MEETING EUROPE'S ENERGY NEEDS

TOWARDS A TRANSMISSION SYSTEM FOR 2020 AND BEYOND

ANNUAL REPORT 2010

European Network of
Transmission System Operators
for Electricity

entsoe

MEETING EUROPE'S ENERGY NEEDS

TOWARDS A TRANSMISSION SYSTEM FOR 2020 AND BEYOND

Europe's transmission system must support the growing use of electricity in every facet of our daily lives – at home, at work, when we travel and when we relax. This publication describes ENTSO-E's role in ensuring that Europe's citizens will have a modern, sustainable and reliable transmission system to meet their expectations for the future.

ANNUAL REPORT 2010

CONTENTS

Europe is going through an important transition. The political, financial and industrial environment in which Transmission System Operators (TSOs) operate has changed. It is not the same as it was 10 years ago and will change even more dramatically over the next decade. The EU's 20/20/20 targets for CO_2 and renewable energy are examples of the significant challenges ahead. A transmission network with adequate capacity is a prerequisite to achieving these targets. European TSOs are working together to make this a reality.

PREPARING FOR THE THIRD PACKAGE

Overview of the interim period by Graeme Steele, Chairman of the Board of ENTSO-E.

One of the biggest legislative initiatives from the European Commission (EC) in 2010 was its communication on Energy Infrastructure Priorities (EIP). This initiative was released in November and is now passing through the EU institutions for feedback. ENTSO-E has been actively contributing to the EIP, for which the pilot Ten Year Network Development Plan provided the factual and methodological basis.

The electricity transmission system is responsible for the movement of bulk energy across Europe, so its timely development is an absolute necessity if Europe's policy objectives of a secure and reliable electricity supply, electricity market integration and increasing power from renewable energy sources are to be met.

It is clear that today's transmission system needs to evolve rapidly. But the changes need political, regulatory and social backing – without them, the system's role in meeting Europe's energy goals will be impossible. A lot of work is still ahead of us. And it is very urgent as, in infrastructure planning timescales, 2020 is just around the corner.

Although the Third Package (Third Legislative Package for the Internal Energy Market), which defines ENTSO-E's role, only formally came into force on 3 March 2011, we started work in 2009 as if it already applied. This activity report describes our progress during the interim period from January 2010 until the end of March 2011.

SIGNIFICANT ADVANCES

Even though the formal work on the network codes, the Ten-Year Network Development Plan (TYNDP) and the other tasks stipulated in Regulation (EC) 714/2009 could not start before 3 March 2011, ENTSO-E has worked hard to prepare as much ground as possible. We have made significant progress on a number of new deliverables, as well as in continuing and improving on those of our predecessor associations.

The ENTSO-E medium-term Scenario Outlook & Adequacy Forecast (SO&AF) 2011-2025, presented at our 'Electricity Infrastructure for a Carbon Neutral Europe' conference in February 2011, is not only an annual work product defined in Regulation (EC) 714/2009 but also an important step forward compared to the previous System Adequacy Forecasts (SAFs) in that it provides an EU-wide scenario built up from Member States' National Renewable Energy Action Plans (NREAPs). The SO&AF will constitute a major building block for the 2012 TYNDP and accommodates one of the most important items of stakeholder feedback from the pilot TYNDP – provision of a top-down approach to system development planning.

PRIORITIES FOR INFRASTRUCTURE

We have strongly endorsed and welcomed the European Commission's (EC's) Energy Infrastructure Priorities (EIP) communication and the priorities identified in it are similar to those in the pilot TYNDP. Starting with the 2012 TYNDP, ENTSO-E will demonstrate not only how the hundreds of transmission expansion projects are justified from a regional and pan-European perspective but also how they relate to the EIP's priority corridors.

Main ENTSO-E deliverables: January 2010 - March 2011

- The ENTSO-E pilot Ten-Year Network Development Plan (TYNDP) published in June 2010. As a common plan for all European TSOs with a firm legal basis in Regulation (EC) 714/2009, the two-yearly TYNDP shows what new transmission infrastructure investments are necessary.
- First Scenario Outlook & Adequacy Forecast (SO&AF) 2011-2025 published in February 2011.
- ENTSO-E first views on a North Seas offshore grid, published in February 2011, met with strong interest from EU institutions, stakeholders and the media. In conjunction with the 'North Seas Offshore Grid Initiative', ENTSO-E will continue to work on this very important project.
- The pilot network code for generators published in March 2011. Work on further codes for market and system operations has started and is progressing rapidly. The focus is on the codes relevant for effective implementation of the Internal Energy Market (IEM).

Building on the TYNDPs and also on separate long-term studies, ENTSO-E will take the lead in planning for the future European electricity highways over the 2030 and 2050 horizons.

Last but not least, ENTSO-E's first conference, 'Towards Electricity Infrastructure for a Carbon Neutral Europe' has successfully managed to both contribute to and shape the public debate on a suitable transmission system for 2020 and beyond. The conference drew a large audience from a wide set of energy sector stakeholders and addressed the central challenges of financing, permitting and public acceptance of infrastructure projects. The discussions showed a unique convergence of opinion from all stakeholders, except perhaps over the compatibility of renewable energy support schemes.

ADEQUATE TRANSMISSION CAPACITY IS VITAL

This positive perception should not lead us to forget, however, that Europe is far away from having the transmission capacity it needs for the future. Renewable energy integration, the secure yet flexible management of future power systems, integrated electricity markets and efficient market coupling all require adequate capacity throughout Europe, and not only across national borders. Should the required capacity not be built in time, the reliability of Europe's electricity supply will inevitably suffer and its energy policy ambitions will have to be reduced in line with the capacity available.

Since establishing ENTSO-E, we have put in place a solid structure with both EU-wide and regional aspects to manage the many issues we face under the Third Package and the increasing level of new requests from European policy-makers. The workload is a significant one for the ENTSO-E secretariat to manage and for the Board to provide governance over.

Most of the effort derives from the commitment of the individual TSOs and their managers' and experts' willingness to devote time and effort to the tasks. Our success as an association, and under the legal requirements of Regulation (EC) 714/2009, will depend upon their future commitment. The exemplary commitment shown in the past fifteen months is a great start that we can build on for the future.

REVIEW OF THE INTERIM PERIOD

The Third Package entrusts ENTSO-E with creating a reliable and sustainable electricity transmission network across Europe to meet its future energy needs. The network must support the three pillars of EU energy policy – increased energy efficiency, a reduction in greenhouse gas (GHG) emissions, and the increasing use of renewable energy. ENTSO-E's work during the interim period has been directed at developing the tools to ensure the consistent planning and development of the European network to meet these aims.

The Third Package's Regulation (EC) 714/2009 mandates ENTSO-E with a number of specific tasks to ensure that the European transmission network is capable of meeting Europe's 2020 energy policy goals. They include the development of pan-European network codes, network development plans, network operational tools and adequacy forecasts, as well as an annual work program:

→ **Network codes**
Network codes define rules for system operations, market integration and system development. They will address 12 areas, including network security and reliability, transparency, capacity allocation, congestion management and energy efficiency, and follow framework guidelines defined by ACER, the Agency for the Cooperation of Energy Regulators.

The codes will be subject to a transparent public consultation process directed by ENTSO-E, followed by EU Member State and parliamentary input via the Comitology process before becoming legally binding on all market participants.

→ **Network development plans**
A non-binding Community-wide Ten-Year Network Development Plan (TYNDP) will be developed every two years. The plan will cover 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) will complement the TYNDP.

→ **Operational tools**
Development of common pan-European network operational tools will ensure network coordination under normal and emergency conditions and include a common incidents classification scale.

→ **Adequacy forecasts**
Summer and winter generation adequacy outlooks will be prepared each year, as well as a long-term system adequacy forecast that looks 15 years into the future.

ENTSO-E's role is to foster cooperation between 41 national electricity Transmission System Operators (TSOs) from 34 countries to meet three primary objectives: ensure the secure and reliable operation of an increasingly complex pan-European electricity transmission network; facilitate the integration of new renewable energy sources (RES) and the achievement of the EU's GHG reduction goals; and enhance the operation of the Internal Energy Market (IEM) by proposing and implementing standardized market integration and transparency procedures. These objectives provide the basis of ENTSO-E's annual work program.

→ **Work program**
ENTSO-E will publish an annual work programme containing the number and description of the network codes to be prepared, a plan for coordinated operation of the network, research and development activities, and an indicative calendar.

All ENTSO-E publications and its current work program are available on the website: *www.entsoe.eu*.

THE FORMATION OF ACER

ACER started operations on 3 March 2011, the same date that the Third Package came into force and its inauguration is an important milestone for ENTSO-E.

However, because of the urgency and scale of the work involved, ENTSO-E already started drafting its first pilot network code and TYNDP in 2009 in close cooperation with ERGEG (European Regulators' Group for Electricity and Gas), acting as if ACER were already in place.

In fact, many ENTSO-E tasks require the formal involvement of ACER before they can be finalized and many of its tasks are new. The interim period has therefore been put to good use to build up the required expertise and practise the close cooperation that will be needed between the EC, ACER and ENTSO-E.

With the Third Package applicable and ACER in operation, the formal framework guideline and network code procedures defined in Regulation (EC) 714/2009 can finally begin.

ACER launched the official public consultation on its draft 'Framework Guidelines for Electricity Grid Connection' at the time of its inauguration and consultation on its draft 'Framework Guidelines for Capacity Allocation and Congestion Management' on 11 April 2011.

ADAPTING ENTSO-E'S ARTICLES OF ASSOCIATION

Regulation (EC) 714/2009 requires ENTSO-E to submit its statutes and membership to ACER and the EC for their formal opinion on its Articles of Association (AoA) and Rules of Procedure (RoP), as well as on its members and consultation processes. ENTSO-E met this requirement in December 2010, in order to facilitate an early response once ACER came into being.

ENTSO-E's Articles of Association (AoA) govern how it operates and set out its members and how membership is granted. They detail the roles and relationships between the various ENTSO-E committees, working and regional groups, Board and Assembly, Legal & Regulatory Group and other ad-hoc teams. They also define the voting rights of ENTSO-E's members and the day-to-day rules governing how the association is run.

Since ENTSO-E was incorporated almost two and a half years before ACER was established, it undertook a review of its AoA and RoP with a view to possible concerns from the EC and ACER. The ENTSO-E Assembly approved amendments to the AoA in December 2010, and the documents were subsequently submitted to both institutions.

Besides some updates for clarity and efficiency, the amendments primarly addressed TSO certification and the application of the network codes in all ENTSO-E member countries, including in those which are not part of the EU.

EXPERIENCE GAINED OVER THE PERIOD

Some of the ENTSO-E tasks mandated by Regulation (EC) 714/2009, such as system adequacy analyses, are a continuation or an update of tasks already undertaken by its predecessor associations. In these cases, ENTSO-E can draw on many years of experience. However other deliverables, such as the network codes and the TYNDP, are being developed for the first time and constitute a particular challenge.

In many ENTSO-E projects, public consultation plays a crucial role in order that the final products reflect the interests of all the concerned stakeholders. The development of the network codes, providing a consistent set of rules to promote an effective and competitive electricity market, is one of ENTSO-E's most important tasks. The pilot code, focusing on network connection rules – one of the 12 areas listed in Article 8 (6) of Regulation (EC) 714/2009 – therefore provided a good opportunity for ENTSO-E to test both its code development and consultation processes.

Roundtable discussion at the ENTSO-E "Towards Electricity Infrastucture for a Carbon Neutral Europe" conference.

THE PILOT CODE PROCESS

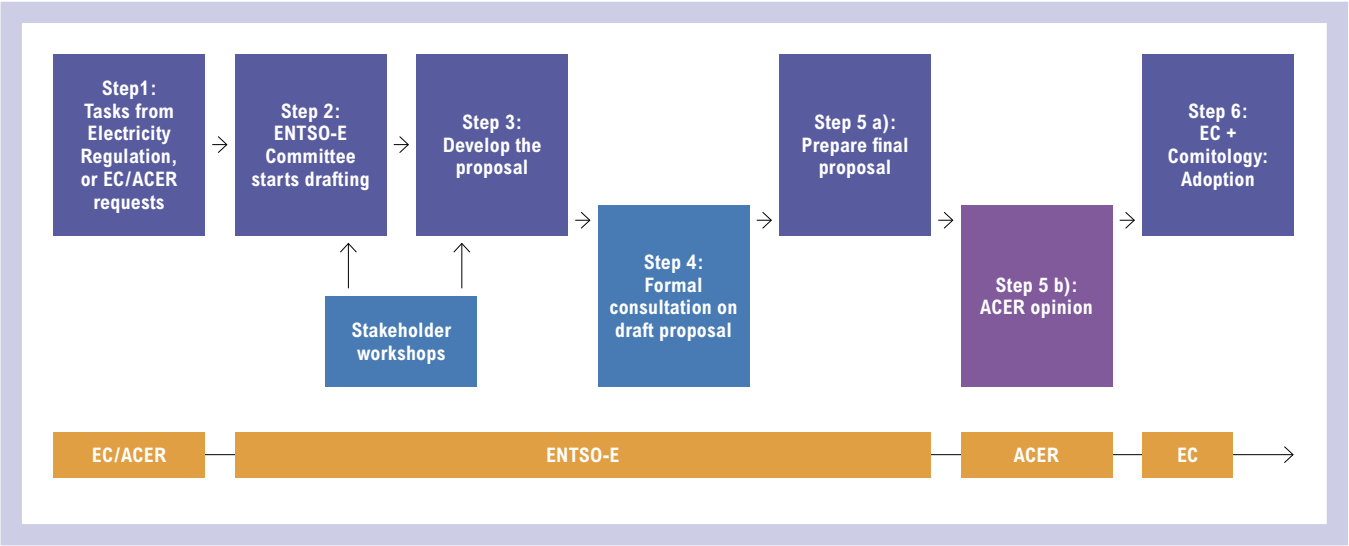
The pilot code drafting process involved close co-operation between ENTSO-E, ERGEG and the EC. This cooperation enabled very useful early discussion of the policy options. In addition, there was substantial stakeholder involvement in the process. ENTSO-E held two public workshops, which attracted some 100 participants each, and approximately 15 bilateral meetings with European associations to address in-depth technical issues.

Many stakeholders became aware of the importance of the network codes and the code development process through the pilot code process. The strong stakeholder response to the publication of an early draft in October 2010, with more than 1500 stakeholder comments, showed how relevant the generation connection topic was for the first network code.

The experience gained during the pilot code exercise has also been very useful in improving the network code development process (NCDP) which forms part of the RoP submitted to ACER and the EC in December 2010. In particular, timing has been reviewed and clarified to improve communication with stakeholders.

