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EU4ENERGY PHASE II

New Roles of DSOs under the Clean Energy Package: A Non-exhaustive Overview of the Key Aspects

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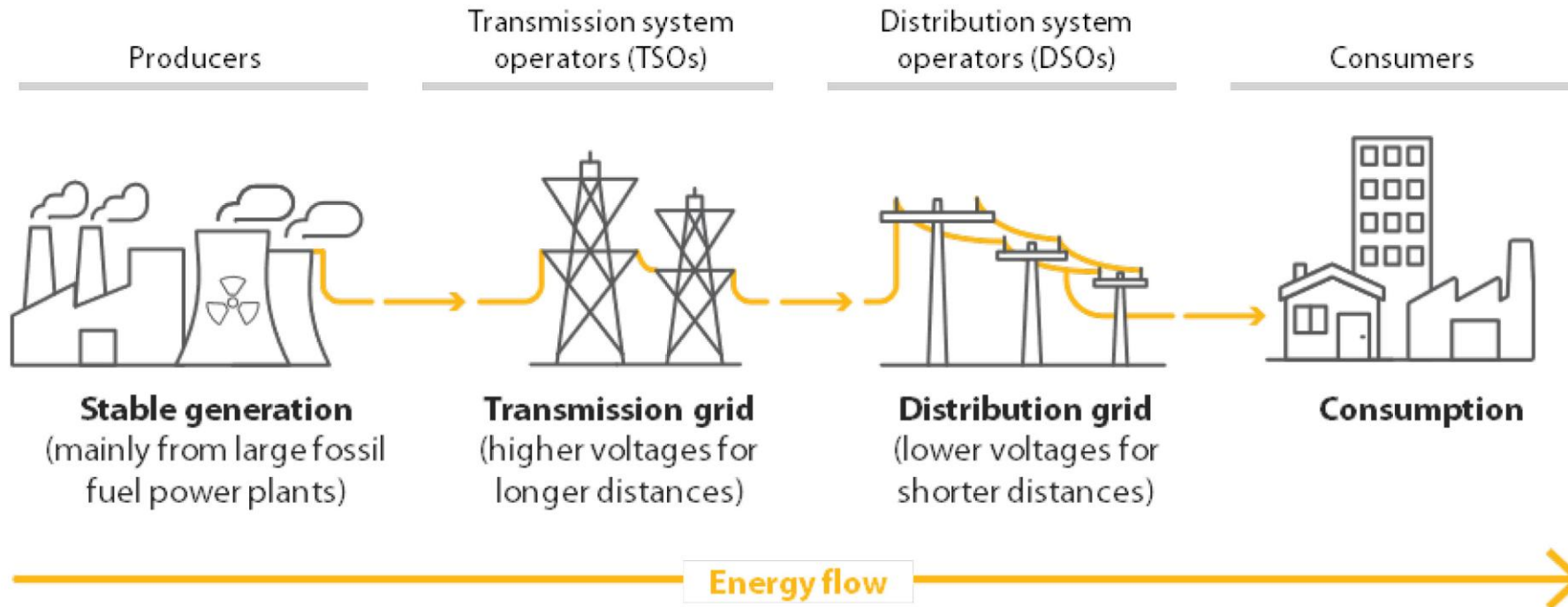
CEER-ENC Regional Workshop on New Roles of DSOs under the Clean Energy Package, Moldova, 9-10.04.2025



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Changing nature of DSOs roles

From the traditional role of DSOs in the electricity system ...



