



ENTSO-E AT A GLANCE

RELIABLE. SUSTAINABLE. CONNECTED.



European Network of
Transmission System Operators
for Electricity

entsoe



WHO IS ENTSO-E?

ENTSO-E, the European Network of Transmission System Operators, represents 41 electricity transmission system operators (TSOs) from 34 countries across Europe. ENTSO-E was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market in 2009, which aims at further liberalising the gas and electricity markets in the EU.

ENTSO-E promotes closer cooperation across Europe's TSOs to support the implementation of EU energy policy and achieve Europe's energy & climate policy objectives, which are changing the very nature of the power system.

The main objectives of ENTSO-E centre on ensuring security of supply and system reliability, the integration of renewable energy sources (RES) such as wind and solar power into the power system, and the completion of the internal energy market, which, in turn, is central to meeting the European Union's energy policy objectives of affordability, sustainability and security of supply.

ENTSO-E contributes to the achievement of these objectives mainly through the drafting

of network codes; the development of pan-European network plans (TYNDPs); the technical cooperation between TSOs; the publication of summer and winter outlook reports for electricity generation, and the coordination of R&D plans. ENTSO-E aims to be the focal point for all technical, market and policy issues relating to TSOs and the European network, interfacing with power system users, EU institutions, regulators and national governments.

ENTSO-E is entirely funded through membership fees paid to the association by its member TSOs. Its annual budget for 2014 was 177 million Euro. ENTSO-E is an association (AISBL), established according to Belgian law in 2009.

Through these deliverables, ENTSO-E is helping to build the world's largest electricity market, the benefits of which will not only be felt by all those in the energy sector but also by Europe's overall economy, today and into the future.





WHY ENTSO-E?

In the early 2000s, Europe's leaders realised that the liberalisation of Europe's energy markets had made only limited progress and that the objectives had not yet been achieved. This left energy markets with uncompetitive gas and electricity prices and persistent barriers to entry for newcomers, thus limiting the possibilities to exercise customer choice.

A commitment by EU leaders to the 2020 energy objectives in March 2007 was a turning point for the European power systems and all market participants.

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%;
- A 20% improvement in the EU's energy efficiency.

Ensuring security of supply, the completion of the internal energy market and significant increase in power generation from renewable energy sources and their integration required much closer cooperation of those organisations that develop and operate the transmission grid – the backbone of the power system.

To facilitate this, policy makers therefore adopted the Third Energy Package in 2009, which in turn, created the ENTSOs for gas and electricity (i.e. ENTSO-E and ENTSOG) and the Agency for the Cooperation of Energy Regulators (ACER).



ENTSO-E'S OFFICIAL MANDATES

THE THIRD ENERGY PACKAGE

The Third Energy Package is a set of two European directives and three regulations. The Regulation that stipulates ENTSO-E's tasks and responsibilities is Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity. The regulation sets out ENTSO-E's responsibilities in enhancing the cooperation between its 41 member TSOs across the EU to assist in the development of a pan-European electricity transmission network in line with European Union energy policy goals. These include:

- ensuring the secure and reliable operation of the increasingly complex network;
- facilitating cross-border network development and the integration of RES;
- enhancing the creation of the Internal Electricity Market (IEM).

To achieve these, the Regulation provides ENTSO-E with a tool box of tasks and responsibilities, including network codes, infrastructure planning and adequacy forecasts.

Transparency Regulation (EU) No. 543/2013 on submission and publication of data in electricity markets (Transparency Regulation) came in force in June 2013. It requires ENTSO-E to redesign and significantly upgrade its existing transparency platform (www.entsoe.net).

ENTSO-E's new central information platform will be operational in January 2015, providing fundamental market data on generation, load, transmission, outages, balancing, etc.

TEN-E GUIDELINES

Regulation (EU) 347/2013 on guidelines for trans-European energy infrastructure came in force in April 2013. The Regulation defines European Projects of Common Interest (PCIs), which are electricity projects that have significant benefits for at least two Member States. It also stipulates that ENTSO-E's ten-year network development plan (TYNDP) be the sole basis for the selection of PCIs. ENTSO-E is also mandated to develop a corresponding cost-benefit methodology for the assessment of transmission infrastructure projects.

