



How can
Elia ensure
that our
industry
remains
competitive
with other
countries?

**PIETER TIMMERMANS,
CEO OF THE FEDERATION OF
ENTERPRISES IN BELGIUM (FEB)**



– CHIEF EXECUTIVE OFFICER OF
VBO/FEB SINCE 2012
– VBO/FEB IS A MULTI-SECTOR
EMPLOYERS' ORGANISATION
REPRESENTING 50,000
BUSINESSES



**JAMES MATTHYS-DONNADIEU,
HEAD OF MARKET DEVELOPMENT AT ELIA**

If we want Belgian companies to remain competitive, our electricity price must be comparable to that of neighbouring countries. While our industries are energy-efficient, they are more energy-intensive than those of our neighbours. As well as the various taxes and surcharges, the electron price and transmission tariffs are key factors. Securing an identical electron price to those of neighbouring countries is an objective in itself. The capacity available at the borders at any given time is the primary determinant for this price.

“The Belgian electricity market is linked to markets in neighbouring countries via interconnectors. This means that we can always use the most efficient generating facilities to meet demand, regardless of whether they are in Belgium or abroad. The desired outcome is convergence between the Belgian electricity price and those of neighbouring countries.

Elia is playing an active role in designing the electricity system of the future to ensure that it remains reliable, sustainable and competitive against the backdrop of the energy transition. Our recent study ‘Electricity Scenarios for Belgium towards 2050’ is a tangible example of this.”



We develop the electricity system and markets

Given the growth in renewable energies and their highly volatile generation, greater flexibility is needed within the electricity system to maintain a constant balance between supply and demand. Digitalisation and the latest technologies offer market players new opportunities to optimise their electricity management by selling their surplus energy or temporarily reducing consumption (demand flexibility). By opening up the market to new players and technologies, Elia aims to boost the security of supply, while also making market prices more competitive.

Developing these cross-border balancing mechanisms requires greater cooperation and coordination at the national and supranational levels, as well as an appropriate legislative framework. To achieve this, Elia ensures that every market player has transparent, non-discriminatory access to the grid.

Elia wants to facilitate further market coupling, both in terms of distribution and at European level. We give new players and technologies a chance by innovating in our systems and by introducing new market products.



PASCALE FONCK,
CHIEF EXTERNAL RELATIONS OFFICER
AT ELIA

“IN ADDITION TO AN AMBITIOUS CHANGE PROGRAMME ADAPTED TO THE RAPIDLY EVOLVING ENVIRONMENT, WE ALSO REFLECT ON HOW TO MANAGE THE SCHEDULED NUCLEAR PHASE-OUT BY 2025 AND THE POSSIBLE TRANSITION SCENARIOS FROM A MARKET AND SYSTEM PERSPECTIVE.”



PATRICK DE LEENER,
CHIEF CUSTOMERS, MARKETS
& SYSTEM OFFICER AT ELIA

“IN 2017, ELIA AND THE DISTRIBUTION SYSTEM OPERATORS CARRIED OUT A PILOT PROJECT TO INTEGRATE FLEXIBILITY AT THE DISTRIBUTION LEVEL INTO SYSTEM OPERATION. THE LAUNCH OF THIS COOPERATION IS VITAL AGAINST THE BACKDROP OF INCREASING RENEWABLE ENERGY AND THE ASSOCIATED VARIABILITY.”

Our ambitions

Towards an integrated market

Making transmission capacity available to market players across international borders is a source of added economic value for the community as a whole. It makes energy markets more accessible and thus more competitive, as there is less of a focus on national markets. Consumers can access the cheapest energy wherever it is available.

Harmonising electricity market rules across Europe

Initiated by the European Commission, the European network codes are drawn up on the basis of proposals by the European transmission system operators and are designed to provide the energy market with a common legislative framework applicable to all Member States.

The European Union (EU) is keen to strengthen the strategies in place to make the pan-European energy market a reliable, competitive and low-carbon sector. Furthermore, each network code forms an integral part of the drive to create a single energy market and to achieve the EU's 20-20-20 goals.

Our expertise at the community's service

Elia is an active member of a number of national and European working groups and gladly makes its expertise available to help plan the energy system of the future. We regularly conduct in-depth studies to enable us to give sound advice about the electricity system's needs. Moreover, Elia is highly customer-oriented and sets up specialised working groups in order to gain a better insight into market players' needs and requirements and to identify the best solutions.