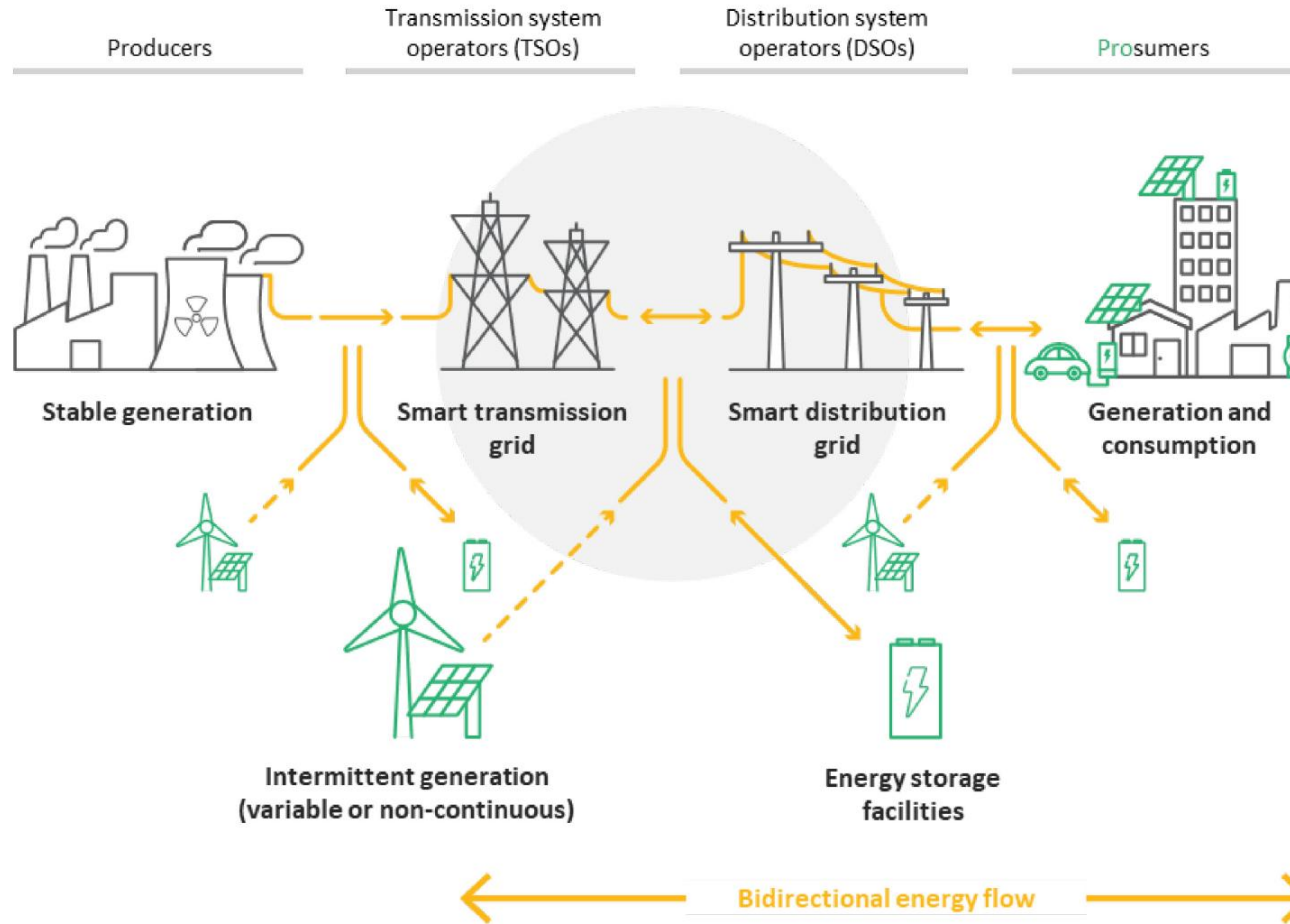
Source: ECA 2025





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Changing nature of DSOs roles



... to new roles to address the needs of new market participants and the overall society.

Source: ECA 2025





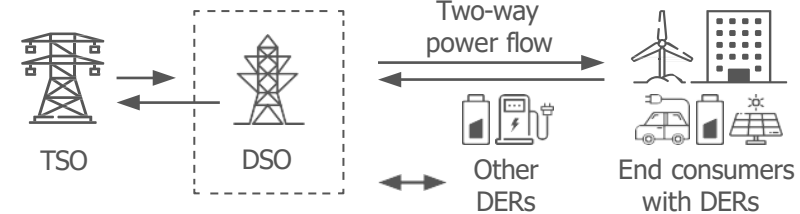
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From physical asset management to active management of grid capacities and integration of DERs

Traditional power system structure



Power system structure with DER deployment



CONVENTIONAL ROLES OF DSO

- 🔗 Connection and disconnection of DERs
- 📅 Planning, maintenance and management of networks
- 🏠 Management of supply outages
- 📄 Energy billing (only if vertically integrated)

+

EMERGING ADDITIONAL ROLES OF DSO

- 🏭 Peak load management through DERs
- 🏗️ Network congestion management
- ⚡ Provide reactive power support to TSOs
- ⚡ Procure voltage support
- ✓ Technical validation for power market

