ANNUAL REPORT 2011

COMPLETING THE INTERNAL ELECTRICITY MARKET BY 2014

THE CHALLENGES FOR EUROPE'S TRANSMISSION SYSTEM

European Network of
Transmission System Operators
for Electricity

entsoe

CONTENTS

ENTSO-E's MISSION

ENTSO-E's role is to enhance cooperation between 41 national electricity TSOs from 34 countries across Europe in order to assist in the development of a pan-European electricity transmission network in line with European Union energy goals. Its specific aims are to:

- ensure the secure and reliable operation of the increasingly complex network;
- facilitate cross-border network development and the integration of new renewable sources of energy;
- enhance the creation of the Internal Electricity Market (IEM) through standardized market integration and transparency procedures.

ENTSO-E is responsible for creating common network operational tools (network codes), a Ten-Year Network Development Plan, recommendations for the coordination of technical cooperation between TSOs within the EU, and annual outlooks for summer and winter electricity generation.

NETWORK CODES

ENTSO-E network codes follow framework guidelines defined by ACER, the Agency for the Cooperation of Energy Regulators. They set out the rules for network operation, development and market integration, covering topics such as operational security and reliability, capacity allocation and congestion management, and network connection requirements. The codes are subject to transparent public consultation followed by input from EU Member States and the EU Parliament via the Comitology process before becoming legally binding on all market participants.

NETWORK DEVELOPMENT PLAN

A non-binding Community-wide Ten-Year Network Development Plan (TYNDP) is developed every two years. The plan covers models of the integrated network, scenario development, a European generation adequacy outlook and an assessment of the resilience of the network. Regional investment plans (RIPs) complement the TYNDP.

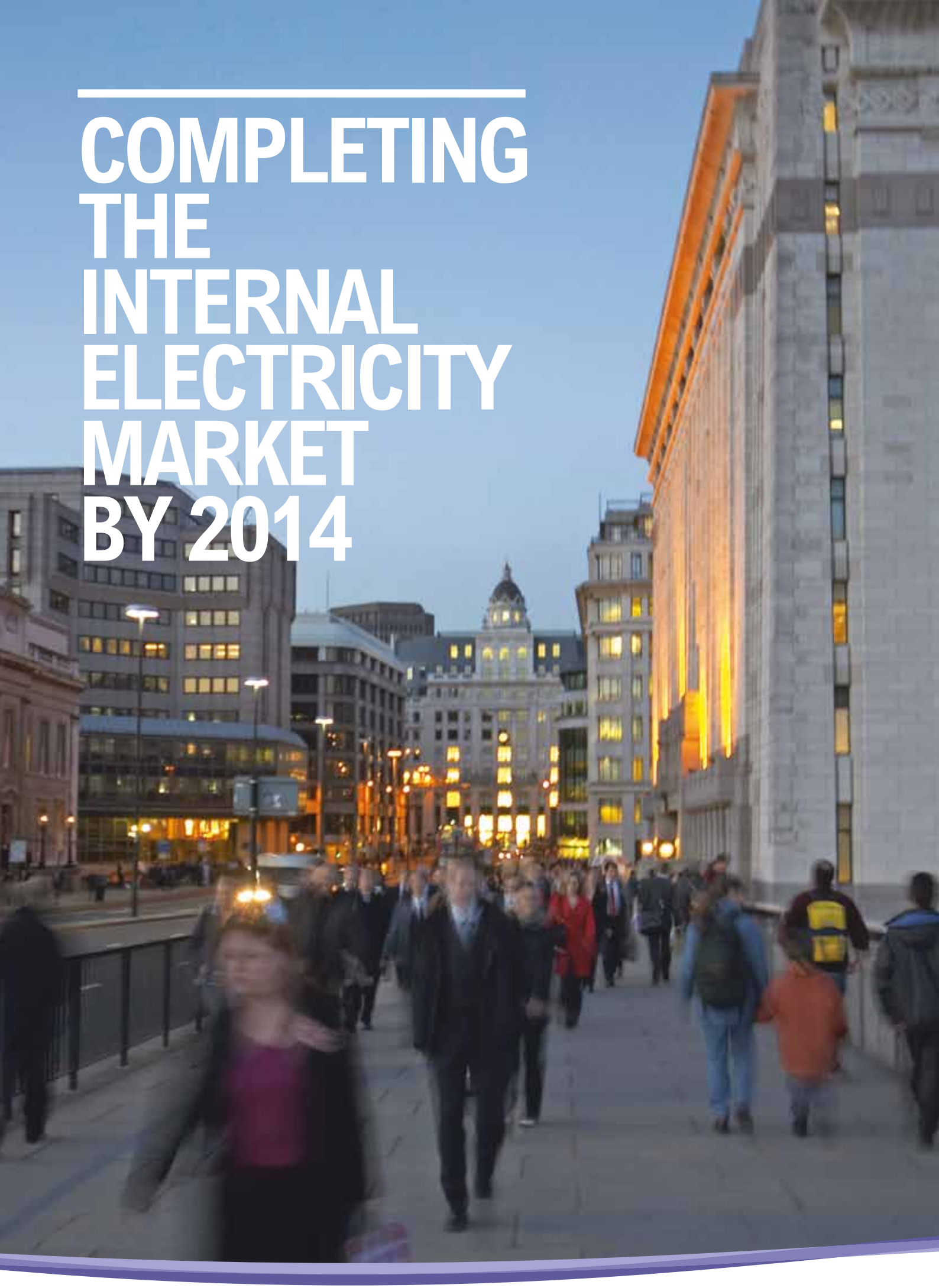
OPERATIONAL TOOLS

The development of common pan-European operational tools ensures network coordination under normal and emergency conditions and includes a common incidents classification scale.

ADEQUACY FORECASTS

Summer and winter generation outlooks are prepared each year, as well as a long-term system adequacy forecast that looks 15 years into the future.

COMPLETING THE INTERNAL ELECTRICITY MARKET BY 2014



THE CHALLENGE

ENTSO-E PRESIDENT DANIEL DOBBENI, CHAIRMAN OF THE BOARD GRAEME STEELE AND SECRETARY GENERAL KONSTANTIN STASCHUS DISCUSS THE MARKET PROCESSES AND SYSTEM INFRASTRUCTURE NEEDED FOR THE INTERNAL ELECTRICITY MARKET (IEM), AND THE MAIN CHALLENGES TO ACHIEVING IT BY THE 2014 TARGET DATE.


GRAEME STEELE

Graeme Steele Increases in wholesale energy prices continue to impact consumer electricity bills across Europe and clearly highlight the importance of implementing the IEM. The larger integrated market will encourage greater competition, bring downward pressure on wholesale prices and ultimately lead to better and more stable prices for the consumer.

It will also reduce long-term investment costs for TSOs as reduced price volatility will lead to more transparent investment conditions, particularly for conventional generators, and improve the security and reliability of the overall network.

> "The larger market should result in better and more stable electricity prices for the consumer."

Furthermore, it will make the challenge of incorporating the more variable sources of renewable energy like wind and PV (photovoltaic) more manageable, facilitating the increasing contribution required from these.

DANIEL DOBBENI

KONSTANTIN STASCHUS

Daniel Dobbeni This is why the European Council confirmed in February that Europe needs the internal market and that it is essential to complete it as fast as possible. But the 2014 target date is quite a challenge, whether in terms of network development, market mechanisms or managing the new energy mix. And it's not only a challenge for the TSOs; the development process requires a significant effort from all the stakeholders involved.

Konstantin Staschus In this respect, adoption of the Third IEM Package in March made 2011 a very important year for ENTSO-E. It officially gave us the mandate to draft the network codes to push forward the necessary changes to the current network. But although the codes are undoubtedly an essential instrument in achieving the market model, they are not the ultimate panacea. They must work in parallel with important regional market coupling initiatives like the recent integration of the Central and North-West Europe regional markets.

"The network code development process must work hand-in-hand with regional coupling initiatives and be consistent with the overall market design."

We are currently drafting the market network code for capacity allocation and congestion management, as well as for network balancing, and by the end of 2012 we'll also be working on the forward markets code. For this code development and the regional initiatives to work hand-in-hand, it's essential to ensure that both approaches are consistent with the overall market design.

Daniel Dobbeni Real market integration will only become a reality when adequate transmission capacity is available to support it, both across borders and within Member States. But increasing capacity, whether with overhead lines or underground cables, still involves protracted permitting processes that are not in line with 2014 or even a 2020 target date.

Building the required infrastructure is a crucial part of the common effort to make the IEM a reality. And although TSOs are ready to invest, they face competition in the capital markets. To resolve these problems, they need the support of Member States, the European Commission (EC) and the regulators.

"Increasing transmission capacity currently involves protracted permitting processes that are not in line with the 2014 target date. TSOs also face competition in the capital markets."

We need a stable and attractive regulatory environment for investors and appropriate incentives for developers that truly reflect the risks and the operation of an increasingly complex electricity system.

Having said this, there has been important progress. The Commission's proposed Energy Infrastructure Package provides guidance on the priorities for Europe's energy infrastructure and aims to tackle inefficient and slow permitting procedures as well as network developers' access to equity and debt capital.

Graeme Steele The EC's proposal is certainly important as it highlights the major investments needed for projects that will directly contribute to meeting Europe's energy policy goals. But the investment in these "projects of European interest" needs to happen at the same time as significant investment is required to reinforce and expand national networks. In this respect, the Commission's proposal has to be consistent with a stable regulatory environment that gives investors and TSOs the confidence to invest.

It's also very important that the EC's corresponding legislation (Regulation on Guidelines for trans-European Energy Infrastructure) maintains a consistency with ENTSO-E's Ten-Year Network Development Plan (TYNDP), especially when it comes to identifying projects of common interest. The 2010 TYNDP identified more than 500 of these, every one of which will make a significant contribution to achieving the EU's energy goals.

"The Energy Infrastructure Package needs to support a stable regulatory environment for investors."

Konstantin Staschus Our preparations for the 2012 TYNDP started as soon as the 2010 plan was published. Its findings are more robust as they are based on a better methodology. The 2012 report is also better structured and more transparent. It has a clear process to include projects of common interest from third parties. Furthermore, it is consistent with studies that look beyond the 2020 horizon, such as those for the North Seas Offshore Grid in 2030 and Electricity Highways in 2050.

R&D plays a very significant role in the projects with longer time-frames. Given the challenges, the TSOs need to create their own sustainable R&D capabilities, which means hiring and training experts, often a lengthy process. The ENTSO-E R&D Plan 2011 estimates that over the next few years TSOs will need to invest some €790m, mostly in demonstration projects, but the regulatory regimes in many countries do not allow them to recover these costs through their tariffs. We also need more progress in this area.

Daniel Dobbeni I think most European leaders now recognize the importance of rapidly developing the network if Europe is serious about achieving its energy and environmental goals.

"The tsunami in Japan has had major consequences for Europe, despite the fact that it took place thousands of kilometers away."

But even events out of our control, such as the Japanese tsunami, can have major consequences for us here in Europe! Germany's resulting nuclear moratorium has had an impact well beyond its own borders, with reduced adequacy margins

bringing new challenges for TSOs in many countries over both the summer and winter periods.

The changes in regional power flows required an even closer exchange of information and coordination measures between neighboring TSOs. This type of unforeseen situation clearly demonstrates the need for TSOs to have full access to all available information about events that may impact the operation of the overall European network.

Konstantin Staschus It also demonstrates how closely system operations are related to the market. The more market integration progresses, the more system operations will change. In some instances, such as with the increase in intraday trading, it will make them more complex. In others it will reduce costs, for example those related to system reliability.

"There is still a lot we need to learn about the ways market practices impact on system operations."

In fact, the relationship between market integration and system operations is crucial. As our joint investigations with EURELECTRIC on system frequency deviations have shown, a small mismatch between market rules and generation unit behavior can result in a situation where the security of the whole system can be brought into jeopardy!

Daniel Dobbeni We also shouldn't forget that some parts of the network count as "critical infrastructure", needing special protection from natural or other risks. The ENTSO-E working group on the subject has been assessing the potential impact of various types of risk and is currently evaluating measures to prevent them.

Graeme Steele Well, it's clear that there are some pretty significant challenges to overcome in ensuring a successful outcome for the IEM. But the European TSOs are certainly willing to play their part in completing it on time. As we approach ENTSO-E's third anniversary, the association also seems well prepared for the huge task of meeting the 2014 target date.

"It is vital that we keep up the high standards as we have an even busier period ahead!"

Overall, 2011 has been an eventful year for ENTSO-E and our members and they have been able to progress a wide range of important tasks. But it's vital that we keep up the high standard of our work as we have an even busier period ahead!

EUROPEAN MARKET INTEGRATION

CREATING AN EFFICIENT AND COMPETITIVE MARKET STRUCTURE

PAVING THE WAY

THE EU TARGET MARKET MODEL & REGIONAL DEVELOPMENT

MARKET INTEGRATION NETWORK CODE DESIGN

FORMAL START OF THE CACM CODE DRAFTING PROCESS

MARKET TRANSPARENCY

CREATING AN EFFICIENT AND COMPETITIVE MARKET STRUCTURE

OVERVIEW: JUKKA RUUSUNEN
ENTSO-E VICE PRESIDENT

"By opening up Europe's energy markets to competition, its citizens and industries have gained many benefits: more choice and more competitive and transparent electricity prices."

The internal electricity market (IEM) will bring both economic and environmental benefits: it will help Europe remain globally competitive as well as minimize the cost of decarbonizing its energy system. But the IEM must not only be able to deliver the investments needed to maintain the integrity of the European power system and facilitate the participation of consumers and small-scale energy producers, it must also provide a coherent approach to the incentives affecting the energy mix and the energy supply. The IEM needs to be capable of handling cross-border energy trading with the utmost efficiency, working closely with a robust transmission infrastructure that can integrate large amounts of renewable energy and ensure security of supply across the network.

> Achieving a fully functioning and competitive European electricity and gas market can add an extra 0.6% - 0.8% to EU GDP by 2020, create employment and curtail inflation.
> *European Commission, EEA biannual seminar, June 2011*

In a well-functioning market, the "invisible hand" of the market enables efficient power dispatch and cross-border flows of electricity. Price signals help consumers to adjust their demand and contribute to the efficient balancing of supply and demand over every time-frame.

Specific measures, such as EU-wide intraday trading close to real time that pools liquidity across the market and intraday wind and solar power forecasting that enables lower reserves, are essential to the operation of the IEM. Harmonized capacity calculation methodologies will help ensure maximum transmission capacities and respect system security standards.

The IEM will provide the building block for a flexible and nimble power system, with an increased number of market participants facilitating the integration of wind, solar and other renewable energy.

2014 COMPLETION DATE

Last February, European Heads of State formally confirmed the need for the IEM and the European Council subsequently set 2014 as the target date for its completion. The Third Legislative Package has been an important step in the creation of the IEM but further efforts still need to be made before electricity can really flow freely across Europe.

The network codes foreseen by the Third Package will provide the relevant tools and the emphasis is now on developing the framework guidelines and network codes to implement the target market model. ENTSO-E TSOs are committed to achieving the model by 2014 despite the considerable challenges involved. In particular, significant network development and convergence will be needed to deliver the mechanisms to allocate cross-border capacity and manage network congestion.

THE IEM NEEDS TO BE CAPABLE OF HANDLING CROSS-BORDER ENERGY TRADING WITH THE UTMOST EFFICIENCY, WORKING CLOSELY WITH A ROBUST TRANSMISSION INFRASTRUCTURE THAT CAN INTEGRATE LARGE AMOUNTS OF RENEWABLE ENERGY AND ENSURE SECURITY OF SUPPLY ACROSS THE NETWORK.

IMPLEMENTING THE TARGET MODEL

Efficient operation of the IEM relies on an agreed set of common rules and enough capacity to allow cross-border trading. Creating and harmonizing the rules is a complex process, reconciling the different goals of the many stakeholders. The process will require a significant effort, not only from ENTSO-E TSOs but also from stakeholders, Member States, the EC, ACER and national regulators, as well as European energy companies and industry associations.

Specific regional projects to implement the target market model will run concurrently with the development of the capacity allocation and congestion management (CACM) and other market-related network codes. Experience gained from the regional projects will be reflected in the codes and, in turn, the codes will facilitate further regional initiatives. This combination of a bottom-up and top-down approach will ensure timely delivery of the necessary market mechanisms.

THE MARKET HARDWARE

Although the target model will provide the IEM with fully functioning market rules, this market "software" cannot work effectively without the backing of a strong grid. An efficient framework for facilitating investment in infrastructure needs to be put in place. Current permitting procedures are also a major obstacle to building new lines, so the "hardware" is unlikely to have the capacity to fully support the IEM during the current decade.

ENTSO-E welcomes the EC's Draft Energy Infrastructure Package (EIP), released in October, with its proposals for facilitating development of the necessary grid infrastructure. But regulatory and financing issues will need further consideration to ensure sufficient access to capital for network developers.

ENTSO-E and its members have actively contributed to the development of the IEM throughout 2011, working on the market-related network codes and specific implementation projects such as the North-West Europe market coupling initiative, which has created the world's largest integrated electricity market.

PAVING THE WAY

INTERVIEW: JACQUELINE VAN OVERBEEK DE MEYER, CHAIR ENTSO-E LEGAL & REGULATORY GROUP, EXPLAINS THE IMPORTANCE OF A CLEARLY DEFINED LEGAL FRAMEWORK FOR TSOs' WORK TO BUILD THE INTEGRATED MARKET.

The Third Package became applicable in March 2011. Why was this event significant from a TSOs' perspective?

The Third IEM Package consists of two Directives and three Regulations. From ENTSO-E's perspective the most important is Regulation (EC) 714/2009 on conditions for access to the network for cross-border exchanges of electricity. The regulation formally mandates the creation of ENTSO-E and details the tasks assigned to it to ensure that the European transmission network is capable of meeting Europe's energy policy goals. These tasks include the development of the pan-European network codes, the Community-wide Ten-Year Network Development Plan (TYNDP), network operational tools and adequacy forecasts, and the annual ENTSO-E work program.

> "The Third Package marked an important milestone in our efforts to create the IEM. It gives ENTSO-E and its member TSOs the formal legal framework for their activities."

The European TSOs proactively founded ENTSO-E in 2008 and the association already started work on the tasks above but it had no formal legal framework ahead of the adoption of the Third Package. March 2011 was the deadline for EU Member States to adopt the Package's two Directives into national law and its three Regulations became applicable at that time.

ACER, the Agency for the Cooperation of Energy Regulators, was formally established in Ljubljana which was significant for ENTSO-E as ACER is an indispensable partner with whom we need to cooperate very closely in achieving our most important tasks.

How necessary is the Third Package for ENTSO-E to achieve its mandate?