As far as compliance is concerned, although the monitoring of code implementation will be covered by a separate document, the NCDP also needs to define a process for validating transitory regimes as well as the criteria for ENTSO-E assessment of code implementation. The basic principles of the NCDP published in 2009, however, remain valid and have been confirmed throughout the drafting process.

ENTSO-E consultation process



Although ENTSO-E accomplished a major milestone with the publication of the draft network code on connection requirements for generators in March 2011, it only represents the culmination of the informal process during the interim period. The formal process began in March 2011 with ACER's public consultation on its draft framework guidelines. As soon as the final framework guidelines are released (foreseen for summer 2011), the formal network code drafting period will begin.

THE CONSULTATION PROCESS

ENTSO-E defined its consultation process in November 2009 with a special focus on the NCDP (see diagram). The consultation process is not only used in the development of network codes but also extensively in the TYNDP to develop demand and generation scenarios by building on national plans (bottom-up) and by taking into account the EU 2020 energy objectives and national renewable energy action plans (NREAPs).

Generation adequacy, grid extensions, regional grid investments, interconnection capacities, connections to perimeter power systems, the adequacy of inter-regional interconnections and new technologies are all addressed.

The consultation process was tested on the pilot TYNDP in March 2010 before its finalization in June. The process has also been applied to ENTSO-E's work programs for 2009-10 and 2010-2011, as well as to the ENTSO-E Research & Development Plan.

Basic principles confirmed

The basic principles of the process – informal bilateral consultation with key stakeholders, ACER and the EC, before extensive public consultation giving all stakeholders the possibility to comment – have been confirmed appropriate. ENTSO-E is further improving its internet facilities to implement an online consultation tool. This will facilitate consultation for stakeholders as well as for ENTSO-E.

For important deliverables, such as the TYNDP or the network codes, ENTSO-E will ensure extensive bilateral and appropriate public consultation supported by consultation workshops across different regions. Where appropriate, these consultations will be conducted not only on the full draft of a deliverable, but also on pre-drafts and earlier scenarios. This will ensure the inclusion of a full range of stakeholders' opinions, even for complex and highly technical issues.

THE THREE-YEAR PLAN

The Three-Year Plan is an important tool for ENTSO-E, ACER and the EC, and also ENTSOG (the ENTSO for gas), to structure and plan the development of framework guidelines and network codes over the medium-term.

It not only helps in the allocation of scarce expert resources at TSOs, regulators, the EC and stakeholders but also in prioritizing the network codes. After agreement with the EC and ERGEG, the ENTSO-E Assembly approved the first Three-Year Plan in June 2010 on which the current 2011-2012 work program is based.

The process of updating the plan is linked to the EC's obligation, according to Regulation (EC) 714/2009, to establish an annual priority list identifying the areas to be included in the development of the network codes for the following year (in this case 2012).

In February 2011, the European Council set 2014 as the target date for the completion of the Internal Energy Market. The network codes prioritized in the current Three-Year Plan will provide the relevant building blocks to reach this challenging goal.

Europe's electricity transmission network is the backbone of its industry, society and economy. The need to substantially develop the existing infrastructure to meet the challenges of 2020 and beyond is therefore widely acknowledged by European decision-makers and stakeholders. Competitive electricity prices, real consumer choice, the fight against climate change, and keeping the electricity supply secure in an increasingly complex system all depend on the choices we make today. But building the appropriate infrastructure faces serious challenges.

BUILDING THE NECESSARY INFRASTRUCTURE

At the end of 2010 the EC released three important Communications on energy strategy and regional initiatives – Energy 2020; Energy infrastructure priorities for 2020 and beyond - a Blueprint for an integrated European network; and European Energy Programme for Recovery. These communications, considered precursors of the EIP, anticipated for the end of 2011, set the agenda for the European and Energy Council meetings in February 2011. Both Councils confirmed Europe's path towards a carbon neutral energy industry and stressed the key role of transmission infrastructure as the enabler of these ambitious policies.

Currently, the planning, permitting and construction of a new transmission line can easily take more than 10-12 years. Resolving these problems is at the core of ENTSO-E's work. Insufficient public understanding of the necessity and benefits of new infrastructure, excessively long permitting procedures with too few positive outcomes, and increasingly difficult access to capital markets because of an uncertain regulatory environment are all obstacles that need to be overcome.

The ability of Europe's Transmission System Operators (TSOs) to build the infrastructure Europe needs on time largely depends on resolving these issues. With its November 2010 communication on Energy Infrastructure Priorities (EIP), the European Commission (EC) has initiated legislative proposals that point in the right direction.

TECHNICAL ARGUMENTATION

Much of ENTSO-E's work in 2010 was oriented towards providing the technical argumentation to support discussions shaping the EIP proposals.

ENTSO-E's pilot Ten-Year Network Development Plan (TYNDP) in June 2010 represented not only a major early deliverable under Regulation (EC) 714/2009 but also a major contribution to the EIP debate, highlighting to policy-makers and stakeholders the magnitude of the transmission infrastructure investments needed to help reach the EU's 20/20/20 targets.

The pilot TYNDP was put forward as a factual and methodological basis for the EIP, demonstrating that only the TSOs have the necessary expertise in the methodology and the knowledge and data for pan-European grid planning. The EIP needs to build on both. The pilot TYNDP further assisted policy-makers by highlighting the most prominent hurdles for the implementation of the necessary investments – lengthy permitting procedures, the lack of public acceptance, the difficulty of raising capital to finance the investments, and the ever increasing uncertainty about future generation options.

While European Member States face these difficulties in varying degrees, the nature of the electric network is such that EU-wide action is necessary, not only on the processes themselves but also to communicate the anticipated benefits of individual projects.

PUBLIC ACCEPTANCE AND PERMITTING

Public acceptance and permitting must be major parts of the EIP proposals. National governments, EU institutions, electricity market participants, environmental organizations and, last but not least, TSOs need to explain to Europe's citizens the need for new transmission infrastructure and the advantages of individual projects in both a regional and a European context. Improving public acceptance will require long-term political commitment.

In parallel, the permitting processes used by Member States to prepare, evaluate and decide on the route of transmission lines must be streamlined to lead to a maximum five-year time frame for reaching final decisions. The positive effect this will have on network planning is already needed.

Public acceptance and permitting improvements are also crucial for all transmission projects, not only for the selected few of 'European interest' that may receive privileged treatment. The majority of

the more than 500 projects identified in the TYNDP as necessary to meet Europe's 2020 energy goals are located within Member States' boundaries but are nonetheless necessary for the overall strength and transfer capacities of the regional and European systems. The EU's energy policy goals will not be met if the permitting of all these lines cannot be agreed within reasonable timescales.

A large amount of thought, time and work by ENTSO-E and its 41 TSO members has been directed at resolving the problems attached to the issues of public acceptance and permitting, as well as to the financing of projects. Individual TSOs are doing much to help resolve these issues but they depend on support from policy-makers at national, regional and European level. Support is also needed from regulators and stakeholders.

TEN-YEAR NETWORK DEVELOPMENT PLAN

Long-term planning of the network has been greatly influenced by recent European legislation, especially that on climate change and market liberalization. These two issues have created a need for substantially greater investment in transmission infrastructure than that of the past two decades and for tightly coordinated pan-European planning. ENTSO-E's bi-annual Ten-Year Network Development Plan provides the focus for this planning at regional and pan-European level.

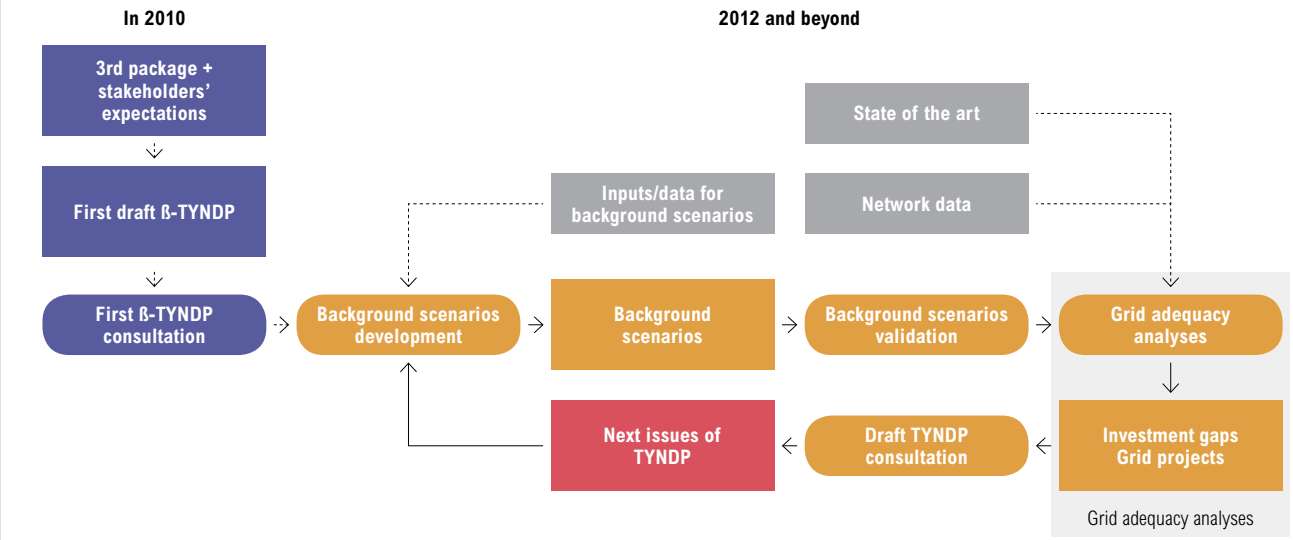
The main drivers for network planning are the integration of new renewable energy sources (RES), the creation of the internal electricity market (IEM) and the long term security of the energy supply.

The integration of RES, such as wind and solar power, is a clearly defined Europe-wide energy policy goal (as part of the EU 20/20/20 objectives). But the sharply increasing contribution of these fluctuating sources to the electricity supply and generation capacity is a challenge for network operations and market integration. Consequently, it impacts the planning methodologies and the modeling of market drivers for transmission investment and increased energy balancing.

The creation of the liberalized pan-European energy market defined by the Third Package is the second significant factor for long-term infrastructure planning. The third, and most central to TSO concerns,

Regulation (EC) 714/2009 mandates ENTSO-E with important new tasks. In addition to drafting legally binding network codes for system operations, it is also required to deliver every two years a non-binding EU-wide Ten-Year Network Development Plan to ensure greater transparency in the entire Community-wide transmission network and to support the decision-making processes at regional and European level. The TYNDP has to include modeling of the integrated EU network, scenario development, a European generation adequacy outlook and an assessment of the resilience of the system. Furthermore, the TYNDP must 'build upon national investment plans', with its compliance monitored by ACER.

Build-up process of the TYNDP



is maintaining a secure electricity supply to 532 million citizens and the reliability of the overall system in this increasingly complex environment.

The Third Package, and especially Regulation (EC) 714/2009, provides the institutions and the tools to promote the coordinated operation and development of national transmission networks, as well as the harmonization of the European regulatory framework. One of the most important tools is the TNYDP.

The TYNDP identifies several main clusters for grid investment of 'pan-European significance'. These include RES integration in the northern and southern parts of Europe, important East-West and North-South flows in the South-East and Central-South regions and the integration of the Baltic States, as well as the connection of new conventional power sources, reinforcements in the power supply of some European cities and regions, and efficient market integration.

THE PILOT TYNDP

ENTSO-E pro-actively released its pilot TYNDP 2010-2020 in June 2010 before the relevant parts of the Third Package came into force. The plan acknowledges that Europe's response to the issue of climate change translates into a massive investment in RES whose efficient integration into the grid is an urgent challenge.

The pilot TYNDP provides the first pan-European view of the required grid developments. All of the projects identified were subject to intensive market and network studies often involving several TSOs. In addition to significant in-depth regional market and network studies, regional adequacy forecasts such as the European Wind Integration Study (EWIS) – a joint study by 15 European TSOs and the EC – provided important input.

The TYNDP is the most comprehensive and up-to-date European-wide reference for the future transmission network and demonstrates the significant investments needed. According to the plan, this involves construction of some 35,000 km of new transmission lines, representing almost 12% of the existing network, and upgrading 7,000 km of existing lines. Total investment costs are estimated at €100 billion.

Publication of the pilot TYNDP marked the culmination of a significant effort by ENTSO-E, supported by the EC, ERGEG and many key stakeholders, to fulfil one of its major tasks. It also marked the beginning an even more intense effort to prepare the second release of the plan in 2012.

THE 2012 TYNDP

Work on the 2012 issue of the TYNDP started immediately after publication of the pilot report in June 2010. Based on ENTSO-E's experience from this exercise and feedback from many stakeholders, regulators and the EC, improvements in the 2012 TYNDP are planned in three main areas:

- to meet the expectations of regulators, market participants and the EC on coordinated European grid development, long term 'top-down' scenarios for load and generation will be developed in addition to the current bottom-up scenarios (i.e. a EU 2020 scenario will be considered in the planning methodology). This requires the commitment of the parties concerned to define at least a 2020 horizon, based on EU targets and Member States' national renewable energy action plans (NREAPs). An important step in achieving this has already been taken in ENTSO-E's Scenario Outlook & Adequacy Forecast (SA&OF) 2011-2025, which for the first time includes an EU 2020 scenario based on the NREAPs;

- the development of common ENTSO-E regional, and later pan-European, market modeling to reflect as closely as possible the forces which drive the commercial flow of electricity, their translation into physical power flows and the corresponding transmission investments needed. Initially this work will result in the creation of regional investment plans (RIPs) for the six ENTSO-E system development regions which will be released with the 2012 TYNDP;

- further development of an ENTSO-E common framework for regional network studies, based on pan-European scenarios and integrated network models following IEC (International Electrotechnical Commission) standards for a common information model (CIM).

As result of other feedback on the pilot TYNDP from the EC and regulators, the main level of detail in the 2012 TYNDP will be based on clustering projects in the pilot TYNDP with any new projects into a maximum of 10 main 'corridors'. In addition to its clustering work on the North Seas offshore grid, which has a 2030 horizon, ENTSO-E is also working on a roadmap for possible European electricity highways for 2050.

Critical to the changes described above is the availability of data to ENTSO-E, particularly details of the type, size and location of investments in new generation capacity.

SCENARIO OUTLOOK & ADEQUACY FORECAST

ENTSO-E's Scenario Outlook & Adequacy Forecast (SO&AF) is a valuable factual contribution to legislation on energy infrastructure, providing hard data and expert calculations for the outlook of the European electricity industry over the medium term. It shows where Europe currently stands in achieving its energy goals by analyzing the adequacy of ENTSO-E interconnected transmission systems through an overview of generation capacity. The SO&AF will provide important input into the 2012 TYNDP and regional investment plans (RIPs).