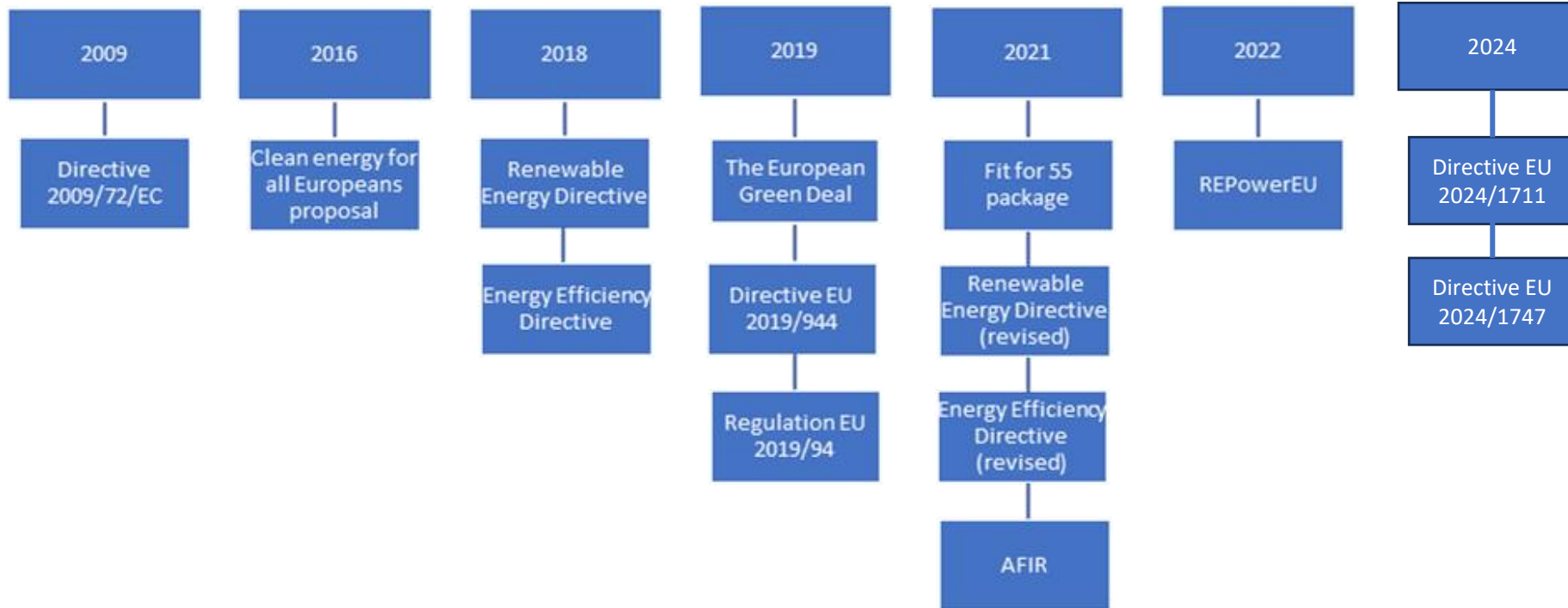
Source: IRENA





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Evolution of EU energy policies defining new roles for DSOs



Source: JRC DSO Observatory, 2022





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Adoption of Energy Community acquis related to DSOs

- Directive 2019/944
- Regulation 2019/943
- Directive 2012/27/EC on energy efficiency, as amended by Directive (EU) 2018/2002, inc. Annexes XI and XII
- Regulation 2022/869 (new TEN-E Regulation)

EU legislation was adapted for ENC and adopted by the Ministerial Council Decisions



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Key new DSO-related responsibilities arising from the Clean Energy Package

DSOs shall

- act as a neutral market facilitator in procuring the energy it uses to cover energy losses in its system in accordance with transparent, non-discriminatory and market-based procedures.
- procure the non-frequency ancillary services needed for its system in accordance with transparent, non-discriminatory and market-based procedures.
- cooperate with TSOs for the effective participation of market participants connected to their grid in retail, wholesale and balancing markets.
- develop a transparent network development plan which shall provide transparency on the medium and long-term flexibility services needed and shall set out the planned investments for the next five-to-ten years, with particular emphasis on the main distribution infrastructure which is required in order to connect new generation capacity and new loads, including recharging points for electric vehicles.
- include in the network development plan the use of demand response, energy efficiency, energy storage facilities or other resources that the distribution system operator is to use as an alternative to system expansion.





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Key new DSO-related responsibilities arising from the Clean Energy Package

Member States shall

- adopt market rules which will facilitate the development of more flexible generation, sustainable low carbon generation, and more flexible demand
- design incentives to the DSOs for the most cost-efficient operation and development of their networks including through the procurement of flexibility services
- design adequate regulatory framework to allow and provide incentives to distribution system operators to procure flexibility services, including congestion management in their areas, in order to improve efficiencies in the operation and development of the distribution system.
- ensure that national regulatory frameworks do not discriminate against participation in the electricity markets, including congestion management and the provision of flexibility and balancing services, of small or mobile systems such as domestic batteries and electric vehicles, both directly and through aggregation.