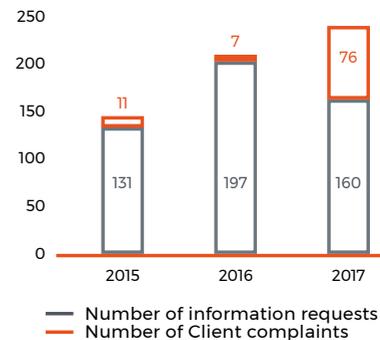


OBJECTIVES

We give every player access to the energy markets, regardless of their size, the kind of technology they deploy and their role in the market, so that they can fully exploit the economic benefits:

- Redesigning the Belgian balancing market to encompass all kinds of technologies and market players, independently from the grid they are connected to
- Integrating Belgium into a wider European balancing market

CLIENT INFORMATION AND COMPLAINTS REQUESTS (BELGIUM)



What we achieved in 2017

Real-time balancing on a day-to-day basis

To make sure the grid runs smoothly 24 hours a day, the operators activate the regulation tools needed to ensure that the grid remains balanced at all times, which resulted in a grid reliability rate of 99.999% in 2017. They have access to reserves to manage the electricity grid, commonly referred to as 'ancillary services'. These reserves contribute to maintaining the frequency and voltage on the grid, managing congestion and balancing generation and consumption in real time.

The control centre coordinates energy flows on the grids, in close cooperation with international coordination centres (such as Coreso and TSCNET) and transmission system operators in neighbouring countries. The reliability of the electricity grid and the country's security of supply depend on their collaboration.



KRISTIEN CLEMENT-NYNS,
ANCILLARY SERVICES MANAGER
AT ELIA

“OUR AIM IS TO OPEN UP OUR BALANCING MARKET FOR NEW PLAYERS AND NEW TECHNOLOGIES BY INNOVATION IN OUR SYSTEMS AND MARKET PRODUCTS. THEREFORE WE HAVE EMBARKED ON AN AMBITIOUS CHANGE PROGRAMME FOR THE BALANCING MARKET.”

THERE ARE THREE DIFFERENT SERVICES FOR KEEPING THE GRID BALANCED:

1

**Primary reserve
FCR**

Frequency Containment Reserve (FCR) or primary reserve

Activated upwards and downwards automatically and on a continuous basis, almost instantly (within 0 to 30 seconds), as required to stabilise the frequency of the European grid. In the event of a deviation, all of Europe's transmission system operators work together, enabling them to provide enough power to cover two concurrent serious incidents (e.g. the loss of two 1,500 MW generation units) within 15 minutes. This reserve is supplied by generation units or offtake sites.

2

**Secondary reserve
AFFR**

Automatic Frequency Restoration Reserve (aFRR) or secondary reserve

Activated upwards and downwards automatically and on a continuous basis, in a timeframe of 30 seconds to 15 minutes, as required to handle sudden imbalances in the area managed by Elia. It is supplied by generation units.

3

**Tertiary reserve
MFRR**

Manual Frequency Restoration Reserve (mFRR) or tertiary reserve

Can be activated upwards manually at Elia's request. It is used to address a major imbalance in the area managed by Elia and/or to deal with congestion problems. There are several types of tertiary reserve and the reserve can be supplied by generation units or offtake sites.



Extension of the primary control market to include new technologies

On 1 May 2017, Elia introduced a new contractual framework governing the provision of the primary frequency control service (FCR or R1). This allows new technologies such as batteries and decentralised generation to participate in grid balancing. This development is in keeping with the multiannual development plan drawn up by Elia in 2016 in close collaboration with the relevant distribution system operators and market players, following changes to Belgium's generating facilities.

Integration of non-CIPU units into the secondary reserve

Since mid-2016, Elia has been examining the feasibility of integrating units, other than large gas-fired generation units, into the secondary reserve and opening participation to units of various sizes, fuelled by diverse technologies (e.g. biogas, cogeneration, heat pumps).

In 2017, Elia carried out a pilot project entitled 'R2 Non-CIPU' in collaboration with Actility, EDF Luminus and Next Kraftwerke. The results of this project suggested it would be beneficial for the aFRR

(automatic Frequency Restoration Reserves or secondary reserve) market to be opened up to non-CIPU flexibility. Elia will develop a new design proposal for the aFRR including a technical and economic assessment of energy transfer implementation. This will be presented for stakeholder consultation in 2018.