ENTSO-E released its first SO&AF 2011-2025 in February 2011 at its 'Towards Electricity Infrastructure for a Carbon Neutral Europe' conference. The publication is the successor to the former UCTE System Adequacy Forecast (SAF) and ETSO's Power System Adequacy reports.

The SO&AF is ENTSO-E's first publication based on a comprehensive assessment of Member States' NREAPs. It indicates that, if the national policies materialize, Europe will be well on track to reach its 2020 energy policy goals, with some 36% of total power being generated from renewable sources.

BUILDING ON THE RESULTS

ENTSO-E will build on the results of the first SO&AF during 2011, in preparation for the RIPs and ultimately the 2012 TYNDP. Its 'top-down' scenarios developed from the NREAPs will form the backbone of the analyses in the 2012 TYNDP, which will align the transmission infrastructure more closely to the attainment of the EU 2020 goals.

In line with its objectives, the SO&AF 2011-2025 contributes to transmission system adequacy and security planning in three main ways:

- it details at an early stage the generation and load scenarios that will be the foundation of the market and network analyses in the TYNDP;
- it assesses the generation adequacy of countries served by ENTSO-E members, providing an overview of generation adequacy across Europe and for each of six regional groups;
- it describes the generation adequacy for each individual country based on national comments from member TSOs.

REPORT STRUCTURE AND CONTENT

The structure and content of the SO&AF are different from the System Adequacy Forecast Report 2010-2025 published in January 2010. Some chapters have been modified to meet the needs and structure of the TYNDP and RIPs and the SO&AF adequacy analysis is now carried out on three scenarios covering different evolutions of generation capacity and load.

In addition, the SO&AF contains an assessment of EU policy regarding the European energy policy goals (20/20/20). It concludes that the EU 2020 scenario is consistent with most experts' estimations of RES penetration and reductions in CO_2 emissions. The effectiveness of anticipated national policies can be appreciated when comparing energy efficiency in the different scenarios.

ENTSO-E's Scenario Outlook & Adequacy Forecast is an annual publication responding to the requirements that Regulation (EC) 714/2009 sets for the TYNDP: "The ENTSO for Electricity shall adopt and publish a Community-wide network development plan every two years. The Community-wide network development plan shall include the modeling of the integrated network, scenario development, a European generation adequacy outlook and an assessment of the resilience of the system".

THE NORTH SEAS GRID

Wind power is expected to deliver a substantial part of the renewable energy defined in the EU 2020 energy policy. The offshore wind sector plays a very important role, not only because public acceptance for offshore wind parks appears greater than that for onshore parks, but also because they have huge generation potential.

The North and the Baltic Seas constitute a highly significant potential energy resource but the infrastructure to transport the potential power that could be generated from it is not built. The existing infrastructure to transport the power from the sea to the land and on to the load centers is not suitable for these needs.

The connection and integration of offshore wind energy in the North Seas is widely recognized as being critical to EU energy targets. Current national connection regimes will in time, however, become a barrier to achieving the targetsw, with issues of network security, market integration, inflexibility and standardization, as well as rising consumer costs, becoming increasingly prevalent.

A coordinated, integrated North Seas offshore grid will deliver significant benefits to European citizens. It can offer improved energy security and network resilience, increased capacity for cross border trade, and a reduced capital cost and environmental impact from fewer, larger assets.

EC Energy Commissioner Günther Oettinger (middle) signs the North Seas Countries Offshore Grid Initiative to develop an integrated wind park grid. Daniel Dobbeni, President of ENTSO-E (far right) said the initiative was based on a common understanding of the potential of RES to contribute to EU energy policy goals.

In addition, increased standardization and deliverability will help alleviate stress in the energy supply chain and provide a good model for further network evolution and integration.

STRATEGIC DEVELOPMENT

Ten European countries signed the 'North Seas Countries Offshore Grid Initiative' in December 2010 to develop an integrated grid in the North Sea. They have agreed to coordinate investments for developing offshore connections between Sweden, Denmark, Germany, The Netherlands, Luxembourg, France, the United Kingdom, Ireland, Norway and Belgium.

The initiative has pledged to facilitate the strategic development of both the offshore and onshore grids and committed to identify and overcome barriers to grid development related to regulatory, planning and technical issues at national, regional and EU level. It has also pledged to facilitate cross-border trade in electricity.

ENTSO-E is committed to collaborate with the countries involved, as well as with ACER and national regulators, in the development of the initiative, which is an important step in continued TSO cooperation in the region. Three working groups will cover grid configuration and integration, market and regulatory issues, and planning and authorization procedures. ENTSO-E will contribute at both Board and working group level and sees the project as an excellent basis for developing other regional renewables initiatives in Europe.

THE ENTSO-E VIEW

Coordination of the development of the North Seas grid involves specific ENTSO-E regional planning to integrate the offshore generation facilities and the associated offshore and onshore transmission systems.

ENTSO-E has therefore developed an initial concept to consider the relative benefits of integrated grid development over the continuation of national, radial schemes. This analysis, which covers only the North Sea perimeter (including the Skagerrak and Kattegat) was presented during the ENTSO-E infrastructure conference in February 2011.

The study provides the first ideas of how an offshore grid could develop, suggesting the benefits of an integrated approach over a point-to-point build-up. It points out that the current approach of radial shore-to-shore connections will reach its limits by 2030 as major increases in wind generation develop.

For the most efficient system, ENTSO-E recommends an integrated offshore grid accommodating larger wind parks that are further offshore with fewer landing points and more efficient energy trading between the North Seas countries. This would increase the flexibility of the power flows, enhance the security of supply and network resilience, and improve the capacity for cross-border trade.

The approach could be delivered at a lower cost as it would result in the installation of fewer assets. Less subsea cable routes and significantly less landing points onshore would also make authorizations more manageable from the point-of-view of society.

While a coordinated grid would demand technological standardization, it would pave the way for future network evolution and greater European integration. This first ENTSO-E view provides a basis for the further, more detailed studies needed on the path towards the realization of an integrated grid in the North Sea and also indicates how useful common planning studies with a 2030 horizon can be for other regions.

THE PILOT NETWORK CODE

The pilot network code on connection requirements for generators is the basis of the first of many network codes that will become legally binding on all market participants over the coming years. Its objective is to provide a significant level of harmonization at European level to help TSOs maintain system security and quality of service over a period when the generation mix is expected to change considerably, as well as to enhance the ability of stakeholders to plan, evaluate and coordinate their generation investments throughout Europe.

The pilot code was elaborated in very close cooperation with ACER's predecessor ERGEG, with input from a wide range of stakeholders, and is in line with ACER's framework guidelines on electricity grid connection. Its development involved TSO experts from each ENTSO-E synchronous area.

Besides supporting the EU's 20/20/20 goals, development of the code meets the requirements of Regulation (EC) 714/2009 to produce a set of operating procedures based on best practice to preserve system security and a high level of reliability and to facilitate the efficient operation of the internal electricity market. Procedures are harmonized for each ENTSO-E synchronous area to reduce development costs.

The code offers sufficient flexibility for TSOs to accommodate expected new technology and allows a sufficient degree of adaptation to regional and national needs. Its technical content is structured on four types of generating unit based on connection voltage and size (in MW).

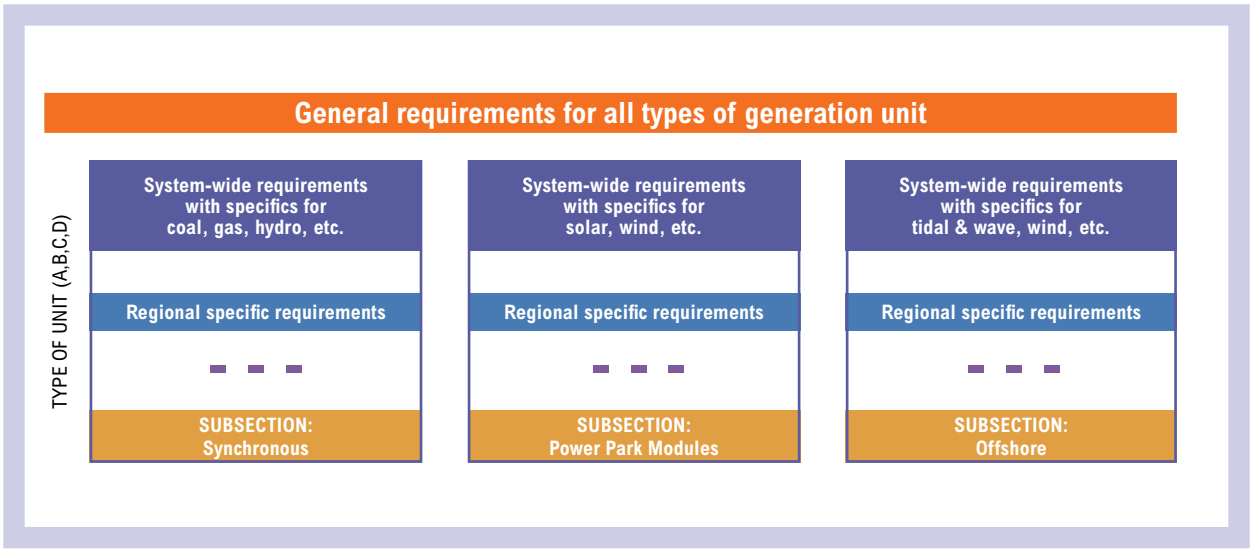
The code sets out the general requirements that must be fulfilled by all types of unit regardless of type, as the behaviour of the transmission system largely depends on the response of each. Moreover, because of significant differences in how particular generation technologies respond to faults and how plants and networks are designed to be protected against their impact, detailed requirements have been defined specifically for synchronous generators, power park modules and offshore units.

STAKEHOLDER CONSULTATION

Consultation with the relevant stakeholders via bilateral meetings and public workshops were important tools in the pilot code's development. Potential overlaps with other technical and operational issues were also taken into consideration during the drafting process.

Although each requirement contributes to the code's objectives of security of supply, integration of renewables and market integration, two main issues were considered the most relevant by the majority of stakeholders. These were voltage fault ride through (FRT) and frequency ranges.

Structure of the technical content of the pilot network code on grid connection



PLANNING TOOL

The pilot code provides network operators with a planning tool that allows sufficient operational flexibility to cope with an increasing number of different topological and operational scenarios. It preserve the cost effectiveness of current generating technologies and the integration of new ones without jeopardizing the security of the system.

In addition, it helps to clarify the roles that TSOs, as well as power generators, will have to play in the future and creates a reference for the development of other codes.

The use of simple language during the scoping phase (the regulations are to be translated into all EU languages), decisions on harmonization and debate on future technologies (e.g. the generation mix), as well as legal 'pre-screening' of the technical document, were considered crucial for the code's successful development. All the institutions involved had the chance to put into practice their cooperation and the process is expected to become smoother and more efficient with the development of future codes.

ELECTRICITY HIGHWAYS

The creation of pan-European electricity highways has been set high on the EIP agenda and the concept of transmitting bulk electricity over very long distances responds to the need of the future network to integrate large amounts of RES. But neither are the definition of electricity highways nor their design straightforward. A realistic long-term vision for onshore and offshore grid infrastructure is necessary and must also include the implementation of the smart grid functionalities that are expected to be realized in the medium-term. By working on these concepts, ENTSO-E is addressing the time period beyond the TYNDP with the aim of filling the gap between 2020 and 2050.

Electricity highways are expected to play an important part in Europe-wide electricity transport duties but not to deliver electricity to customers, connect single power plants nor match electricity load with supply. They will be an integral part of the pan-European transmission system and not a separate or specific technology. Continuous development of the existing 400 kV grids, energy storage and demand response technologies will therefore also be necessary.

ENTSO-E's pilot TYNDP has already identified almost 500 transmission projects to ensure that the resulting European grid will meet its 2020 energy policy goals. These will be the foundation for the development of electricity highways, which for technical and commercial reasons will need to be integrated with existing TSO grids and operated as one uniform system.

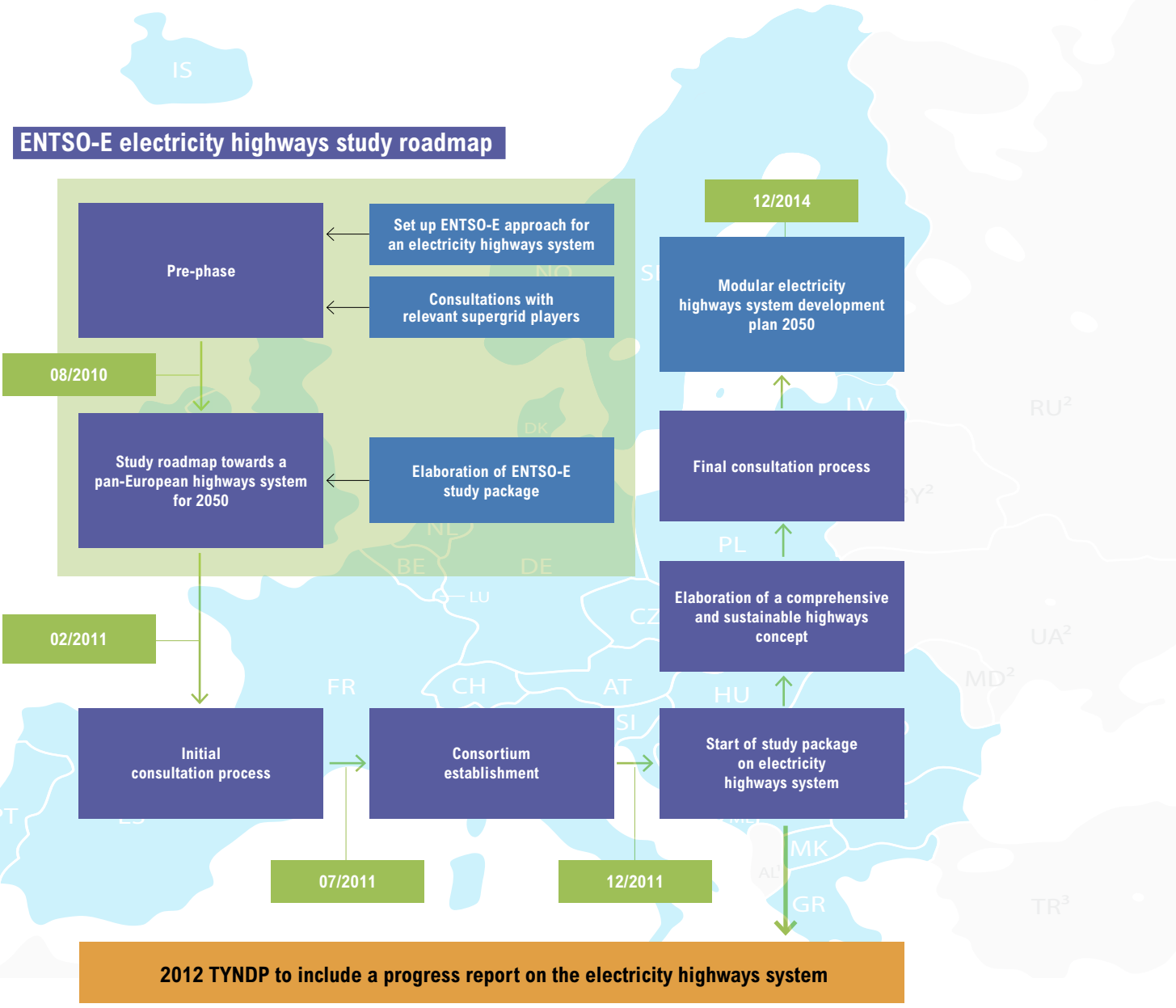
Ensuring secure, reliable and cost-effective operation at all times implies that electricity highways are planned, operated and congestion-managed together with existing TSO grids. TSOs will need to design and operate systems to ensure that any failure of a high-capacity highway does not lead to cascading outages, voltage collapse or blackouts. Secondly, market integration based on price coupling and congestion management cannot be achieved unless the electricity highways and existing TSO grids are operated as one market platform.