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Major challenges for DSOs in energy transition

- Integration of new market participants, e.g., energy communities, prosumers, storage, aggregators,..., with specific needs to be addressed by DSOs.
- RES development and electrification of the overall economy creates demand for significant investment in expansion of grid capacities.
- Develop new functionalities and capabilities to implement flexibility and demand response mechanisms, efficient grid usage and development methodologies, resilience measures, and consumer empowerment tools.
- Engage with policy makers and regulators to design adequate regulatory frameworks facilitating efficient and fair regulatory outcomes.

Safety, reliability, and efficiency of grid operation continue to be the backbone of DSO responsibilities





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EU Action Plan for Grids (2023)

- Electricity consumption in the EU is expected to increase by around 60% between now and 2030.
- Networks will have to accommodate a more **digitalised, decentralised and flexible system** with millions of rooftop solar panels, heat pumps and local energy communities sharing their resources, more offshore renewables coming online, more electric vehicles to charge, and growing hydrogen production needs.
- With 40% of EU distribution grids more than 40 years old and cross-border transmission capacity due to double by 2030, **€584 billion in investments are necessary.**





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EU Action Plan for Grids (2023)

- Accelerating the **implementation of Projects of Common Interest** and developing **new projects** through political steering, reinforced monitoring and more proposals;
- Improving the **long-term planning of grids** to accommodate more renewables and electrified demand, including hydrogen, in the energy system by steering the work of system operators as well as national regulators;
- Introducing **regulatory incentives** through guidance on anticipatory, forward-looking investments and on cross-border cost sharing for offshore projects;
- Incentivising a better usage of the grids with **enhanced transparency and improved network tariffs** for smarter grids, efficiency, and innovative technologies and solutions by supporting the cooperation between system operators and recommendations by the Agency for the Cooperation of Energy Regulators (ACER);
- Improving **access to finance for grids** projects by increasing visibility on opportunities for EU funding programmes, especially for smart grids and modernisation of distribution grids;
- Stimulating **faster permitting for grids** deployment by providing technical support for authorities and guidance on **better engaging stakeholders and communities**;
- **Improving and securing grid supply chains**, including by harmonising industry manufacturing requirements for generation and demand connection.

Complemented with the **EU Pact for Engagement** to raise public awareness of the role of grids in energy transition

