ENTSO-E
DEAR READER,

The role of ENTSO-E is set to develop with the energy transition and the successes of European market integration. We believe that this calls for greater transparency. This is why we share this booklet with you. “ENTSO-E at a Glance” provides insights into our structure, our tasks, our ambitions, and our people.

Throughout our mandate and during the next years, we want to focus on the participation of renewables in the market, on the development of power regions, notably through regional security coordination initiatives, and on an incentivizing regulatory environment, particularly when it comes to the investments needed in grid infrastructure. We believe in markets, and we believe in customers. We want markets to drive the energy transition, and we want customers to become active participants in all markets.

We believe in transparency and in participation. During our mandate, we will improve further when needed, and disseminate results through the transparency platform and knowledge sharing, informing decision-makers and exchanging with stakeholders.

Not only the Internal Energy Market, but also the ambitious European Energy transition requires all efforts combined.

ENTSO-E is on board.

Chair of the Board – Bente Hagem, Statnett, Norway

President – Peder Andreasen, Energinet.dk, Denmark
WHAT IS ENTSO-E?

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

The role of Transmission System Operators has considerably evolved with the Third Energy Package. Due to unbundling and the liberalisation of the energy market, the transmission system has become the meeting place in which the various players interact. The importance of TSOs and of ENTSO-E’s work products for a well-functioning market, a reliable system and the success of energy policy keeps on growing.

ENTSO-E OBJECTIVES

ENTSO-E members share the objective of completing and ensuring the optimal functioning of the internal energy market. They also support the ambitious European energy and climate agenda. Important issues are the integration of a high degree of renewables in Europe’s energy system, the development of the correspondingly needed system flexibility, and a much more customer-centric approach than in the past.

ENTSO-E is committed to developing the most suitable responses to the challenge of a changing power system while maintaining security of supply. Innovation, a market-based approach, customer focus, stakeholder focus, security of supply, flexibility, and regional cooperation are key to ENTSO-E’s agenda.
ENTSO-E contributes to the achievement of these objectives through:

• policy proposals based on the European system viewpoint;
• the drafting of network codes and contributing to their implementation;
• strengthened and focused regional cooperation through the Regional Security Coordination Initiatives (RSCIs);
• technical cooperation between TSOs;
• the assessment of short- and long-term regional and pan-European system adequacy;
• the development of long-term pan-European network development plans (TYNDPs); and
• the coordination of research, development and innovation plans and activities and participation in European research programmes and Horizon 2020.

ENTSO-E is aware that such important tasks go hand in hand with a strong interaction with European institutions, ACER, and crucially with market participants and stakeholders. Transparency is therefore a key principle for ENTSO-E, and it requires constant listening, learning, and improvement in the interest of society at large.

WHY ENTSO-E?

ENTSO-E has been created to support the internal energy market and Europe’s energy transition. In the early 2000s, European 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. Additionally, EU leaders committed in March 2007 to the 2020 energy objectives. This was a turning point for the European power system and all market participants.

• 20% reduction in EU greenhouse gas emissions from 1990 levels;
• 20% share of EU energy consumption produced from renewable resources; and
• 20% improvement in the EU’s energy efficiency.

Ensuring security of supply, the completion of the internal energy market, and a significant increase in power generation from renewable energy sources and their integration required much closer European energy cooperation. Notably, cooperation needed to be reinforced at the level of transmission grid operators – the backbone of Europe’s electricity supply. To facilitate this, policy-makers therefore adopted the Third Energy Package in 2009, which in turn created the ENTSOs for electricity and gas (i.e., ENTSO-E and ENTSOG) and the Agency for the Cooperation of Energy Regulators (ACER). Since its creation, ENTSO-E’s legal mandates have increased continuously.
ENTSO-E’S LEGAL MANDATES

ENTSO-E is not just a European association. By EU regulation it has been given mandates to advance on the integration, decarbonisation and security of the European power systems and markets.

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 says that ENTSO-E is responsible for enhancing cooperation between its 41 members to assist in the development of a pan-European electricity transmission network supporting the following overarching objectives:

• secure and reliable operation of the increasingly complex network;
• facilitation of cross-border network development and the integration of renewables; and
• enhancement of the Internal Energy Market.