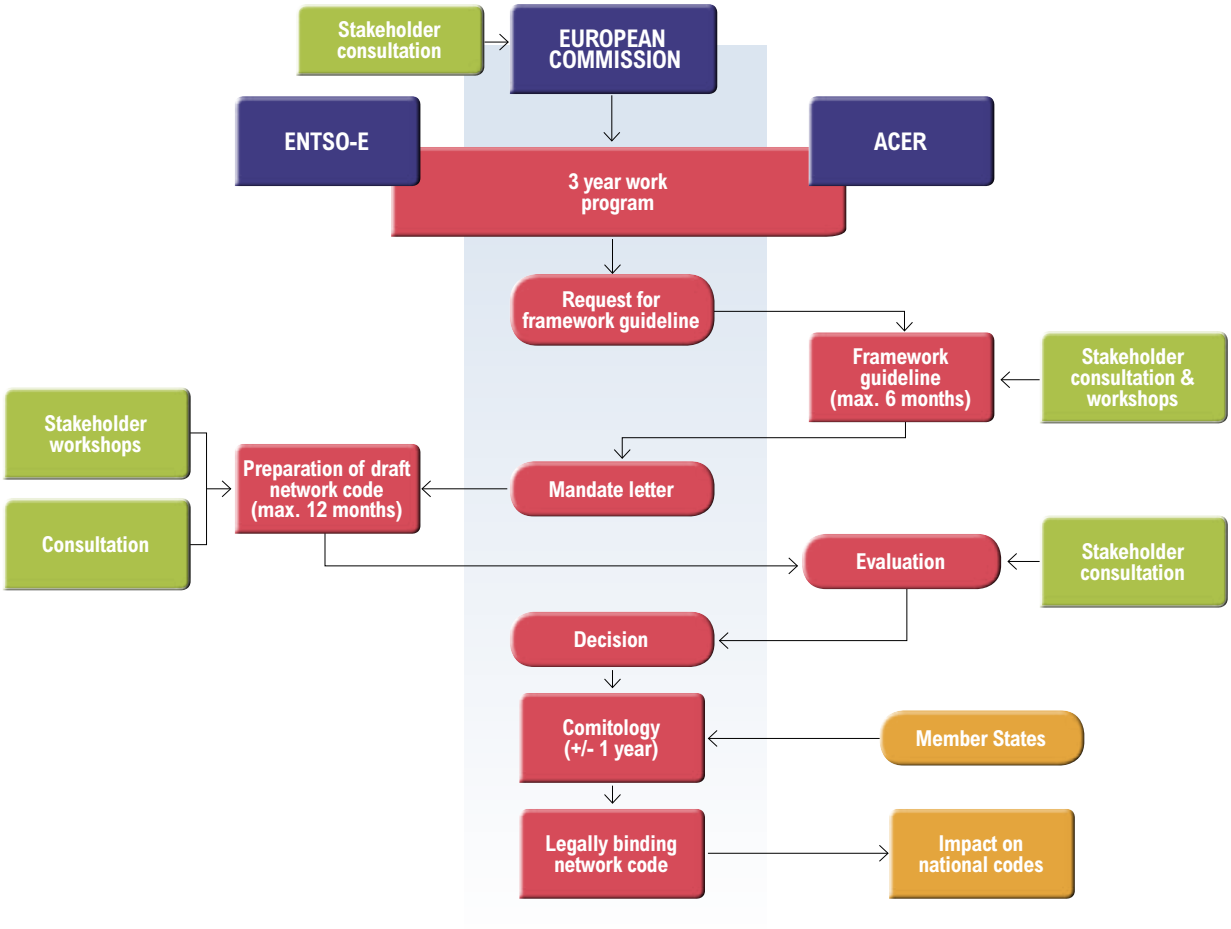
ENTSO-E cannot fulfill its mandate unless the corresponding legal framework is in place to govern its interplay with ACER, the European Commission (EC) and other stakeholders in the achievement of its major deliverables such as the network codes or the TYNDP.

As part of this process, Regulation (EC) 714/2009 required ENTSO-E to submit its membership, Articles of Association (AoAs) and Rules of Procedure (RoPs) to ACER and the EC for their approval. The AoAs govern how ENTSO-E operates, how membership is granted, the voting rights of members, the structure of the Board and the Assembly, and the roles and relationships between the various ENTSO-E committees and groups. The RoPs cover ENTSO-E's internal regulations, consultation processes and network code development activities.

ENTSO-E met this requirement in December 2010 in order to facilitate an early opinion from ACER once it was established. Following the opinions from ACER and the EC, the ENTSO-E Assembly formally adopted the association's AoAs and RoPs.

The three parties have now fulfilled their legal obligations under the Regulation regarding the formal establishment of ENTSO-E.

Network code development process



Can you describe the importance of the development of the network codes in more detail?

The network codes are a major part of ENTSO-E's work program. They will ensure a highly harmonized standard of network operability, reliability and security within the integrated market. They focus clearly on EU energy policy goals and are an indispensable tool in achieving these. Specifically, they address cross-border system and market integration issues, as well as pan-European system operation and development.

ENTSO-E's network code development process (NCDP) helps define the characteristics of each code and establishes the procedure for its development and approval. It strikes a balance between the close involvement of stakeholders in the development process and the duty of ENTSO-E to draft the codes within a given time-frame. Formalized consultation with stakeholders enables ENTSO-E to benefit from expert input into its draft proposals and provides openness and transparency in the drafting process.

After passing through Comitology, the network codes will become EU law and therefore binding on all market participants within the EU. They will not, however, change Member States' rights to establish their own national codes that do not affect the cross-border flow of electricity.

Can the codes be applied beyond EU borders and is it meaningful to do so?

It would not be ideal from the TSOs' perspective if the applicability of the network codes remained limited to EU Member States. Europe's interconnected transmission system extends well beyond EU borders and ENTSO-E member TSOs also operate in non-member countries.

The technical reality is that in an interconnected network, electricity flows follow the laws of physics and do not necessarily respect the legal boundaries of Member States. This fact has to be reflected in the scope of the application of the network codes.

There are already existing legal tools to extend the codes, such as the EEA Treaty covering Norway and Iceland and the Energy Community Treaty which, in addition to EU states, includes Albania, Bosnia-Herzegovina, Croatia, Romania, Moldova, Montenegro, Serbia, the Ukraine and the UN Interim Mission in Kosovo.

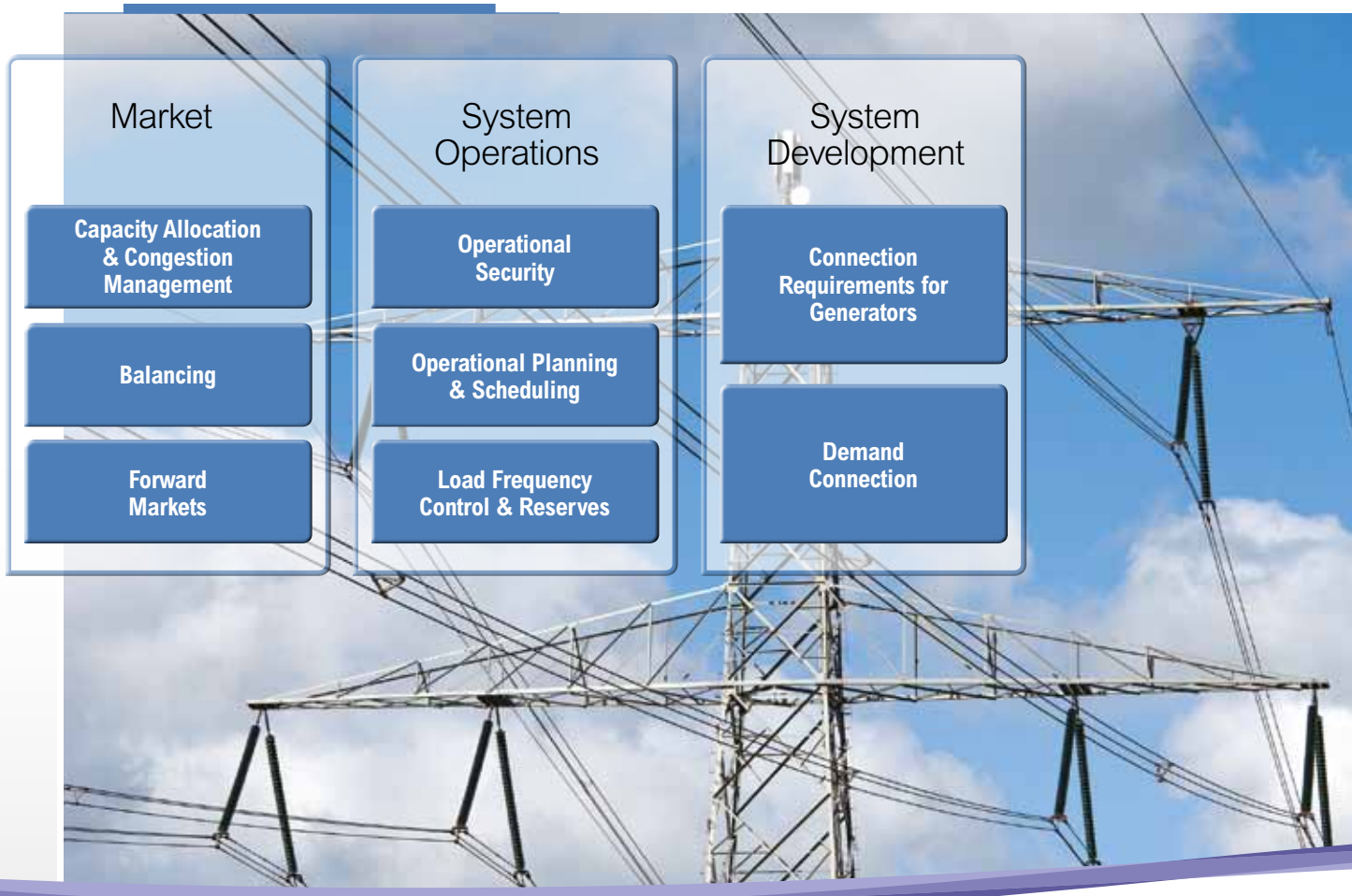
For the network codes to be most effective, ENTSO-E considers it important that at least all the countries where ENTSO-E members operate comply with them as soon as possible.

In this context, it is worth pointing to the Energy Community Ministerial Council's decision last October to adopt the rules of the Third Package. From ENTSO-E's perspective this was an important step in the right direction and resulted in all Energy Community members now having a legal obligation to implement the Third Package by January 2015.

The Council also stressed the immediate need to start to align the region's network codes with those of the EU. So there is clearly a political will to extend the internal market beyond EU borders.

Now that the ENTSO-E legal framework has been set up and an important landmark achieved, the ENTSO-E Legal & Regulatory Group is looking forward to actively supporting the ENTSO-E working groups in establishing the network codes.

Network codes - pre 2014



THE EU TARGET MARKET MODEL & REGIONAL DEVELOPMENT

INTERVIEW: JUHA KEKKONEN, CHAIRMAN ENTSO-E MARKET COMMITTEE, DISCUSSES THE MARKET MODEL AND HIGHLIGHTS THE IMPORTANCE OF REGIONAL MARKET INITIATIVES.

What is the objective of the target market model ?

The purpose of the target model is to gain broad agreement among stakeholders and policy-makers on how to harmonize existing regional electricity markets so that they evolve towards a single European market. Specifically, this means integrating the generating and transmission infrastructure across Europe by developing a common approach to calculating cross-border transmission capacity, defining appropriate market bidding areas, and creating efficient pan-European trading mechanisms across the four market time-frames (forward, day-ahead, intraday and balancing).

> "The target market model provides the overall description of the market mechanisms needed to facilitate the creation of the internal electricity market."

The model is the focus of market development and will be implemented through binding market network codes as well as regional market coupling initiatives. This combination of a bottom-up and top-down approach will ensure delivery of the IEM by 2014. The North-West Europe (NWE) region plays a pivotal role in the process because of it geographical position and advanced market development.

Market integration will be based on price coupling, the key element of the target model for capacity allocation and congestion management developed in the Florence Forum, which involves all the main stakeholders and EU Member States.

What is the current status of the intraday market?

In December 2010, the Florence Forum stressed the need to implement an intraday market across Europe in line with the target model. ENTSO-E and EUROPEX (the Association of European Energy Exchanges) have therefore committed to the implementation of a pan-European intraday mechanism consisting of a shared order book (SOB) function, which implicitly matches cross-border trades, and a capacity management module (CMM) that continuously allocates cross-border capacity.

The approach is capable of providing an interim solution for implementation, covering at least the NWE region by the end of 2012, with a clear path to a smooth transition to the target model by the end of 2014. To avoid delay, the interim solution foresees the market governance framework remaining relatively simple and pragmatic, with the target model governance framework likely to be more complex.

What is the common grid model and how does it fit in?

The common grid model (CGM) is a central design feature of the target model that enables the

calculation at a specific time of the cross-border capacity available for trade between areas of the grid beyond the scope of a single TSO (or several TSOs in the same bidding area).

Each TSO has to contribute to the creation of a CGM according to a well-defined procedure. The CGM represents the network containing the cross-border capacities to be assessed and enables an accurate estimation of grid conditions at the time of the calculation. The larger the grid area and the wider the topology, the more reliable the capacity calculation.

The CGM concept will be part of the forthcoming capacity allocation and congestion management (CACM) network code.

How is the day-ahead market designed according to the target model?

The target model favors a price-coupling approach for capacity allocation and management in the day-ahead market. This means that the cross-border flows and prices in the different bidding areas of the market will be determined at the same time. The approach provides an efficient Europe-wide mechanism for price formation and optimized use of the grid by means of the interaction between the price zones.

An important feature is the coordinated matching function where the actual allocation of cross-border capacity is based on a single algorithm for the whole coupled area. This price-coupling algorithm is being defined by the power exchanges following TSOs' requirements concerning capacity allocation.

Regional market developments

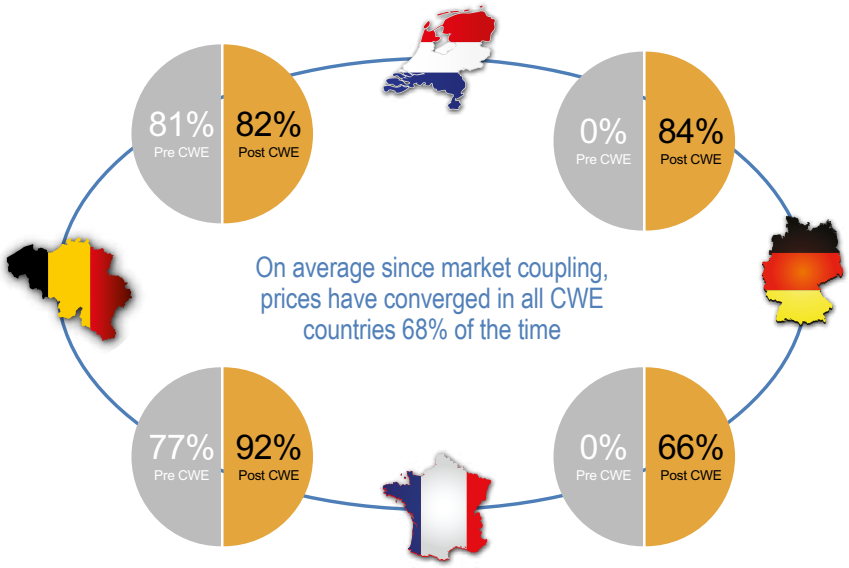
Price coupling was launched in November 2010 in the Central West Europe (CWE) region as a first step towards the pan-European market. The CWE region is also linked to the Nordic region via an interim tight volume coupling procedure (including NorNed).

In December, the Florence Forum agreed that price coupling should be extended to the North-West Europe region (CWE, Nordic regions and GB) by the end of 2012 and subsequently endorsed the project for both day-ahead and intraday markets.

The target market model

- Flow-based capacity calculation or current available transmission capacity (ATC) for less meshed networks;
- Bidding zones along structural congestion lines rather than national borders;
- Forward market based on "financial" transmission rights or physical "use-it-or-sell-it" rights;
- Day-ahead market price coupling using a single algorithm for defining prices in all bidding areas and in all energy schedules;
- A pan-European intraday market for continuous implicit capacity allocation.

CWE price convergence



ENTSO-E's Day-Ahead and Intraday Monitoring Groups are now working to ensure the further extension of day-ahead price coupling and continuous intraday trading to other regions where non-NWE TSOs are widely represented.

In the South-East Europe region, the Energy Community Regulatory Board (ECRB) approved an action plan in June 2011 jointly developed by ENTSO-E's Regional Group South-East and its own Electricity Working Group (EWG). This plan includes development of a CGM and capacity calculation method for the region in line with ENTSO-E's current initiatives within the EU.

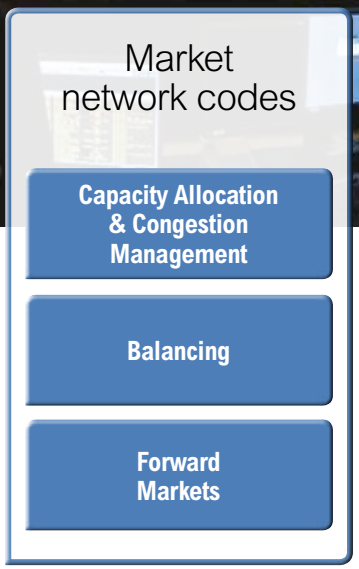
The intention is to create a coordinated auction office as a single source for cross-border capacity allocation and congestion management for forward markets and market coupling to establish a liquid day-ahead market mechanism convergent with EU markets. Although the current lack of liquidity in the small local markets adds complexity, it is expected that the coupled markets will promote liquidity and encourage cross-border trade throughout the region. Based on analysis of the current status of intraday trade, local TSOs will also develop a common solution for coordinated cross-border capacity allocation on an intraday basis.

What are the main market challenges and what opportunities do you see for 2012 and beyond?

Market coupling is a real-time process requiring a sufficient level of market harmonization to be reliable and ensure that the resulting use of the transmission capacity does not jeopardize the overall security of the network. Extending individual initiatives to cover the whole of Europe is therefore difficult without a strong EU-wide framework because of the multiple jurisdictions and different regional implementations.

The sheer number of parties involved in inter-regional solutions can be particularly challenging. In addition, organized day-ahead markets either do not exist or work well enough in some countries. Power exchange regulation also differs depending on the Member State, as does the identification and treatment of power exchange costs related to coupled markets.

