

ENTSO-E MISSION

Driving European energy security,
competitiveness and decarbonisation



entsoe

The role of ENTSO-E and its TSO members

ENTSO-E – the European Network of Transmission System Operators for Electricity – brings together 40 electricity Transmission System Operators (TSOs) from 36 countries. ENTSO-E members are responsible for the secure and coordinated operation of Europe's electricity system. Together, they operate a system of around 500,000 km of power lines – **the largest interconnected electrical grid in the world** – and serve about 520 million citizens.

The work of the TSOs is essential to powering Europe. The grid is the backbone of the electricity system and has extended over the borders of the EU, stretching from Portugal to Ukraine and Turkey, as well as most recently the Baltics, from Denmark to Italy. The shared mission of the TSOs is prescribed in national and European laws and focuses on the development of the national transmission grid and inter-connections as an enabler of the EU objectives. They operate

the electricity system in an efficient, secure and coordinated manner, balancing demand and supply 24/7 in real-time, and assessing the overall system's adequacy. TSOs, in fact, guarantee a functioning infrastructure that makes the trade of electricity possible for all market participants, and that ensures a reliable power supply for all members of society: industry, households and public entities.

The operation of this essential infrastructure is in the interest of the whole of society.

To that extent, electricity is not merely a market commodity: it is an essential service. And this essential service is only accessible if there is a fully functionable and resilient infrastructure, as well as an efficient and secure electricity system operation to deliver power when and where it is needed.

Across the European continent, electricity TSOs can take different legal ownership forms: state owned (the most common), private ownership, stock market listed company with public entities among shareholders, etc. But despite this

diversity, all TSOs are fully regulated and unbundled entities, and share numerous public service obligations assigned to them by their own governments, including (but not limited to) the security of supply. These missions are based on the fact that, while electricity is today a commodity traded through **market** mechanisms, and the transmission system is the physical vehicle of this market, the power system is also a key factor for the **security** of the country, the quality of supply, and the **competitiveness** of the economy.

ENTSO-E – 40 electricity Transmission System Operators (TSOs) from 36 countries



AL	Albania	OST
AT	Austria	APG, VUEN
BA	Bosnia and Herzegovina	NOS BiH
BE	Belgium	Elia
BG	Bulgaria	ESO
CH	Switzerland	Swissgrid
CY	Cyprus	Cyprus TSO
CZ	Czech Republic	ČEPS
DE	Germany	TransnetBW, TenneT DE, Amprion, 50Hertz
DK	Denmark	Energinet
EE	Estonia	Elering
ES	Spain	REE
FI	Finland	Fingrid
FR	France	RTE
GR	Greece	IPTO
HR	Croatia	HOPS
HU	Hungary	MAVIR
IE	Ireland	EirGrid
IS	Iceland	Landsnet
IT	Italy	Terna
LT	Lithuania	Litgrid
LU	Luxembourg	Creos Luxembourg
LV	Latvia	AST
ME	Montenegro	CGES
MK	Republic of North Macedonia	MEPSO
NI	Northern Ireland ⁽¹⁾	SONI
NL	The Netherlands	TenneT NL
NO	Norway	Statnett
PL	Poland	PSE
PT	Portugal	REN
RO	Romania	Transelectrica
RS	Serbia	EMS
SE	Sweden	Svenska Kraftnät
SI	Slovenia	ELES
SK	Slovak Republic	SEPS
UA	Ukraine	Ukrenergo
Observer members		
MD	Moldova	Moldelectrica
TR	Türkiye	TEİAŞ

⁽¹⁾ In compliance with 12 February 2021 EC Notice to Stakeholders on the Withdrawal of the UK and EU rules in the field of the Internal Energy Market

These shared public service responsibilities need close cooperation beyond the national borders, which led to the creation of ENTSO-E. Today, the association serves two main complementary purposes:

Cooperation of European TSOs



The foundations of this cooperation date back to the 1950s with the creation of electrical synchronous areas and interconnections, which laid the groundwork for today's interconnected European power system. TSOs established associations to work together on their own mandates and missions, that came together into what today is ENTSO-E. The European electricity system is one of the most stable and reliable grids in the world and is supported by the cooperation and coordination of TSOs both within European Union and closely interconnected European countries. ENTSO-E strives to build consensus for decision-making amongst its member TSOs as this forms the strongest foundation for cooperation.

