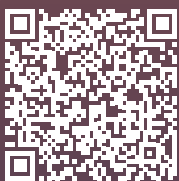
Taking stock of the EU Grid Action Plan



DSOs fit for 55



Guidance on EU permitting-related provisions on grid and renewable energy projects



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