Insufficient legislation is in place so far to cover the requirements and responsibilities for implementing the target model, although this situation will change with the development of the network codes. The CACM code will define the overall technical and business process requirements of market coupling, as well as determine indicative deadlines for their implementation. But there is a need to tightly define governance arrangements in parallel to ensure Europe-wide implementation. These arrangements are currently being worked on by the EC and will probably be the subject of a separate guideline.



MARKET INTEGRATION NETWORK CODE DESIGN

The Third Package replaces earlier voluntary intergovernmental market integration agreements with binding EU network codes being prepared by ENTSO-E along framework guidelines drafted by ACER. These codes will provide the legal basis for cross-border capacity allocation and congestion management.

To be successful, the combined approaches of framework guidelines and network codes and regional market coupling need to be consistent. The deadline to complete the IEM by 2014 also increases the importance of developing the market-related framework guidelines and network codes efficiently. Setting the right priorities for the corresponding system operations and development codes will be crucial.

The market integration network code design process will make existing voluntary regional market coupling agreements binding and elevate them to a pan-European level. From this perspective, therefore, the codes must be viewed as an overall package during the Comitology process.

ACER's capacity allocation and congestion management (CACM) framework guideline covers capacity calculation, the definition of bidding zones and the allocation of cross-border capacity in the forward, day-ahead and intraday markets, but not network balancing. ENTSO-E has been developing the network code corresponding to the CACM guideline, except for the forward market time-frame, since September 2011. The forward markets network code will be drafted from October 2012 onwards. The network balancing framework guideline will result in a separate balancing code.

INTERRELATIONSHIP WITH OTHER NETWORK CODES

The CACM code will be second developed by ENTSO-E after the network code on connection requirements for generators (RfG) and it has important interactions with the forward markets and balancing codes, as well as with other codes covering system operation, particularly when it comes to capacity calculation.

The Third Energy Package requires TSOs to set up regional cooperation structures within ENTSO-E to ensure that regional initiatives are compatible with the EU-wide codes. ENTSO-E's structure, which includes specific regional groups, as well as pan-European working groups and committees, is organized to create links between the centralized policy-making and regional development.

FORMAL START OF THE CACM CODE DRAFTING PROCESS

ACER released its framework guidelines on capacity allocation and congestion management (CACM) in July 2011. ENTSO-E is now developing the corresponding CACM network code which it will submit to ACER by the end of September 2012. The CACM code defines the overall technical and business process requirements for market integration.

The code will set out the methods for allocating capacity in the day-ahead and intraday time-frames and will outline the way in which capacity will be calculated across the different bidding areas (the common grid model). At this stage, issues related to the allocation of forward capacity will not be included.

A price-coupling system will determine a single energy price for each bidding area based on bids from market participants. The system will use a single algorithm to determine the price and the cross-border capacity that will be allocated based on the calculation.

The code will be assessed by ACER according to its ability to maintain network reliability, support the IEM and cross-border trade, deliver benefits to customers, and facilitate EU targets for renewable energy (RES) generation.

FORWARD AND BALANCING MARKETS

The objective of forward transmission rights, whether physical or financial, is to provide market participants with long-term hedging solutions against day-ahead market price differences. The forward markets network code will require TSOs to provide a single platform for the allocation of long-term transmission rights at European level. Regional platforms may operate as a transitional arrangement, as long as these do not hamper the improvement and harmonization of the allocation rules.

ACER's CACM guideline does not address integration of network balancing even though coordination between the balancing and intraday markets is essential. This will be the subject of a separate framework guideline and network code.

IMPACT ON OTHER LEGISLATION

There is a need for the network codes to ensure consistency with other new regulations or legislation under preparation, such as the Markets in Financial Instruments Directive (MiFID), the OTC derivatives European Market Infrastructure Regulation (MIR) and the Regulation on Energy Market Integrity and Transparency (REMIT). This will minimize the risk of developing overlaps with other parts of TSO business or double supervision by energy or stock-market regulators.

The interrelationship between the calculation of cross-border capacities and operational security means that ENTSO-E anticipates close coordination with the forthcoming system operations network codes. This might take the form of some technical elements in future operations codes supplementing the provisions of the CACM code.

MARKET TRANSPARENCY

Transparency is essential to the implementation of the IEM. It plays a key role creating an efficient, liquid and competitive market. It is vital to create a level playing field for all market participants by reducing asymmetry of information and scope for market abuse.

While several pro-transparency initiatives have been adopted by local market participants, overall governance of market transparency is still in progress. The current regulatory environment has significant gaps which the EU intends to fill through a new tailor-made market transparency framework.

CURRENT DRAFT LEGISLATION SEEKS TO ESTABLISH A MINIMUM COMMON LEVEL OF DATA TRANSPARENCY, THE PUBLICATION OF DATA ON A NON-DISCRIMINATORY BASIS AND THE DEVELOPMENT OF A CENTRAL INFORMATION PLATFORM TO ALLOW ALL MARKET PARTICIPANTS TO HAVE A COHERENT AND CONSISTENT VIEW OF THE MARKET.

Information relevant to the market can be categorized in two ways – so-called "fundamental" data related to network infrastructure and the physical supply and demand of electricity and "trading" data based on the market activities themselves.

Pre-trade transparency involves the disclosure of the fundamental data which operators gather as a prerequisite for efficient trading. Post-trade transparency covers access to information on previous transactions like prices, quantities and bid curves. Record-keeping obligations require a certain amount of information to be available in the medium to long term.

FUNDAMENTAL DATA TRANSPARENCY

Current draft legislation on the transparency of fundamental data is based on the draft Comitology Guidelines on Fundamental Electricity Data Transparency (FEDT) issued by ERGEG at the end of 2010. These seek to establish a minimum common level of data transparency, the publication of data on a non-discriminatory basis across all Member States, and the development of a central information platform to allow all market participants to have a coherent and consistent view of the market.

When deciding on the type and quantity of data to be published, an appropriate balance is needed between sufficient transparency to foster a competitive market and excess complexity or information overload. There are several considerations relating to force majeure or to European or national competition law for which exemption, or at least delays in public disclosure, will be necessary.

There is also a need for guidelines to be compatible with European Directive 2008/114/EC on European critical infrastructure. This concerns the disclosure of information that could be used to plan the disruption or destruction of the infrastructure. In many instances, generating units are considered critical infrastructure subject to particular protection and information is generally not publicly available in real time.

A development and consultation process is currently underway which, following the Comitology process, will result in the publication in mid-2012 of the new

EU Regulation governing the publication of minimum fundamental data for wholesale electricity markets. This is foreseen to establish a central electricity market fundamental data information platform (EMFIP) for publishing load, generation, transmission and balancing data.

DATA INFORMATION PLATFORM

ENTSO-E has the responsibility for establishing the central platform and for leading the work required to define the data to be published on it. In the meantime, necessary changes and adaptations will be made to the existing ENTSO-E transparency platform (entsoe.net). Delivery of reliable information from the larger volume of data required will require substantial development of this platform.

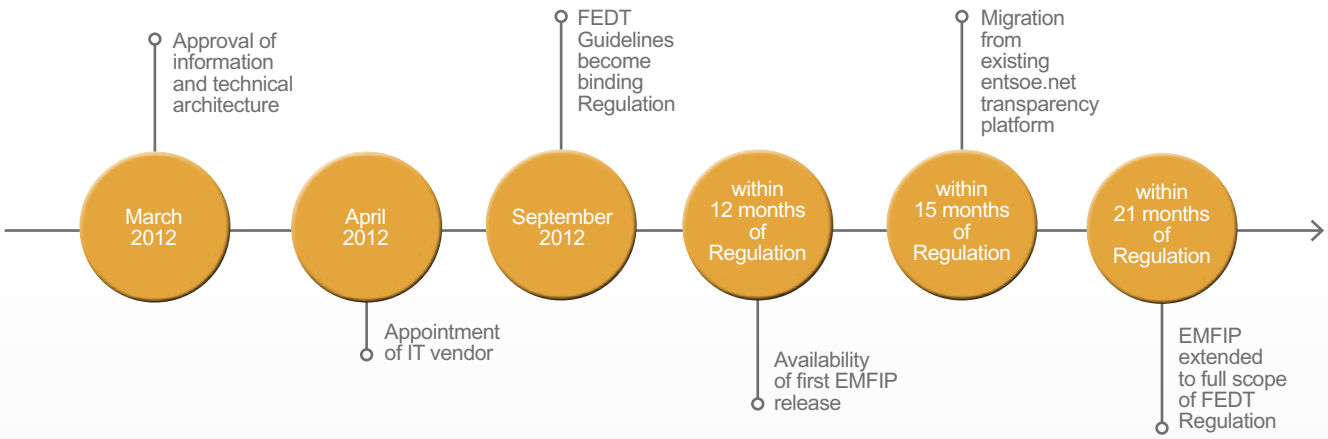
The new EMFIP is crucial to the efficient operation of the IEM and ENTSO-E planning will prioritize its timely delivery. The long-term goal is to integrate platform development with ENTSO-E's existing strategic data and information initiatives. Consistent data architecture and definitions will reduce the cost of providing coherency. Where possible, data will also be migrated from entsoe.net.

The EMFIP development is highly dependent on the effort and resources provided by TSO working groups to articulate the business requirements, finalize data definitions and test the platform. Significant amounts of new IT infrastructure will be needed in the development phase and to be maintained on an ongoing basis. It is therefore vital that TSOs are offered the comfort that the costs related to this expenditure will be recoverable through national tariffs.

It is also necessary that all parties have sufficient time to implement the requirements of the transparency guidelines, since Member States face different challenges in delivering them. An efficient implementation plan based on a minimum two-year period following introduction of the Regulation is considered important.

Different standards and asymmetric levels of information between EU and non-EU countries could also erode some of the Guidelines' benefits so it is important to take appropriate action to ensure their rapid and effective applicability to non-EU countries, especially to those whose electricity markets impact on the EU.

Key EMFIP milestones



SYSTEM INFRASTRUCTURE FOR THE INTEGRATED MARKET

THE NEED FOR A RELIABLE NETWORK

TEN-YEAR NETWORK DEVELOPMENT PLAN 2012

NORTH SEAS OFFSHORE GRID

NETWORK CODE ON CONNECTION REQUIREMENTS FOR GENERATORS

ENTSO-E R&D PLAN 2011 & THE SMART GRID

DATA FOR SYSTEM PLANNING

THE NEED FOR A RELIABLE NETWORK

OVERVIEW: DANIEL DOBBENI PRESIDENT ENTSO-E

> "Although the software (the market rules) will be harmonized by 2014, the hardware (the network infrastructure) will be far from that stage if you consider the 2020 time-line."

The development of the internal market and the integration of increasing amounts of renewable energy require Europe's transmission network to greatly expand even from that at the start of this century. Yet not only is there increasing uncertainty about the planning of new infrastructure, due to the different evolution of the generation mix in EU Member States in terms of the technologies being considered and their speed of adoption, but also major initiatives like offshore grids and electricity highways are raising cost-sharing issues among neighboring states.

Making the internal market a "reliable reality" depends on building the necessary network infrastructure on time to create adequate transmission capacity inside and across the borders of Members States, as well as in many neighboring countries. ENTSO-E's 2010 pilot Ten-Year Network Development Plan (TYNDP) identified close to 500 projects of European interest in the period up to 2020 involving some 35,000 km of new transmission lines and 7,000 km of existing line upgrades.

For the projects foreseen up to 2015, an investment of some €23 - 28 billion is needed. Promoting the social acceptance of such projects, streamlining the permitting processes and setting up the appropriate regulatory and financial framework are of paramount importance. European TSOs have long argued that significant regulatory steps need to be taken to facilitate the delivery of the energy infrastructure which Europe needs.

PERMITTING/PUBLIC ACCEPTANCE

The single biggest challenge to meeting the EU's targets is obtaining the necessary planning consents for the new infrastructure in a timely fashion. In recent years, national processes have led to long project delays – 12 years on average – with increased costs across Europe. Ultimately, uncertainty surrounding investment in regulated assets will become a deterrent to new investment.

There is an urgent need to develop manageable processes that balance the requirement for public involvement and environmental considerations with long-term strategic interests at both a national and a pan-European level. Legislators must take into

account a view of the overall network when considering improvements in permitting. The much needed "one-stop-shops", the time limits and compensatory mechanisms that the EC is currently calling for will only have moderate impact if they are limited to a few major projects. The interconnected nature of individual networks delivers reliability and security of supply. However, it also means that the weakest link will ultimately influence the overall system!

INFRASTRUCTURE FINANCE

ENTSO-E has also repeatedly stressed the importance of stable regulation, focused incentives and rewards proportionate to risks to attract the very large investment finance required. In order to get the planned infrastructure built, clarity is needed on how capital and operational costs will be recovered from market participants and consumers. This clarity must be provided by speedy and transparent decisions from national and European regulatory authorities and policy-makers.

Regional approaches may be appropriate before mechanisms and instruments are harmonized at a European level. Nevertheless, for the continued development of the network beyond 2020 it is essential that pragmatic measures are taken regarding recovery of the cost of infrastructure that is truly pan-European. Although the "user-pays" principle is predominant, current arrangements do not take into account the difficulties TSOs anticipate in attracting the necessary finance, both equity and debt, for these investments.

Attracting finance is a competitive activity for TSOs and regulators are often reluctant to take into account cross-border requirements when determining or approving individual schemes. Part of the risk uncertainty is the threat of tariff reviews, with regulators reconsidering the reasonable rate of return at regular intervals over the life of a transmission asset.

ENERGY INFRASTRUCTURE PRIORITIES

The draft EC Regulation on Guidelines for the Implementation of European Energy Infrastructure Priorities, released in October 2011, highlights the very significant levels of investment that are needed for projects of common European interest (PCIs). ENTSO-E supports the pragmatic approach to prioritize these projects based on regional decision-making, since this involves all the key players – Member States, Regulators and the TSOs. In the TYNDP, ENTSO-E sets out in a transparent and comprehensive way the assessment criteria for selecting PCIs, establishing the TYNDP as the factual and methodological basis for policy and investment decisions.

Regulatory and financing issues will also benefit from further consideration in order to move beyond "business as usual" scenarios. A sound EU regulatory framework for these investments is essential to ensure that network developers have adequate access to capital.

ENTSO-E'S 2010 PILOT TYNDP IDENTIFIED CLOSE TO 500 PROJECTS OF EUROPEAN INTEREST IN THE PERIOD UP TO 2020. THESE INVOLVE SOME 35,000 KM OF NEW TRANSMISSION LINES AND 7,000 KM OF EXISTING LINE UPGRADES. ENTSO-E'S 2012 TYNDP, PUBLISHED IN MARCH FOR PUBLIC CONSULTATION, FOUND THAT ONE IN THREE INFRASTRUCTURE INVESTMENTS IS DELAYED DUE TO LONG PERMITTING PROCESSES.

TEN-YEAR NETWORK DEVELOPMENT PLAN 2012

INTERVIEW: JEAN VERSEILLE, CHAIRMAN ENTSO-E SYSTEM DEVELOPMENT COMMITTEE, OUTLINES THE 2012 TYNDP AND REGIONAL INVESTMENT PLANS.

What is the rationale for pan-European system development?

Historically the EU's power systems were individually designed within each Member State. Development of cross-border interconnections was limited to providing mutual support to enhance security of supply. Today, the need to complete the internal electricity market (IEM), as well as to handle significant volumes of RES generated in remote locations and transport it over long distances, has clearly demonstrated the necessity of extending and strengthening the overall European network. The cost is considerable and spread across Europe, so coordinated planning by TSOs from all Member States aims to produce the most secure and cost-effective infrastructure design to meet pan-European needs.

> "The TYNDP demonstrates the required development of new transmission infrastructure, both within Member States and across borders. It is a vital facilitator for the IEM as well as for RES integration and maintaining the security of the network."

ENTSO-E and its member TSOs have taken steps to co-ordinate the design of the future European network and to identify projects of European significance in the Ten-Year Network Development Plan (TYNDP).

Work on the 2012 TYNDP started immediately after the pilot TYNDP was published in 2010 and experience from the pilot and market feedback have led to improvements in several areas. These cover the inclusion of long term, top-down scenarios based on EU 2020 energy targets and national renewable energy action plans (NREAPs), common pan-European and regional market studies, and an ENTSO-E framework for regional network studies.

The TYNDP, therefore, serves as the tool to inform Member States and all stakeholders about which new grid project they may need to support in the face of decisions that have system-wide impact.

Are there other changes in the 2012 TYNDP and regional investment plans?

The two long-term scenarios based on EU energy policy provided the input data for "market studies" at European and regional level. These aim to identify the cross-border bulk power flows resulting from the optimal use of the European generation mix and to assess the benefits expected from the development of interconnectors. Several "planning cases" describing local needs serve as the basis for more detailed regional grid studies and for detailed project assessment.

The TYNDP sets out the key indicators and data to assess projects, which should be used to identify "Projects of Common Interest" (PCIs) within the context of proposed infrastructure legislation. This methodological consistency with new infrastructure

legislation makes the TYNDP both the factual and methodological basis for European network planning.

The 2012 TYNDP consists of eight reports – the TYNDP, the Scenario Outlook & Adequacy Forecast (SO&AF) and six Regional Investment Plans – allowing stakeholders to focus on the level of detail of most interest to them. In order to account for changed cross-border flow patterns caused by Germany's decision in spring 2011 to phase out nuclear, new sensitivity analyses have been elaborated to evaluate the impact of this decision. The regional plans build on binding national plans, contain common market and network studies, and are the step between national and pan-European system planning.

How are stakeholders being involved in the preparation of the TYNDP 2012 ?

The scenarios in the 2012 TYNDP were consulted widely at workshops and via the web, but few stakeholders commented on them directly and there was little feedback from the EC or regulators. Six regional workshops addressing the TYNDP and regional investment plan (RIP) methodologies took place in November and December 2011 and an extended public consultation period, which started on 1 March 2012, runs until the end of April facilitated by a new online consultation tool: www.entsoe.eu/consultations. An additional European consultation workshop is also being held.

In addition, the 2012 TYNDP has been open to projects proposed by developers who are not ENTSO-E members. ENTSO-E developed a process, published on its website in February 2011, for including projects from these third parties with a series of simple, transparent technical, legal and regulatory conditions required to be included in the TYNDP. None of the projects submitted to ENTSO-E, however, met these conditions.

Can you offer a preview of the 2012 TYNDP contents?

The main level of detail in the 2012 TYNDP will be based on the presentation of about 100 projects of European significance (which can be groupings of investments) associated with identified network boundaries where investment is needed. The plan will present some 50,000 km of projects worth more than €100 billion over and above investment projects that are of national or regional significance. They will enable some €5 billion of annual cost savings by 2020, the connection of 125 GW of renewable energy to the network, and the annual saving of some 170 billion tons of CO_2.