Because TSOs have the overall legal responsibility for the security and stability of the power system as a whole, ENTSO-E is taking the lead in planning the development of the pan-European electricity highways. Member TSOs will investigate all the relevant factors related to their construction in consultation with the EC and stakeholders, including Distribution System Operators, manufacturers, research institutes developing the necessary technologies and NGOs.

STUDY ROADMAP

ENTSO-E has developed a study roadmap for a modular development plan for a pan-European electricity highway system (MoDPEHS). With a special focus on infrastructure-related issues, the roadmap acts as an overall guideline to the conceptual path to the 2050 pan-European power system. It analyzes where electricity highways, connecting stations for subsea cables and reinforcements of the existing transmission grid could realistically be constructed.

ENTSO-E will publish comprehensive electricity highways and transmission grid maps for public



discussion together with the costs and consequences of the grid development. The result of the investigations will be a long-term concept for a realistic infrastructure capable of accommodating very large energy flows over continental distances.

The challenge for grid extensions – and not only in the case of the electricity highways – is that extensive investments will be needed. These will significantly exceed already known investments and compete with other infrastructure schemes for support on the financial markets. Adequate rates of return for grid investments which reflect the risks are therefore required.

A NEW ROLE FOR ENTSO-E

In December 2010 the Florence Forum supported the EC proposal to set up a dedicated 'Electricity Highways Platform', which it would lead in cooperation with ENTSO-E and the regulators and involve all relevant stakeholders. The platform will establish generation scenarios, assess ENTSO-E's concepts for grid architecture and the consequences of their deployment, and support the necessary research and development. It will also design the appropriate legal, regulatory and organizational framework.

ENTSO-E's work on the electricity highways concept presented in the 2010 TYNDP will be further elaborated through discussions in the Forum to provide the best solutions from an engineering, economic and environmental point of view.

A steering committee composed of the EC, ENTSO-E and ACER will manage the platform. The committee started organizing the work in early 2011 and discussion on the selection of stakeholders has begun. To ensure that all are aligned to the program's objective of delivering the final MoDPEHS by 2014, the formation of industry consortia for the studies has already begun.

RESEARCH & DEVELOPMENT

ENTSO-E's R&D activities provide direct input into deliverables such as the TYNDP, planning the North Seas offshore grid and the electricity highways. ENTSO-E has recognized the particular importance of these activities by creating a fourth committee in its organizational structure to provide adequate support and coordination. The R&D Committee will play a central role in directing necessary research into the most vital technological elements of tomorrow's transmission networks, create synergies in the demonstration and deployment of projects, and share the results of this combined effort.

European TSOs recognize the need to speed up technological innovation through electricity highways, offshore grids, long HVAC cables, HVDC technology and smart grids to meet the challenges of integrating large amounts of renewable electricity. Innovation and R&D should contribute to choosing the most efficient investments to support system development, system operations and market goals. The future-oriented concepts of smart grids and European electricity highways exemplify this. R&D contributes to a realistic discussion of these concepts in preparation for well-founded and well-tested implementation.

ENTSO-E's role in the European Electricity Grid Initiative (EEGI), and its mutual launch with EDSO-SG (the European DSO Association for smart grids) of the smart grid's R&D roadmap 2010-2018, required broad TSO participation and committee-level coordination of ENTSO-E R&D activities.

The ENTSO-E R&D plan and the EEGI roadmap describe the necessary further development of grid equipment technologies, operational practices, grid architecture and other R&D activities to facilitate the achievement of the EU's energy goals. The development requires a financial commitment of some €600 million for R&D projects and close collaboration with all relevant stakeholders.

THE ENTSO-E R&D PLAN

The ENTSO-E R&D plan is one of its most important deliverables, with Regulation (EC) 714/2009 specifying that ENTSO-E should adopt such a plan as part of its work program. The plan contributes to the process launched by the EC for a Strategic Energy Technology (SET) plan to foster dialogue between TSOs, the regulatory authorities, the EC and EU Member States. It defines priority research fields and defines 14 base work streams addressing TSO issues over the period 2010-2018.

Although Regulation (EC) 714/2009 does not require ENTSO-E to conduct a formal consultation on the R&D plan, it held public consultations on the document in January and February 2010 to obtain highly valuable stakeholder input. The first edition of the plan, published in March 2010, reflects this.

THE SMART GRID: EEGI ROADMAP 2010-2018

A stronger and smarter European electricity network will play a central role in accommodating the massive deployment of renewable and decentralized energy sources. The EEGI therefore proposes a 9-year European research, development and demonstration (RD&D) program to accelerate innovation and the development of the future European system - the 'smart grid'.

The smart grid will be a flexible, user-centered, interactive, sustainable network. Its deployment will start progressively over the period from 2010 to 2030. Its benefits include:

- → increased hosting capacity for renewable and distributed sources of electricity;
- → integration of national networks into a market-based, truly pan-European network;
- → a high level of quality in the electricity supply to all customers;
- → the active participation of users in energy markets and energy efficiency;
- → the anticipation of new developments such as a progressive electrification of transport;
- → an economically efficient deployment of future networks, for the benefit of grid users;
- → the opening up of business opportunities and markets for new players in the smart grids arena.

European-level planning and implementation of the EEGI RD&D program is necessary to avoid unnecessary duplication of effort and to promote new developments and the exchange of best practice. In the case of European transmission networks and markets, it is crucial to ensure the appropriate cross-border coordination of planning and operations. The initiative will also promote solutions that support standardization and interoperability.

SYSTEM INNOVATION

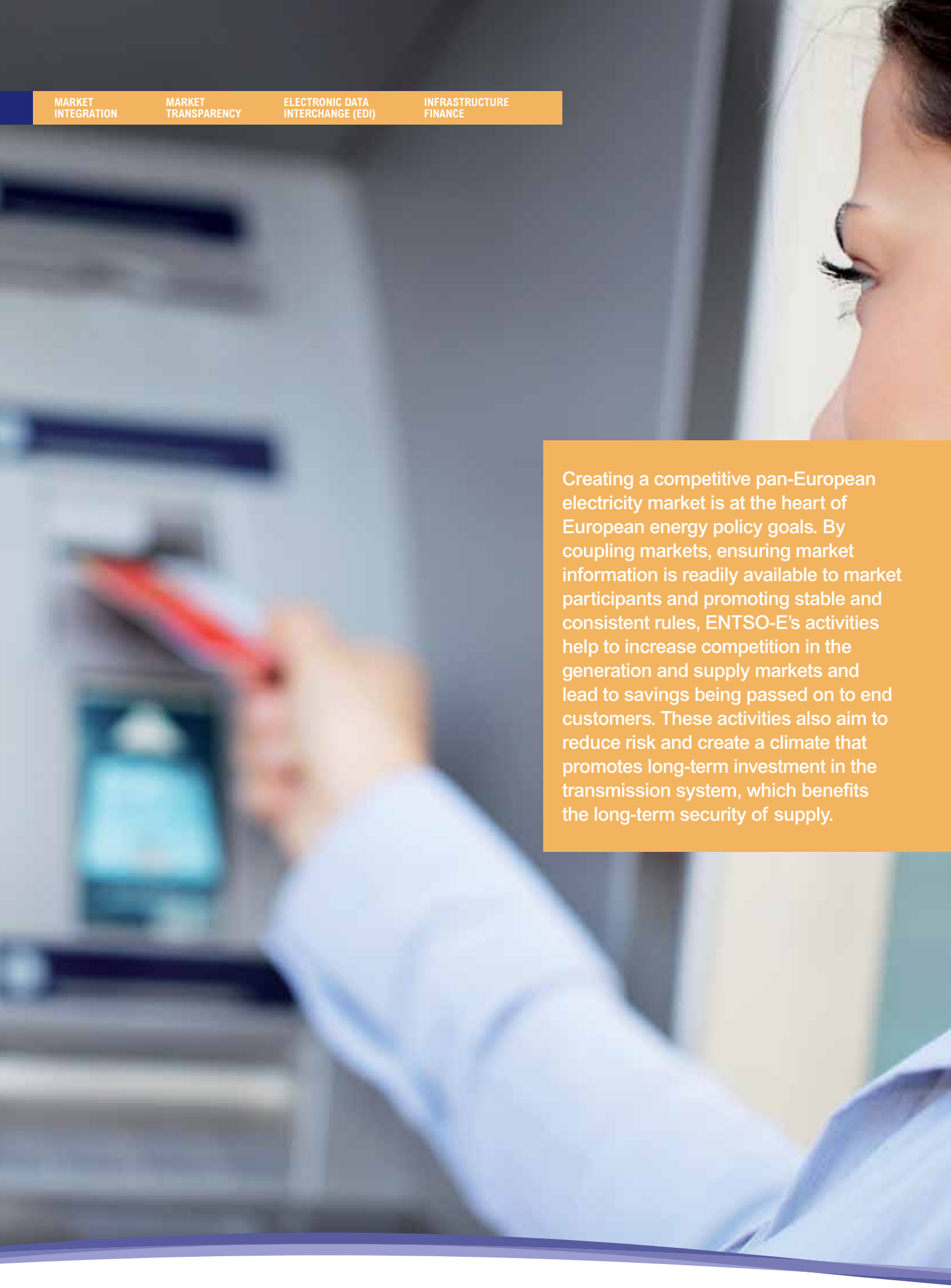
The proposed RD&D program focuses on system rather than technological innovation and addresses the challenge of integrating new technologies under real life working conditions and validating the results. Large scale demonstrations of new developments will allow an evaluation of their benefits, an estimation of costs and the necessary preparations for scaling up and accelerated adoption by network operators.

Transmission grids today already include many 'smart' features and their operation and control depend strongly on real-time data and extensive use of information technology. However, two issues have led to a close cooperation between TSOs and distribution system operators on the smart grids RD&D agenda.

These are the greatly increased use of information and communications technology in the distribution grids and the vision of smart grid-enabled participation by distribution-level organizations in Europe-wide electricity markets (e.g. future intraday markets) in which the TSOs perform major functions. This illustrates how crucial the EEGI RD&D agenda is for the future development of the transmission network.

Priority research fields in the R&D plan or in R&D projects managed by ENTSO-E members, and therefore monitored by ENTSO-E, in progress or that will begin in 2011 include architecture and planning tools for the pan-European network; tools to improve technology efficiency aimed at increasing the operational flexibility and security of transmission systems; and simulation techniques that will give rise to new market design options.

Specific R&D products developed for designing future energy scenarios cover tools for monitoring pan-European network behavior for better transmission adequacy assessment, better surveying pan-European markets, market modeling taking into account rapidly increasing RES penetration, facilitating specific market integration of RES and planning based on active demand.



Creating a competitive pan-European electricity market is at the heart of European energy policy goals. By coupling markets, ensuring market information is readily available to market participants and promoting stable and consistent rules, ENTSO-E's activities help to increase competition in the generation and supply markets and lead to savings being passed on to end customers. These activities also aim to reduce risk and create a climate that promotes long-term investment in the transmission system, which benefits the long-term security of supply.

CREATING A TRANSPARENT, COMPETITIVE AND EFFICIENT MARKET

Achieving a competitive electricity market across Europe requires a range of activities at the highest level. These include a consistent approach to coupling national and regional markets; policies that enhance transparency and promote investor confidence; and a framework that attracts investors to TSO businesses and allows new cross-border capacity to be developed. Achieving this is likely to involve a streamlining of planning and permitting processes and a set of clear market rules which all parties understand and can operate in order to reduce risk.

The European electricity market operates in much the same way as other commodity markets. Parties buy, sell and trade energy across different timescales as generators seek to sell power at the most advantageous price and suppliers and large industrial customers seek to meet their energy needs at the lowest price. Price is set via supply and demand principles.

Ensuring that projects work towards a common goal has been achieved by establishing a European 'target model' for market operation under different timescales. Parties buy and sell power from years ahead, day-ahead to intraday (very close to real time) and the market design needs to be capable of reflecting this.

During 2010 ENTSO-E has built on the work of previous years to develop a clear and universally accepted target model for market integration and has supported the development of market coupling solutions across Europe. The sections below explain the concept of market coupling, discuss the target market model and explain the progress which is being made in different regions to establish regional markets.

DEVELOPMENT STAGE

While the vision of a single pan-European market has lately become much clearer, the details remain at the development stage. A series of projects with the objective of coupling markets are in place at regional level. As barriers to integration are progressively overcome and pan-European rules are defined through market-related network codes, these regional projects will merge until the Europe-wide internal electricity market is effectively implemented by the end of 2014.

Article 8 of Regulation (EC) 714/2009 requires ENTSO-E to draft network codes to push market integration forward. These codes cover areas such as capacity allocation and congestion management, trading related to technical and operational provision of network access services and system balancing, and harmonized transmission tariff structures that include locational signals and inter-TSO compensation rules. The regulation also requires TSOs to set up regional cooperative structures within ENTSO-E, and ENTSO-E's market regional groups support regional market coupling initiatives in line with the overall European market coupling described in the target model and in ENTSO-E's strategic plan.