Extension of the current secondary reserve market

Elia conducted a study on the possible extension of the current secondary reserve market. After presenting the different scenarios and undertaking a stakeholder survey, it put forward an implementation proposal in early March 2017, based on market feedback.

Previously, the secondary market was restricted to certain scenarios: for day-ahead it was only open to CIPU units and, for intraday, only if those CIPU units suffered an outage.

After consulting stakeholders, Elia suggested opening up the secondary market to all units (CIPU and non-CIPU) and in all circumstances (outage or otherwise) from 31 December 2017.

This opening of the market clearly adds value and will allow Belgium to become one of the frontrunners in Europe in terms of the exchange of reserves.

Study on dynamic dimensioning of reserve needs

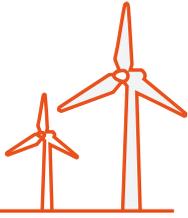
In October 2017, Elia unveiled a new method to 'dynamically' size balancing reserve needs in near-real time based on day-ahead predicted system conditions, including offshore and onshore wind power, solar photovoltaics, electricity demand, power plant schedules and transmission assets.

The study demonstrates that the proposed alternative methodology improves the reliability and efficiency of reserve procurement, particularly in future systems with increasing renewable generation. The actual application of dynamic dimensioning is subject to a follow-up study on dynamic ('daily') procurement of the tertiary reserve in 2018.

Study on the pricing methodology used for the settlement of activated balancing energy

Elia analysed the advantages and disadvantages of moving to a 'paid-as-cleared' methodology earlier than planned under EU legislation. The new methodology aims to introduce a better market dynamic. Elia also set out an implementation plan and undertook a cost-benefit analysis.

Based on an initial estimate, the study concludes that the new pricing methodology could be implemented for mFRR in the second half of 2019 at the earliest, and for aFRR in late 2020 at the earliest, provided that there is sufficient liquidity in the relevant markets. This estimate is liable to change based on further analysis and a detailed project schedule, as well as other priorities set by Elia, CREG and other market players.



Strategic reserve

WHAT IS IT?

The strategic reserve is a concept that was implemented for the first time during the winter of 2014-2015. It is designed to address the structural shortage of installed generation capacity in Belgium brought about by the temporary or permanent shutdown of power stations (for either economic or technical reasons). The reserve is intended to help maintain security of supply during the winter period.

Ahead of each winter period and on the instructions of the Energy Minister, Elia organises a call for tenders for power stations that have announced that they will be shutting down and for demand-side managers.

The reserve capacity established may be activated during the period from 1 November to 31 March; it may not be used for any other purpose. Each year, strategic reserve demand is assessed for the following winter.

WHEN IS IT ACTIVATED?

The strategic reserve is activated where a 'structural capacity deficit' is identified (according to economic or technical criteria) based on market forecasts or other information available to Elia the day ahead of a given day or several hours in advance.

In 2017 the Belgian and European authorities have been in contact to investigate if the Belgian mechanism of strategic reserve is compatible with the applicable EU State aid rules, and in particular with the 'Guidelines on State aid for environmental protection and energy 2014 - 2020' (EEAG).

Even though there is not yet a final, public decision from the European authorities, Elia and CREG have been formally informed of the commitments that the Federal Minister of Energy has taken towards the European Commission with the aim of obtaining a positive final decision. To the extent possible, these commitments have already been taken into account for the next winter period 2018-2019.



The strategic reserve for winter 2017-2018

In line with the Electricity Act, Elia conducts an annual probabilistic analysis of Belgium's security of supply for the next winter by 15 November. This analysis, together with the opinion of DG Energy, is an important element to be taken into account by the Federal Minister for Energy to decide on the need for a volume of strategic reserve. On 15 January 2018 the Federal Minister of Energy instructed Elia to constitute a reserve of 500 MW for this winter (2018-19).



SITUATION ON THE GRID DURING THE COLD SPELL

"During the winter of 2016-2017, a period of cold weather in Belgium and France led Elia to consider activating the strategic reserve in mid-January 2017. In the end this didn't happen as weather conditions in France improved. Working in close coordination with other European transmission system operators, Elia managed to maintain security of supply without having to activate the strategic reserve. In Belgium, the various market players made every effort to ensure optimal generating facilities and to keep their customer portfolios balanced."