The 2012 TYNDP will be the basis for other long-term planning activities. Besides the North Seas Offshore Grid Initiative, which has a 2030 horizon, ENTSO-E is working on the roadmap for European Electricity Highways for 2050, due in 2014. Detailed study of this time-frame, taking into account social and political considerations, technological advances and financial perspectives, will provide the most coherent scenarios as a basis for the decision as to how Europe will manage the transfer of large amounts of power over long distances.

Consistency with the medium-term outlook will be provided by interaction between the TYNDP and the roadmap, with the 2030 horizon being used as a bridge between the European targets for 2020 and 2050. The difficulty of predicting this far ahead will be met via four scenarios that capture a realistic range of future pathways and challenges for the grid.

NORTH SEAS OFFSHORE GRID

The integration of the increasing amount of wind energy generated in the seas of Northern Europe is widely recognized as critical to achieve EU energy targets. In addition to being an important immediate energy source, connecting this capacity to large hydro-power storage facilities can reduce the need for energy balancing.

In December 2010, ten Northern European countries signed the North Seas Countries Offshore Grid Initiative to develop an integrated offshore network by 2030. One of the initiative's tasks has been to identify suitable scenarios for future grid infrastructure, taking into account current government policies and national developments.

As part of ENTSO-E's contribution to the Initiative, its report "Offshore Grid Development in the North Seas" summarizes the key assumptions, methodology and findings of the member TSOs directly involved and offers recommendations for future offshore grid development. ENTSO-E presented the findings of the report at its Electricity Infrastructure conference in February 2011.

TSOs have a strong track record of successful collaboration in developing cross-border interconnection projects, so ENTSO-E considers itself well qualified to help identify the necessary investment needs associated with development of the North Seas grid and the related grid reinforcements onshore.

The Offshore Grid project, which is funded by the EU's Intelligent Energy Europe (IEE) program, aims to offer a technical and economic view of possible grid structures and regulatory frameworks. The ENTSO-E study confirms the benefits highlighted by the inter-governmental initiative.

CONSIDERATION OF DIFFERENT CONFIGURATIONS

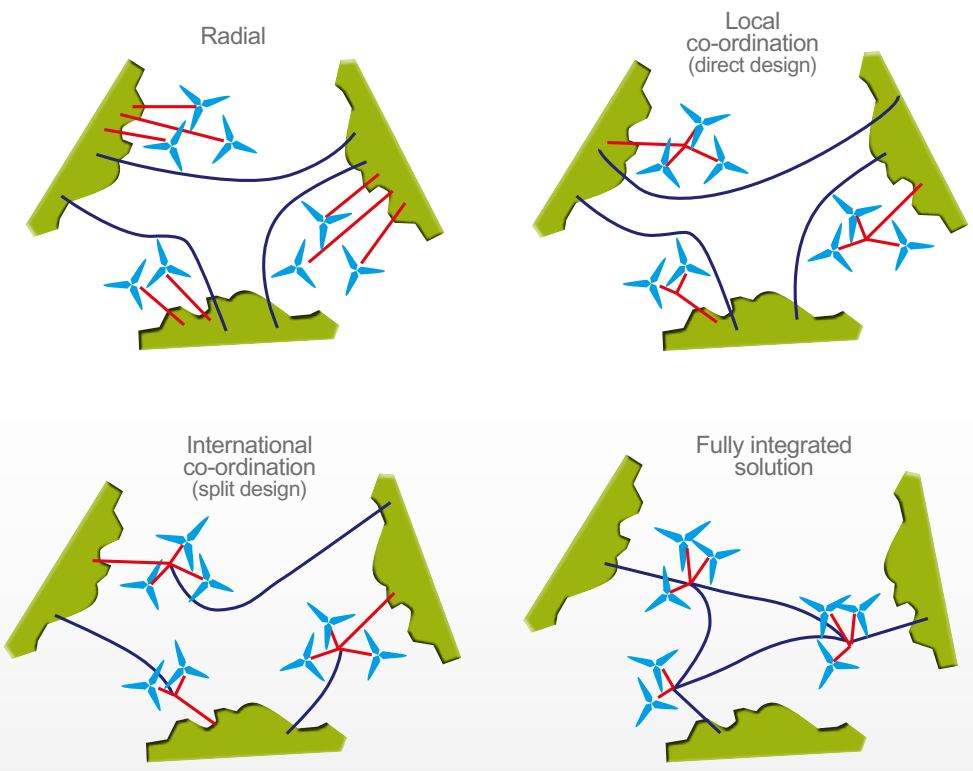
Since the lifespan of offshore wind installations and interconnectors tends to be very long (up to 50 years), the grid design concepts are intended to prepare the market and decision-makers for plausible development scenarios between now and 2030. The ENTSO-E reflections are based on a 2030 scenario.

The initial concepts consider the relative benefits of integrated grid development over the continuation of national radial schemes. They cover the North Sea perimeter, including the Skagerrak and Kattegat but not the English Channel, and assume that, in addition to current and proposed interconnector projects, some additional subsea interconnectors will be needed.

These additional links have been designed according to two different concepts: direct and split. An alternative approach has been to create a grid that combines assets and cross-border capability by developing the connectors on a wider European basis, sharing the costs and benefits. As with onshore grids, a fully integrated offshore network increases the flexibility of the power flows, enhancing security of supply and network resilience, and improves capacity for cross-border trade.

The fully integrated solution can be delivered at a lower cost since it involves the installation of fewer assets, with capital savings in the order of 10% (or some €7 billion). Fewer subsea cable routes and significantly fewer landing points onshore also make permitting more manageable. While a fully coordinated grid would demand greater technological standardization, it would pave the way for future network evolution and integration.

Possible offshore grid configurations



North Seas grid investment (fully integrated solution)

OVERALL INVESTMENT APPROX. €85 Bn.

MOST EFFICIENT CONNECTION (126 GW) €69 Bn.

INTERCONNECTORS ALREADY PLANNED (TYNDP) €9 Bn.

Cost savings

OVER DIRECT DESIGN €21 Bn.

OVER SPLIT DESIGN €16 Bn.

NETWORK CODE ON CONNECTION REQUIREMENTS FOR GENERATORS

The network has changed substantially across Europe, with RES generation increasingly becoming mainstream. Investment in new transmission infrastructure remains crucial as demonstrated by ENTSO-E's TNYDP. The European network codes complement the development process by adapting the rule-set to the changing network requirements.

System security cannot be ensured independently of the technical capabilities of all the network participants, so TSOs need regular coordination with generators to ensure that the equipment connected to the network has the robustness to face disturbances and facilitate restoration of the system in case of major incidents.

Following the development of the pilot network code on grid connection requirements for generators (RfG), ENTSO-E is now drafting the formal code based on framework guidelines from ACER. The RfG code is an essential building block in the context of the construction of the IEM and will contribute to non-discriminatory competition among generators. It will also make an important contribution to system security and RES integration.

IT IS CRUCIAL THAT ALL GENERATING UNITS (SUCH AS THIS LARGE HYDRO PLANT) CONNECTED TO THE NETWORK CAN PROVIDE THE NECESSARY TECHNICAL CAPABILITIES TO MEET ITS REQUIREMENTS FOR SYSTEM SECURITY.

From a systems engineering standpoint, the transmission network and the generating units need to be considered as a single entity. It is therefore crucial that all generating units can provide the necessary technical capabilities to meet the requirements for network security. Moreover, harmonization of the requirements at a pan-European level has important supply-chain benefits and contributes to efficient markets for equipment, putting downward pressure on overall costs.

NETWORK SECURITY

The major objective of the RfG code is to ensure that power generating facilities at all voltage levels are capable of providing network operators with the required services. In compliance with ACER's framework guidelines, the code will apply to existing generating units once a TSO proposes its application and the proposal is approved by the corresponding national regulatory authority.

The rapid changes in transmission systems, with new technologies like FACTS (flexible AC transmission systems) and HVDC (high voltage direct current) circuits, create some uncertainty in anticipating the needs for system security over the next 20 years. But, in common with the other network codes, the RfG code will enter into European legislation via Comitology and will be applicable for a long period of time. Since changes or amendments will only be possible through extensive legislative procedures, it is essential that the requirements of the code can be applied to existing plants retroactively.

OPEN, TRANSPARENT DEVELOPMENT

The RfG code entered the formal development phase with the publication of ACER's framework guidelines in July 2011 and the EC's subsequent invitation to start drafting the code. This followed the second release of the pilot RfG code in March 2011.

ENTSO-E HAS MAINTAINED EXTENSIVE DIALOGUE WITH STAKEHOLDERS, ADDRESSING NETWORK CODE TECHNICAL ISSUES VIA TWO PUBLIC WORKSHOPS IN 2011 WHICH ATTRACTED AROUND 100 PARTICIPANTS EACH AND SOME 15 BILATERAL MEETINGS WITH EUROPEAN ASSOCIATIONS.

During this "informal" development period, ENTSO-E maintained an extensive dialogue with stakeholders to address technical issues via two public workshops, which attracted around 100 participants each, and some 15 bilateral meetings with European associations. The response to this open approach resulted in the consideration of more than 1,500 comments from stakeholders.

ENTSO-E released its working draft of the updated RfG code in November 2011 and regional workshops were held in Zagreb and Stockholm in December in conjunction with the development of the 2012 TYNDP. Several workshops were also organized by TSOs at national level. The current draft and its development process will be communicated throughout Europe in the first half of 2012 through national user groups and workshops initiated by TSO members, as well as through regional ENTSO-E workshops.

FORMAL CONSULTATION

The formal public consultation on the code was launched in January 2012 with stakeholders having two months to provide feedback via ENTSO-E's web-based consultation tool (www.entsoe.eu/consultations). The tool provides a clear structure for respondents to enter comments and facilitates ENTSO-E's handling of a large number of these. It serves as the main communication channel between ENTSO-E and respondents.

Broad stakeholder input and feedback is an essential part of the drafting process and ENTSO-E is particularly encouraging DSOs to become closely involved in the consultations. The process will help ensure that the RfG code is of the highest possible quality with wide applicability.

After the public consultation all comments will be thoroughly reviewed by ENTSO-E and the code adapted where necessary. An analysis of the comments received will be made public and the minutes agreed in discussions with stakeholders during the formal development period published. ENTSO-E plans to submit the RfG code to ACER by the end of June 2012.

The code recognizes that future generation capacity will be either synchronously connected to the network (as the vast majority of conventional thermal units or hydro plants) or via power converter installations (wind turbines, PV installations) and that generation will be at all voltage levels. It will therefore be compatible with the network code for demand connection (DCC), which will set out the requirements for connection of significant demand facilities and distribution networks, and is due for submission to ACER at the end of 2012. Both codes will complement each other and rigorous ENTSO-E coordination will ensure their consistency with the other system operations and market network codes.

ENTSO-E R&D PLAN 2011 & THE SMART GRID

INTERVIEW: HUBBERT LEMMENS, CHAIRMAN ENTSO-E RESEARCH & DEVELOPMENT COMMITTEE, HIGHLIGHTS THE ROLE OF R&D IN THE LONG-TERM DEVELOPMENT OF THE NETWORK.

Why is it important for TSOs to cooperate on R&D at a European level?

The TSOs are aware of the need to speed up technological innovation and the Third Package explicitly tasks them with undertaking research, development and demonstration (RD&D) activities to enhance their operations. Concepts such as the smart grid and the creation of the pan-European intraday and balancing markets are good examples.

Development of new grid equipment technologies, as well as modeling practices and grid architecture, are important technological innovations to enable TSOs to fulfill their mission in a changing energy system. ENTSO-E's R&D Committee plays a major role in coordinating ENTSO-E members' R&D projects and in participating in activities such as the European Electricity Grid Initiative (EEGI).

TSO R&D is complementary to that performed by universities, research institutes or equipment manufacturers and is a key element in the implementation of new technologies. TSOs bring a knowledge of the entire European network and expertise in cooperating with each other. But this essential R&D contribution needs to be supported by an appropriate regulatory framework. Apart from a few exceptions, the situation in most ENTSO-E countries today is that the tariff schemes do not include a component dedicated to recovering R&D costs nor are there any specific incentives to promote TSO R&D.

ENTSO-E estimates that TSO-related R&D activities required to meet EU 2020 objectives will cost some €790 million. This necessitates a stable, long-term R&D commitment from the TSOs who, now that they are no longer part of vertically integrated companies, need both the time and the resources to recruit and train suitable R&D staff.

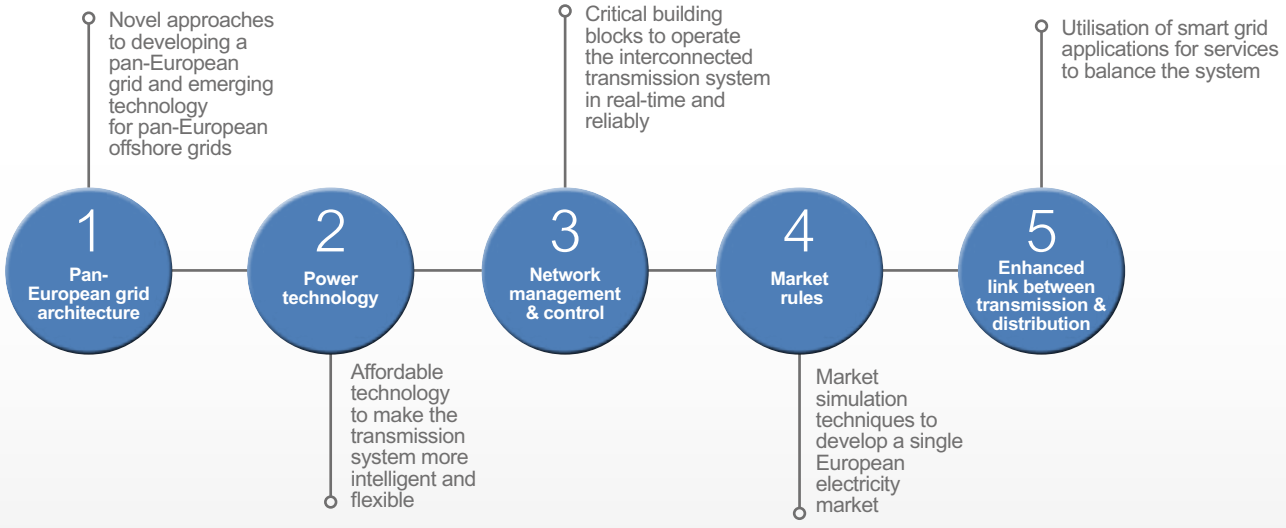
> "The involvement of ENTSO-E and its members in R&D activities cover initiatives such as the SET Plan and the European Electricity Grid Initiative. The guiding aim is to harness technological innovation to help achieve EU policy goals and create a smarter energy system."

ENTSO-E recently published its 2011 R&D Plan. Why does it prepare such a plan?

The consolidated R&D Plan is one of ENTSO-E's important, legally mandated deliverables and part of its work program. It serves TSOs' needs and contributes to the Strategic Energy Technology (SET) process which aims to initiate dialogue between European TSOs, regulatory authorities, EU Member States and the EC. The plan proposes RD&D projects with concrete benefits to match EU energy policy targets and provides a basis for seeking essential TSO R&D funding.

The ENTSO-E 2011 R&D Plan is the second to be published. Titled "European Grid: Towards 2020 Challenges and Beyond", it was released in December 2011. Five research and innovation clusters contribute to keeping the European network's capital and operational costs, as well as the security of the electricity supply, at affordable levels. They include pan-European grid architecture, power technology, network management and control, market rules, and an enhanced link between transmission and distribution. The R&D Plan also identifies the functional projects and current priorities according to each cluster.

ENTSO-E research and innovation clusters



THE SMART GRID WILL CONTRIBUTE TO THE OPERATION OF THE IEM THROUGH THE CLOSER INTEGRATION OF LOCAL SYSTEMS INTO A USER-CENTERED, FLEXIBLE AND SUSTAINABLE PAN-EUROPEAN NETWORK. IT WILL TAKE INTO ACCOUNT FAR MORE VOLATILE NETWORK CONDITIONS WHILE MAINTAINING SYSTEM SECURITY.

The 2011 R&D Plan takes into account stakeholder comments from the EEGI Roadmap consultation process at the beginning of 2011 and also includes important updates on functional and operational projects. It has also been reformatted to provide more concise information.

What are the main features of the European Electricity Grid Initiative?

The objective of the EEGI is to accelerate development of the overall electricity system in Europe by means of a smart grid. It is one of the SET Plan's European Industrial Initiatives to meet the challenges of the energy sector through technological innovation. These initiatives are industry-driven strategic technology alliances that address key low-carbon energy technologies.

ENTSO-E and EDSO-SG play an important role in the planning, monitoring and dissemination of the EEGI. In May 2010, they jointly published the EEGI Roadmap 2010-2018 and Implementation Plan 2010-12. The Roadmap proposes a 9-year European RD&D program focusing on system innovation and addresses the challenge of integrating new systems technology under live working conditions.

Europe-wide planning and implementation of the EEGI RD&D program is necessary to avoid duplication of effort and ensure appropriate cross-border coordination. The initiative will also promote solutions that support European standardization and interoperability.

The smart grid will be developed progressively between now and 2030. It will contribute to the operation of the IEM through the closer integration of local systems into a user-centered, flexible and sustainable pan-European network.

Smart transmission grids will optimize the use of transmission assets in a flexible way, taking into account the far more volatile system conditions than ever before, while maintaining system security.

Smart distribution grids are intended to allow customers to adjust their load in reaction to market prices and so enable demand to respond to bids in the Europe-wide intra-day and balancing markets. This demand response will be an important contribution to the TSOs' ability to balance the overall network as the fluctuating renewable energy sources increase this challenge.

What about electricity highways?

There is a need for convergence in the development of an efficient concept for pan-European electricity highways. ENTSO-E's study roadmap for a Modular Development Plan on a pan-European Electricity Highways System (MoDPEHS) and the active TSO involvement in the EEGI project are the stepping stones for the elaboration of a practical development plan.

In line with the EC's Infrastructure blueprint, ENTSO-E put forward the study roadmap as a tool to assess how a sustainable European electricity highways system could be developed over the 2050 time-frame. Based on this, work is already beginning within the "e-Highway2050" R&D project. A consortium, consisting of ENTSO-E and member TSOs, relevant industry associations, scientific institutes and universities, is due to provide a detailed description of the project by the end of March 2012.

Consistency with the EU's strategic vision for 2050 is extremely important in assessing future transmission needs and ENTSO-E and the European TSOs are well-placed to take a leadership role in this process.