MARKET INTEGRATION

Market coupling is a method used by TSOs and power exchanges to match day-ahead energy trades and cross-border transmission capacities in one integrated process. This ensures the efficient use of interconnection capacity and gives the right price signals and energy flows across the coupled area.

Where interconnector capacity is sufficient to accommodate optimal energy flows determined by the market coupling process, a single energy price will emerge. However, when capacity is not sufficient, the interconnector is said to be congested and prices will diverge. Market coupling therefore provides energy prices that reflect the value of the energy based on participants' offers and bids in the coupled regions, taking into account the impact of interconnection congestion.

This process can lead to more efficient decision-making and lower prices. But it also illustrates that insufficient transmission infrastructure, especially at cross-border interconnectors, can be a barrier to market efficiency and lower prices, and so to market integration itself. Therefore the network development initiatives described in the previous chapter are also crucial to market integration.

An adequate framework of governance is essential to ensure that market coupling can be rolled out throughout Europe. As it is essentially a congestion management activity, market coupling has a public service nature. Since TSOs are responsible for

ensuring fair and non-discriminatory access to day-ahead cross-border capacity according to Regulation (EC) 714/2009, they will have to define the requirements of the mechanism.

Robust contractual agreements are necessary between TSOs and power exchanges to ensure the sound implementation and operation of market coupling in any one region, and especially Europe-wide.

THE EU TARGET MARKET MODEL

Since its establishment, ENTSO-E has worked with the European Commission (EC), ERGEG and important stakeholders, such as the power exchanges to remove barriers to the full establishment of the Internal Energy Market (IEM).

In ENTSO-E's view, in order to create a truly pan-European market it is paramount to harmonize the designs of the existing regional markets and 'merge' them into one. In order to achieve this, a pan-European market model needs to be defined and agreed. ENTSO-E has invested substantial resources in 2010 to creating an EU target market model which can be implemented in most of Europe by 2014.

The model envisages forward energy trading facilitated by explicit TSO allocation of interconnector capacity and/or financial derivatives by third parties, with implicit auctioning of the remaining capacity at the day-ahead stage and a continuous implicit auction for intraday capacity. Cross-border capacities will be calculated based on a 'common grid model' (CGM), using either flow-based or available transmission capacity methodologies. The implicit auctioning of interconnector capacity is achieved through market coupling. Energy flows are optimized between the coupled markets and total energy demand is satisfied at the lowest price.

Implementing the EU target market model will require considerable effort at both regional and pan-European level. At regional level the TSO cooperation which has led to the development of competitive cross-border markets in much of Europe will need to continue.

In addition, ENTSO-E will deliver a system of market-oriented network codes, such as the code for capacity allocation and congestion management, which will outline the rules that constitute the EU target market model and promote convergence and clarity. This task will form an important part of ENTSO-E's work during 2011 and 2012.

REGIONAL ACHIEVEMENTS

In November 2010, TSOs from ENTSO-E's Continental Europe and Nordic regions successfully launched Central West European (CWE) price market coupling and CWE-Nordic tight volume coupling. European consumers will benefit from the economic optimization resulting in a more efficient use of the power systems in the region, convergence or equalization of prices and improved security of supply.

The CWE price coupling covers Belgium, France, Germany, Luxembourg and The Netherlands. It is based on coordinated capacity and price calculations performed respectively by the TSOs and the power exchanges. The interim tight volume coupling (ITVC) solution is based on the existing EMCC (European Market Coupling Company) model connecting the entire Continental European region

with the Nordic market via interconnectors between Germany, Denmark and Sweden.

The two initiatives integrate a day-ahead market of 1,816 TW hours of production, the largest of its kind in the world and accounting for approximately 60% of European electricity consumption. They mark a crucial intermediate step towards the Europe-wide price coupling target market model.

The results of the CWE/ITVC coupling have been very positive in the first months of operation showing a more efficient use of the interconnections (96% correct flows between the Nordic and CWE regions) and subsequently a better price convergence of the markets involved (although price differences remain due to congested interconnections).

Although it is only one step towards single price coupling, where all borders and bidding areas are treated on an equal basis (i.e. price and flows are calculated at the same time all over Europe), the lessons learned from ITVC can be used in planning an enduring solution. The expectation is that this will develop further, with other regions such as Great Britain, Iberia or Italy joining in due course.

DEVELOPING INTRADAY MARKETS IN NORTH WEST EUROPE

The implementation of a cross-border continuous intraday market in Europe is also a priority to accommodate the increasing share of variable renewable energy production.

In addition to its work on day-ahead markets, ENTSO-E has been part of the ad-hoc advisory group (AHAG), chaired by ERGEG, involved in designing a target model for intraday markets based on the implicit continuous allocation of cross-border intraday capacities. The model is based on a shared order book function, where all intraday bids from different market areas are shared, and a capacity management module with the available cross-border capacities between the areas. The bids are matched in a continuous way provided that enough cross border capacity is available.

As a first step prior to a Europe-wide rollout of the intraday target model, ENTSO-E launched a pilot project in North West Europe (NWE) in May 2010. The goal of the project is to achieve the implementation of an efficient intraday market there which can be extendable to other regions and be compatible with the day-ahead arrangements. The 13 NWE TSOs are committed to designing and implementing a solution to meet ENTSO-E, AHAG and market expectations.

In December 2010, the Florence Forum called for all stakeholders to ensure that all intraday solutions were compatible with the wider European target market model. To this end, a shared order book function and capacity management module need to be developed and implemented by the end of 2012.

The intraday target market model is to be specified in the capacity allocation and congestion management (CACM) framework guideline developed in early 2011, followed by a network code. The Forum supported this being adopted as the European platform.

THE COMMON GRID MODEL

To enable trade between areas of the grid which are beyond the scope of a single TSO (or several TSOs in the same bidding area), the cross-border capacity available for such transactions needs to be determined. This is done by using grid models. All TSOs have to contribute to the creation of these models and deliver them on time according to a strict procedure. This is a central design feature of the EU target market model.

To perform coordinated cross-border transfer capacity calculations TSOs need to build a common grid model (CGM) in which the grid area containing the cross-border capacities to be assessed is represented. The CGM has to enable an accurate and reliable estimation of grid conditions at the target time of the calculation. Large interconnected grid areas run capacity calculations in a more reliable way over a wider topology.

The CGM concept was developed by TSOs under the framework of the capacity calculation project. It will be part of the forthcoming corresponding network code and constitutes a central element of the target market model. The drafting process of the network codes that result from the work thus constitute important milestones in implementing the target market model.

MULTI-YEAR INTER-TSO COMPENSATION

According to Regulation (EC) 714/2009, an inter-TSO mechanism to compensate them for hosting transit flows of electricity (e.g. when France imports power from Poland, Germany is likely to be a transit country) is one element that needs to be resolved in order to eventually arrive at a functioning IEM. The Inter-TSO compensation (ITC) mechanism has therefore been designed to compensate TSOs for hosting cross-border flows on their networks. Its aim is to provide an incentive for them to make the necessary investments, even if the investments benefit other countries.

Various versions of the ITC mechanism have been in place on a voluntary basis for a number of years. However, with the entry into force of the Third Package, the first legally binding ITC mechanism was put in place. It was signed by ENTSO-E and 39 TSOs from 34 countries in line with the requirements of the new EC guidelines (Regulation (EU) 838/2010). The contract is now a multi-year agreement and replaces the previous voluntary agreements.

The ITC agreement includes two elements, which are similar in substance to the mechanisms used in previous contracts. The first relates to the cost of losses, which depends on flow volumes and electricity price. All ITC parties receive full compensation for transit losses in their system.

The second element is to compensate TSOs for the additional infrastructure which they may need to host transit flows. This involves the distribution of a 'Framework Fund' between the TSOs based on the levels of transits they cause or host. The level of the framework fund has been determined by the EC to be €100 million per year, although this figure may be reviewed in the future.

TRANSPARENCY: A KEY ASPECT OF WELL FUNCTIONING MARKETS

An efficient, competitive market needs all market participants to have confidence in the market. This requires information to be available in a clear, consistent and timely manner. Much of this information is held by TSOs and hence they have an important role in making it available. Building on its Europe-wide internet transparency platform www.entsoe.net, ENTSO-E has been working to enhance data transparency through various initiatives throughout 2010. It has also been working on an electronic data interchange (EDI) platform to allow the large amount of data that has become necessary since market liberalization to be exchanged between the different market participants and TSOs.

Transparency is a key feature of the future transmission system so that a fully developed internal electricity market can be achieved. It is crucial to the effective functioning of any market. Market players need to have access to clear, consistent and reliable information in a timely manner to manage their market risks cheaply and efficiently.

Insufficient transparency has an adverse effect on market competition and price formation as not all market players have access to the same information. This contributes to creating an unlevel playing field.

According to Regulation (EC) 714/2009: "market monitoring undertaken over recent years by the national regulatory authorities and by the Commission has shown that current transparency requirements and rules on access to infrastructure are not sufficient to secure a genuine, well-functioning, open and efficient internal market in electricity."

Moreover, asymmetry of information also creates opportunities for market manipulation. The perception that market manipulation can take place acts as a strong barrier to market entry, reduces trust in price formation and may result in lower liquidity.

Publication of fundamental data is a precondition to the creation of a competitive and efficient electricity market. Fundamental data refers to the availability of information which describes the physical conditions influencing the market directly or indirectly. Market participants rely heavily on accurate and timely information on both the availability of the transmission infrastructure and market fundamentals (information about supply and demand) for their trading decisions.

TRANSPARENCY POLICY

European TSOs have already contributed to transparency provisions and will continue to enhance them through publications made available on their websites, on transparency platforms at market places (e.g. the European Power Exchange), and through the ENTSO-E central transparency platform *www.entsoe.net*.

Transparency has improved significantly over the past few years through European legislation and voluntary initiatives by market participants and TSOs. However the need for further legislation to improve transparency on a pan-European scale has been widely recognized.

In March 2010, ENTSO-E adopted its transparency policy, which summarizes its position and main initiatives related to transparency. The policy will be subject to a revision procedure every two years, or whenever necessary (e.g. when there are changes in legislation, such as the future transparency guide-

lines). As the policy was drafted before ERGEG published its guidelines on fundamental data transparency, an update may already become necessary during 2011.

TRANSPARENCY GUIDELINES

Over the year ENTSO-E also collaborated closely with ERGEG on its advice to the EC for a Comitology guideline on fundamental data transparency. The proposal, published in December, aims at implementing a legally binding fundamental data disclosure framework for electricity in 2011.

The proposal not only addresses what data must be disclosed, but also when and where it should be published. TSOs, power exchanges and ENTSO-E already disclose much of the data that fall within the scope of the proposed guideline. While these data are published on www.entsoe.net, TSO websites, national market platforms such as the EEX (European Energy Exchange) transparency platform, and regional platforms like Nord Pool Spot, the full harmonized picture is missing.

To resolve this shortcoming, the proposal includes an obligation for ENTSO-E to create an EU-wide transparency platform. This platform will enable the publication of fundamental data defined as vital for the proper functioning of the IEM and will be a means to promote transparency across Europe. ENTSO-E is currently scoping the project with the aim of going live with the new platform in 2012-2013.

At the same time, ENTSO-E will continue to support and improve the existing *www.entsoe.net* platform. The main improvements cover increasing the amount and quality of the data published (up by 40% in 2010), the users of the platform (EC, traders, TSOs, regulators, consulting companies, universities, etc.) and cooperation with regional power exchanges and auction offices for more efficient data delivery.

ELECTRONIC DATA INTERCHANGE

Prior to liberalization of the European electricity market, data exchanges were principally found within various vertically-integrated utilities. But an integrated market requires a significantly large amount of data interchange between the different market participants. To accommodate this need from a business process perspective, increased electronic data interchange (EDI) is both desirable and necessary.

Standardization of business process descriptions and their application to TSO and other wholesale market participants' data interchange practices and formats is necessary to ensure that software developers provide market participants with the necessary software to automate and manage their trades effectively.

ENTSO-E has worked on a number of important business processes in 2010, primarily covering market balancing. The most important of these include:

- an ENTSO-E reserve resource process (ERRP) where a review of the previous process was carried out to align it with latest business practices;
- explicit transmission capacity auctions (ETCAN): a new document was drafted to provide capacity traders with the relevant information on auctions held by a TSO or auction office;
- Central Issuing Office (CIO) energy identification codes (EICs) management. The CIO provides EICs for TSOs, areas, interconnections, etc. and the document describes the rules to be applied by the CIO for these specific codes;
- an ENTSO-E capacity allocation and nomination process (ECANP) where ENTSO-E is currently reviewing the implementation of explicit auctions managed through auction offices or TSOs;
- 80 maintenance requests processed either to correct errors, clarify language or update the business processes in various implementation guides including the ENTSO-E acknowledgement process (EAD), settlement process (ESP) and outage document (EOD).

ENSURING INFRASTRUCTURE FINANCE

Internal Energy Market initiatives such as market coupling aim to efficiently use existing transmission capacity. However in much of Europe there is insufficient cross-border capacity, which means the full benefits of these initiatives cannot be realized. Therefore, for markets to function effectively, a significant investment in new transmission capacity to relieve congestion and allow market participants to respond to price signals is needed.

The EC's Energy Infrastructure Package (EIP) identified the need for an approximate €200 billion investment to meet Europe's energy policy goals and highlighted the challenges involved in funding this investment. In particular, it focused on the challenges of new technologies such as offshore networks, complex issues of cost allocation which prevent projects from being developed, and risks and delays created by planning processes.

VIABLE FRAMEWORK

Creating a framework which is capable of attracting continued investment in European TSOs is vital. The prerequisites are stable and predictable regulatory regimes, transparent decision-making, returns that are competitive and proportionate to risk, and a focus on delivering outputs which maximize social welfare.

ENTSO-E has therefore looked at the interrelated issues of regulation, investment incentives and financing tools to ensure that the TSOs' views are clearly communicated. Throughout 2010 (and in the first quarter of 2011) ENTSO-E and its members have briefed regulators and legislators at national and European level about the investment incentives needed to build the required transmission infrastructure.

ENTSO-E has also contributed to the public debate through its electricity infrastructure conference in February 2011 and its participation in numerous other forums.

Maintaining the reliability and security of the transmission system is a dynamic challenge as the network evolves and becomes increasingly complex. Europe must ensure a secure supply of energy to its citizens at competitive prices against a background of increasing competition for the world's natural resources. With the change in the relative importance of sources of energy, the challenges involved in maintaining system reliability and security in 2020 and beyond will be substantially different to those we face today.