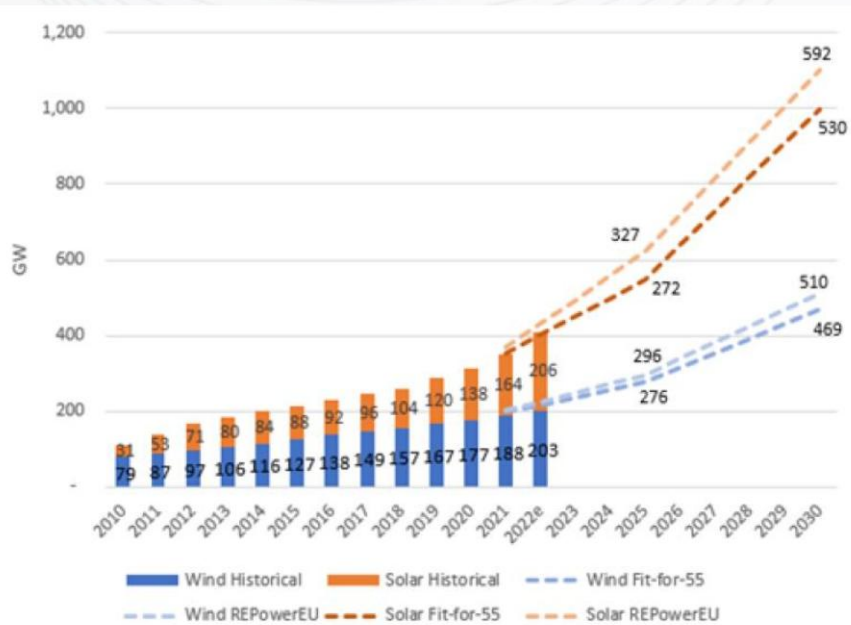




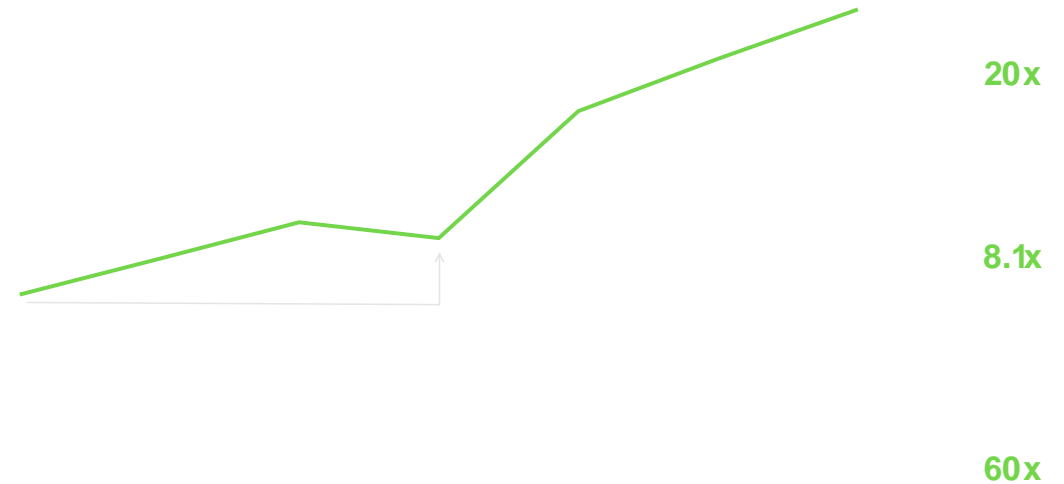
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Energy transition will lead to significant demand for new grid capacity

Volume of RES installed capacity in the EU, and projection of RES to reach 'Fit-for-55' and 'REPowerEU' targets



Source: European Commission (2023) Commission staff working document - Reform of the Electricity Market Design.



Sources: European Commission, Eurelectric

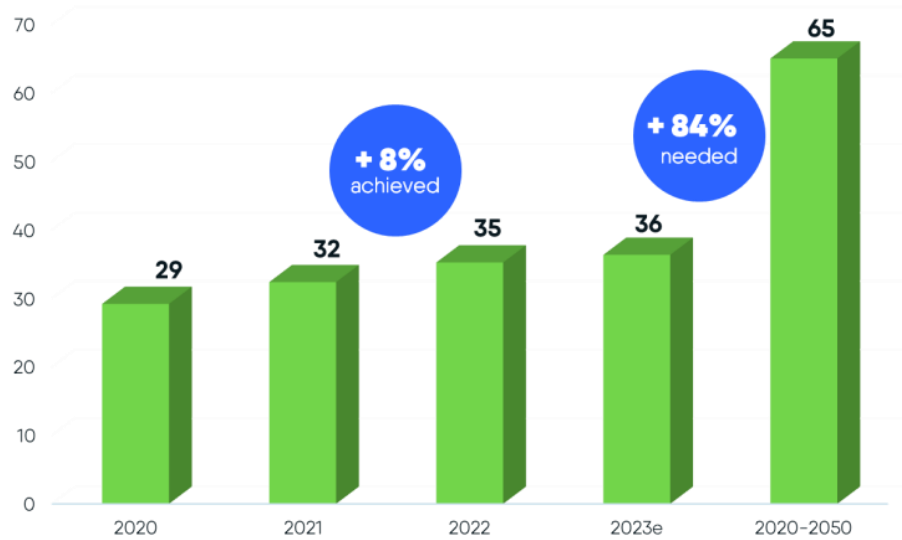




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This will lead to major increase in grid investment

Investments in distribution grid/year (in 2022 bn Euro)



The need to increase drastically investments in grid infrastructure for a decarbonised