Kristof Sleurs, Head of Operations NCC at Elia





**HANS VANDENBROUCKE,
HEAD OF THE BELGIAN MARKET
MODEL TEAM AT ELIA**

“BIDLADDER ALLOWS SMALLER UNITS TO PARTICIPATE IN FLEXIBILITY. UNTIL NOW, THIS WAS ONLY POSSIBLE FOR UNITS WITH A MINIMUM CAPACITY OF 25 MW. BIDLADDER OPENS UP THE BALANCING MARKET TO THE DEMAND SIDE AND DECENTRALISED GENERATION, THEREBY LEVERAGING THEIR FLEXIBILITY. THIS IN TURN, MEANS GREATER LIQUIDITY FOR ELIA.”



The DataHub project FACILITATING FLEXIBILITY EXCHANGES WITH DISTRIBUTION SYSTEM OPERATORS

On 1 January 2018, Elia and the distribution system operators (DSOs) launched a joint platform called T-DSO DataHub for exchanging data between them. This is needed for the verification and settlement of the flexibility volumes activated at Elia's request, as part of the ancillary services designed to manage grid balance. T-DSO DataHub enables all market players and grid users to offer flexibility to Elia.

Its development follows the launch, in late June 2017, of BidLadder, a platform allowing market players to provide Elia with all the flexibility they have in their portfolio. To open BidLadder to the distribution system, Elia and the DSOs needed a tool to facilitate these data exchanges. DataHub is that tool.

The BidLadder project ENABLING MARKET PLAYERS TO PUT AVAILABLE FLEXIBILITY ON THE MARKET

BidLadder is a market platform set up by Elia that has been operational since September 2017. It allows all market players to offer their flexibility on a daily basis to keep the grid balanced, regardless of the voltage level they are connected to and the technology they use (generation or demand-side management). This means that smaller units can participate with a high degree of flexibility. Until now, only large generation units with an installed capacity of at least 25 MW could offer their available energy, whereas smaller generation units and demand flexibility were excluded. The platform has been operational since September 2017 for customers connected to the Elia grid, and will be available for the distribution system in early 2018.

Elia will facilitate data exchange within BidLadder by means of the DataHub platform, developed in collaboration with distribution system operators.

Extension of the flow-based method

Elia is currently working to extend the flow-based method to include intraday for the Central West Europe (CWE) region. In August 2015, the flow-based method was launched for only day-ahead. Elia is also seeking to extend the flow-based formula for the Eastern European (CORE) regions, in order to comply with the guidelines set out in the network codes.

Up to that point, international electricity exchanges in the CWE region had been governed by the transmission capacity available at each border.

The flow-based model is based on a more detailed simulation of network components and enables capacity to be allocated by high-voltage connection rather than by border. This more complex, but more accurate system, provides market players with more detailed information and offers them a wider range of import and export options.

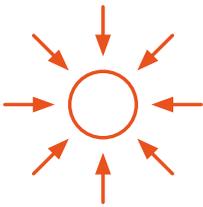




The ENCODE project IMPLEMENTATION OF EUROPEAN NETWORK CODES

In Belgium, Elia launched the ENCODE project designed to implement the EU network codes at national level and, at the request of the federal energy authorities, initiated consultations with market players via the Elia Users' Group on the main aspects associated with implementing the codes.

The aim is to submit a proposal for the amendment of the Federal Grid Code in May 2018 and, later in the year other proposals, based on the network codes, to the relevant authorities. All these proposal submissions will be preceded by public consultations organised by Elia.



The MARI and PICASSO projects

BALANCING MARKET INTEGRATION

Elia signed two Memoranda of Understanding in 2017 related to the integration of the balancing markets. The MARI and PICASSO projects anticipated the EU Guideline on Electricity Balancing coming into force.

– **The MARI project** - In early April 2017, as part of the MARI project, 19 European transmission system operators (TSOs) signed a Memorandum of Understanding for the design, implementation and operation of a new platform for the exchange of balancing energy from Frequency Restoration Reserves with manual activation or mFRR (R3 - tertiary reserves).

– **The PICASSO project** - In July 2017, as part of the PICASSO project, eight TSOs signed a Memorandum of Understanding for the design, implementation and operation of a platform for common activation of balancing energy from automatic Frequency Restoration Reserves or aFRR (R2 - secondary reserves). The TSOs ensured that market players were involved early on in the design phase of these integrated markets, with public consultations launched in late 2017 to gather input from market participants. Under EU regulations, these platforms should be up and running no later than the end of 2021.