DATA FOR SYSTEM PLANNING

Standardized data from ENTSO-E members is crucial for efficient data exchange. To optimize this exchange, ENTSO-E uses a data exchange profile based on the common information model (CIM) standardized by the IEC (International Electrotechnical Commission), the global standardization authority for electrical and electronic technologies. The purpose of the profile is to define how ENTSO-E members, using different vendor software, exchange information in a suitable format for ENTSO-E activities and regional initiatives.

Over the past few years, ENTSO-E has assumed worldwide leadership of the CIM. The ENTSO-E CIM profile describes the interface between individual software systems without governing any activity within a member's own software. It defines the format for data exchange in sufficient detail to allow software developers to conform to the standard and provide the required interoperability.

Use of the profile is based on the Third Package which requires ENTSO-E to adopt common tools to ensure the coordination of network operations, elaborating network codes for data exchange and transparency. The CIM's web-based exchange format can contribute directly to these tasks and the experience gained from its development and implementation will be used in the network codes. The processes and formats for data exchange will form part of several of the codes.

REGULAR TESTING

The CIM-based profile was first used in 2010 for preparing network models as the basis for system development, with the ENTSO-E TYNDP being a major beneficiary. This profile remains the valid version for data exchange but ENTSO-E has an agreed roadmap for regular testing of its continued interoperability and for updates to the profile and the IEC standards. The testing procedure is also designed to allow vendors to verify the correctness of the CIM standards in supporting ENTSO-E processes.

In addition to applying the CIM profile to system development studies, it will also now be modified to cope with the exchange of system operations data (performed on an hourly or daily basis) as well as market data. The support of vendors is essential in this context since they provide the software required for the effective operation of the new format.

FUTURE UPDATES

The 2nd edition of the ENTSO-E profile is currently being developed and was tested in a large-scale interoperability test in July 2011. A key objective was to validate the latest IEC standard on which the profile is based. The decision on its implementation will be made in October/November 2012.

ENTSO-E has requested that the IEC ensure that any CIM updates take into account compatibility with earlier CIM releases. Although ENTSO-E supports the expansion of functionalities such as dynamics, HVDC and wind modeling, the core of the load flow data exchange defined in the existing CIM will remain stable for as long as possible. This will play an important role in the decision to use updated CIM versions as the core of the ENTSO-E profile.

ENTSO-E decided to migrate all TSO processes to the first edition of the profile before approving the 2nd edition. Member TSOs have committed to finalizing migration of planning data exchanges by December 2011 and of day-ahead congestion forecast data by mid-2012.

SYSTEM SECURITY IN THE INTEGRATED MARKET

ENSURING OPERATIONAL SECURITY

ENTSO-E AWARENESS SYSTEM

CRITICAL SYSTEM PROTECTION

SYSTEM RELIABILITY IN A CHALLENGING ENVIRONMENT

ADDRESSING FREQUENCY DEVIATIONS

ENSURING OPERATIONAL SECURITY

OVERVIEW: MALGORZATA KLAWE VICE CHAIR OF THE ENTSO-E BOARD

> "Ensuring system security and reliability is the TSOs' primary objective, but the environment in which they have to do this is becoming increasingly challenging."

Electricity is increasingly regarded as a prerequisite for modern society to function and for our technological and economic development. Ensuring the reliability of the electricity transmission system and the security of the electricity supply 24/7, 365 days a year is the TSOs' most important objective.

But as the importance of electricity to our private and professional lives increases, the way in which TSOs are required to operate is becoming more complex. This is mainly due to the development of the internal electricity market (IEM), the requirement to accommodate an increasing share of fluctuating renewable energy like wind and solar, and to changes in the energy mix. They all bring new risks to the system, change load flows across large geographic areas and require more TSO activity closer to real-time which increases costs.

CHALLENGES AND BENEFITS OF THE IEM

The relationship between market integration and system operations brings both challenges and benefits for TSOs. As far as the challenges are concerned, increased day-ahead and intraday trading bring system operations closer to real time making network security much more demanding. In some cases, TSOs now need to execute counter-trades in order to guarantee the firmness of their allocated and nominated transmission capacities. In addition, greater day-ahead and intraday trading in a market based on a larger share of intermittent RES means that operators' assumptions about these time-frames are less likely to be reliable.

On the benefits side, regional market coupling is expected to help cut long-term investment costs. Larger markets tend to reduce price volatility by evening out the generation supply over a greater number of units. This enables better forecasting as well as a more transparent environment in which to make investment decisions on new generating capacity. Improved long-term investment conditions, in turn, increase long-term system security as they allow system adequacy requirements to be addressed more accurately.

With increasing European market integration, the greater volume of cross-border exchanges of electricity has significantly contributed to the convergence of prices. But it has also revealed the high level of congestion on the interconnections as well as within national grids. From a system operations perspective, therefore, the introduction of the market integration mechanisms has undoubtedly changed the way TSOs ensure the security and reliability of the network.

But TSOs are continuously introducing new tools and methodologies to further improve the coordination of their activities. They have already started to address the changes with the development of the network codes and ENTSO-E's network code development process is being carefully coordinated with ACER, the European Commission and stakeholders.

CONSISTENT NETWORK CODE FRAMEWORK

Although different network codes need to address different grid-related challenges, ENTSO-E is paying close attention to creating a consistent framework for the codes as the challenges they address are often interrelated. To give some examples, the development of the network code for operational security is being closely coordinated with the capacity allocation and congestion management code. Other examples are the links between the load frequency control and reserves network code and that for market balancing, and those between the codes for operational security and connection requirements.

TSO cooperation goes far beyond network code development. They cooperate very closely in the exchange of real-time information, they are responding to new challenges related to system protection, and they cooperate with other system users such as the generators in analyzing potential hazards to system security.

ENTSO-E member TSOs are fully aware that, in doing their job, they are contributing to the common objective of keeping the lights on in Europe.

ENSURING THE RELIABILITY OF THE ELECTRICITY TRANSMISSION SYSTEM AND THE SECURITY OF THE ELECTRICITY SUPPLY 24/7, 365 DAYS A YEAR IS THE TSOs' MOST IMPORTANT OBJECTIVE.

ENTSO-E AWARENESS SYSTEM

By improving the exchange of information between TSOs, the ENTSO-E Awareness System (EAS) is a tool to help maintain system security and reliability. Past network disturbances have made all European TSOs aware that real-time information about the source of a disturbance and the condition of the overall network is essential for an appropriate fast and coordinated response.

The EAS will allow TSOs to see information regarding the status of the whole European electricity network in real-time so that they can rapidly react to large incidents and mitigate their risk. It is being implemented by ENTSO-E and will make use of status information from all ENTSO-E TSOs.

This will include real-time information on network frequency, generation in-feed, cross-border exchanges of power and network status values defined as normal, alert, emergency, blackout and restoration. The EAS will serve as a "monitor" for control room engineers and will be totally separated from public access for security reasons.

The EAS will not provide a tool for managing or controlling the network. Nevertheless, it will alert control rooms to the status of other European control areas using familiar traffic signal color coding and deliver additional information for them to understand the source of any problem and how to cope with it.

The tender for the EAS was awarded to Siemens in 2010, since when the system has been under development. During 2011, specific focus was given to the system design in order to meet a range of technical standards and to conduct performance tests and agree operating procedures. TSOs in France and Germany will be the first to use the EAS when the project goes live in mid-2012. It will then be rolled out in stages to other ENTSO-E members before the end of 2012.

CRITICAL SYSTEM PROTECTION

Europe's transmission system is considered by the EC and Member States as critical infrastructure – infrastructure that needs protection from physical risks such as natural disasters or planned terrorist or cyber attack.

ENTSO-E's workshop with the EC on Critical System Protection in June 2011 marked a first milestone in a joint effort to address the potential risks to the European transmission system and demonstrate examples of how to mitigate these risks. The event explored common ground on issues including 'Carrington' events, cyber security and other high impact, low frequency (HILF) threats.

The EU's legal framework for protecting critical infrastructure, the European Program for Critical Infrastructure Protection (EPCIP) and the corresponding EPCIP Directive, adopts an "all hazards" approach with responses to natural hazards, terrorist threats, criminal activities and other accidents.

ENTSO-E's Critical System Protection (CSP) Working Group has reviewed the implementation of the EPCIP Directive in member TSOs. Responsibility for implementing the Directive varies widely by country, and several governments have partly delegated this to their local TSOs.

CYBER SECURITY

A major topic for analysis is cyber security, with several recent examples showing the vulnerability of important institutions to computer hacking. The CSP Working Group has therefore also set up a dedicated Expert Group to deal with this specific challenge.

The Group is evaluating how TSOs can jointly best contribute to the identification and protection of critical infrastructure in Member States. In 2012 it will identify best practice in reacting to identified risks and develop a strategy on cyber security, which it expects to finalize in the first quarter of the year.

SYSTEM RELIABILITY IN A CHALLENGING ENVIRONMENT

INTERVIEW: KLAUS KLEINEKORTE, CHAIRMAN ENTSO-E SYSTEM OPERATIONS COMMITTEE, DISCUSSES SOME OF THE MEASURES BEING TAKEN BY TSOs TO DEAL WITH CHANGES IN THE WAY ENERGY IS BEING GENERATED IN EUROPE.

What were the consequences of Germany's decision to shut down eight of its nuclear power plants in the immediate aftermath of Fukushima?

The Government's decision had enormous consequences for the German grid, as well as for the European system as a whole. As soon as it was announced, the European TSOs, and especially the four TSOs in Germany, carried out numerous system analyses to develop possible scenarios. Their initial results were included in ENTSO-E's Winter and Summer Outlook reports, which were expanded to include analyses of the overall network and power flows.

The analyses demonstrated a significant increase in operational risk at national level as well as in some other major Continental European regions. In Germany, the immediate decrease in the margin between generation and load resulted in a highly loaded grid and some lower voltage levels.

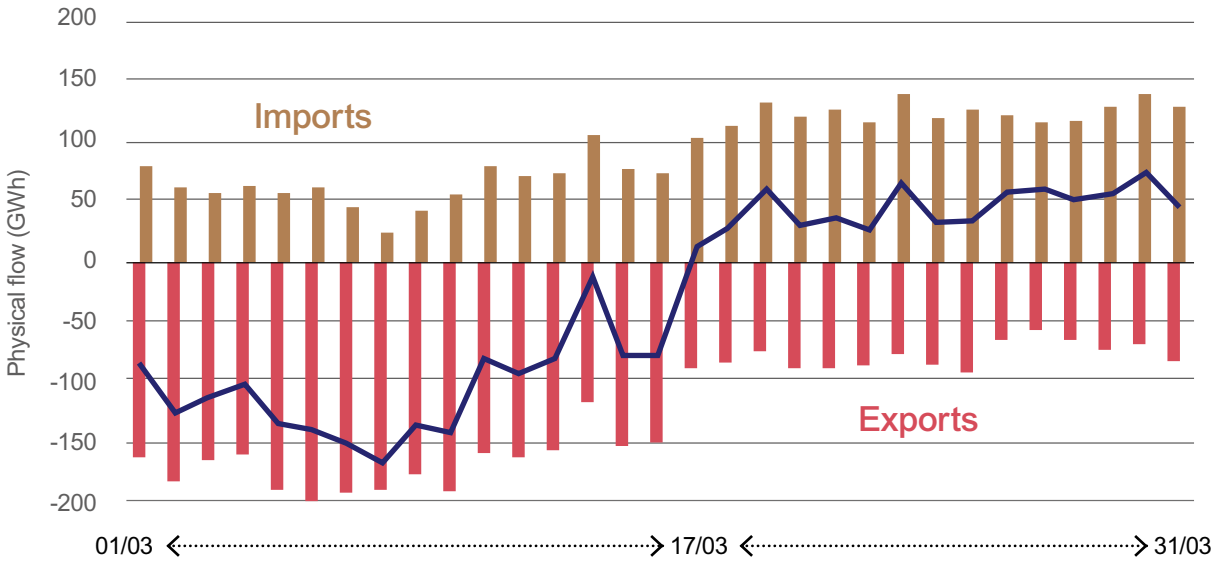
Since publication of the analyses, ENTSO-E and member TSOs have been actively working to manage the winter and summer scenarios. One reason why the network has not experienced greater difficulties is that, overall, weather throughout the region has been comparatively mild.

The 2011/2012 winter scenario highlighted December and January as the most difficult months for the European network, especially in the case of a prolonged, extended cold spell. In such a case, France would need a significant level of imports from neighboring countries at times when Germany's cross-border flows would already be very high. It noted that the two countries would be unable to assist each other if extreme weather conditions occurred in both countries simultaneously.

In countermeasures to maintain system security, German TSOs arranged support from adjacent TSOs in Austria, Switzerland and Italy, and prepared for the activation of grid and market-related remedies in a coordinated manner, with a controlled curtailment of the power supply as

> "2011 produced some examples which demonstrated the increasingly challenging environment in which TSOs need to ensure system security. They highlighted how difficult these challenges may be."

Cross border flows of electricity Germany, March 2011



ENTSO-E's preliminary analysis of power flows in March 2011 deduced that Germany's average daily import of electricity from 19 March to 3 April was 43 GWh, although hourly values changed significantly. The graph shows exports (negative values), imports (positive values) and the energy balance (line) in GWh.

the last resort. ENTSO-E's winter review, to be published in June 2012, will show how close reality came to the forecasts but some exceptional remedial action has been drawn on.

Over the 2011 summer period, there was a general increase in Germany's north-south power flows and in the use of its interconnection capacity. Several control areas experienced reduced energy margins and there were some power shortages at local level.

What is important for European TSOs to remember is that the network situation since March 2011 has been the result of a political decision. It has highlighted the importance of TSOs having a clear view of the timing and duration of major changes in generation capacity or the generation mix. Although they are in close contact with each other to exchange information and coordinate measures to maintain system security, it has clearly demonstrated that it is vital that they also maintain active communication with political decision-makers and that Member States need to coordinate major decisions affecting generation capacity.

TSOs are also facing the increasing penetration of RES. What are they doing to address this?

Handling the significant increase in RES generation, especially wind and solar energy, is one of the greatest operational challenges TSOs face over the next few years. In its "Pure Power" review, the European Wind Energy Association (EWEA) shows that wind power has grown in real terms every year over the past ten years to a substantial position today. There has also been almost exponential growth in PV installations. By 2020, wind and solar energy are forecast to generate the equivalent of 60 conventional 400 MW CCGT power plants in terms of the amount of energy exploited.

To cope with this amount of volatile generation, system design and operation need to alter fundamentally. The behavior of this partly decentralized generation capacity and the vast majority of centralized RES capacity (e.g. offshore wind) has called for a complete review of traditional TSO operating procedures and network tools.

And, with an increasing proportion of generation coming from embedded or distribution-connected units, there will also be a requirement for more information or possibly even TSO control of the units. In any case, cooperation with the DSOs will have to change as well. The system operations network codes and the connection code for generators will address these challenges in complementary and, of course, consistent ways.

For efficient network management, it will also be necessary for RES units to provide additional services other than just energy. Appropriately harmonized standards are needed to meet the requirements of the various synchronous areas and which can be credibly enforced.

Finally, although additional legislation, like that covering priority dispatch, may be acceptable at low levels of RES penetration, post 2020 greater emphasis will have to be given to designing market mechanisms and operational protocols that more closely meet the European network's overall needs and policy objectives.

Loop flows

One of the consequences of the rapid expansion of RES generation and the corresponding local grids, such as those in northern Germany and the North and Baltic Seas, has been the increase in the number of so-called loop flows. But since these are governed by the laws of physics and not national boundaries, they are a phenomenon which is difficult to prevent.

Even if generation and demand lie within a single country, the resulting power flows may well follow a path of less resistance through neighboring systems. This is ultimately due to the fact that generation is no longer allocated close to consumption. Only extension and reinforcement of the overall grid can provide a suitable remedy.

***Is modification of RES generation equipment required to protect the network*?**

In some cases, yes. Photovoltaic (PV) panels are a good example. In several European countries, such as Germany and Italy, connection standards for inverters for photovoltaic panels and other distributed generation have so far specified that the equipment automatically disconnects from the grid whenever the system frequency deviates between 0.2 and 0.3 Hz from the 50 Hz standard.

The standard was imposed at the time when the installed PV capacity was marginal but today the significant growth of PV plants has resulted in an installed capacity approaching 40,000 MW in those two countries alone. Since some 15,000 MW of this capacity could disconnect instantaneously if the

system frequency ever reaches 50.2 Hz, there is a risk of an immediate generation loss far in excess of the Continental European system's 3,000 MW "ride-through" design limit.

Some countries have already changed PV connection standards, but others have not yet done so due to complex standardization procedures. ENTSO-E's RfG network code should resolve the problem when it is introduced in early 2013 but the severity of the issue requires earlier action, with support from national regulatory authorities.

German TSOs have proposed a two-stage approach which is supported by EPIA (the European Photovoltaic Industry Association) and BSW (the German Solar Federation). The approach will resolve the problem for PV plants that are already in operation, as well as for new installations.

Before these actions can be implemented, however, a number of issues relating to ownership, accountability and cost recovery need to be resolved by national regulators. ENTSO-E has requested EC support in encouraging the appropriate national authorities to facilitate this.

ADDRESSING FREQUENCY DEVIATIONS

For several years, European TSOs have observed increasing frequency deviations from the network's 50 Hz standard. These have implications both for TSOs and generators, as well as for the IEM. In addition to reducing the TSOs' ability to ensure system security and reliability, they lead to higher operating costs for generators due to the increased use of power plant equipment and, ultimately, higher energy costs for consumers.

System frequency represents the "heartbeat" of an interconnected network as it permanently reflects the balance between load and generation. Deviation from the frequency set-point signals either a generation surplus or a deficit which can cause instability throughout the entire system.

Most automated control systems are based on system frequency and standard European operating practice is to limit deviations from the 50 Hz standard to within 1%. In the Continental European synchronous area TSOs are even aiming to limit frequency deviations to +/200 mHz, which corresponds to as little as 0.04%.

As the liberalized market sets different objectives for power generation, European TSOs have increasingly observed deterministic frequency deviations in various synchronous systems, independent of their size or geographic dimension. Variations with peak-to-peak values of up to 150 mHz and more have been observed.

SIGNIFICANT EFFECTS

The deviations affect system security by activating part of the primary reserve intended to cover large generation or load outages, limiting its use over longer time periods. Significant deviations can cause all the primary reserves to be activated without a critical incident having occurred. The main consequences of this are additional cost, leading to increased prices for end-users.

Furthermore, on the generation side, system frequency deviations often require plant equipment to operate inefficiently and beyond standard design specifications. This not only increases environmental emissions but eventually also leads to greater operational costs.

A joint ENTSO-E and EURELECTRIC working group representing TSOs and generators has analyzed the phenomenon in order to find potential solutions for the European network. The analysis, completed in late 2011, has been published in the report titled: "Deterministic Frequency Deviations – Root Causes and Proposals for Potential Solutions".