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

INTER-TSO COMPENSATION MECHANISM
Regulation (EU) 838/2010 on guidelines relating to the inter-TSO compensation mechanism sets out the methodology by which TSOs receive compensation for the costs incurred in 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.

TEN-E GUIDELINES
Regulation (EU) 347/2013 on guidelines for trans-European energy infrastructure, which came into force in April 2013, introduces European Projects of Common Interest (PCIs): 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 analysis methodology for the assessment of transmission infrastructure projects.
ELECTRICITY MARKET TRANSPARENCY REGULATION (EU) NO. 543/2013

The Transparency Regulation (EU) No. 543/2013 on submission and publication of data in electricity markets came into force in June 2013. This regulation makes it mandatory for European data providers and owners to submit fundamental information on electricity generation, load, transmission, balancing, outages, and congestion management for publication through the ENTSO-E Transparency Platform, which has been operational since January 2015.

The information published by ENTSO-E is collected from data providers such as TSOs, power exchanges, or other qualified third parties. The platform enables the provision of nearly real-time market information and thus facilitates the development of more transparent, liquid, efficient, and competitive electricity markets across Europe.

STAKEHOLDER ENGAGEMENT

Stakeholder contributions play an essential part in the development of all main ENTSO-E deliverables, including network codes, 10-year network development plans, scenario outlooks and adequacy forecasts, annual work programmes, and R&D roadmaps.

ENTSO-E is committed to listening to the concerns of customers, stakeholders, and other relevant parties, to strive to understand their needs, and to use stakeholders’ feedback as an important contribution for improving the quality of ENTSO-E work products.

Consultation with stakeholders is far more than a mandatory requirement – stakeholder expertise is indispensable to delivering well-critiqued and acceptable proposals. ENTSO-E is committed to taking into account the broadest range of views from stakeholders at an early stage of development of its products. The association engages on a regular basis with individual stakeholders and stakeholder groups through numerous informal meetings, formal web-based consultations, and workshops. ENTSO-E’s online consultation tool was chosen primarily for its user-friendliness. It allows stakeholders to easily contribute to the development of ENTSO-E’s deliverables.

ACER AND EU INSTITUTIONS

ENTSO-E is strongly committed to maintaining its close and productive working relationship with ACER and the EU institutions. On network codes, ENTSO-E wants to go further and engage with national regulators, Member States, and all stakeholders to ensure that network codes are well-understood and that all parties have the capacity to implement them successfully. The European Stakeholder Committees for network codes implementation, jointly set up with ACER, will be key in meeting this challenge.

Stakeholder engagement will continue to be the barometer helping ENTSO-E to fulfil its missions and functions in a way that maximises the competitiveness, sustainability, and security of the EU power system.
ENTSO-E BY NUMBERS

41 transmission system operators (TSOs)

across

34 European countries

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

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

423,586 GWh of electricity exchange between member TSOs in 2014

532 million customers served by the represented TSOs
3,174,2 tWh electricity consumption in 2014

312,693 km transmission lines managed by TSOs required to keep the lights on in Europe:

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

1,023,721 MW net generation capacity

This is nearly five 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 USA or China and one fifth of the world’s installed generation capacity³)

If laid out, these lines would circle the earth’s circumference more than seven times

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 WORK PRODUCTS

To fulfil its EU mandates ENTSO-E has developed a series of work products which go from network codes, ten-year network development plans, transparency platforms, research and development roadmaps. They are the results of joint work with EU institutions and stakeholders.

PAN-EUROPEAN TRANSMISSION NETWORK PLANS AND COST-BENEFIT ANALYSIS

ENTSO-E’s ten-year network development plan (TYNDP) identifies the investment needs for the pan-European electricity transmission system. The TYNDP package consists of the TYNDP report, six detailed regional investment plans, the scenario outlook and adequacy forecast (SO&AF).

The TYNDP ensures greater transparency regarding the entire European electricity transmission network. It aims at supporting decision-makers at regional and European levels. ENTSO-E’s TYNDP is the sole basis for the selection of EU projects of common interest (PCIs).

ENTSO-E updates the TYNDP every two years, continuously improving its methodology. For inclusion in the TYNDP, each project, whether transmission or storage, has to go through a cost-benefit analysis. The Europe-wide cost-benefit analysis methodology is developed by ENTSO-E in consultation with stakeholders and adopted by the European Commission. It assesses projects against socio-economic and environmental criteria. The cost-benefit analysis ensures that each project provides more benefits to EU citizens than they cost.