INTER-TSO COMPENSATION MECHANISM

Regulation (EU) 838/2010 on guidelines relating to the inter-TSO compensation mechanism sets out the compensation methodology TSOs receive for the costs incurred as a result of hosting cross-border flows of electricity. In compensating TSOs for these costs, the mechanism aims to incentivise the hosting of cross-border flows and facilitate the creation of an effectively competitive pan-European electricity market.

STAKEHOLDER ENGAGEMENT

Stakeholder contributions play an essential part in the development of all main ENTSO-E deliverables, including network codes, network development plans, work programmes and R&D roadmaps. Consultation with stakeholders is far more than a mandatory

requirement – stakeholder expertise is indispensable to draft sound, well critiqued and acceptable proposals. Stakeholder engagement is ensured through numerous informal meetings with individual stakeholders or stakeholder groups, and formal web-based consultations and consultation workshops.

ENTSO-E IN FIGURES



41 transmission
system operators
across **34** European
countries

The geographical area covered by ENTSO-E member TSOs is going beyond the EU

This corresponds to the world's biggest economic area, roughly on par with the USA



532 million
customers served by the
represented TSOs



307,503 km

of transmission lines
managed by TSOs required to
keep the lights on in Europe

which, if laid out
would circle the
earth's circumference
more than 7 times

3,307.9

**TWh electricity
consumption
in 2013**

This accounts for almost
15% of the world's total
electricity consumption
in 2013¹⁾

387,251

**GWh of electricity
exchange between
member TSOs
in 2013**

This is over 4 times the yearly production
capacity of the largest power plant in the
world – the Three Gorges Dam in China²⁾

This is roughly as much as in
the US or China and one fifth of
the world's installed generation
capacity³⁾

1,004,062

**MW net generation
capacity**

1) Based on figures from the World Energy Council, World Energy Sources Survey 2013

2) Based on figures from www.cleanenergyactionproject.com

3) Based on figures from <http://www.tsp-data-portal.org/TOP-20-Capacity#tspQvChart>



ENTSO-E'S KEY DELIVERABLES

PAN-EUROPEAN TRANSMISSION NETWORK PLANS

ENTSO-E's Ten-Year Network Development Plan (TYNDP) identifies the investment needs for the electricity transmission systems at a pan-European scale. The TYNDP package is supported by six detailed Regional Investment Plans as well as the Scenario Outlook and Adequacy Forecast (SO&AF).

The TYNDP ensures greater transparency regarding the entire European electricity transmission network to support decision-making process at regional and European levels, and is also the sole basis for the selection of EU projects of common interest (PCIs).

ENTSO-E updates the non-binding TYNDP every two years, continuously improving its methodology. The 2014 TYNDP describes the strengthening of the European power grid planned until 2030 as the most cost-efficient and secure way to integrate up to 60% of renewable energy, depending on the scenario. The plan includes rigorous cost-benefit analyses to ensure each of the 120 transmission projects provides more benefits to consumers and citizens than they cost.

ADEQUACY FORECASTS

ENTSO-E publishes annual summer and winter generation outlooks, as well as a long-term system adequacy forecast that look 15 years into the future – the Scenario Outlook & Adequacy Forecast (SO&AF).

The ENTSO-E outlook reports present the views of Europe's TSOs regarding national or regional security of supply for the summer and winter periods, and highlight possibilities for neighbouring countries to contribute to the generation/demand balance in critical situations.

The SO&AF analyses the adequacy of the pan-European power system through an overview of generation adequacy for all ENTSO-E members, for regions and for individual countries at a mid- and long-term time horizon. ENTSO-E's SO&AF 2014, was released as part of the TYNDP 2014 package in July with a time horizon for its adequacy analyses to 2030.

NETWORK CODES

ENTSO-E's network codes are a set of rules drafted by ENTSO-E, with guidance from ACER, to facilitate the harmonisation, integration and efficiency of the European electricity market.