TYPICAL CAUSES

Historically, dispatchers have manually adjusted generation output to closely follow demand. But today the liberalized market model has made hourly step generation scheduling common practice. This appears to be the main cause of the frequency deviations – a short time mismatch between load and generation occurs because the generation schedule follows the market rules rather than the real-time demand.

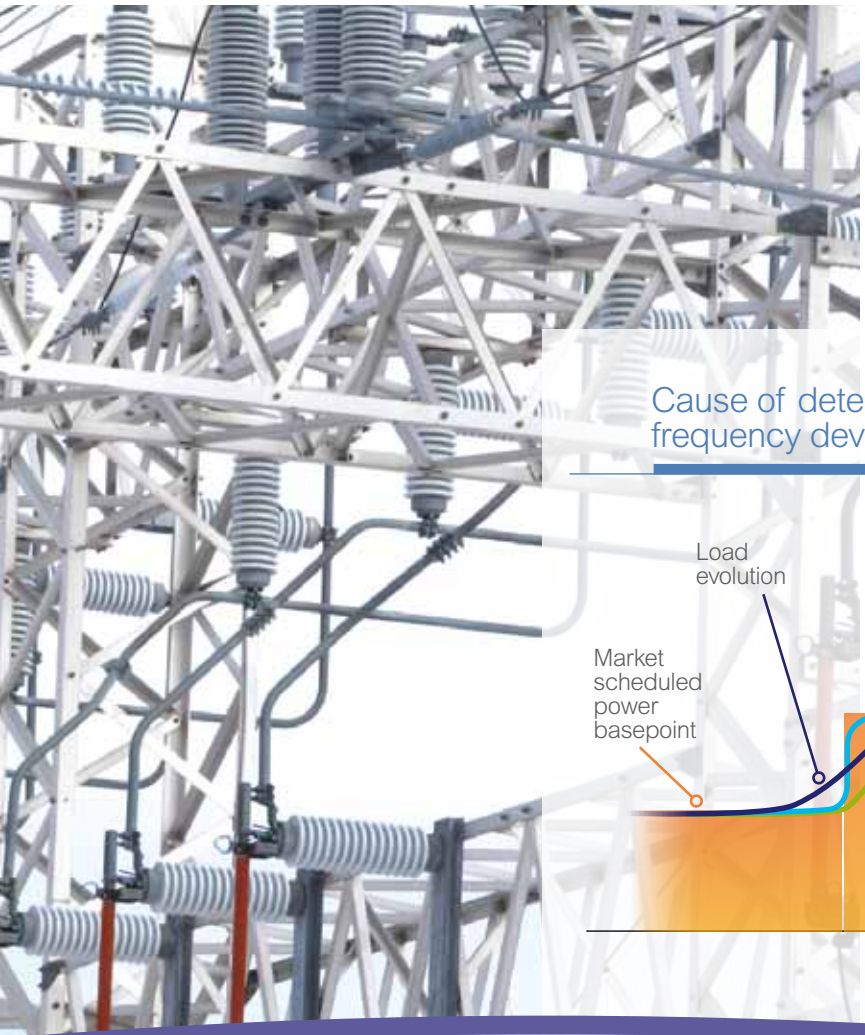
For example, current market rules require load planners to order generation output in one hour blocks, which generators supply as closely as possible to the schedule in order to control costs. But as the load increases continuously, an imbalance often occurs with the stepwise increase in generation, causing the frequency deviation. The same phenomenon occurs when the load decreases.

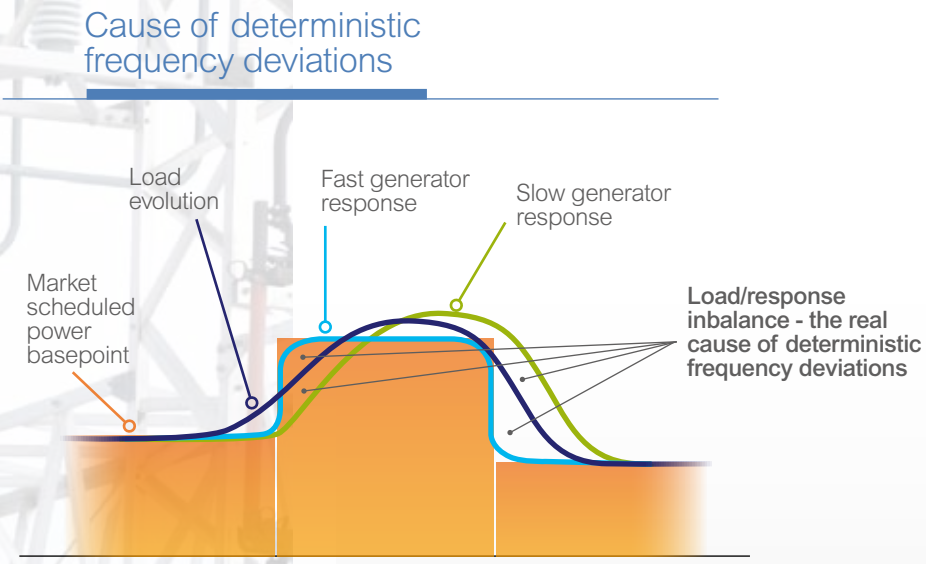
POSSIBLE SOLUTIONS

The Working Group's investigation found that increasing the control reserves does not substantially improve the quality of the system frequency. The most effective and efficient solution is to eliminate the cause of the deviations. In other words, generation scheduling and related market rules need to be adapted to current operating conditions and be applied according to real-time changes in load.

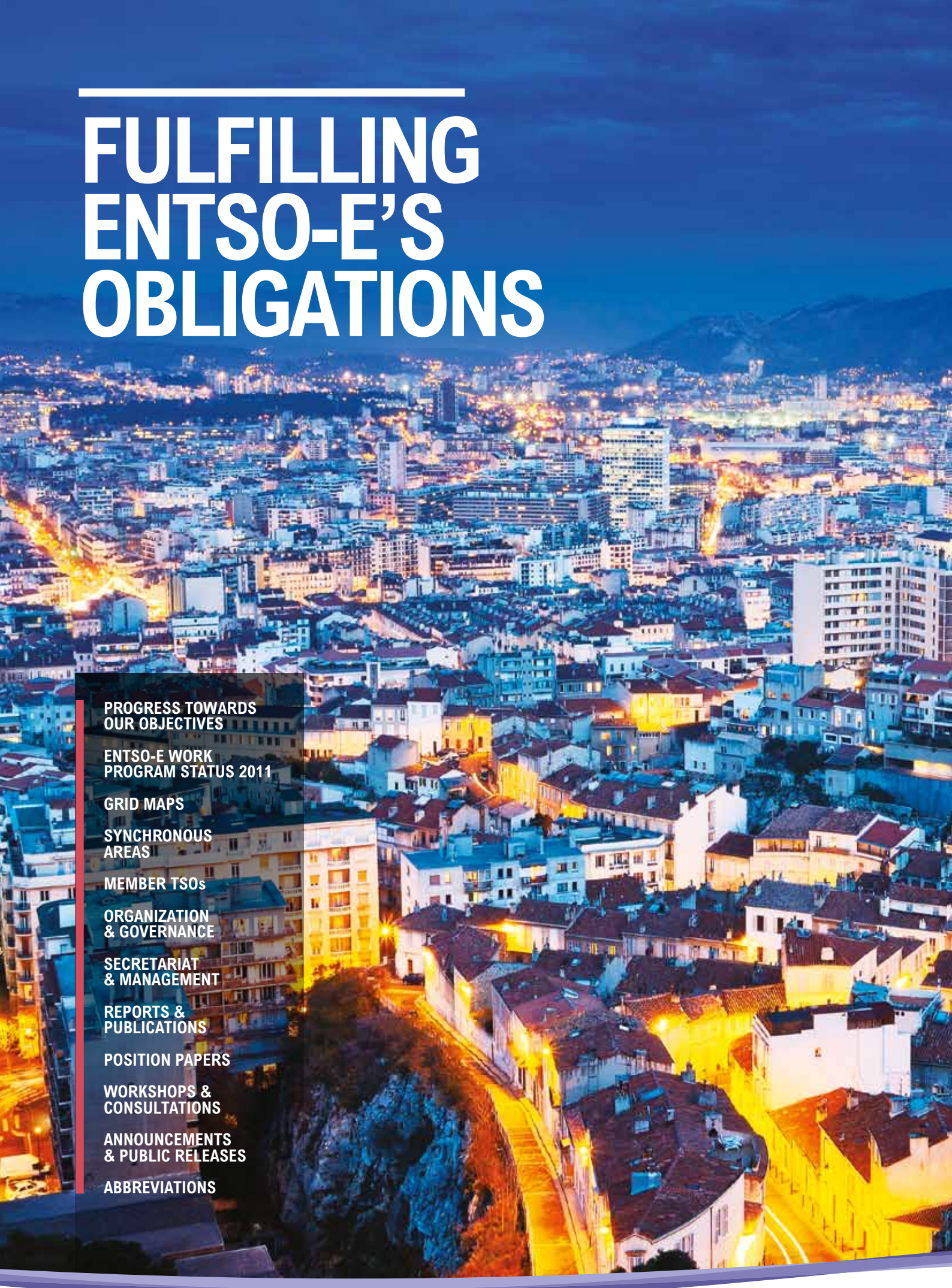
As the European network is based on highly meshed interconnection lines, the changes will need to be synchronized at European level and require a combination of different technical solutions. These include incentives for generators to adopt ramp-base billing, changes in handling the schedule (i.e. replacing the one-hour power step with two half-hour ramping schedules), replacing the schedule itself with 15-minute power steps or ramps, and methods to smooth the scheduled variations of large hydropower plants. Simulations show that all of these solutions will have a positive impact.

The findings of the frequency deviation report will now be discussed with market experts from ENTSO-E and EURELECTRIC in order to propose the best technical solutions with regard to market feasibility in order to reduce operational risks as soon as possible.





FULFILLING ENTSO-E'S OBLIGATIONS



PROGRESS TOWARDS OUR OBJECTIVES

OVERVIEW: GRAEME STEELE CHAIRMAN OF THE ENTSO-E BOARD

> "From ENTSO-E's perspective, the most important date in 2011 was March 3, the day the Third Internal Market Package and Regulation (EC) 714/2009 officially became applicable."

The first part of this report highlights the challenges facing ENTSO-E and its member TSOs in meeting the EU's energy policy goals, in particular the creation of the internal electricity market (IEM) and the main milestones in making it a reality. The following pages provide the complete scope of ENTSO-E's activities over the past year with detailed progress on different ENTSO-E projects.

The Third Package's Regulation (EC) 714/2009 defines ENTSO-E's obligations and many of the specific tools the association and member TSOs must use in helping to achieve the EU goals. The formal adoption of the Package makes a substantial difference to ENTSO-E's daily work by giving it a legally defined framework of cooperation with regulators and the European Commission (EC), as well as with stakeholders and network users. The legal framework forms the backbone of some of ENTSO-E's most important work products.

NETWORK CODE DEVELOPMENT

The network codes feature prominently in this report due to their importance in the development of a well-functioning IEM. Their preparation is one of the main tasks assigned by Regulation (EC) 714/2009.

ENTSO-E has now formally been invited by the EC to start work on four codes: connection requirements for generators (RfG), demand connection (DCC), capacity allocation and congestion management (CACM) and system operations (SO). Significant resources have already been committed by ENTSO-E and member TSOs to the development of the codes and further resources will be added in the future.

Although none of the codes have yet been completed, it is important to already start thinking about their efficient management once they are in force. It is probable that they will need to be modified periodically. They need to reflect the dynamic nature of the electricity market and there will undoubtedly be parts which stakeholders will want to be changed or clarified.

DYNAMIC ENVIRONMENT

The environment in which ENTSO-E operates is a changing one and the EC's Guidelines for Trans-European Energy Infrastructure and the Connecting Europe Facility demonstrate that it will remain so.

Besides the legal environment, the political one is equally vibrant. Member States' decisions to phase out nuclear power after the nuclear catastrophe in Japan has made clear that closer coordination and communication of national decisions affecting generation capacity is needed. This is a major concern

for TSOs as our first and foremost task is to ensure the security and reliability of the electricity supply. In response to these concerns, EU Member States and the EC have set up the Electricity Coordination Group. In the Group's first meeting last December, ENTSO-E was invited to present its Winter Outlook report and its analyses related to the impact of PV installations on system frequency.

Politicians and decision-makers in the EU, as well as in many European countries, have now recognized that the key objectives of European energy policy depend on creating a stronger transmission network. They support streamlined infrastructure permitting procedures and the regulatory incentives necessary for the significant expansion of the European transmission network. But, as my colleagues have demonstrated in the first part of the report, this is only the beginning. Much hard work is still ahead, especially when looking at the challenging 2014 target date for the IEM.

The EC's Energy Infrastructure Package demonstrates the crucial role that the transmission network plays in achieving EU energy policy objectives and the low-carbon ambitions of Member States. However, to deliver the network development necessary to meet these goals we must crack the permitting and public acceptance problem!

TSOs will continue to promote the benefits of developing the network so policy-makers and the public have a better understanding of the fact that Europe's energy policy goals and its low carbon future cannot be achieved without significant investment in pan-European infrastructure. In this context, our Ten-Year Network Development Plans are an important tool.

CONSISTENCY AND CONTINUITY

To ensure the continuity of its work in market integration, system development, system operations and R&D, ENTSO-E published its 2012 work program in October 2011. The program incorporates the European Council's goal of completing the IEM by the end of 2014 and the Three-Year Plan for Network Codes, jointly developed with the EC and ACER, also targets this date.

Stakeholder comments received during the work program consultation process highlight the fact that ENTSO-E's activities require successful cooperation with generators, DSOs and energy traders. We aim to improve our performance in stakeholder engagement so that we are seen as an organization noted for excellence in this area. This will be a major focus for the ENTSO-E Board in 2012.

The remaining pages of the report show the status of ENTSO-E's activities against its 2011 work program in line with the requirements of Regulation (EC) 714/2009. They also provide an overview of the association's members, organization and structure as well as of ENTSO-E publications, position papers, workshops and public announcements.

ENTSO-E WORK PROGRAM STATUS - END 2011

Activity	Goal	Deliverable & completion date (end of quarter/year)	Committee/ group in charge	Interaction with other groups
Design for market integration	Market integration network codes design	Three projects provide structured input to: - a framework guideline on capacity allocation and congestion management; network codes covering capacity calculation, intraday and day-ahead markets. Drafting of network codes ("as if" / formal development process): - Capacity calculation: (Q3/2011 - Q1/2012 / Q2/2012 - Q3/2012). - Intraday - trading/congestion management: (Q4/2010 - Q3/2011 / Q4/2011 - Q1/2012). - Day-ahead - trading/congestion management: (Q4/2010 - Q3/2011 / Q4/2011 - Q1/2012). - Forward market: (Q4/2011 - Q3/2012).	Market (MC)	System Operations (SOC)
System operations	Formal work for network codes on operational security principles and on primary, secondary and tertiary control and reserves.	Structured input to the network codes on: - operational security principles (Q3/2011 - Q2/2012, with common scoping discussions Q3/2012). - primary, secondary and tertiary control and reserves management (Q4/2011 - Q3/2012, with common scoping discussions Q4/2012)	SOC	
Pilot code for grid connection with special focus on wind generation	Based on the requirements common to all generators, identify and develop rules harmonizing network code requirements with particular relevance to connecting wind generators to transmission networks across Europe.	Completion of the pilot code, assuming the ERGEG framework guideline is completed and the EC letter received by the end of 2010 (Q1/2011 - Q4/2011).	System Development (SDC)	
TYNDP	Determine the trends, needs and future development of the transmission network at European level based on common network and market models. Preparation of the next edition of the TYNDP, to be published in 2012, and subsequently every 2 years.	Finalize 6 regional investment plans for publication with the 2012 TYNDP (Q4/2011). Define and implement methodologies for market modelling on a pan-European scale (2012). Proposal for a EU 2020 targets top-down scenario (Q1/2011). Define a market and network model database (Q4/2011).	SDC	
R&D	Ensure cross-functional coordination of all TSO's research subjects. Ensure smooth implementation of the ENTSO-E R&D plan.	Monitor the R&D Plan as a whole (2010-2011) and report on R&D plan monitoring. Support the EC during the Calls for Proposals (2010-2011) Communication on the R&D plan progress among the technical stakeholder community (2010-2011). Design (Q4/2011) and approval (Q1/2012) of the 2nd edition of the ENTSO-E R&D Plan for public consultation (Q1/2012). Survey on R&D support in the various implementations of the Third Energy Package at national level (Q4/2011).	R&D (RDC)	MC, SOC, SDC