ADEQUACY FORECASTS

ENTSO-E publishes summer and winter generation outlooks, as well as a long-term system adequacy forecast, the Scenario Outlook & Adequacy Forecast (SO&AF).

The ENTSO-E outlook reports present the views of Europe’s TSOs regarding national, regional, and pan-European 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 system adequacy of the pan-European power system on the long-term time horizon.
ENTSO-E’s network codes are binding pan-European 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; and
- **market codes** facilitating and harmonising electricity trading across European borders.

Each code follows a similar process. ACER develops a framework guideline setting the policy choices for each code. On this basis, the codes are drafted by ENTSO-E following intense consultation with stakeholders. After ACER’s opinion and recommendation for adoption, each code is submitted to the European Commission for approval through the Comitology process, i.e., to be voted on by Member State representatives. Parliament and Council have three months to raise any objection. Following that network codes become EU law, directly binding and implemented across all Member States.

Alongside drafting the codes, TSOs have started early implementation of certain provisions of the codes. The consistent implementation of the codes across Europe will be the next challenge for the electricity sector as a whole.

**ENTSO-E TRANSPARENCY INFORMATION PLATFORM**

One of the key contributors to the achievement of the internal energy market is ENTSO-E’s Central Information Transparency Platform, which is in constant improvement since its launch in January 2015. The Transparency Platform provides free and equal access to fundamental data and information on pan-European wholesale energy generation transmission, and consumption. This contributes to providing a level playing field for all market participants.

Under REMIT’s transparency framework obligations, TSOs are required to disclose inside information in an effective, timely, and complete manner. TSOs have obligations to become more transparent by publishing simultaneous information on congestion management within one hour after real time as well as costs of and reasons for any actions undertaken.

The data from the Transparency Platform will further support and complement fundamental data gathering obligations under REMIT. The platform is intended to support an open, integrated, and transparent electricity market in line with the third energy package. The ENTSO-E Transparency Platform therefore has a key role to play in supporting the steady evolution of electricity markets across Europe in terms of integration, competition, liquidity, and transparency.

**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 the large uncertainties of the electricity system. The 2015 work programme includes sections on strategy and resources and puts ENTSO-E’s contributions in the wider context of Europe’s energy goals. Due to the importance of the network codes for the European electricity market and system, the work programme includes a separate network code chapter. Other chapters address R&D, system development, system operations, markets, and other activities.

**REGIONAL TSO COOPERATION**

TSOs have been cooperating in regions for many decades. This regional approach is the basis of most ENTSO-E activities, whether in operation, planning, or market issues. The TYNDP package includes six regional development plans. On the market side, TSOs have cooperated to create a common auction office for allocating cross-border transmission capacity (i.e., CAO, CASC). The regional and bottom-up approach is enabling progress on the implementation of the third package, including the network codes.

On operational security, ENTSO-E developed a range of tools including the ENTSO-E Awareness System (EAS) and the Regional Security Coordination Initiatives (RSCIs).
The EAS is an IT tool that provides a real-time view of the energy flows and state of the network across the whole of Europe. It is an essential collaborative tool for TSOs in 32 countries to increase European consumers’ security of supply.

Regional security coordination initiatives such as Coreso (Coordination of Electricity System Operators), SSC (Security Service Centre), TSC (Transmission System Operator Security Cooperation), SCC (Security Coordination Centre), MIBEL (Mercado Ibérico de Energía Eléctrica), and Nordic organisations improve the security of the overall network and maximise the transmission capacity available to market participants. In 2015, RSCIs covered close to three-quarters of Europe’s population.

**RESEARCH, DEVELOPMENT, AND INNOVATION (R&D)**

Innovation, which includes the three dimensions business model-, process-, and technology innovation, is vital for achieving the energy transition. ENTSO-E’s R&D Roadmap provides the ENTSO-E vision on grid projects to be carried out by TSOs to meet EU objectives. 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. The Implementation Plan also reflects on the upcoming needs and priorities of TSOs and other stakeholders. It also serves as the backdrop for developing calls for proposals under the European Energy Research and Innovation (EERI) Programme and 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, for example, on smart grids with EDSO for Smart Grids.