ENTSO-E's network codes are grouped in three overarching areas:

- **CONNECTION CODES:** connecting electricity generators, demand and DC lines to the transmission grids
- **OPERATIONAL CODES:** governing how the pan-European electricity systems are operated
- **MARKET CODES:** facilitating and harmonising electricity trading across European borders

Under formal development since 2011, each code takes 12 months to draft, following an ACER framework guideline for the policy choices. Following ACER's opinion and recommendation for adoption, each code is submitted to the EC for approval through the Comitology process, i.e. to be voted on by Member State representatives and thus become EU law, directly binding and to be implemented across all Member States.

More detailed information on the aims and current status of ENTSO-E's ten network codes can be found on our dedicated network codes website – networkcodes.entsoe.eu.

ELECTRICITY MARKET TRANSPARENCY

One of the key contributors to the achievement of the internal energy market (IEM) is ENTSO-E's Central Information Transparency Platform which will be significantly upgraded in January 2015, providing many more fundamental market data on generation, load, transmission, outages, balancing, etc. than now. These data will be published ex-post, but within short delays (some data within the hour).

This platform will enable the provision of the required market information for the future and further facilitate the development of efficient and competitive energy markets across Europe. Such developments support the steady evolution of electricity markets across Europe in terms of integration, competition, liquidity and transparency.

Transparency has improved markedly over the past few years, partly thanks to ENTSO-E's existing Transparency Platform, operational since 2006, which publishes already many data items of great interest to market participants on a daily basis.

ANNUAL WORK PROGRAMME

ENTSO-E's Annual Work Programme shows how codes, network plans, innovation and TSO cooperation combine with market and policy contributions to chart a path through today's large energy system uncertainties. The 2015 work programme includes sections on strategy and resources, to put ENTSO-E's contributions into the perspective of Europe's energy goals.

Due to the importance of the network codes for the European electricity market and system, the work programme contains a separate network code chapter. Other chapters address R&D, system development, system operations, market and other activities.

TSO COOPERATION

TSO cooperation has been a reality for many decades and forms the basis of most ENTSO-E activities. ENTSO-E develops a range of tools to ensure the secure operation of Europe's interconnected transmission grids. Most importantly, this includes the ENTSO-E Awareness System (EAS) and Regional Security Coordination Initiatives (RSCIs).

The EAS delivers a pan-European view of the network. When a disturbance occurs in a particular country, TSOs coordinate their responses to restore the system to a normal operating state. To support them in doing this rapidly and efficiently, the EAS provides a real-time view of the energy flows and state of the network across the whole of Europe and is an essential collaborative tool for TSOs in 32 countries to increase European consumers' security of supply.

The work of regional security coordination groups such as Coreso (Coordination of Electricity System Operators), SSC (Security Service Centre) and TSC (Transmission System Operator Security Cooperation), as well as initiatives through MIBEL (Mercado Ibérico de Energía Eléctrica) and Nordic organisations continue to improve the security of the overall network and maximise the transmission capacity available to market participants.



RESEARCH & DEVELOPMENT (R&D)

R&D at the TSO-level plays a crucial role in Europe's ability to meet its low carbon objectives and the ENTSO-E R&D Roadmap 2013 – 2022 provides the ENTSO-E vision on grid projects to be carried out by TSOs to meet these. The roadmap is supported by the annual R&D Implementation Plan which combines both top-down and bottom-up approaches in meeting the requirements of the roadmap and also reflects the upcoming needs and priorities of TSOs and other stakeholders. This plan also serves as the backdrop for developing calls for proposals under the European Energy Research and Innovation (EERI) Programme and also provides input for initiatives by the European Commission, the European Electricity Grid Initiative (EEGI), technology providers and other stakeholders. For large parts of this work, ENTSO-E cooperates very closely with the distribution system operators (EDSO for Smart Grids), for example on smart grids. In addition to these publications ENTSO-E also publishes, annually, an R&D Monitoring

Report which assesses the progress of TSO-related R&D work and allows ENTSO-E to monitor its progress against the targets set out in the R&D Roadmap 2013 – 2022.

R&D in the TSO domain focuses on the integration of new network technologies, pan-European standardisation of system modelling, operations and data exchange, and the exchange of knowledge.

HISTORICAL DATA & STATISTICS

ENTSO-E collects and collates a wide range of historical data sets and figures on power systems of member TSOs, including production, consumption, cross-border exchanges and network components. These are published periodically on ENTSO-E's website Data Portal, and in monthly and yearly publications such as the Statistical Factsheet and the Yearly Statistics & Adequacy Retrospect.