OPERATING AN INCREASINGLY COMPLEX SYSTEM

Regulation (EC) 714/2009 mandates ENTSO-E to ensure the security of the electricity supply and to maintain system reliability through network codes and the adoption of common network operational tools to ensure the coordination of network operations under normal and emergency conditions, including a common incidents classification scale.

By transporting bulk power across the continent from where it is generated to where it is needed, Europe's transmission system is vital to its society and economy. Balancing the electricity supply with consumer demand is one of the central services performed by TSOs. Maintaining system reliability and the security of supply is therefore an explicit EU energy policy goal – a goal that gets increasingly complex as the system grows. Regulation (EC) 714/2009 mandates ENTSO-E to perform a number of tasks in this respect.

Public policy also has a substantial impact on the network (for instance the integration of renewable energy sources or policy decisions regarding the use of nuclear energy in the aftermath of the Fukushima incident), so Transmission System Operators (TSOs) need strong political support for their work and to achieve their objectives.

While a disturbance at distribution level may affect a few households, several hundred or, in the worst case, thousands of households, disturbances at transmission level have the potential to affect millions of households and entire industries, cities or regions, with a substantially greater negative social and economic impact.

SECURITY OF SUPPLY

Maintaining security of supply across Europe is a coordinated task for all TSOs but operational details differ in its five 'synchronous areas' (see Appendix for further details of ENTSO-E synchronous areas).

In the synchronously interconnected Continental European network, all the national networks, including some from countries outside the EU, are totally interconnected by alternating current (AC) lines. This means a disturbance in, say, Lisbon measurably impacts the network supply in Madrid, Berlin, Athens and elsewhere.

The networks of the UK, Ireland and the Scandinavian countries are asynchronously connected to Continental Europe via direct current (DC) lines, which in the event of a disturbance can act as barriers, protecting the integrity of the network. The Baltic states are synchronously interconnected with non-EU and non-ENTSO-E countries such as Belarus and Russia and also via DC lines to the Nordic countries. Iceland and Cyprus are isolated systems.

IMPACT OF CHANGING THE GENERATION MIX

Long term energy policy decisions, have a substantial impact on the system. This is particularly true when they affect the generation mix. EU energy policy is aimed at increasing volumes of energy sourced from renewables. ENTSO-E's Scenario Outlook & Adequacy Forecast (SO&AF) 2011-2025 forecasts that the renewable energy share in meeting electricity consumption at EU level will reach 36% in 2020.

Integrating power generated from fluctuating renewable energy sources (RES) such as wind or solar is a significant challenge, given that renewable energy generation is often far away from load centers. The transmission system will have to significantly change to accommodate this.

Short term policy decisions can have a substantial impact on the system. The most recent example is the reaction to the nuclear incident at Fukushima, with some Member States reconsidering their use of nuclear power. It is evident that regional generation adequacy across the ENTSO-E Continental European area is affected by such decisions.

TSOs are constantly in contact with each other both regionally and on a pan-European basis to exchange information and coordinate measures to maintain the security of supply. Any policy decisions and other developments affecting generation capacity and

adequacy margins are taken into account by them in the preparation of forecasts, such as the ENTSO-E Summer and Winter Outlooks, and in daily operational planning based on power flow data exchange rules (defined for example in the ENTSO-E Regional Group Continental Europe operation handbook).

MAJOR INITIATIVES

During the interim period significant progress has been made at both a pan-European level involving all ENTSO-E regions and regionally concerning one or a number of specific synchronous areas.

Major ENTSO-E pan-European projects have been to prepare the groundwork for the network codes for system operations and to develop the ENTSO-E awareness system, an incidents classification scale, and counter-measures for system frequency deviation. The measures for system frequency deviation are worked out in cooperation with EURELECTRIC because the deviations affect both the transmission system and power generation.

At regional level, tasks have included work on issues such as compliance monitoring for the Continental European synchronous area, optimizing DC loop flows across the Nordic and the Continental European synchronous areas for maximum transfer capacity, wind power integration in the UK, ramping restrictions between the Nordic and Continental European areas, and system extension – specifically with the Turkish operator TEIAS.

NETWORK CODES FOR SYSTEM OPERATIONS

Network codes with legally binding rules for TSOs and grid users are crucial for maintaining system reliability and security as well as an efficiently functioning electricity market. Some measures can be coordinated at a pan-European level across all synchronous areas. But historically, ENTSO-E predecessor organizations have created measures and rules which have developed into different best-practices across various synchronous areas. ENTSO-E's task is to coordinate and consolidate this important work, while observing and respecting the regional differences caused by the areas' different characteristics (size, regulation, interconnectivity, generation mix, etc).

The European network codes for systems operation will need to be concise, addressing the 'what', whereas their exact implementation – the 'how' – needs to be developed at regional synchronous area level. Detailed regional and national rules, tried and tested over the past 50 years and confirmed by the high reliability of the systems in question, should be 'embedded' in the network codes and become a legal reference by this route.

CURRENT RULES

Current rules for system operation mostly address TSO issues. Facctors affecting network reliability outside direct TSO control include generation siting and mix, authorization procedures, etc. TSOs exercise different levels of influence and have different contractual relations with DSOs and the generators.

Harmonization therefore needs to be assessed by added value, considering the compatibility of the solutions with existing practice and by avoiding sudden changes in system operation. TSOs are prepared for this development in order to ensure seamless changes in the current regional codes and operational practices.

Following discussions during 2010 with ERGEG on future framework guidelines for system operations, ENTSO-E accepted the following structure and timing for the introduction of the pan-European codes:

- → Operational security (Q2/2012);
- → Operational planning and scheduling (Q4/2012);
- → Load frequency control and reserve (Q2/2013);
- → Operational training (Q4/2013);
- → Emergency requirements and operational procedures (Q2/2014).

With the formation of ACER, the framework guidelines for system operations are foreseen to be developed by mid-2011 and ENTSO-E's formal code development work on the operational codes will commence at the same time.

OPERATIONAL SECURITY NETWORK CODE

Over the past year, ENTSO-E has made significant progress on the draft operational security network code. Its main objectives are to determine common operational security principles; to enshrine the common level of pan-European operational security that has already been reached and the coordination of operations under normal and emergency situations; and to determine the common requirements for DSOs, generators and consumption units connected to transmission and distribution grids necessary for operational security.

Stakeholders have already emphasized the link between ENTSO-E's operations and its connection codes. The operational security network code is thus a important milestone to ensure system security and reliability for the challenges the transmission system is likely to face in 2020 and beyond.

The level of detail in the operational security network code will be general – common operational security principles – in order to ensure that the same harmonization requirements can be proposed for all synchronous areas. The goal of the draft is to focus on what should be attained by the relevant requirements rather than on how it should be attained. The stepwise approach builds on the existing rules of the synchronous areas, with the continuous improvement loop ensuring a consistent shift towards pan-European standards.

THE ENTSO-E AWARENESS SYSTEM

Past network disturbances and experience of abnormal operating conditions have made European TSOs aware that real-time information about the source of a disturbance and the condition of the overall system is necessary for them to react positively and in a coordinated way. By improving communication and exchange of information between TSOs in critical situations, the ENTSO-E awareness system (EAS) is another tool to help maintain system reliability and security of supply.

All TSOs today are fully capable of supervising their transmission networks and monitoring adjacent systems through their own independent SCADA (supervisory control and data acquisition) systems. And, although co-operation and data exchange between TSOs have made enormous strides recently, this generally focuses on bilateral and regional network topology and status information. A Europe-wide awareness system that not only shares data and information in real-time but also provides a common view for all operators will significantly enhance coordination when dealing with major disturbances.

The EAS is a new seamless online operational tool that makes this common centralized awareness function available to European TSOs. They will be able to use the system to observe in real-time critical parameters of the whole ENTSO-E transmission system. It is one of ENTSO-E's key deliverables, responding to the requirements of Regulation (EC) 714/2009 for common operational tools to ensure the coordination of network operations.

CHALLENGING DESIGN

Designing and setting up a common IT tool for TSOs in 34 countries is a significant challenge. The tool's capabilities and flexibility for data exchange and visualization must meet the demands and expectations of the individual TSOs as well as offer simple procedures to get the maximum benefit from the tool. Internal consultation has already demonstrated the benefits of common operational usage and understanding among users.

The communication infrastructure, the direct link to the SCADA systems and the distribution of visualizations to many control centers are only some of the technical challenges involved. Retaining the security of the SCADA domains, defining a common technical standard for the interfaces, central hosting and operation of the system, and contracting out related services all need to be resolved.

A European tender was successfully met in 2010 and the system is expected to become operational at the end of 2011. The chosen approach promises a high level of quality and flexibility with availability to TSOs via standardized interfaces, while the overall investment in time and budget for a centralized solution remains reasonable.

INCIDENT CLASSIFICATION SCALE

The power system is subjected to various disturbances that potentially could lead to widespread incidents over a large part of the interconnected system, regardless of where they occur. Knowledge about the main causes and sources of a disturbance and learning from incidents are necessary for TSO operators to avoid their recurrence.

Categorizing and classifying incidents and optimizing counter-measures is important today and will become even more so in 2020 when the network will be operating with increased complexity. Development of the common incident classification scale will help in this process.

PAN-EUROPEAN APPROACH

ENTSO-E began developing a technical definition of the pan-European approach to the common incident classification scale in 2010 and a working draft has been produced. The document describes the principles of classification with full explanations of the methodology used to establish correspondence between events and their level of importance with regard to system security.

It also defines the process each TSO will have to apply in order to analyze classified events and the reporting and analysis procedures at ENTSO-E level. To achieve this task, ENTSO-E is reviewing current incident classification scales applied by individual TSOs or developed within regional initiatives. The idea is to propose an incidents classification scale that can be applied by TSOs in all synchronous areas and in the isolated systems of Iceland and Cyprus.

Implementation of the classification scale should allow operators to better track events and their development in terms of system security by highlighting the need for feedback and facilitating the identification of ways to improve the network codes in order to avoid the repetition of an incident.

SYSTEM FREQUENCY DEVIATION

The system frequency is the heartbeat of an interconnected power system as it permanently reflects the balance between load and generation. Small deviations, in the range of 20-40 mHz in Continental Europe, from the 50 Hz frequency standard are normal in the operation of the system and signal either a generation surplus or a generation deficit within the whole system*. But when the deviations become large they signal a major imbalance between load and generation and, if the imbalance is allowed to persist, there are significant risks to the security of supply.

Keeping system frequency deviations under control through automatic and manual activation of reserves is therefore a central element in system reliability. It is the TSOs' responsibility to monitor and control the balance between production and consumption, including the balance at an international level.

Over the past few years practically all ENTSO-E synchronous areas have experienced an increasing number of higher frequency variations at hour boundaries mainly during the morning and evening ramping periods (where spot trading on one or more cross-border links is restricted). In Continental Europe substantial variations in peak-to-peak values in the range of 150 mHz and more have been observed mainly within the standardized time interval for scheduled cross-border (international) electricity exchanges. This trend can also be observed in other synchronous areas.

PAN-EUROPEAN TEAM

An ENTSO-E/EURELECTRIC pan-European team has been working since December 2009 on an in-depth study of this phenomenon. Its main objective has been to analyze the origins of the deviations and their consequences on system security and to suggest possible mitigating actions.

In its forthcoming report, foreseen to be published at the beginning of 2012, the team will propose possible solutions for reducing the critical frequency deviations during the scheduled ramping period. Where necessary, the report will then be used in consultations with ACER and national regulators, the EC, the European Federation of Energy Traders (EFET) and other stakeholders. After formal approval by the respective associations, the results will contribute to both the European operational and market standards.

* ENTSO-E displays the live system frequency for the European synchronous area on its website: *www.entsoe.eu/system-operations/the-frequency*.

RAMPING RESTRICTIONS - NORDIC AND CONTINENTAL EUROPEAN AREAS

Commercial trade in electricity in Europe has grown markedly over the last few years due to tighter market integration and greater interconnectivity between individual countries. Balancing the network has therefore become increasingly difficult to manage and violations of the frequency limits reduce system security.

As a consequence, Nordic TSOs have been working to harmonize the ramping rules (restricting changes in spot trading) for trade between the Nordic and the Continental European synchronous areas. The objective is to limit planned changes in load flow to a level that can be handled by the current infrastructure and procedures for system operations. During 2010, ENTSO-E's Nordic TSOs evaluated the current rules to restrict ramping and put forward possible alternatives for the future, including counter trade, increased reserves, better TSO control of production, and other market measures.

COMPLIANCE MONITORING IN CONTINENTAL EUROPE

ENTSO-E promotes the reliability and efficient operation of the interconnected power system in the Continental European synchronous area through enforcing compliance with the Regional Group Continental Europe (RGCE) operation handbook (OH).

The long term goal of the compliance monitoring process (CMP) is to make the operation handbook standards more measurable and to expand best practice among Continental European TSOs. The actions will also promote higher security of supply in the future Continental European system.

Compliance monitoring has been a regular practice among TSOs since 2006 but the 2010 CMP put in place in January introduced several changes to the methodology of earlier processes. The process is based on TSO self-assessment declarations and obligatory ENTSO-E compliance audits.

SELF-ASSESSMENT

The self-assessment process in 2010 covered the load-frequency control and performance, scheduling and accounting, and operational security policies of the RGCE handbook.

There are additional questions on a number of multilateral standards which are deemed critical for system security and cooperation among TSOs. The 2010 self-assessment process and compliance audits provided valuable feedback for further improvement in the development of clear and measurable standards and best practice. The 2011 compliance monitoring program is available on ENTSO-E's website: *www.entsoe.eu/publications/former-associations/ucte/compliance-monitoring-inforcement.*

ENTSO-E will be building on this experience to design and implement an ENTSO-E-wide system to monitor and enforce compliance of network codes as required by Regulation (EC) 714/2009.

INTEGRATING WIND GENERATION IN GREAT BRITAIN

Work in the British synchronous area has been undertaken to look at likely generation scenarios for 2020. The most significant change will be the increased penetration of wind power, which is expected to provide some 26.7 GW of the region's total 100 GW capacity in 2020.

Consideration has been given to the technical and operational challenges that will arise from the higher penetration of wind energy and larger interconnections, together with new demand issues from an anticipated increase in embedded generation (132 kV and below) and the smart meter rollout program.

The principal challenge is the volatility of renewable generation. To maintain current security standards, a significant additional energy reserve will be needed. By 2020 it is anticipated that this will be approximately equivalent to 30% of the total forecast wind generation output, in addition to the current reserve levels, to cover demand forecasting errors and other plant losses.

INCREASED FLEXIBILITY AND OPERATING RESERVES

Flexibility in thermal plant operations will become increasingly important to manage the variability. In the run up to 2020, demand-side services are likely to play an increasing role in energy balancing to help smooth the demand profile and assist in managing the variability (i.e. through time tariffs or dynamic response services).