In addition to these publications, ENTSO-E publishes annually an R&D Monitoring Report that 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.

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

**ELECTRICITY DATA AND STATISTICS**

ENTSO-E collects and collates a wide range of data sets and figures on power systems of member TSOs, including production, consumption, cross-border exchanges, and network components. These are published on ENTSO-E’s Transparency Platform and in publications such as the Statistical Fact-sheet, Electricity in Europe, and the Yearly Statistics & Adequacy Retrospect.
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<thead>
<tr>
<th>Country</th>
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<td>Nezavisni operator sustava u Bosni i Hercegovini</td>
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<td>Elia System Operator SA</td>
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**WHAT 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. In the liberalized market context, transmission is the point of interaction for the various players. To ensure security of supply, TSOs also guarantee safe operation, maintenance, and 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).
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 that 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.

**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); and
- mutual assistance in the event of disturbances.
# KEY ENTSO-E PUBLICATIONS

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<th>Overview</th>
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<tr>
<td>Annual Work Programme</td>
<td>The Work Programme represents ENTSO-E’s priorities and major deliverables for the upcoming year.</td>
<td>Annually – Q4</td>
</tr>
<tr>
<td>Annual Report</td>
<td>The Annual Report reviews the work achieved on system development, operational security, market integration, and network codes drafting and implementation during the previous year.</td>
<td>Annually – Q1</td>
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<tr>
<td>Ten-Year Network Development Plan</td>
<td>The TYNDP provides information on needed pan-European investments in electricity transmission systems to support grid decision-making processes at regional and European levels.</td>
<td>Biennial – Q4, in even years</td>
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<tr>
<td>Scenario Outlook &amp; Adequacy Forecast</td>
<td>The Scenario Outlook &amp; Adequity Forecast analyses the mid- and long-term system adequacy of the pan-European interconnected system.</td>
<td>Annually – Q2</td>
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<tr>
<td>Outlook Reports</td>
<td>The ENTSO-E Outlook Reports present the views of Europe’s electricity TSOs regarding national, regional, and pan-European security of supply for the summer and winter periods.</td>
<td>Biannually – Q2/Q4</td>
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<tr>
<td>R&amp;D Roadmap</td>
<td>The R&amp;D Roadmap lays the groundwork for the upcoming electricity highways, smart grids, and the change to a low-carbon electricity system.</td>
<td>Every four years – Q1/Q2</td>
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<td>R&amp;D Implementation Plan</td>
<td>The Implementation Plan defines short-term R&amp;D activities and gives practical implementation details for the next three years.</td>
<td>Annually – Q1/Q2</td>
</tr>
<tr>
<td>R&amp;D Application Report</td>
<td>The R&amp;D Application Report analyses the concrete impact of TSOs’ R&amp;D projects.</td>
<td>Biannually – Q1/Q2, in odd years</td>
</tr>
<tr>
<td>Electricity in Europe</td>
<td>Electricity in Europe provides a brief analysis in text and graphics of the major provisional electricity transmission statistics and trends from the previous year.</td>
<td>Annually – Q2</td>
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<tr>
<td>Statistical Factsheet</td>
<td>The Statistical Factsheet provides key data and information and data on ENTSO-E and its 41 member TSOs in a handy format.</td>
<td>Annually – Q2</td>
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<td>Monthly Statistics Reports</td>
<td>ENTSO-E’s Monthly Statistics provide basic figures on power systems of member TSOs, including production, consumption, and cross-border exchanges.</td>
<td>Monthly</td>
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<tr>
<td>Yearly Statistics &amp; Adequacy Retrospect</td>
<td>The YSAR report provides a range of figures on members’ power systems, including production, consumption, cross-border exchanges, and network components.</td>
<td>Annually – Q2</td>
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<tr>
<td>European Transmission Tariffs</td>
<td>ENTSO-E’s Overview of Transmission Tariffs in Europe analyses the design, structure, and level of transmission tariffs in more than 30 countries.</td>
<td>Annually – Q3</td>
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</table>
ENTSO-E is an international non-profit association (AISBL) established according to Belgian law. The highest body of ENTSO-E is the Assembly, which comprises of representatives at CEO level of all the currently 41 members. The Assembly meets four times a year. ENTSO-E is financed by its members. The member TSOs contribute to the budget according to the number of countries and the population they served.
ENTSO-E BOARD

The ENTSO-E Board is elected every two years from the overall membership and through the Assembly. It includes 12 representatives. The president, vice-president, and committee chairs are invited to board meetings.