Fulfilling EU legal mandates



With the adoption of the Third Energy Package in 2009, ENTSO-E's role was formally recognised by European institutions. ENTSO-E was granted legally mandated tasks to further develop the European interconnected grid and to facilitate the integration of European electricity markets. These mandates cover a large spectrum of tasks, including system operation, system development, market integration, information technologies, R&D and innovation.

ENTSO-E and TSOs' contribution to Europe's energy security, competitiveness and decarbonisation

Over the last 15 years, the Association's collaborative model – integrating our shared expertise with national and European mandates – has proven effective in navigating the common goals, and sometimes trade-offs, of system security, competitiveness and decarbonisation.

The electricity system and grid infrastructure are now in flux. As Europe transitions toward carbon neutrality and a further electrification of sectors to reduce energy dependence on

fossil fuels, our power system needs to expand, modernise and integrate new clean energy and flexibility sources as well as new actors. At the same time, due to geopolitical shifts, TSOs are confronted with growing threats to the security of supply as well as to the physical and cyber security of the grid. Meanwhile, Europe is under pressure to enhance the competitiveness of its industry and to ensure the affordability of energy for industrial consumers and households.

ENTSO-E and its TSO members play a key role in addressing these challenges:

1 European security

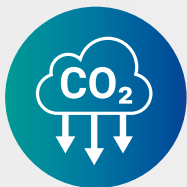


TSOs' efforts to integrate renewable and low carbon generation in the grid and the European energy system through internal and cross-border infrastructure and the progressive synchronisation of more countries with the continental network significantly contribute to Europe's security of supply and independence from foreign supplies of fossil fuels. They implement physical and cyber security of national critical infrastructure preventing blackouts.



2 European competitiveness

TSOs are developing cost-efficient infrastructure and delivering affordable energy to society. They also work with suppliers of critical grid technologies to increase Europe's production capacity, promote research in innovative solutions, and drive the modernisation and digitalisation of the grids.



3 European decarbonisation

TSOs and ENTSO-E's collaboration with other stakeholders – EU institutions and agencies, DSOs, gas and hydrogen operators, as well as the public – is vital to plan an energy system that is fit for purpose and to assess the future needs of the energy system in terms of infrastructure, flexibility, and related investments.



ANNEX

ENTSO-E's contribution to the security of the European power system and Europe's security of supply

Expanding the power system

Europe already has the largest interconnected power grid in the world, while ENTSO-E's coordination of its TSO members allows for the successful integration and synchronisation of progressively more regions. In March 2022, [Ukraine and Moldova's](#) electricity systems were synchronised with the continental European network through an emergency procedure aimed at enhancing the security of energy supply for both countries following Russia's invasion of Ukraine. ENTSO-E and the European Commission worked very closely with the counterparts in the two countries and managed to complete the synchronisation process in record time. In February 2025, ENTSO-E and its TSOs members supported [Latvia, Lithuania and Estonia](#) to successfully disconnect from the Russian-controlled BRELL electricity system and to finalise the synchronisation with the continental European network, ensuring more security and energy independence to the Baltic countries. Since 2022, ENTSO-E and its members have also been working extensively with TSOs from the **West Balkan Energy Community** (EMS, CGES, MEPSO, NOSBiH, KOSTT, OST) to strengthen regional power system cooperation in South-East Europe, strengthen the security of electricity supply and market integration for the whole continent. An [agreement was reached in December 2024](#).

Security of Supply

Twice a year, ENTSO-E conducts the [Seasonal Outlooks](#) (Summer and Winter) to analyse possible risks for the security of supply in Europe in the short term. The results of those reports inform and support the decisions of national authorities and EU institutions.