Source: Eurelectric's "Decarbonisation Speedways" study, 2023

Sources: Eurelectric, ECA



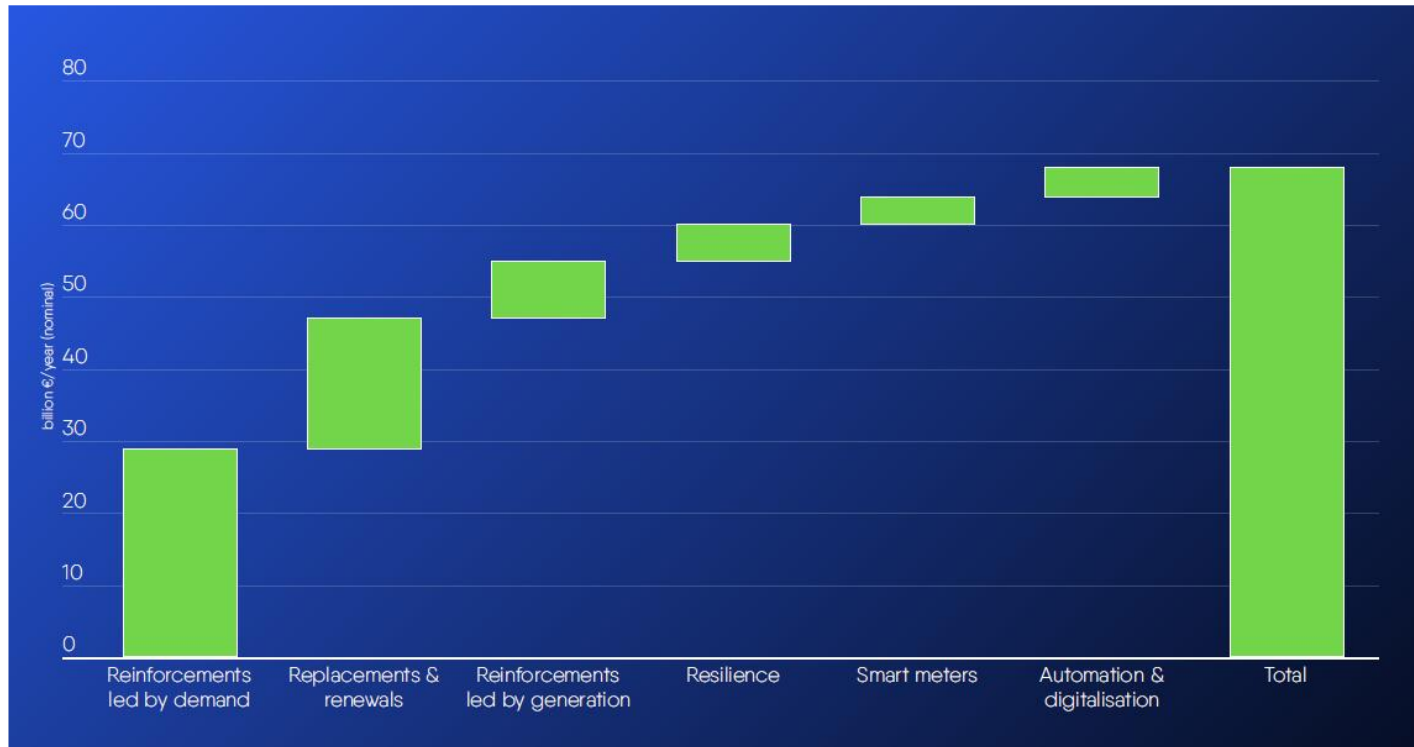
Projections of doubling annual investment in distribution grids till 2050 to achieve the EU energy transition goals, with high degree of sensitivity to underlying assumptions.





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Structure of projected grid investment



Key investment drivers:

- Grid reinforcement for demand
- Replacement and renewal
- Grid reinforcement for generation
- Resilience
- Smart meters
- Automation and digitization

Source: Eurelectric





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New approaches could reduce the investment needs for new grid capacity



Key drivers:

- Anticipatory investment
- Asset performance excellence
- Grid-friendly flexibility

Eurelectric estimated that these new approaches could reduce the projected investment needs by cca 11 bn Eur pre annum, or cca 16%.