WHO ARE TSOs?

Transmission System Operators (TSOs) are responsible for the bulk transmission of electric power on the main high voltage electric networks. TSOs provide grid access to the electricity market players (i.e. generating companies, traders, suppliers, distributors and directly connected customers) according to non-discriminatory and transparent rules.

To ensure security of supply, TSOs also guarantee the safe operation and maintenance, and the planning of the system. In many countries, TSOs are in charge of the development of the grid infrastructure too. TSOs in the European Union internal electricity market are entities operating independently from the other electricity market players (unbundling).

Country	Company	Abbr.
Austria	Austrian Power Grid AG Vorarlberger Übertragungsnetz GmbH	APG VÜN
Bosnia and Herzegovina	Nezavisni operator sustava u Bosni i Hercegovini	NOS BiH
Belgium	Elia System Operator SA	Elia
Bulgaria	Electroenergien Sistem Operator EAD	ESO
Switzerland	Swissgrid ag	Swissgrid
Cyprus	Cyprus Transmission System Operator	Cyprus TSO
Czech Republic	ČEPS a.s.	ČEPS
Germany	TransnetBW GmbH TenneT TSO GmbH Amprion GmbH 50Hertz Transmission GmbH	TransnetBW TenneT GER Amprion 50Hertz
Denmark	Energinet.dk	Energinet.dk
Estonia	Elering AS	Elering AS
Spain	Red Eléctrica de España S.A.	REE
Finland	Fingrid OyJ	Fingrid
France	Réseau de Transport d'Electricité	RTE
United Kingdom	National Grid Electricity Transmission plc System Operator for Northern Ireland Ltd Scottish Hydro Electric Transmission Limited Scottish Power Transmission plc	National Grid SONI SHETL SPTransmission
Greece	Independent Power Transmission Operator S.A.	IPTO
Croatia	Croatian Transmission System Operator Ltd.	HOPS



Country	Company	Abbr.
Hungary	MAVIR Magyar Villamosenergia-ipari Átviteli Rendsz- erirányító Zártkörűen Működő Részvénytársaság	MAVIR ZRT.
Ireland	EirGrid plc	EirGrid
Iceland	Landsnet hf	Landsnet
Italy	Terna - Rete Elettrica Nazionale SpA	Terna
Lithuania	Litgrid AB	Litgrid
Luxembourg	Creos Luxembourg S.A.	Creos Luxembourg
Latvia	AS Augstsprieguma tīkls	Augstsprieguma tīkls
Montenegro	Crnogorski elektroprenosni sistem AD	CGES AD
FYR of Macedonia	Macedonian Transmission System Operator AD	MEPSO
Netherlands	TenneT TSO B.V.	TenneT NL
Norway	Statnett SF	Statnett
Poland	PSE S.A.	PSE
Portugal	Rede Eléctrica Nacional, S.A.	REN
Romania	C.N. Transelectrica S.A.	Transelectrica
Serbia	JP Elektromreža Srbije	EMS
Sweden	Svenska Kraftnät	Svenska Kraftnät
Slovenia	Elektro Slovenija, d.o.o.	ELES
Slovak Republic	Slovenska elektrizacna prenosova sustava, a.s.	SEPS