System adequacy

Every year, ENTSO-E conducts and publishes the [European Resource Adequacy Assessment](#) (ERAA) in close cooperation with the European Commission and ACER. The ERAA is a tool that evaluates power system adequacy up to 10 years ahead, using advanced modelling to assess potential imbalances between supply and demand of the power system. These analyses support policymakers at EU and national level in outlining strategic decisions, such as the need to introduce capacity mechanisms.

Grids operation security

All TSOs cooperate within ENTSO-E to develop a common methodology for Probabilistic Risk Assessment (PRA). The goal is to improve how operational security management takes into account the probability of occurrence of a power system disturbance or failure. The establishment of a PRA complements the current and historical approaches, enabling better-informed decisions in the definition of security limits.



Ukraine and
Moldova's



Latvia, Lithuania
and Estonia



Agreement
was reached
in December
2024



Seasonal Outlooks



ERAA

System security rules

Under ACER's guidance, ENTSO-E is responsible for drafting the [Network codes](#) and their relevant methodologies, a set of harmonised rules aimed at supporting system operations and ensuring new grids connections are future-proof (e. g. [Network Codes on System Operation Guidelines](#), [Emergency and Restoration](#), [Demand Connection Code](#), [HVDC Connections](#), [Requirement for Generators](#)). The most recent [Network Codes for Cybersecurity](#) and for [Demand Response](#) respectively help make the power system more resilient against cyber threats and supply shocks.

ENTSO-E's contribution to Europe's competitiveness, through energy affordability, market efficiency and innovation

Energy affordability

Interconnections play a key role in lowering total cost of energy by reducing Europe's dependency on fossil fuels imports, increasing the efficiency of the overall electricity system and of the market functioning, facilitating the cost-effective integration of renewables, and pooling flexible resources. ENTSO-E greatly contributes to the development of cross-border infrastructure through the publication of the [Ten-Year Network Development Plans \(TYNDP\)](#), a study published every two years which assesses system needs for transmission infrastructure for 2030, 2040 and up to 2050 to minimise total system costs. The TYNDP also serves as a tool for the European Commission to select the projects that provide the greatest benefit to Europe's society (Projects of Common Interest and Mutual Interest, PCI/PMI), which become eligible for EU funding through the Connecting Europe Facility (CEF), thus mitigating their financial impact on consumers.

Industrial competitiveness and supply chain

ENTSO-E is also collaborating with different stakeholders from the entire value chain on the implementation of the 2023 Grids Action Plan to make the European industry and overall energy supply chain more resilient. In particular, ENTSO-E is working with the DSO Entity and technology providers – including Europacable and T&D Europe – **to improve visibility of grid project pipelines, facilitate investments in manufacturing capacity, drive down costs and secure supply chains.**

Economic growth

Investing in electricity infrastructure creates jobs and benefits Europe's economy. By 2040 the TYNDP 2024 project portfolio, worth 288 billion euros in the EU, is expected to **create 4.1 million jobs, mobilise 603 billion euros in production, and increase the EU GDP by 247 billion euros.** Public administration revenues through taxes could reach 111 billion euros, benefiting European society. In a nutshell, by 2040, each euro invested in the electricity grid will translate into over 2 euros saved in system costs.



Network codes



Network Codes
on System Oper-
ation Guidelines



Emergency and
Restorations



Demand Connection
Codes



HVDC Connections



Requirement for
Generators



Network Codes for
Cybersecurity



Demand Response



TYNDP

Market integration and efficiency

ENTSO-E constantly supports TSO members in developing a well-functioning European electricity market according to the objectives of the 3rd Internal Energy Market package, while promoting TSOs cooperation which allows for a **more liquid and integrated electricity market**, leading to a harmonised European market framework, higher transparency towards stakeholders and the containment of costs for European society. TSOs, for instance, play a vital role in **balancing electricity**, thus facilitating the exchange of resources to make generation equal demand always, and allowing new players such as demand response and renewables to take part in the European market. ENTSO-E's [yearly market report](#) monitors the progress of electricity markets and provides key information to decision makers and market actors to further advance on the integration and efficiency of the EU energy market.