Source: Eurelectric

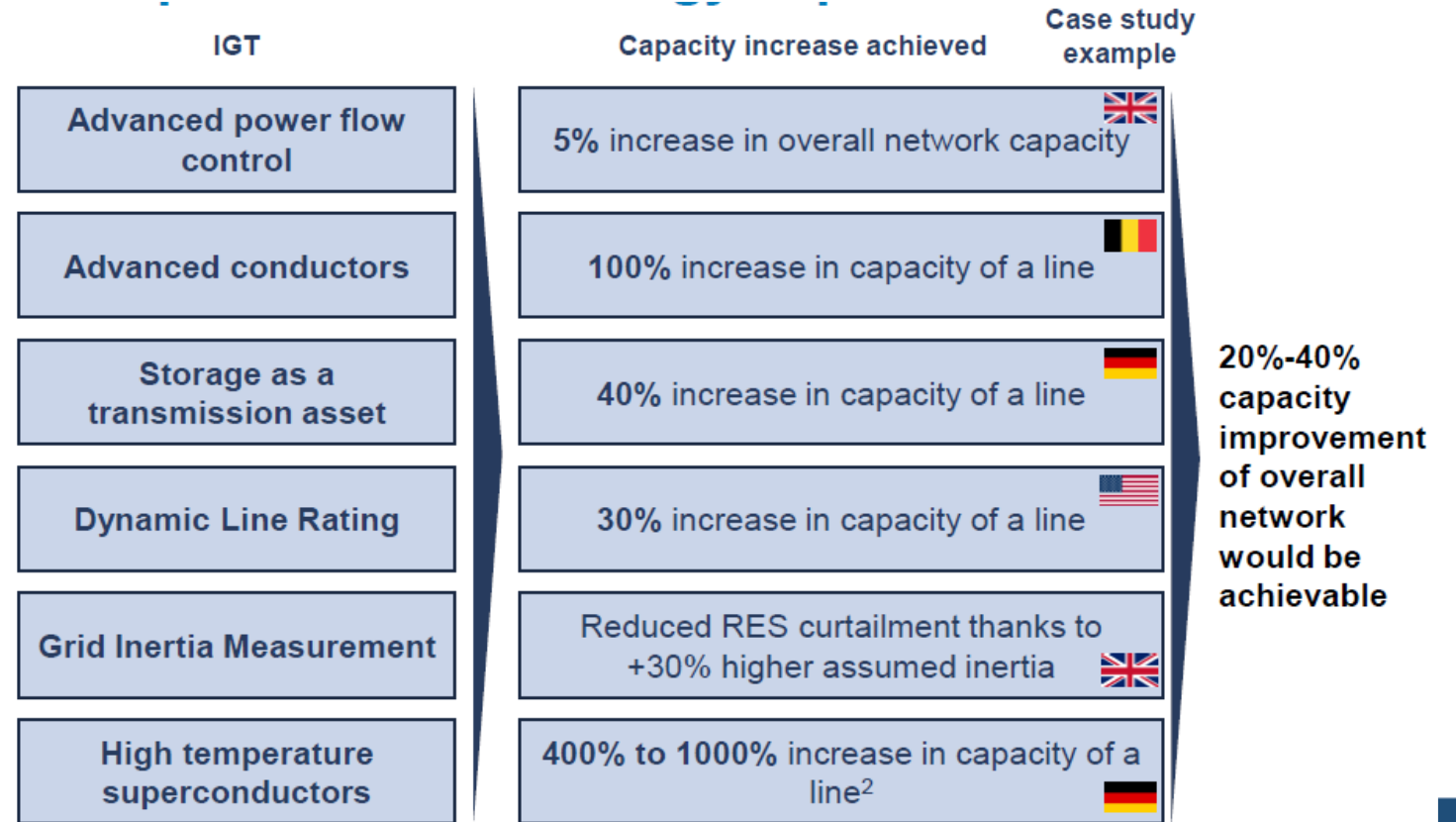




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Additional approaches could release existing grid capacity

- New approaches to grid operation and development are being piloted and implemented worldwide to reduce the need for new capacities.
- Innovative power grid technologies (IGT) could release 20 - 40% of new capacity in existing grids, as estimated in a recent study for CurrENT.
- **Measures aiming at better utilization of existing grid shall complement grid development planning.**



Source: CurrENT, Prospects for innovative power grid technologies, 2024





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ACER – CEER position on addressing the key issues relevant for DSOs

Distribution networks are the new gateway for achieving a flexible and decarbonised energy system

- Clear regulatory framework for distribution networks and local markets for distributed flexibility services.
- Rules ensuring fully neutral role of electricity DSOs.

Network costs must be allocated through fair and cost reflective tariffs

- Develop best practices for network tariff structures that are cost-reflective, non-discriminatory and fit for the new challenges facing our energy system, in particular accurately rewarding flexibility and the use of innovative grid technologies.

Non-wire alternatives can significantly increase the capacity of the existing power grid

- Develop incentive frameworks for power system operators to apply the most cost-effective solutions to increase the capacity of the network.



Challenges of the future electricity system

Recommendations and commitments

11 July 2024





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An overview of EU DSOs engaging in their new roles (2022)

Number and Size	DER and Flexibility	Data Management	Regulation
56 DSOs from 22 EU Member States	≈ 160 MW of RES connected: PV (45%) wind (39%) hydro (14%)	Almost all DSOs exchange data with the TSO and >60% of them perform coordinated operational security analysis	Above 70% of DSOs' businesses regulated using revenue cap models
25 small DSOs 24 medium DSOs 4 big DSOs 3 urban DSOs	Above 1 mil. EV charging columns reported, nearly all owned and operated by third parties	≈ 60% of DSOs exchange real-time SCADA measurements with the TSO	≈ 45% of DSOs treat R&D costs under specific regulatory mechanism
Nearly 168 mil. of connected customers and above 1600 TWh of avg. distributed annual energy	Above 380 thousand of heat pumps installed (based on the information available to the DSO)	≈ 65% of DSOs share data about generation & demand forecast with the TSO	≈ 60% of DSOs take part in regulatory experimentation on smart grids/metering/tariffs
Close to 6.5 mil. km of network lines	34% of DSOs procure flexibility and ≈ 40% report existence of energy communities in their grids	Nearly 50% of DSOs with >90% of smart metering deployed in their grids	≈ 80% of DSOs prepare 5-10 years investment plan, out of which above 60% include grid flexibility needs