**SILVIO FERREIRA,
PROJECT MANAGER AT ELIA**

“ELIA'S NEW CALCULATION PLATFORM, POWERFACTORY, IS FLEXIBLE AND WILL MAKE IT EASIER TO DEVELOP NEW PROCESSES FOR COPING WITH FUTURE CHALLENGES RELATING TO GRID SECURITY OR CAPACITY CALCULATIONS (DYNAMIC AND VOLTAGE STABILITY, INTRODUCTION OF HVDC, ETC.).”

The iCAROS project

COORDINATION OF ELECTRICAL INSTALLATIONS

In a rapidly changing environment, Elia is reviewing its processes for coordinating the electrical installations of grid users (currently governed by the CIPU contract). As part of this review, it launched the iCAROS project (Integrated Coordination of Assets for Redispatching and Operational Security) in 2017. This will enable the implementation of new operational data exchanges for the coordination of electrical installations and the management of congestion risks, as well as the new roles required by the European Guideline on Electricity Transmission System Operation.

Elia issued a design note in 2017, which it put out for consultation in early December. In 2018, it will publish a new version of this note taking into account the feedback from market players, with a view to preparing the implementation.



The Loftie project

IMPROVING GRID SIMULATIONS

Running grid simulations requires even more advanced tools as well as a grid model management integrating forecasts from one day to ten years ahead. New data and IT architecture has been developed and implemented within Elia to enable the relevant departments to perform all their analyses in a more modern and flexible environment.

The Loftie project (Load Flow Tools and Insourcing of Expertise) was launched in 2014. The new PowerFactory tool was phased into service in 2017. It enables the incorporation of changes in the business processes of the operational planning and grid development departments, namely the modelling of renewable generation and medium-voltage substations (DSOs), increased automation to enable more scenarios to be implemented, and compatibility with the new ENTSO-E codes and standards.

Operational planning migrated to PowerFactory in several phases, starting with weekly planning in June 2017. Daily planning was migrated in November 2017.

The next goal for Loftie in 2018 will be to fully model renewable generation in operational planning's security calcu-

lations. This major change will make it possible to move towards the conditional weekly planning of multi-scenario outages, while improving the quality of the daily planning simulations.

Our expertise at society's service

STUDY ON THE FUTURE OF THE BELGIAN ENERGY SYSTEM

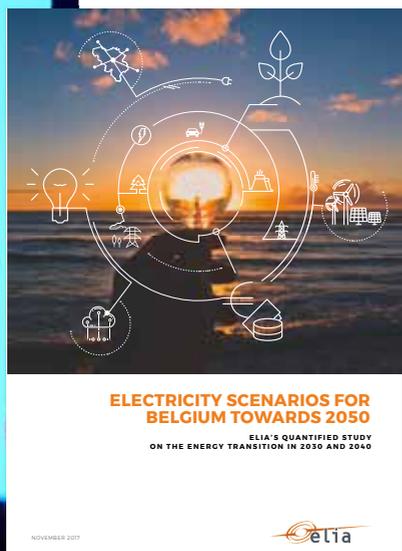
In a new study on the future of the Belgian energy system, published in November 2017, Elia calls on the Belgian authorities to take swift action. 'Electricity Scenarios for Belgium towards 2050' argues that it is high time to make decisions that will safeguard the Belgian energy system and the country's welfare and prosperity. The rapid and fundamental changes brought about by the energy transition create new needs and requirements and there is the additional challenge of the 2025 nuclear exit required by law. In addition to the many challenges, Elia's study also describes the industrial opportunities for Belgium as Europe's 'Energy Roundabout'.

Elia published the report to support policymakers working on an inter-federal Energy Pact. It looked at both the short term (statutory closure of all Belgian power stations in 2025) and longer term (achieving the COP 21 climate standards by 2050).

The study triggered a lively public debate in Belgium and is still widely regarded as a landmark document. Among other things, Elia noted that the replacement capacity for nuclear energy in 2025 would not come from nowhere and that 3.6 GW of flexible thermal power plants would be needed – with a support mechanism – to absorb the shock of the nuclear exit.

The study also showed that additional interconnectors are a 'no regrets' option. They contribute towards the achievement of Belgium's climate goals and offer the best guarantee for ensuring prices that are competitive compared to neighbouring countries. Additional interconnectors also bring industrial opportunities for our domestic generation market: Belgium can establish itself as a first mover to realise the concept of the Energy Roundabout within a European context.

The future study was presented in detail at Elia's annual Stakeholders' Day on 17 November 2017. The report was discussed in advance with numerous market players and interest groups and enjoyed widespread support in the sector when launched.