Innovation

Closing the innovation gap with other world powers is one of the core areas for action to accelerate the development of a future power system supporting Europe's policy ambitions and, more broadly, to boost the EU's competitiveness. The transformation of Europe's energy system requires a massive ramp-up of research, development and innovation efforts ranging from new concepts and computer modelling solutions to demonstrations of both power and digital technologies. To plan these initiatives, [ENTSO-E's Research, Development and Innovation Roadmap](#) outlines innovation missions and milestones for the core TSOs activities for the following 10 years. ENTSO-E provides information about new innovative and state-of-the-art technologies through its [Technopedia](#) platform, helping actors across the value chain understand each technology, their advantages and different use cases and applications around Europe. **A collaboration with the DSO Entity is also bringing to the development of a Digital Twin of the European electricity system**, a sophisticated virtual model which aims to enhance the efficiency and smartness of the grid, that will ensure the development of innovative solutions and the coordination of investments, as well as of a strategy for promoting technology uptake for smart grids and network efficiency via a new "[DSO/TSO Technopedia](#)" (expected in 2025).

ENTSO-E's contribution to the achievement of Europe's decarbonisation targets

In 2022, ENTSO-E developed its groundbreaking [Vision to achieve a Power System Fit for a Carbon Neutral Europe](#). This vision is still very relevant today and focus on the following key aspects:

Carbon neutral energy sources

In a fully carbon neutral economy, electricity will be the main and most efficient energy carrier, because of the higher efficiency of electrical end uses versus synthetic green fuels, and because of the maturity of renewable electricity generation technologies. **TSOs' role is crucial to accelerate the integration of renewable energy sources, as they balance RES intermittency, operate the grids smartly and cost-efficiently, and support the transition towards a so-called "system of systems".**



ENTSO-E yearly
market report



ENTSO-E's
Research,
Development
and Innovation
Roadmap



Technopedia



DSO/TSO
Technopedia



ENTSO-E Vision

System flexibility resources

Pan-European flexibility needs stemmed from generation and demand variability are projected to roughly double in the next decade. Leveraging TSOs' extensive experience in planning and operating the electricity grid and their knowledge of the system's needs, for a long time **ENTSO-E has identified flexibility as a crucial factor for both the present and the future power system** and has advocated for the development of quantitative analysis of flexibility requirements. Today, ENTSO-E and DSO Entity are the responsible for a common methodology to be used for national flexibility needs assessments, which will proactively identify and address emerging system challenges.

Power grid

As the electricity system grows more complex and towards more decentralised generation sources, **enhanced collaboration among TSOs at regional and European levels will be crucial**, also to connect generators, consumers and flexibility resources across Europe, and enabling a fully integrated European Energy Market. This coordination will continue to evolve, notably by the implementation of additional tasks for the Regional Coordination Centres (RCC), to efficiently ensure the security of system operations while we move towards a more decentralised energy system with more renewable energy sources.

Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
CEF	Connecting Europe Facility
CGES	Crnogorski elektroprenosni sistem AD
DSO	Distribution System Operator
EMS	Akcionarsko društvo Elektromreža Srbije
ERAA	European Resource Adequacy Assessment
KOSTT	Market Operator of the Republic of Kosovo
MEPSO	Transmission System Operator of the Republic of North Macedonia
NOS BiH	Nezavisni operator sustava u Bosni i Hercegovini
OST	OST sh.a – Albanian Transmission System Operator
PCI	Project of Common Interest
PMI	Public Message Interface
PRA	Probabilistic Risk Assessment
R & D	Research and Development
RCC	Regional Coordination Centres
RES	Renewable Energy Sources
T & D Europe	European Association of the Electricity Transmission & Distribution Equipment and Services Industry
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plans

Publisher

ENTSO-E AISBL
8 Rue de Spa
1000 Brussels
Belgium

www.entsoe.eu
info@entsoe.eu

© ENTSO-E AISBL 2026

Design

DreiDreizehn GmbH, Berlin
www.313.de

Images

Title: [istockphoto.com/gremlin](https://www.istockphoto.com/gremlin)
p. 4: [istockphoto.com/gorodenkoff](https://www.istockphoto.com/gorodenkoff)

Publishing date

October 2026