The board coordinates the committees and the Legal and Regulatory Group work and implements Assembly decisions. It adopts position papers within the framework of the general strategy of the association adopted by the Assembly. It meets approximately six times a year.

President
Peder Andreasen,
Energinet, Denmark

Vice-President
Matteo del Fante
Terna, Italy

Chair of the Board
Bente Hagen,
Statnett, Norway

Vice-Chair of the Board
Ben Voorhorst, TenneT TSO B.V., The Netherlands

Member of the Board
Zbyněk Boldiš,
ČEPS, Czech Republic

Member of the Board
Kamilla Csomai,
MAVIR, Hungary

Member of the Board
Thomas Karall,
APG, Austria

Member of the Board
Klaus Kleinekorte,
Amprion, Germany

Member of the Board
Jukka Ruusunen,
Fingrid, Finland

Member of the Board
Piotr Rak,
PSE, Poland

Member of the Board
Andrés Seco,
REE, Spain

Member of the Board
Jean Verseille,
RTE, France

Member of the Board
Thomas Tillwicks,
Swissgrid, Switzerland
ENTSO-E has established four specialised committees comprised of managers from member TSOs. Each committee leads a number of regional groups and working groups. TSOs cooperate through ENTSO-E committees on different electricity policy issues.

The ENTSO-E Committee structure reflects its contributions to the four main EU energy policy goals:

<table>
<thead>
<tr>
<th>EU policy goal</th>
<th>ENTSO-E committee’s mission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contributing to the development of a strong and adequate grid</td>
<td>The System Development Committee coordinates at European and regional levels the network development and prepares the ten-year network development plans, the Regional Investment Plans, and adequacy forecasts. It also drafts connection network codes.</td>
</tr>
<tr>
<td>2. Guaranteeing secure and reliable power system operations</td>
<td>The System Operations Committee is in charge of technical and operational standards, including operational network codes and power system quality. It ensures compliance monitoring and develops tools for data exchange, network models, and forecasts.</td>
</tr>
<tr>
<td>3. Promoting a fully developed internal electricity market</td>
<td>The Market Committee works towards an integrated and seamless European electricity market and is in charge of methods for cross-border congestion management, integration of balancing markets, ancillary services, and the inter-TSO compensation mechanism, including market network codes.</td>
</tr>
<tr>
<td>4. Ensuring the ambitious use of innovation</td>
<td>The Research &amp; Development Committee ensures the effective implementation of ENTSO-E’s mandate in the area of innovation and R&amp;D, largely focusing on strong and smart grids and the empowerment of customers and prosumers.</td>
</tr>
</tbody>
</table>

At the same level as the four committees, the transversal Legal & Regulatory Group advises all ENTSO-E bodies on legal and regulatory issues. In addition, expert groups on data, network codes implementation, and EU affairs provide specific expertise and work products to the association.

Chair of the System Operations Committee
Joachim Vanzetta, Amprion

Chair of the System Development Committee
Sebastien Lepy, RTE

Chair of the R&D Committee
Carlo Sabelli, Terna

Chair of the Market Committee
Pascale Fonck, Elia

Chair of the Legal and Regulatory Group
Milan Roman, SEPS
THE ENTSO-E SECRETARIAT  ITS ROLE AND STRUCTURE

ENTSO-E’s Secretariat is based in Brussels. The Secretariat employs 69 permanent staff members. It is headed by the Secretary General and represents ENTSO-E to the European institutions, regulators, and stakeholders. Together with the board, the Assembly, the committees, and the LRG, the Secretariat develops the deliverables described above. Through its support of the ENTSO-E bodies and working groups, the Secretariat ensures a smooth and effective functioning of the association’s work.

An important task of the Secretariat is ensuring that ENTSO-E work products reflect European policy directions and stakeholder concerns, which the Secretariat aims to understand particularly well due to its location in Brussels and communication and policy expertise. The Secretariat is organised along the committee structure, with thematic and horizontal sections headed by managers and supported by advisors and coordinators.
CONTACT ENTSO-E

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