ROXANNE VANDE ZANDE,
GRID CODES AND REGULATED CONTRACTS
MANAGER AT ELIA

"OUR STUDY WAS AN EYE-OPENER FOR BOTH THE SECTOR AND POLICYMAKERS. WE SHOWED THAT NEW CAPACITY WILL BE NEEDED IN EVERY FUTURE SCENARIO, INCLUDING A PARTIAL NUCLEAR EXTENSION. BY DOING NOTHING, BELGIUM WOULD ALMOST AUTOMATICALLY END UP IN A DOOMSDAY SCENARIO FROM 2025, IN WHICH AT LEAST 4 GW OF NUCLEAR CAPACITY WOULD HAVE TO BE EXTENDED AT SHORT NOTICE OR THERE WOULD BE SERIOUS SUPPLY ISSUES FOR YEARS TO COME, RESULTING IN SIGNIFICANT ECONOMIC DAMAGE TO THE COUNTRY."

Rewenables Grid Initiative

Since 2011, Elia has been a member of the Renewables Grid Initiative (RGI), a coalition of environmental organisations (such as the WWF and Birdlife) and system operators. Their shared aim is to generate consensus around the grid expansion needed to integrate renewables, while respecting biodiversity and the environment.

In 2017, RGI organised a number of webinars and workshops on community compensation measures and improving public acceptance by undergrounding high-voltage lines. In addition, various workshops were held to help the NGOs understand how transmission system operators develop and expand their networks, which led to a greater appreciation of the many obstacles that TSOs face.



Global Energy Interconnection Development and Cooperation Organisation

In November 2017, the Elia Group, via Elia Grid International, joined the Global Energy Interconnection Development and Cooperation Organisation (GEIDCO), an international body based in China. GEIDCO facilitates and promotes the establishment of a global system of energy interconnections. It does this by compiling development plans and proposals for technical standards with the help of industry experts.

The Elia Group wishes to contribute its expertise to this international initiative for the development of interconnections.



OUR COLLEAGUES IN ENERGY ASSOCIATIONS

Elia is committed to cooperating and maintaining good relationships with all market players. This is helped by the fact that some of our managers are members of sectoral organisations. Pascale Fonck, Elia's Chief External Relations Officer, became an ENTSO-E Board Member in June 2017. Patrick De Leener, now Chief Customers, Market & System Officer at Elia, was CEO of Coreso until November 2016, while Jan Van Roost, formerly Head of Settlement, Metering & Data Reporting at Elia, has held the position of Coreso COO since August 2017. Cécile Pellegrin, Elia's Head of Network Operations, has been Head of Development at Coreso since August 2017.





WHAT HAPPENED AT 50HERTZ?

WindNODE



The WindNODE project got under way in January 2017 with an initial consortium meeting at 50Hertz's Netzquartier building attended by all partners. WindNODE is a joint research project in which over 70 partners are coming together to develop new decentralised and sustainable solutions for the energy transition. The goal is to efficiently integrate large quantities of renewable electricity into the energy system while keeping power grids stable. WindNODE will use the possibilities offered by digitalisation to create a smart energy system and allow the coordinated operation of many different partners in a decentralised system.

Berlin Energy Transition Dialogue

In March 2017, Elia and 50Hertz were jointly represented at the third Berlin Energy Transition Dialogue, a German federal government organisation. The Elia Group supported a number of sessions at the two-day event, where we demonstrated our experience in integrating renewable energy and explained how the transmission system needs to be modified to cater for this.



BORIS SCHUCHT,
CEO 50HERTZ

"RENEWABLE ENERGY SOURCES HAVE EVOLVED INTO A DOMINANT SOURCE OF ENERGY, PARTICULARLY IN OUR CONTROL AREA. INNOVATION AND SMART GRID CONTROL ARE ESSENTIAL FOR ENSURING THAT RENEWABLE ENERGY IS INTEGRATED SAFELY AND EFFICIENTLY. WINDNODE COMBINES BOTH OBJECTIVES."



Roundtable for Europe's Energy Forum

On 18 October, 50Hertz's CEO Boris Schucht took part in an open discussion in Brussels on the future operation of the European electricity system as part of the Clean Energy Package. In a joint effort with other European transmission system operators, the Regional Energy Forum (REF) model was presented to Maroš Šefcovic, the European Commissioner for Energy Union. These REFs could improve coordination between existing Regional Security Centres (RSCs) such as Coreso and TSCNET.