Interconnectors are also set to play an important role, with an anticipated 100% increase in interconnection to around 6 GW by 2020. Interconnectors offer the potential to help manage and share variable resources and reserves between national markets. They also provide the potential for national TSOs to offer ancillary services to each other. Here the EC's Energy Infrastructure Package (EIP) proposals play a role as they have the potential to speed up permitting processes and improve financing conditions.

The potential unplanned generation loss for which the operational reserves need to be dimensioned is expected to increase from 1320 MW to 1800 MW principally as a result of new larger nuclear facilities connecting to the transmission system but also from increases in spur connections resulting from the GB 'Connect and Manage' regime. This larger potential loss of generation underlines the need for additional energy reserves.

TRANSPARENT FRAMEWORK

During the year, ENTSO-E's Great Britain regional group has worked on many projects to ensure security of supply and reliability of the British system and to provide a transparent framework for market libera-lization. It has also contributed to many measures to maintain operational standards and cooperate with other ENTSO-E regions and committees in order to achieve the technical compatibility of proposed market changes and network development plans. In this context, the cross-border balancing regime with RTE, France is one example of a successful achievement.

SYSTEM EXTENSIONS
PARALLEL TRIAL INTERCONNECTION WITH TEIAS

System extensions, the process of connecting a previously unconnected external system to one of ENTSO-E's synchronous areas, are designed to bring benefits to consumers in both areas in terms of increased trading possibilities and lower costs (transmission, reserve power and system balancing). As the overall synchronous area becomes larger, more reserve power is available to it, so less investment is required, and the output of the more volatile renewable sources can be evened out. But extensive testing is needed to ensure that all the technical standards are fulfilled, and that no risks result to the security of either system

Over the years, the Continental European synchronous area has been progressively interconnected with the systems of Poland, the Czech and Slovak Republics, Hungary, Bulgaria and Romania, as well as with Morocco, Algeria and Tunisia. Western Ukraine has been running in permanent synchronous operation with Continental Europe since 2003, and the Balkan region was reconnected in 2004.

Over the past ten years, Turkey has improved the operation and control of most of its generating and transmission systems to comply with Continental European standards. In December 2009 this resulted in an agreement with the Turkish Electricity Transmission Company TEIAS on a trial parallel interconnection with the Continental European synchronous area.

This parallel operation will not only increase the quality and security of the electricity supply in Turkey, but is also foreseen to give Turkey eventual access to the European power market. The preparatory work for the project, supervision of its implementation and monitoring of the trial are being managed by a consortium of ENTSO-E member TSOs and are subject to decisions by the ENTSO-E Continental Europe Regional Group.

ONE-YEAR PARALLEL TRIAL

The Turkish system is connected to that of Bulgaria by two 400 kV lines and to the Greek system by one 400 kV line. After rigorous stand-alone operational tests under high and low load conditions, it was synchronized with Continental Europe through these lines on 18 September 2010. The date marked the beginning of the one-year parallel trial interconnection.

In terms of power exchanges, the trial period has been organized in three phases. After a stabilization period with no exchange of energy, the first non-commercial exchange was carried out in February 2011 in both directions and at both borders. This second phase ran for two weeks, with the evaluation of the results in mid-March. Following a successful evaluation, ENTSO-E decided in May 2011 on a limited capacity allocation for commercial exchanges of power. This third phase of the trial commences on 1 June 2011.

Although 2010 has been an interim period in the run up to the Third Package formally becoming applicable, ENTSO-E and its member TSOs have worked actively to make progress in all the areas covered by its mandate: system operations, network development, market integration, and R&D. The proactive approach has been for a very good reason. We cannot afford to lose any time if we are to achieve Europe's energy policy goals, in particular its 20/20/20 objectives.

ACTING NOW TO ENSURE OUR FUTURE

ENTSO-E President Daniel Dobbeni reviews ENTSO-E's achievements during 2010 and the challenges ahead.

Keeping Europe's electricity network secure and reliable, while integrating ever larger amounts of intermittent renewable energy sources (RES), and making the internal energy market (IEM) a reality by 2014 are tremendous challenges. To meet these, the European power and grid systems need to evolve dramatically. The tools given to ENTSO-E by the Third Package – and more specifically by Regulation (EC) 714/2009 – are a major step in the right direction.

The United Nations Universal Declaration of Human Rights states that: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services" – all of which is ultimately dependent on the adequate provision of energy. Modern society's obligation to meet these primary needs leads to both increased power system complexity and choices and compromise in terms of delivering electricity.

But European TSOs are ready to respond to the challenges they face in continuing to provide a high standard of service to the 532 million citizens covered by ENTSO-E's members.

NETWORK CODES

Network codes are one of ENTSO-E's most important deliverables and the Third Package defines their development process in great detail. The codes will pass through the EU Comitology process, making them binding not only on TSOs but also on all other market participants. The involvement of the European Commission (EC), ACER and Member States, as well as extensive public consultation, will ensure that the codes are well balanced and fit for purpose.

Making the codes legally binding solves an important shortcoming of the European energy market prior to the Third Package. Previously TSOs could make their operational rules binding among themselves through operation handbooks and multilateral agreements, but these instruments could only rely on co-operation with other parties to ensure operational security and market integration.

Very important groundwork on the pilot code on grid connection requirements for generators has been accomplished by ENTSO-E with the publication of its conclusions on the preparatory work on the pilot code in March 2011.

With ACER now operational and having launched its public consultation on the corresponding framework guideline, the way forward for the formal work on the pilot code is now set.

Similar, important milestones on a number of market and operations-related codes have also been reached during the interim period. ENTSO-E has advanced projects as far as possible so that the codes can be rapidly drafted and finalized once ACER and the EC give the signal.

TEN-YEAR NETWORK DEVELOPMENT PLAN

ENTSO-E also published its first pilot Ten-Year Network Development Plan (TYNDP) in 2010. The plan identified the complete set of pan-European transmission infrastructure investments needed from a TSO perspective, based on national legislation and the input from TSO customers.

This year we have seen enormous interest in the TYNDP as it has provided important information for Europe's long-term transmission planners and wider stakeholders. By looking ten years into the future, it tells us which lines need to be built and refurbished to achieve the EU's three most important energy goals – an increased use of renewable energy, a fully integrated internal energy market, and the security of the European energy supply.

Before the pilot TYNDP was published, TSOs were aware that the European transmission system would have to drastically change. This awareness is now widely shared by all concerned parties.

By identifying almost 500 infrastructure projects of European relevance across 34 countries, the TYNDP provided the factual and methodological input for the EC's 'Energy Infrastructure Priorities for 2020 and 2030' communication in November 2010.

The 2012 edition of the TYNDP, on which work started immediately after publication of the pilot, will have improvements in a number of areas in order to address feedback from stakeholders. These include a top-down approach based on the EU's 2020 energy scenario, national action plans, extensive regional consultation on each scenario and a focus on developing Europe's electricity corridors.

TARGET MARKET MODEL

Network codes are also an indispensable tool in the further integration of the Internal Energy Market (IEM). During the interim period, ENTSO-E worked with the EC, regulators and stakeholders to develop a common target market model and start work on its implementation. The relevant groundwork was completed and the market-related framework guidelines and their corresponding network codes developed as far as possible without the formal framework guidelines.

ACER started its public consultation on its framework guideline for capacity allocation and congestion management on 11 April 2011 and, once the guideline is finalized, ENTSO-E will start drafting the corresponding network code.

Transparency is of fundamental importance to a well functioning market and over the past year ENTSO-E has been steadily improving the quantity and quality of data available from its *www.entsoe.net* transparency platform. An enhanced European information platform will become available at the end of 2012. Work on this project has already started and when complete will strengthen the IEM through improved access to fundamental market data.

All these changes constitute new challenges and, as the European grid grows increasingly complex, it also needs to be adapted to accommodate new services such as demand-side management.

SECURITY OF SUPPLY

Electricity is the backbone of our economy and society, so a secure supply is of paramount importance. While the grid is being transformed to help achieve Europe's energy policy goals, one must not forget that one of its fundamental tenets is to provide a secure supply of electricity. ENTSO-E has continued to develop measures to improve system reliability and security despite the new challenges.

The development of legally binding network codes for system operations constitutes one of the most important deliverables in this area. An ENTSO-E awareness system and a pan-European incident classification scale will increase TSO exchange of information as well as further improve and standardize their actions in such cases.

BARRIERS TO PROGRESS

Despite the significant advances on many fronts, TSOs still face important barriers in transforming the network.

As the pilot TYNDP shows, substantial investment in electricity infrastructure is required over the next ten years to help Europe achieve it's 2020 policy goals. This investment, however, is often hampered by an unclear public understanding of the necessity and the benefits of transmission infrastructure, resulting in a lack of public acceptance for it. Permitting procedures are excessively long with too few positive outcomes and TSO access to capital markets needs stronger regulatory support.

At European level, ENTSO-E is contributing to public discussions of these issues at European parliamentary events, as well as at frequent public workshops and conferences. However reaching the general public and the media needs stronger support from political decision-makers and NGOs to explain why new transmission lines are necessary and the benefits they will bring.

Social acceptance of transmission infrastructure could be greatly improved by developing communication tools to present its vital role at public debates at local, regional and national level.

The ENTSO-E conference in February this year was an opportunity for ENTSO-E members to share the results of their work with the wider stakeholder community, regulators and European institutions. The conference attracted more than 400 delegates and provided an excellent forum for discussions about the energy policy issues affecting our business.

ENERGY INFRASTRUCTURE PRIORITIES

In this context, ENTSO-E clearly welcomes the EC's blueprint on Energy Infrastructure Priorities (EIP), which provides essential guidance on its future infrastructure policy. It endorses the EC's aim to tackle the barriers hindering the development of electricity networks.

The fact that transmission infrastructure is crucial for reaching Europe's energy objectives is now unanimously acknowledged and action at EU level to boost the necessary investments is urgently needed. The priorities identified in the EIP blueprint are in line with those of the ENTSO-E pilot TYNDP. ENTSO-E and its members will continue to contribute actively to the debate on implementing the blueprint.

PERMITTING

As far as permitting processes are concerned, ENTSO-E views the blueprint's concept of a 'one stop shop' and time limits for a final decision as positive steps. The proposal could be further strengthened to accelerate delivery of the necessary infrastructure by setting a maximum time limit of between three to five years for the completion of all procedures.

In addition, accelerated permitting processes should apply to all projects, whether or not they are included in the priority corridors. As the projects in the TYNDP illustrate, many reinforcements to the grid are needed simultaneously.

INVESTMENT

Regarding the regulatory and financial measures to enhance infrastructure investments and TSO access to capital, ENTSO-E supports the existing 'user pays principle' of the regulatory regime. It is essential, however, that the regime also offers investors in TSOs a stable and attractive framework of incentives to encourage funding of network expansion.

In particular, the framework should include appropriate regulated rates of return on investments in infrastructure that TSOs can actually realize. Granting rates of return surcharges is an additional instrument to foster grid investment commonly used by national regulatory regimes.

ENTSO-E'S CONTRIBUTION

It has been my personal pleasure to represent ENTSO-E member TSOs in key discussions with the EC, ERGEG, ACER, and the associations representing our customers, on a number of key issues. The discussions on our work on the infrastructure requirements identified in the TYNDP, energy security and the adequacy of generation margins has given me and my colleagues an increasing sense of the value of our contribution.

Our work over the next year will increasingly focus on network code development. More precise timing and priorities from ACER and the EC for the preparation of these codes points to a very busy year ahead for ENTSO-E and experts from TSOs and stakeholders.

While major progress was made during 2010 at European and regional levels, the pace is still too slow to match the expectations of market parties and the massive penetration of RES, which is leading to a fundamental change in the energy mix in all Member States.

Together with my fellow CEOs, who represent 41 TSOs in 34 countries, I harbor the ambition that we can advance with adequate speed and achieve Europe's energy and climate change ambitions, while keeping the lights on in a sustainable and reliable way. Quite a challenge!

APPENDICES

- Work program status
- Synchronous zones
- Member TSOs
- Organization structure
- Secretariat
- Reports & position papers
- Workshops & consultations
- Press releases
- Abbreviations

ENTSO-E WORK PROGRAM STATUS - END 2010

Activity	Goal	Work start	Deliverable & completion date (end of quarter/year)	Committee/ Group in charge
Connection of generation	Development of the pilot code for grid connection with special focus on wind generation	Q3/2009	First preliminary draft pilot code available for information to stakeholders (Q2/2010); input to ERGEG's framework guideline consultation (Q3/2010); second preliminary draft pilot code available for information to stakeholders (Q3/2011)	System Development Committee (SDC)
Other generation connection specificities	Development of remaining chapters of generation connection network code	Q2/2010	Final draft pilot code ending the informal period and including all generating technologies available for information to stakeholders (Q1/2011)	SDC
Transparency	Development of transparency policy as input to EC Guideline entsoe.net (ETSOVista) development	Q3/2009 Q3/2009	1. Position paper/transparency policy (Q1/2010) 2. Update of entsoe.net platform (Q2/2010) 3. Continuous input to ERGEG and EC for Guideline (until Q4 /2010)	Market Committee (MC)
Operational network codes	Scoping work on operational framework guideline and network codes Development of operational network codes: – load flow management – use of balancing tools and of ancillary services – standardized coordination methodology / procedures	Q1/2010 Q4/2009 Q4/2009 Q4/2009	1. Continuous input to ERGEG framework guideline (until Q3/2010) 2. Terminology (Q2/2010) 3. Comparison analyses on operational rules in synchronous areas (Q2/2010) 4. Network codes (Q4/2011)	System Operations Committee (SOC)
Market integration issues	Design and implementation of market integration through contributions to Ad-Hoc Advisory Group (AHAG) and three implementation projects. Code development	Q1/2010 After Q3/2010	Ultimate deliverables are network codes whose number and scopes depend on the framework guideline, the implementation projects and EC priorities: 1. Intraday code 2. Day-ahead code 3. Capacity calculation code (Completion dates depend on priorities and availability of experts, possibly as early as Q4/2011)	 MC MC MC coordinated with SOC
Network develop-ment and planning	Preparation of a pilot TYNDP (the first draft early 2010)	Q3/2009	TYNDP 2010-2020 (Q2/2010)	SDC