SYNCHRONOUS AREAS

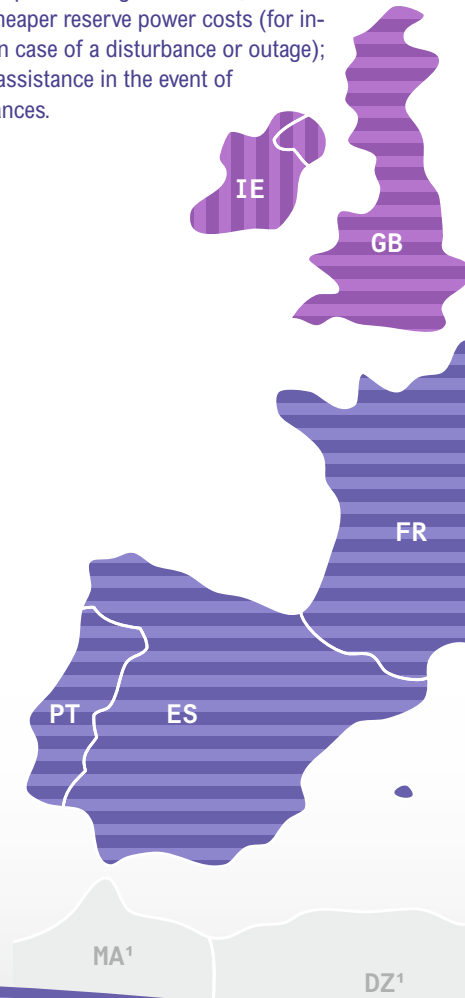
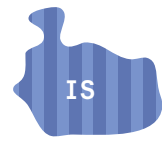
The geographical area covered by ENTSO-E's member TSOs is divided into five synchronous areas and two isolated systems (Cyprus and Iceland). Synchronous areas are groups of countries which are connected via their respective power systems. The system frequency (50 Hz, with usually very minor deviations) is synchronous within each area and a disturbance at one single point in the area will be registered across the entire zone. Individual synchronous areas are interconnected through direct current interconnectors.

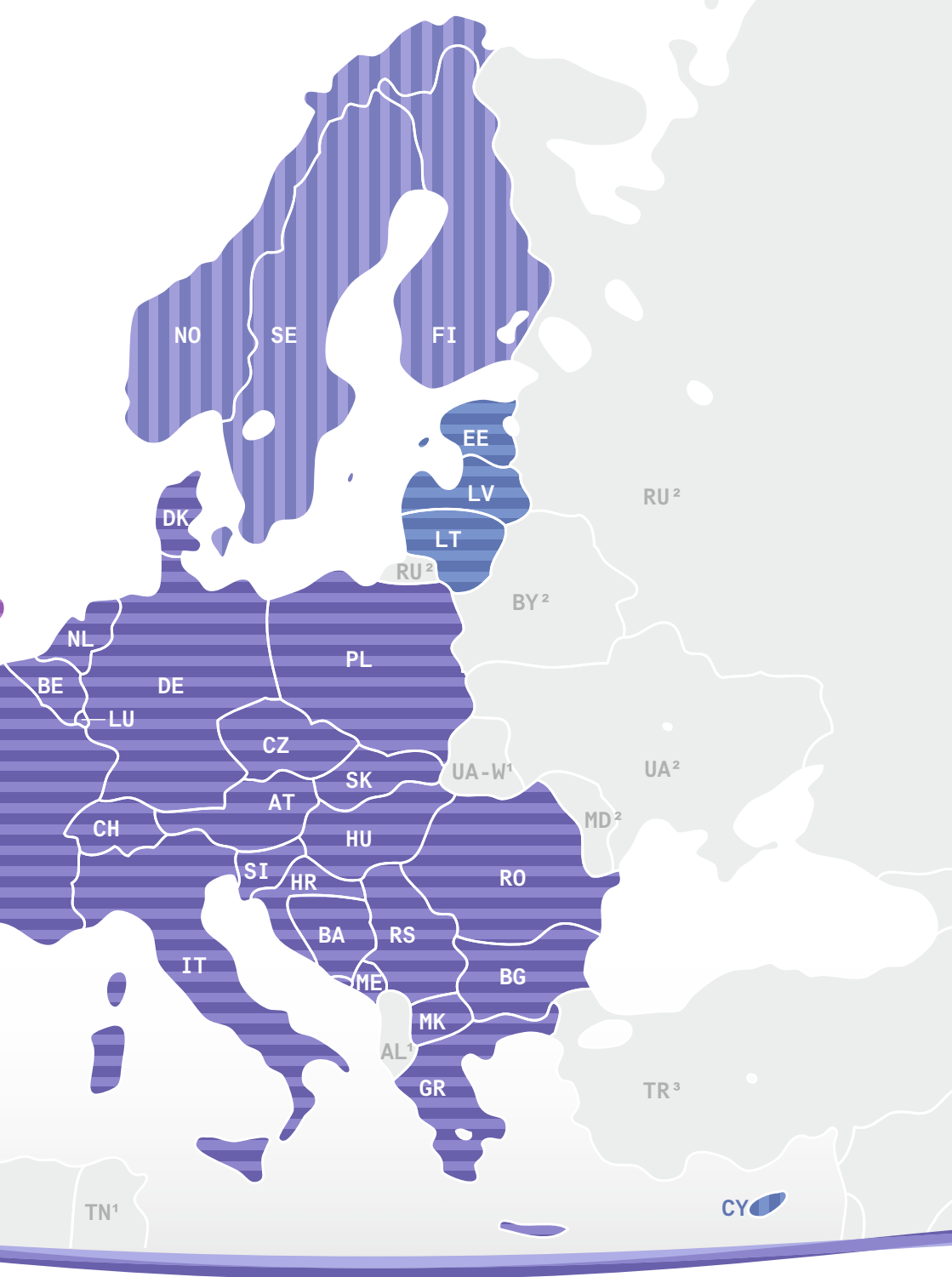
- Continental European synchronous area
- Baltic synchronous area
- Nordic synchronous area
- British synchronous area
- Irish synchronous area
- Isolated systems of Cyprus and Iceland