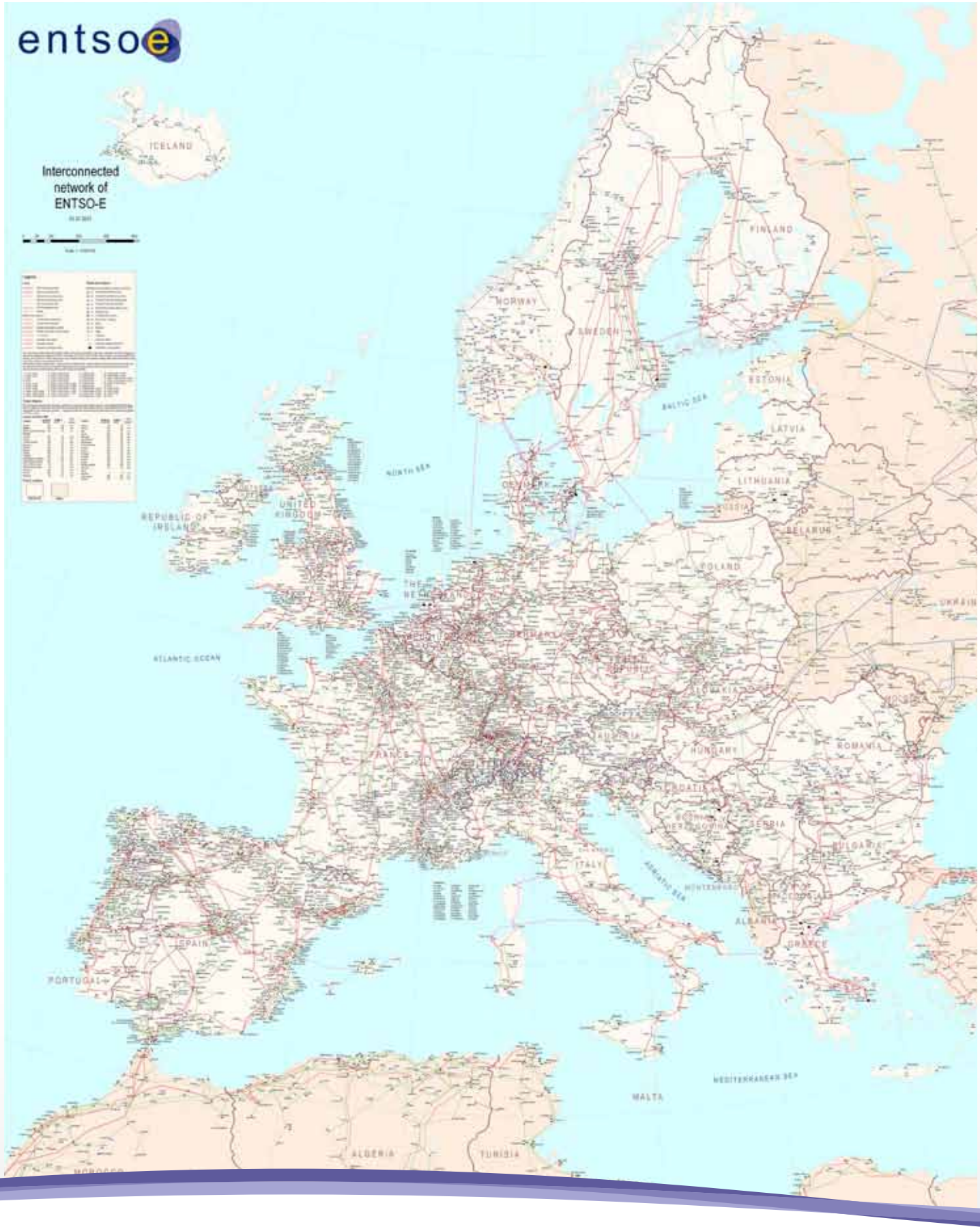
Consultation with (start quarter/year)	Status/comments
	ENTSO-E has actively engaged in the development of the European target model over the past few years through projects related to the Florence Forum, such as the Ad-hoc Advisory Group (AHAG).
Consultation during "as if" phase (Q3/11); possible consultation during formal development phase (Q1/12).	Formal drafting of the network code on Capacity Allocation & Congestion Management (CACM) - covering day-ahead, intraday and capacity calculation - started in September 2011. This followed a successful scoping phase with effective feedback on the corresponding framework guideline delivered by ACER in July 2011. Ongoing consultation activities with stakeholders include bilateral meetings, workshops and a stakeholder user group representing the main stakeholder associations. A draft CACM network code has been submitted for ENTSO-E Assembly approval on 20 March 2012 and will then undergo public consultation. ENTSO-E is now participating in the ACER Electricity Stakeholder Advisory Group (AESAG) project (the follow-up to AHAG) dealing with the regional implementation of the target model. It is also engaged in scoping work on network codes for forward and balancing markets, both now scheduled by the EC, ACER and ENTSO-E to start formal development in October 2012.
Stakeholder consultations to take place (2012).	Common scoping discussions with ACER proceeded as planned, leading to the ACER framework guideline on System Operation of December 2011 based partly on inputs from the scoping work with ENTSO-E. The letter from the EC inviting ENTSO-E to start the formal development of the network codes for System Operation was received in February 2012. Three operational codes are prioritized as part of the effort to complete the IEM by 2014: the network codes on Operational Security (formal 12-month period beginning 1 March 2012), on Operational Planning & Scheduling (formal 12-month period beginning 1 April 2012) and on Load Frequency Control & Reserves (formal 12-month period beginning 1 July 2012).
Stakeholder consultations to take place (Q1/2011).	The network code on Grid Connection Requirements Applicable to all Generators (NC RfG) is on schedule and underwent public consultation from 24 January until 20 March 2012. The expected delivery of the code is end-June 2012, in line with the official schedule. Extensive consultation activities took place throughout 2011 and continue in 2012, including many bilateral meetings with stakeholders, 3 workshops and in 2012 the formation of a stakeholder user group. Scoping also took place in 2011 on the Demand Connection Code with formal work beginning on 1 January 2012.
	The six regional investment plans have been finalized and approved by the ENTSO-E Assembly in early 2012, and entered public consultation in March 2012. The pan-European TYNDP 2012 report was finalized at the same time to also enter public consultation in March 2012. Methodologies for market modeling have been elaborated and studies undertaken by the Regional Group Continental Central East for the whole ENTSO-E area in summer 2011. In parallel, regional groups have run regional market studies, which are based on the common pan-European market database. The EU 2020 targets top-down scenario was elaborated in January 2011 and entered public consultation in February 2011. The network model database was defined in September 2011 and implementation started in November 2011. Further specification of the database is ongoing until February 2012. The market model database requirements are being updated and are expected by end-March 2012 for implementation by summer 2012. Both projects are in time for the start of work on the 2014 TYNDP. New scenarios on the 2030 visions will also be developed.
Public consultation (Q1/2012)	The formal monitoring of the R&D Plan has been postponed to 2012, but the ENTSO-E R&D Committee's first meeting took place in December 2010 to discuss R&D projects and the significant work on defining key performance indicators concluded in 2011. The discussion will further continue under the framework of the GRID+ project and the EEGI. ENTSO-E fulfilled the task on updating the ENTSO-E R&D Plan in December 2011. ENTSO-E supports the EEGI and the EC in preparing calls for proposals. ENTSO-E analyzed the survey on R&D support in the various implementations of the Third Energy Package at national level. The outcome was a basis for the position paper on a regulatory framework, published in 2011. This task will be repeated in 2012.

ENTSO-E WORK PROGRAM STATUS - END 2011

Activity	Goal	Deliverable & completion date (end of quarter/year)	Committee/ group in charge	Interaction with other groups
Coordination of operation of the network	Ensure coordination of network operation in normal and emergency conditions.	Preparation of an ENTSO-E Awareness System (Q4/2011). Implementation of the crisis communication procedure (Q4/2011). Implementation of the Incident Classification Scale procedure (Q4/2011). Exchange of operating experience, focusing on voltage stability (Q4/2011). Investigation of the deteriorating quality of system frequency (Q4/2011). Analyses and investigation of a common pan-European approach for the determination of operational reserves (Q4/2011)	SOC	MC
Long-term strategy and other system development issues	Roadmap towards a pan-European power system 2050	Systematic preparation work on roadmap (Q2/2010 - Q4/2010); consolidated draft (Q1/2011). Preparation of realization of the study package of "Roadmap towards a pan-European power system 2050 (Q4/2011). Position papers on transmission infrastructure technology, electro-magnetic fields (EMF) and licensing procedures (2010 - 2011).	SDC	
Transparency	Implementing the EC guideline on fundamental data transparency.	Adapting and developing ENTSO-E transparency platform entsoe.net according to the requirements set by the guideline (Q3/2011)	MC	
TSO economic framework	Investment incentive schemes.	Work on this topic will be combined with continuing work on tariff harmonization	MC	

Consultation with (start quarter/year)	Status/comments
	The ENTSO-E Awareness System (EAS) was defined and tendered for in 2011 and vendor implementation is well advanced. Implementation is planned for the second half of 2012. The crisis communication procedure was refined and tested during the first half of 2011 and applied since summer 2011.
	The Incidents Classification Scale Methodology was approved by SOC in December 2011. It is planned to have a reporting phase during 2012 using a temporary reporting tool for analyzing criteria and thresholds as a basis for the permanent web-based reporting tool. Investigations into the issue of the deteriorating quality of the system frequency were completed in December 2011 (and published jointly with EURELECTRIC in winter 2012). A new team (extended with additional market experts) was established in December to suggest concrete implementation proposals on the basis of analysis of the report's recommendations. The SOC approved the analyses for a pan-European approach for the determination of operational reserves and a schedule for the finalization of the work, which will be a basis for the network code on Load Frequency Control & Reserves.
Public consultation (Q2/2011)	The roadmap has been finalized and entered public consultation in May 2011. It was published in July 2011. The consortium for performing the roadmap studies was set up in September 2011 and it has applied for EC funding. The ENTSO-E position paper on a framework regarding electricity highways was published in December 2011. The Offshore Transmission Technology Report was released in December 2011. ENTSO-E views on the offshore grid development in the North Seas was published in February 2011. A paper on the feasibility and technical aspects of the partial undergrounding of extra high voltage power transmission lines was published in January 2011. ENTSO-E submitted position papers in 2011 and 2012 on the Energy Infrastructure Package, especially on the parts concerning licensing, and prepared a position paper on electro-magnetic fields for approval in March 2012.
	The new Transparency Regulation is currently being drafted by the EC based on the 2010 ERGEG proposal. ENTSO-E responded to the EC public consultation on ERGEG's advice on the FEDT Guidelines in September 2011. Following this, ENTSO-E provided the EC with an updated version of the appendix (definitions) for Load, Generation, Transmission and Balancing. The definitions continue to be revised and the business requirements specifications for the future transparency platform will be based on them. The first complete draft of the business requirements specifications are foreseen the end of April 2012. A corresponding stakeholder communication plan has been created. Bidders for the new transparency platform (EMFIP) have been shortlisted to six candidates and a consultation was held in February 2012. Bidders are currently being reviewed with the aim of agreeing a contract by mid-June 2012.
	ENTSO-E issued a position paper on creating conditions to allow TSOs to finance Europe's network infrastructure in early 2011. The paper tackled the issue of regulatory certainty, incentive design and attracting investment. The paper has been communicated to the EC, regulators and to the European Parliament in the context of the Energy Infrastructure Package (EIP). The positions have also provided input for ENTSO-E's EIP response. ENTSO-E has also responded to a consultation by the THINK project on tariff harmonization questions.

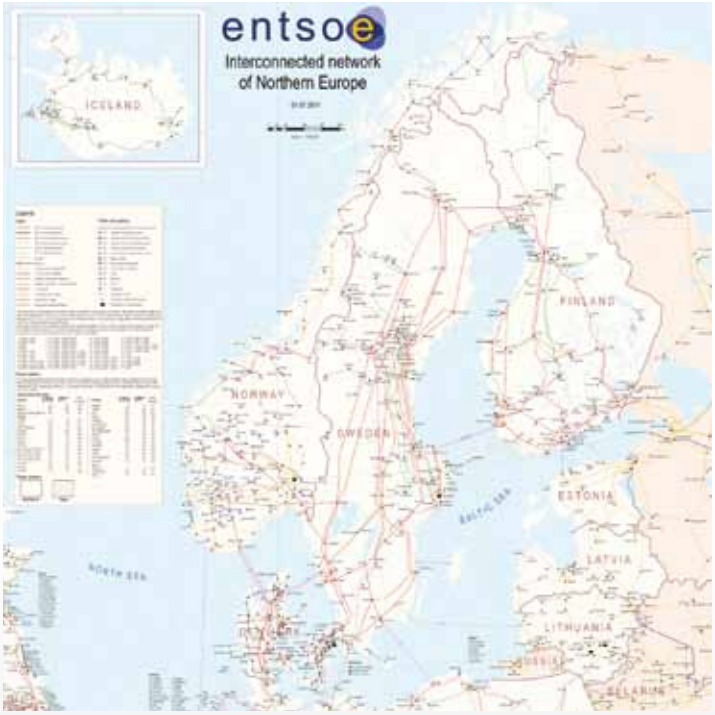
ENTSO-E GRID MAPS 2011



ENTSO-E member TSOs, as well as non-members, have contributed to producing three ENTSO-E grid maps – the interconnected network of ENTSO-E, the interconnected network of Continental Europe (formerly the UCTE area) and the interconnected network of Northern Europe. The grid maps show power plants (distinguishing between hydro, wind and thermal), power stations and sub-stations, existing high voltage lines and lines under construction of voltages of 220 kV and more, and of 110 kV to 150 kV if they cross national borders.

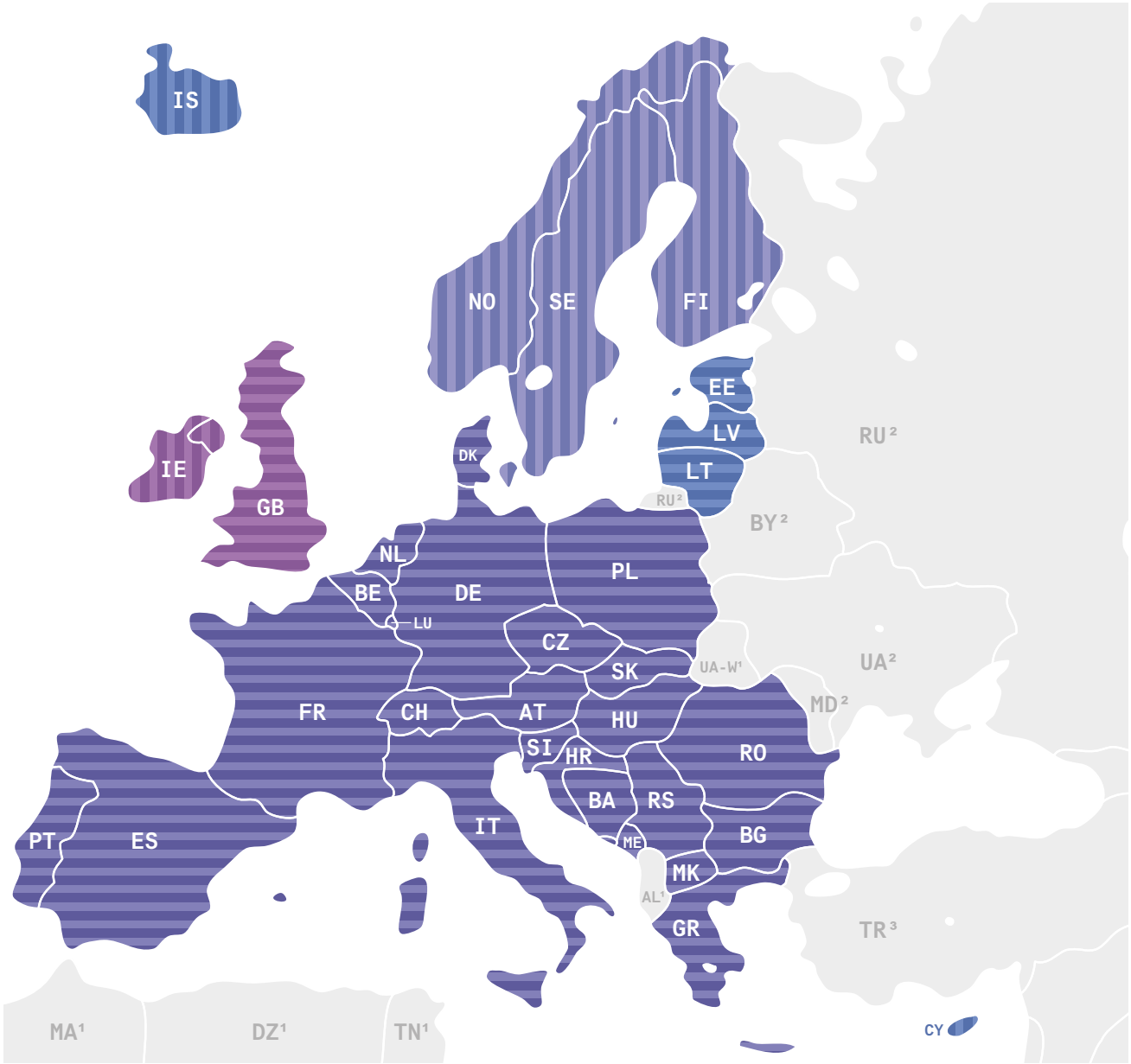
Electronic versions of the maps can be downloaded from ENTSO-E's website at **www.enstsoe.eu/resources/gridmap/order-gridmap**. Hard copies can also be ordered at: **www.enstsoe.eu/resources/publications/order**.

Interconnected network of Continental Europe



Interconnected network of Northen Europe

ENTSO-E SYNCHRONOUS AREAS



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

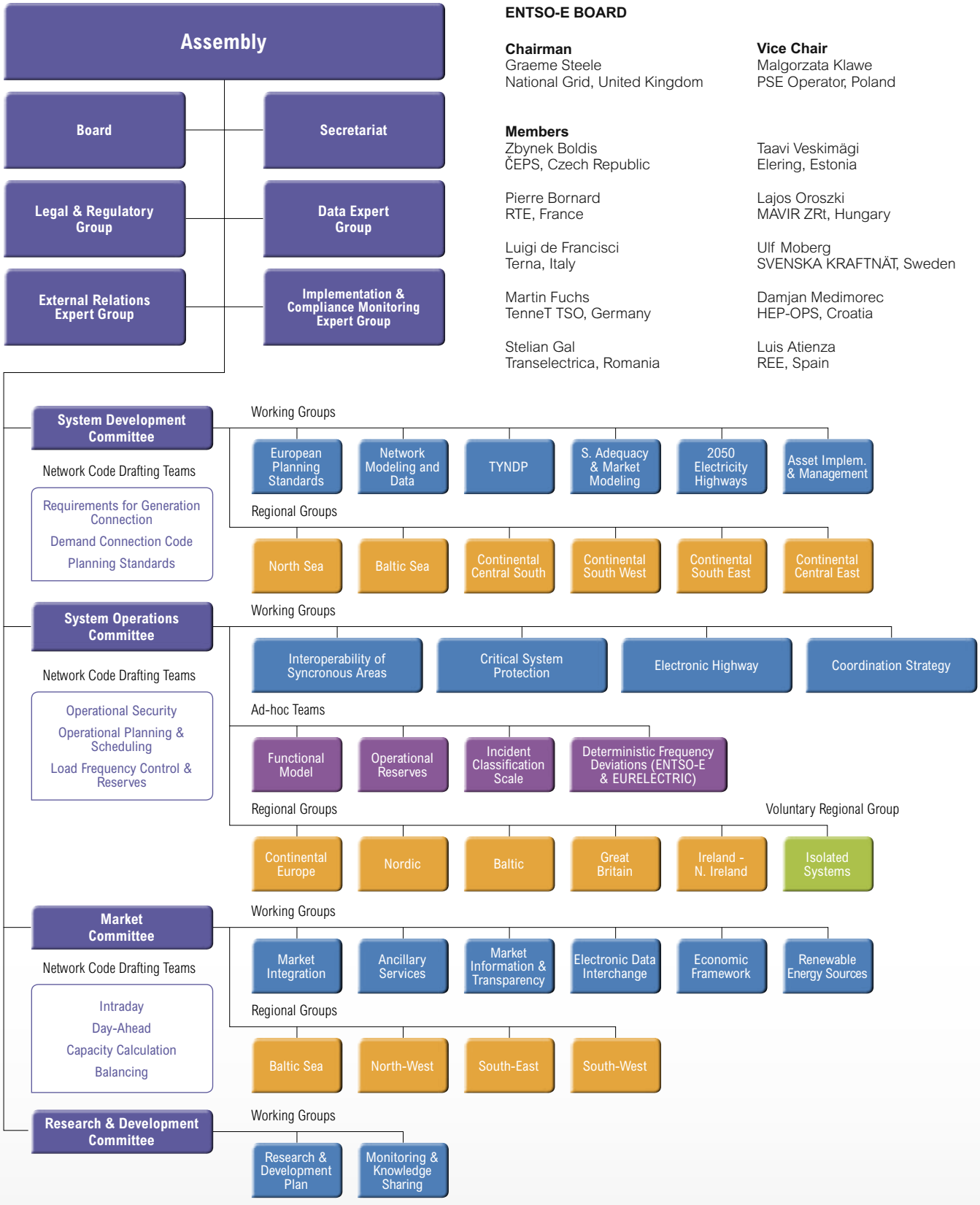
[3] Since September 2010 in trial parallel interconnection with the continental European system