Source: JRC DSO Observatory, 2022

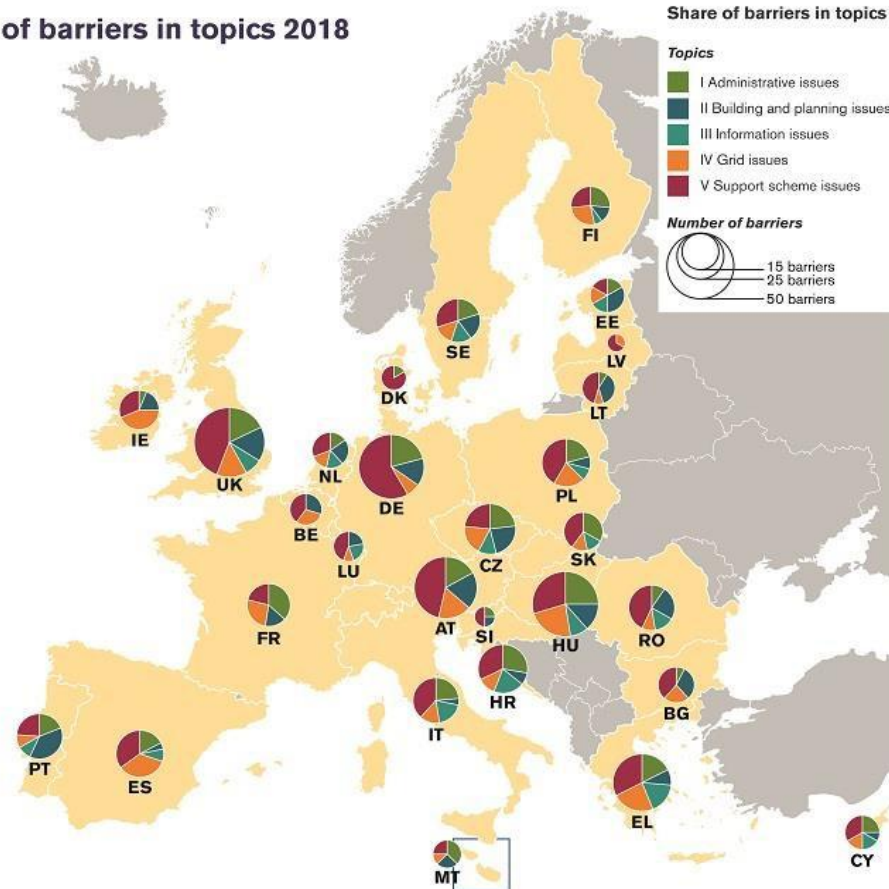




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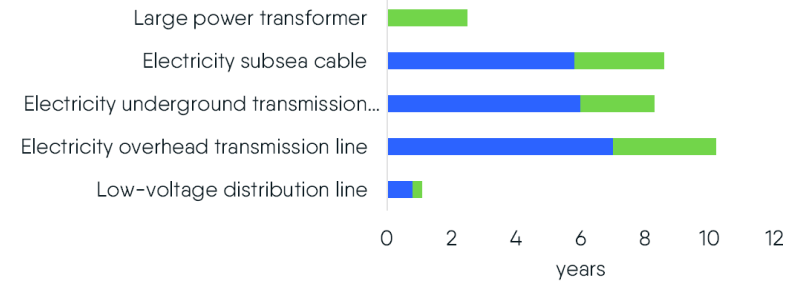
Need for improvements in grid development and operation activities

Share of barriers in topics 2018



Sources: Ecofys 2019

Average lead times to build new electricity grid assets



■ Planning and permitting ■ Construction/manufacturing Source: Eurelectric

- Permitting processes
- Standardization of technical requirements
- Transparency of grid status
- Digitalization of grid connection process
- Timely and reliable provision of data to grid users
- Simplification of reporting requirements
- New grid development and operation methodologies
- Engagement with stakeholders





THANK YOU
FOR YOUR ATTENTION

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