¹ synchronous with the continental European system
² synchronous with the Baltic system
³ from September 2010 planned trial parallel interconnection with the continental European system

The benefits of synchronous areas include:

- generation pooling, resulting in lower generation costs;
- common provisioning of reserves, resulting in cheaper reserve power costs (for instance in case of a disturbance or outage);
- mutual assistance in the event of disturbances.





MAJOR ENTSO-E PUBLICATIONS

Publication	Overview	Frequency
Annual Report 2013	The 2013 Annual Report highlights TSO cooperation and updates on the status of network codes, infrastructure development through the TYNDP, market integration and R&D.	Annually – Q2
Ten-Year Network Development Plan (TYNDP) 2014	The TYNDP provides information on pan-European investments in electricity transmission systems to support policy, generation and grid decision-making processes at regional and European levels.	Biennial – Q4, in even years
Yearly Statistics & Adequacy Retrospect 2012	The YS&AR report provides a range of figures on members' power systems – including production, consumption, cross-border exchanges & network components.	Annually – Q2
R&D Roadmap 2013–2022	The R&D Roadmap lays the groundwork for the upcoming electricity highways, smart grids and for the change to a low-carbon electricity system.	Every four years – Q1/Q2
Monthly Statistics Reports	ENTSO-E's Monthly Statistics provide basic figures on power systems of member TSOs, including production, consumption and cross-border exchanges.	Monthly
R&D Implementation Plan 2015–2017	The Implementation Plan defines short-term R&D activities and gives practical implementation details for the ensuing three years.	Annually – Q4
The ENTSO-E Annual Work Programme 2014–15	The Work Programme represents ENTSO-E's priorities and major deliverables.	Annually – Q4
Outlook Reports	The ENTSO-E Outlook Reports present the views of Europe's electricity TSOs regarding national or regional security of supply for the summer and winter periods.	Biannually – Q2 & Q4
European Transmission Tariffs	ENTSO-E's Overview of Transmission Tariffs in Europe analyses the design, structure and level of transmission tariffs in more than 30 countries.	Annually – Q3
Electricity in Europe	Electricity in Europe provides a brief analysis in text and graphics of the major provisional electricity transmission statistics and trends from the previous year.	Annually – Q2
R&D Monitoring Report	The Monitoring Report assesses the progress of TSO-related research and development (R&D) work within the R&D Roadmap 2013–2022.	Annually – Q4
Statistical Factsheet	The Statistical Factsheet provides updated essential information and data on ENTSO-E and its 41 member TSOs in a handy format.	Annually – Q2
Scenario Outlook & Adequacy Forecast	The Scenario Outlook & Adequacy Forecast analyses the mid- and long-term generation adequacy of the pan-European ENTSO-E interconnected power system.	Annually – Q2

ENTSO-E GOVERNANCE



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Major Projects:

www.entsoe.eu/major-projects/

Major Publications:

[www.entsoe.eu/publications/
major-publications/](http://www.entsoe.eu/publications/major-publications/)

Data Portal:

www.entsoe.eu/data/data-portal/

Central Transparency Platform:

www.entsoe.net/

Network Codes:

<http://networkcodes.entsoe.eu/>



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