ENTSO-E MEMBER TSOs

COUNTRY	COMPANY	ABBREVIATION
AT | Austria	APG – Austrian Power Grid AG	APG
	Vorarlberger Übertragungsnetz GmbH	VÜN
BA | Bosnia and Herzegovina	Nezavisni operator sustava u Bosni i Hercegovini	NOS BiH
BE | Belgium	Elia System Operator SA	Elia
BG | Bulgaria	Electroenergien Sistemen Operator EAD	ESO
CH | Switzerland	swissgrid ag	swissgrid
CY | Cyprus	Cyprus Transmission System Operator	Cyprus TSO
CZ | Czech Republic	ČEPS a. s.	ČEPS
DE | Germany	TransnetBW GmbH	TransnetBW
	TenneT TSO GmbH	TenneT TSO
	Amprion GmbH	Amprion
	50hertz Transmission GmbH	50Hertz
DK | Denmark	Energinet.dk	Energinet.dk
EE | Estonia	Elering AS	Elering AS
ES | Spain	Red Eléctrica de España S.A.	REE
FI | Finland	Fingrid OyJ	Fingrid
FR | France	Réseau de transport d'électricité	RTE
GB | United Kingdom	National Grid Electricity Transmission plc	National Grid
	System Operation Northern Ireland Ltd	SONI
	Scottish Hydro Electric Transmission Limited	SHETL
	Scottish Power Transmission plc	SPTransmission
GR | Greece	Independent Power Transmission Operator S.A.	IPTO
HR | Croatia	HEP-Operator prijenosnog sustava d.o.o.	HEP-OPS
HU | Hungary	MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság	MAVIR ZRt.
IE | Ireland	EirGrid plc	EirGrid
IS | Iceland	Landsnet hf	Landsnet

COUNTRY	COMPANY	ABBREVIATION
IT | Italy	Terna – Rete Elettrica Nazionale SpA	Terna
LT | Lithuania	LITGRID AB	LITGRID
LU | Luxembourg	Creos Luxembourg S.A.	Creos Luxembourg
LV | Latvia	AS Augstsprieguma tīkls	Augstsprieguma tīkls
ME | Montenegro	Crnogorski elektroprenosni sistem AD	Crnogorski elektroprenosni sistem
MK | FYROM	Macedonian Transmission System Operator AD	MEPSO
NL | Netherlands	TenneT TSO B.V.	TenneT NL
NO | Norway	Statnett SF	Statnett
PL | Poland	PSE Operator S.A.	PSE Operator
PT | Portugal	Rede Eléctrica Nacional, S.A.	REN
RO | Romania	C.N. Transelectrica S.A.	Transelectrica
RS | Serbia	JP Elektromreža Srbije	EMS
SE | Sweden	Affärsverket Svenska Kraftnät	SVENSKA KRAFTNÄT
SI | Slovenia	Elektro Slovenija d.o.o.	ELES
SK | Slovak Republic	Slovenska elektrizacna prenosova sustava, a.s.	SEPS

ENTSO-E ORGANIZATION & GOVERNANCE



ENTSO-E BOARD

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ENTSO-E is governed by an Assembly and structured along the lines of four committees: System Development, System Operations, Market, and Research & Development. These committees are organized in a number of working groups, as well as regional and voluntary regional groups.

- The System Development Committee coordinates at pan-European level the network development and prepares the Ten-Year Network Development Plan.
- The System Operations Committee is in charge of technical and operational standards as well as the power system quality. It ensures compliance monitoring and develops tools for data exchange, network models and forecasts.
- The Market Committee works towards an integrated and seamless European electricity market and is in charge of cross-border congestion management, integration of balancing markets, ancillary services, and the inter-TSO compensation mechanism.
- The Research & Development Committee focuses its activities on the European Electricity Grid Initiative (EEGI) and the launch of the grid's R&D Roadmap 2010-2018. It was established in September 2010 to ensure the effective implementation of ENTSO-E's mandate in the area of R&D and to correspond to the EU's greater emphasis on electric grids.

The ENTSO-E Board coordinates the committees' work and implements Assembly decisions. A Legal & Regulatory Group advises all ENTSO-E bodies on legal and regulatory issues and Expert Groups on Data, Implementation & Compliance Monitoring, and External Relations provide expertise to the association and ensure cooperation between all member TSOs in their fields of expertise. The Brussels-based Secretariat is the association's representation to EU institutions, regulators and stakeholders.

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- **Legal Advisor** — Nicolas Roger-Machart

*As of 20/03/2012

ENTSO-E REPORTS & PUBLICATIONS 2011

REPORTS & PUBLICATIONS

December	ENTSO-E Research & Development Plan 2011
	Offshore Transmission Technology Report
November	Statistical Yearbook 2010
	Winter Outlook/Summer Review Report 2011
	Nordic Winter Power Balance 2011-2012
October	ENTSO-E Work Program for 2011 through to December 2012
August	Test Report on ENTSO-E's 2nd large-scale CIM interoperability test
	Regional Action Plan for Market Integration in South East Europe
	Analysis of Continental European inter-area oscillations of 19 and 24 February 2011
	Nordic Grid Disturbance and Fault Statistics 2010
July	Study Roadmap towards the Modular Development Plan on pan-European Electricity Highways System 2050 (MoDPEHS)
	Assessment of stakeholder comments and frequently asked questions on "Grid connection requirements applicable to all generators"
	System Adequacy Retrospect Report for 2010
June	Overview of Transmission Tariffs in 2011
	Annual Report 2010
	ENTSO-E Memo 2010
May	Summer Outlook/Winter Review Report 2011
	Compliance Oversight Report 2010
	Nordic Summary of the Winter Situation 2010-2011
March	Conclusions of the informal Pilot Network Code
	Baltic Sea Regional Projects – Status Report
February	Scenario Outlook & Adequacy Forecast 2011-2025
	ENTSO-E Factsheet 2011
	Compliance Monitoring Program 2011
January	Joint Paper on the feasibility and technical aspects of partial undergrounding of extra-high voltage power transmission lines
	Technical Background and Recommendations for defence plans in the continental European synchronous area

ENTSO-E POSITION PAPERS 2011

POSITION PAPERS

December 9	ENTSO-E position paper on a framework regarding electricity highways
December 7	Creating competitive pan-European energy markets which ensure appropriate adequacy and efficiently integrate renewable energy
November 11	Developing balancing systems to facilitate the achievement of renewable energy goals
November 10	Addressing transmission-related challenges of renewable energy integration
October 5	ENTSO-E position and proposals to amend the EC draft Energy Efficiency Directive
September 15	ENTSO-E response to EC public consultation on fundamental data transparency guidelines
September 8	ENTSO-E response to ACER consultation: framework guidelines on system operation
August 26	ENTSO-E response to ERGEG draft advice on the regulatory oversight of energy exchanges
August 11	Regional action plan for market integration in South East Europe
July 25	Firmness of cross-border transmission capacity and financial compensation
July 18	A new regulatory framework for TSO R&D in ENTSO-E countries: summary
July 8	Position paper on cross-border balancing. Supporting document: cross-border balancing maps
June 10	ENTSO-E response to ACER draft framework guidelines on capacity allocation and congestion management for electricity consultation
May 19	ENTSO-E response to EC consultation on EC green paper - COM (2011) 48: From Challenges to Opportunities: Toward a Common Strategic Framework for EU Research and Innovation funding
May 2	ENTSO-E response to the stakeholder consultation paper on the Europe 2020 Project Bond initiative
May 2	ENTSO-E response to ACER consultation: framework guidelines on electricity grid connections
April 29	Open letter: Developing the network code on capacity allocation and congestion management
March 25	Creating conditions to allow TSOs to finance Europe's transmission investment challenge
March 7	ENTSO-E response to the EC public consultation on the "External dimension of the EU energy policy"
February 15	ENTSO-E response to the public consultation on the EC communication "The Future Role of Regional Initiatives"
February 10	ENTSO-E views on the offshore grid development in the North Seas
January 20	Feasibility and technical aspects of partial undergrounding of extra high voltage power transmission lines

ENTSO-E WORKSHOPS & CONSULTATIONS 2011

WORKSHOPS

December 15	ENTSO-E workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results for Regional Group North Sea"
December 14	ENTSO-E stakeholder workshop on "TYNDP & RgIP 2012 methodologies" and "Network Code on Grid Connection Requirements for Generators"
December 12	ENTSO-E CSE regional workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results" and "Network Code on Grid Connection Requirements for Generators"
December 7	ENTSO-E CCS regional workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results"
December 5	ENTSO-E RG CCE workshop with stakeholders on "TYNDP & RgIP 2012 results"
November 29	ENTSO-E RG CSW workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results"
June 15	Stakeholder workshop on the assessment of projects of European interest
June 14	Stakeholder workshop on EEGI priorities and RD&D regulatory framework
May 10	Workshop on a Study Roadmap towards a Modular Development of a pan-European Electricity Highways System 2050
March 24	Second ENTSO-E Baltic Sea regional stakeholder workshop on the TYNDP 2012 process and Regional Investment Plan 2012
January 10	Second workshop on the Roadmap towards ENTSO-E's TYNDP 2012 and the 20/20/20 scenario

CONSULTATIONS

July 1 - September 2	ENTSO-E Work Program 2011-12
May 2 - June 3	Study Roadmap towards Modular Development of a pan-European Electricity Highways System 2050 (MoDPEHS)
February 16 - March 15	Ten-Year Network Development Program (TYNDP) 2012 Scenarios

ENTSO-E ANNOUNCEMENTS & PUBLIC RELEASES 2011

December 16	Consultation workshop on NC RfG scheduled for 15 February 2012
December 15	ENTSO-E releases its Position Paper on a Framework regarding Electricity Highways
December 14	Registration open for InnoGrid2020+: The European Research and Development Dissemination Seminar on 23-24 February 2012
December 14	The ENTSO-E Research & Development Plan is published
December 13	Registration for the ENTSO-E Interoperability Test "CIM for System Development and Operations" 2012 and "CIM for Energy Market" 2012 opened
December 6	ENTSO-E supports action against VAT fraud in the electricity and gas sector
December 2	ENTSO-E releases its Offshore Transmission Technology Report
November 30	ENTSO-E releases its Statistical Yearbook 2010
November 24	Power margins this winter: ENTSO-E's winter outlook report shows increased risks; Transmission System Operators increase cooperation
November 8	Registration open for regional workshops on the TYNDP, Regional Investment Plans 2012 and Network Code on Connection Requirements for Generators
November 2	Working draft Network Code on Connection Requirements Applicable to all Generators updated
October 21	ENTSO-E to hold regional workshops on the Ten-Year Network Development Plan and Regional Investment Plans 2012
October 19	ENTSO-E warmly welcomes European Commission's legislative proposal for a Regulation on guidelines for trans-European energy infrastructure
October 10	European TSOs concerned about system adequacy for this winter
October 10	ENTSO-E publishes its Work Program for 2011 through to December 2012
October 5	ENTSO-E supports draft Energy Efficiency Directive but changes are needed for efficient system operation
September 23	Invitation to Data Management Workshop – 11 October, Brussels
September 23	New requirements for quarterly production plans in Sweden and Finland
September 21	ENTSO-E receives official request to start drafting a Network Code on Capacity Allocation and Congestion Management for Electricity
September 20	Photovoltaic industry supports ENTSO-E's call to address inadequate frequency disconnection settings of PV plants
September 19	ENTSO-E publishes response submitted to ACER's consultation on Framework Guidelines on System Operation
September 19	Third phase of the trial parallel operation of TEIAS prolonged until autumn 2012
August 31	Submission of proposals on the "Inclusion of third party projects for the TYNDP 2012 release" from 1 to 15 September
August 16	Test report on ENTSO-E's 2nd large-scale CIM interoperability test is now available
August 11	Regional Action Plan for market integration in South East Europe
July 28	ENTSO-E publishes letter to the Commission requesting support in encouraging national regulatory authorities to facilitate action to address automatic frequency disconnection settings of installed photovoltaic (PV) panels
July 22	ENTSO-E publishes the Study Roadmap towards the Modular Development Plan on pan-European Electricity Highways System 2050 (MoDPEHS) and starts of the official application phase for the Consortium
July 18	Release of conclusions on R&D workshop held on 14th June
July 18	ENTSO-E proposes a new regulatory framework for TSO R&D in ENTSO-E countries
July 18	Future ENTSO-E CIM-based data exchange format verified in large-scale CIM interoperability test

July 14	Final reminder for submissions of proposals according to the ENTSO-E procedure on inclusion of third party projects for the TYNDP 2012 release
July 11	ENTSO-E releases its assessment of stakeholder comments and frequently asked questions on grid connection requirements applicable to all generators
July 8	ENTSO-E publishes System Adequacy Retrospect report for 2010
July 8	ENTSO-E publishes its views on cross-border balancing and seeks discussions with interested parties
July 1	ENTSO-E Announcement of the opening of a public consultation on the ENTSO-E Work Program 2011-2012
June 30	ENTSO-E elects Daniel Dobbeni as its President, and other office holders
June 17	ENTSO-E publishes its overview of transmission tariffs in Europe 2011
June 16	European power balance expected to be maintained this summer
June 15	Summary and assessment of stakeholder's comments to ENTSO-E consultation on TYNDP 2012 background scenarios published
June 10	ENTSO-E releases its Annual Report 2010: Towards a transmission system for 2020 and beyond
May 31	Media advisory: on 16 June ENTSO-E releases its System Adequacy Outlook for summer 2011
May 24	Stakeholder workshop on EEGI priorities and RD&D regulatory framework scheduled for 14 June
May 23	Stakeholder workshop on the assessment of projects of European interest scheduled for 15 June
May 4	Trial parallel operation with TEIAS to proceed to the final phase on 1 June
May 3	ENTSO-E response to ACER's consultation on Framework Guidelines for Electricity Grid Connections published
May 2	Launch of a public consultation on the Study Roadmap towards MoDPEHS
April 29	Open letter on Capacity Allocation & Congestion Management Network Code
April 14	Second phase of parallel trial interconnection with TEIAS completed
April 1	Workshop on a Study Roadmap towards Modular Development of a pan-European Electricity Highways System 2050
March 25	European grid operators join WWF to think "beyond the hour"
March 24	ENTSO-E puts in place an enduring inter-TSO compensation mechanism
March 23	ENTSO-E'S conclusions of the informal Pilot Network Code released
March 3	ENTSO-E welcomes formal establishment of ACER
February 21	Second ENTSO-E workshop on the 20-20-20 Scenario: minutes and presentations now available
February 17	TEIAS parallel trial interconnection to pass into second phase on 21 February
February 16	ENTSO-E public consultation on background scenarios for the next TYNDP 2012 opens
February 15	Second ENTSO-E Baltic Sea regional stakeholder workshop on the TYNDP 2012 Process and Regional Investment Plan 2012
February 10	ENTSO-E presents studies on North Sea grids and 2020 forecasts, and confirms TSO commitment to achieving EU's energy policy goals despite barriers to implement infrastructure projects
February 4	ENTSO-E welcomes Energy Summit conclusions
February 4	ENTSO-E releases guidance on the inclusion of third party projects for the TYNDP 2012
January 20	Joint paper on the feasibility and technical aspects of partial undergrounding of extra high voltage power transmission lines
January 3	Change of venue for ENTSO-E's workshop on the roadmap towards the TYNDP 2012 and 202020 scenario
January 3	Austrian TSO TIWAG-Netz AG transfers responsibilities as a TSO to Austrian Power Grid AG

ABBREVIATIONS

ACER	Agency for the Cooperation of Energy Regulators
ATC	Available transmission capacity
CACM	Capacity allocation & congestion management
CCGT	Combined coal and gas thermal
CGM	Common grid model
CIM	Common information model
CMM	Capacity management model
CSP	Critical system protection
DCC	Demand connection code
DSO	Distribution system operator
EAS	ENTSO-E awareness system
EC	European Commission
ECRB	Energy Community Regulatory Board
EDI	Electronic data interchange
EDSO	European Network of Distribution System Operators
EEGI	European Electricity Grid Initiative
EIP	European Infrastructure Package
EMFIP	Electricity Market Fundamental data Information Platform
EP	European Parliament
EPCIP	European Program for Critical Infrastructure Protection
ERGEG	European Regulator's Group for Electricity & Gas
EURELECTRIC	Union of the Electricity Industry
EUROPEX	Association of European Energy Exchanges
EWEA	European Wind Energy Association
EWG	Electricity Working Group
FACTS	Flexible AC transmission systems
FEDT	Fundamental electricity data transparency
HILF	High impact, low frequency
HVDC	High voltage direct current
IEC	International Electrotechnical Commission
IEE	Intelligent Energy Europe
IEM	Internal electricity market
MiFID	Market in Financial Instruments Directive
MoDPHES	Modular Development Plan on a pan-European Electricity Highways System
NCDP	Network code development process
NREAP	National renewable energy action plan
PCI	Project of common interest
RD&D	Research, development & demonstration
REMIT	Regulation on Energy Market Integrity and Transparency
RES	Renewable energy source
RIP	Regional investment plan
RfG	Connection requirements for generators
SET	Strategic Energy Technology
SO	System operations
SO&AF	System outlook & adequacy forecast
SOB	Shared order book
TSO	Transmission system operator
TYNDP	Ten-Year network development plan

Imprint

Publisher: ENTSO-E AISBL

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Managing Editor: Michael Mieszczanski

Design & Production: Strategy International Communications, Brussels

Printed by: Imprimerie Oberlander, Charleroi

Photos: Elering AS, Elia, Energinet.dk, ENTSO-E, RTE, TenneT TSO, Terna, Gettyimages, i-stock, Shutterstock

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