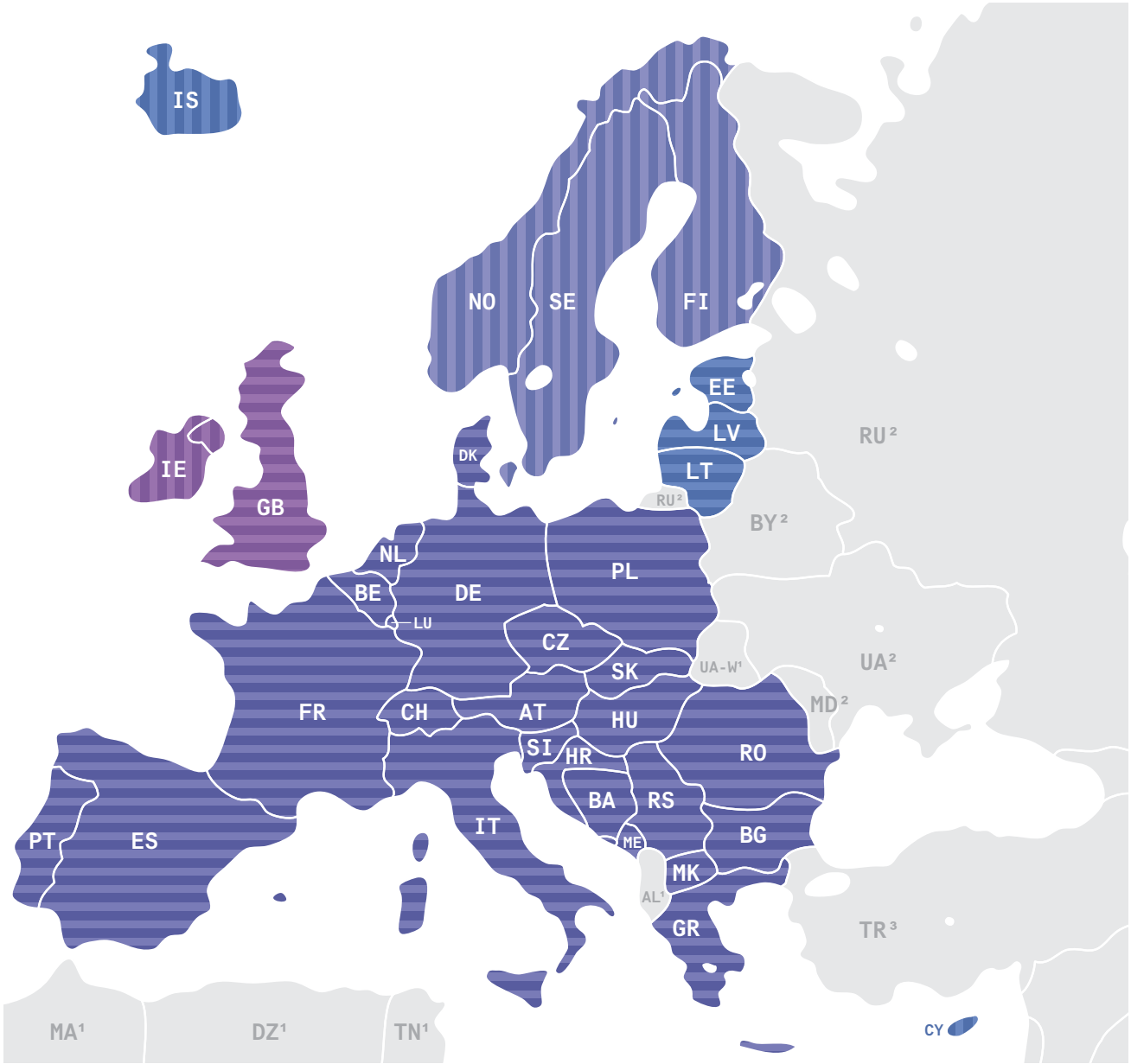
Interaction with other groups	Consultation with (start quarter/year)	Status/Comments
System Operations Committee (SOC), Market Committee (MC), Legal & Regulatory Group (LRG)	All stakeholders; in particular ERGEG regarding their pilot framework guideline on connection (Q2/2010 - Q3/2010)	• More than 15 bilateral meetings with European stakeholder associations took place in 2010 as well as two public workshops (April and November 2010) resulting in fundamental improvements in the draft pilot code. Work progressed in close collaboration with the European Commission (EC) and ERGEG. • The informal pilot network code was released in March 2011 and the evaluation of stakeholders' comments is foreseen to be published in Q2/2011. The formal drafting period is to commence after the ACER framework guideline is released in the second half of 2011. • Input to ERGEG's framework guideline was submitted in September and November 2010. Both the framework guideline and the pilot code have provided valuable insight for the forthcoming formal codes in terms of process and contents. In the case of connection codes, the ENTSO-E approach aims to provide the appropriate level of harmonisation of rules to guarantee the safe operation of the power system of the future and facilitate the installation of new power units, in particular renewables, throughout Europe.
SOC, MC, LRG	All stakeholders (2010)	• Significant acceleration of the foreseen work resulted in the inclusion of all generating technologies in the code to provide stakeholders a complete overview of the final document in Q1/2011.
Data Expert Group, LRG	All stakeholders (on position paper: beginning early in 2010)	• ENTSO-E transparency policy was published on the ENTSO-E website in March 2010. • Data definitions, data quality, downloads have been improved and the number of published data has increased. • ENTSO-E contributed significantly to ERGEG's draft guideline, in particular by providing definitions, agreed among all members. • ENTSO-E responded to ERGEG's public consultation on fundamental data transparency. • Working paper on transparency definitions on ENTSO-E's website has been published as a first step in stakeholder dialogues, which will continue in 2011. • A tendering process for IT vendor was launched in 2010 and completed in 2011.
As needed	All stakeholders; in particular ERGEG, EURELECTRIC (beginning in Q1/2010; intense on the different topics during different quarters in 2010)	• Scoping work and input to the operational framework guideline was progressing according to ERGEG's updated plan, with active TSO participation in ERGEG's expert group. Within the scoping work the division of the framework guideline into particular network codes has been agreed, namely: operational security, operational planning and scheduling, load-frequency control and reserves, operational training, emergency procedures. A preliminary scope for the network code on operational security has been agreed and an internal workshop held. • ENTSO-E terminology has been developed and will continue to improve as the network codes are being developed. • Comparison analyses have been conducted in ENTSO-E's Working Group European Operational Standards in line with the network code development plan.
SOC, LRG SOC, LRG LRG	ERGEG's Ad-Hoc Advisory Group involving all stakeholders (through at least Q1 /2010) ERGEG during development of (input to) framework guideline (Q2 - 3/2010) All stakeholders for code development (starting Q4/2010)	• Target models for Day-ahead and Intraday developed as expected. Considerable work is continuing to assist in the development of regional projects. ENTSO-E has been active in delivering market integration and AHAG-related issues paving the way for the network code development (expected to start around Q3 2011). Deliverables included: strategy and project goals paper for AHAG market integration projects, which were approved by the ENTSO-E Assembly in March 2010; responses to early consultations on initial impact assessment and the capacity allocation & congestion management (CACM) framework guideline (March and July); response to the formal consultation on framework guidelines on CACM (November 15); active participation at AHAG's Day-Ahead & Governance project chaired by the EC – ENTSO-E effectively contributed to the corresponding governance options paper presented by the EC at the Florence Forum (final paper aligned with ENTSO-E goals).
All SDC working groups and regional groups; EWIS project, LRG	All stakeholders; in particular ERGEG, EURELECTRIC, EFET, EWEA (Q3 - 4/2009), public consultation (Q1 - 2/2010)	• The first ENTSO-E pilot TYNDP was released in June 2010. It provides for the first time a TSO-consolidated overview of the electricity transmission infrastructure needs over the next ten years. It also highlights the main barriers to the development of the grid thus effectively launching the policy debate and providing solid factual and methodological foundations for decision making. • All of the almost 500 projects in the TYNDP, as well as the generation outlook within the report, are based on cooperative TSO studies on bottom-up scenarios depicting the TSOs' best estimate of future generation and load evolution. • Formal consultation on the TYNDP were held in Q2 2010 for a period of six weeks. Prior to that, informal meetings with European stakeholders associations, as well as close collaboration with EC and ERGEG resulted in sharing the objectives and improving the transparency and quality of the plan. As a result, the preparations for the first formal TYNDP in 2012 will be based on this valuable feedback, including top-down scenarios, an improved and more systematic regional approach, and the transparent assessment of transmission projects.

ENTSO-E WORK PROGRAM STATUS - END 2010

Activity	Goal	Work start	Deliverable & completion date (end of quarter/year)	Committee/ Group in charge
R&D	Preparation of a consolidated TSO R&D Plan, contributions to EC's Strategic Energy Technologies Plan	Q3/2009	R&D Plan (Q4/2009)	SDC lead, with MC and SOC
Operational issues	Preparations for common operational tools; coordination of regions for operational issues	Q4/2009	1. Operational experience exchange forum (Q1/2010) 2. Congestion forecasting improvements (Q4/2010) 3. Actions aiming at harmonization of regional Network Codes (Q4/2010)	SOC
Network development and planning	Development of position papers on future transmission technology, EMF and licensing procedures	From Q3/2009 to Q4/2010	Position papers (from Q1/2010 to Q4/2010)	SDC
Network development and planning	Formulation of long-term strategy/vision for the extension of the European network, possibly with a view to effects on market integration	Q4/2009	System extension strategy (Q4/2011)	SDC
TSO cooperation on operational issues	Development of technical document on operational reserves	Q4/2009	1. Comparison analyses 2. Proposed common principles for methodology for reserves' determination (Q4/2010)	SOC
Operational issues	Development of technical document on determination of incident classification and methodology of incident analyses	Q4/2009	1. Criteria for incident classification 2. Methodology of incident analyses (both Q4/2010)	SOC
Ancillary services	Ancillary services – definition of commercial products and standards	Q3/2009	Document (Q4/2010)	MC
Economic framework market issues	Economic framework positions: 1. ITC 2. Investment incentives 3. Tariffs	Q4/2009	Position papers: ITC (Q4/2009) Others (Q4/2010)	MC
RES integration	1. Roadmap for the development of offshore wind generation 2. Overview of policies on RES support and grid connection	Q3/2009	Roadmap and paper (both Q2/2010)	MC, closely coordinated with SDC, SOC and LRG

Interaction with other groups	Consultation with (start quarter/year)	Status/Comments
SOC, MC, LRG	Public consultation Q1/2010	• The first ENTSO-E R&D Plan was released in March 2010 after public consultation at the beginning of 2010. The ENTSO-E R&D Plan was then used as an input for the TSO's contribution to the European Electricity Grid Initiative (EEGI) Roadmap and Implementation Plan. The ENTSO-E R&D Plan provides, for the first time, a consolidated TSO R&D Plan as required by the Third Energy Package. • The ENTSO-E R&D Plan was published on the ENTSO-E website.
None	None	• Goals addressed indirectly; exchange of operational experience was taking place at meetings of the System Operations Committee, where regional groups (equivalent to synchronous areas) report about their activities, and within each regional group, where specific issues are being addressed. • Improvements in congestion forecasting were initiated within the scope of responsibility of the Ad-Hoc Team Coordinated Service, where possibilities of extension of Continental Europe's DACF (day ahead congestion forecast) process towards other synchronous areas and options of IDCF (intraday congestion forecasts) process implementation are being analyzed. The process is intended to move towards a pilot project. • Code harmonization was addressed throughout discussions in the Working Group European Operational Standrads, contributing to the development of pan-European network codes; and within the Ad-hoc Team Operational Reserves, working on a common methodology for reserves sizing.
WG R&D, MC, SOC, LRG	EC, EP, ERGEG (Q3/2009)	• ENTSO-E position paper on permitting procedures for electricity transmission infrastructure was published on 7 July 2010. The paper stresses that the effective functioning of authorisation procedures is a crucial precondition for the realisation of important electricity infrastructure projects in the public interest, according to the objectives of European energy policy, and proposes solutions primarily at the national level, but also requiring action at European level. The overall objective of this process has to be that these procedures can be completed within a reasonable time and do not impose an undue burden on TSOs due to environmental, health or societal interest. • ENTSO-E Europacable joint paper on partial undergrounding, finalized in December 2011 and published on ENTSO-E's website in January 2011, provides an overview of the technologies for partial undergrounding of transmission lines, assesses the advantages and disadvantages of such solutions, demonstrating that their application is dependent on a case-by-case analysis of the specific situation.
SDC, MC, LRG	EC and other stakeholders (beginning in Q2/2010)	• Due to other priorities, formal work has not started yet, but discussions are pending.
MC, LRG	ERGEG, EURELECTRIC, EFET (Q1/2010)	• Work has progressed significantly with the completion of a proposal on common definitions, a review of sizing and types of reserves in different TSOs and different synchronous areas. The work continues with a review of indicators on quality of frequency regulation in all synchronous areas. The final report will be an input to the network code on load-frequency control and reserves.
None	None	• Criteria for incident classification were agreed internally; the final report is expected to be approved in 2011.
SOC, LRG	All stakeholders; in particular EURELECTRIC (2010)	• An internal background paper on cross-border balancing was approved by the Market Committee in November 2010. An external position paper to be published in 2011 in light of scoping discussions for the balancing framework guideline and network code.
SOC, LRG	All major stakeholders (Q4/2009 and later)	• ITC: ENTSO-E's Legal & Regulatory Group put in place an extension to the 2010 ITC agreement to cover January and February 2011. ENTSO-E collected data to update the agreement which came into application in March 2011. • Investment Incentives: Working Group Economic Framework (WG EF) developed a position paper on finance and regulation, based on results of a questionnaire to understand the existing regulatory frameworks across members states and what parties perceive as the most significant barriers to efficient investment in their countries. The paper has informed ENTSO-E's overall engagement with the European Commission and the EIP. ENTSO-E also responded to a consultation on project bonds issued by the Commission. • Tariffs: In preparation for a framework guideline, WGEF has created a subgroup to develop views on the scope for tariff harmonization. A draft report which will inform future work will be approved in mid 2011. WGEF produced the annual tariff report in early 2011 (approved by MC in May). 4. Congestion revenues: WGEF produced its annual report on congestion revenues in May 2011.
None	EC, ERGEG, European coordinator (Q3-4/2009)	• Offshore wind issues: ENTSO-E's Sub-Group Offshore Wind prepared an analysis on market and regulatory issues for the development of an offshore grid in the North Sea (June). The essence of this paper was communicated to the European Commission as part of ENTSO-E's response to the Commission's letter on the EIP (July 2010). • Support schemes: questionnaire survey completed by ENTSO-E's Working Group Renewable Energy Sources. The group is to draft a discussion paper on the harmonization of support schemes from a TSO pointy of view. • RES group membership updated and terms of reference refreshed in late 2010/early 2011. • New cross-committee group created to ensure coordination of RES issues across ENTSO-E.

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

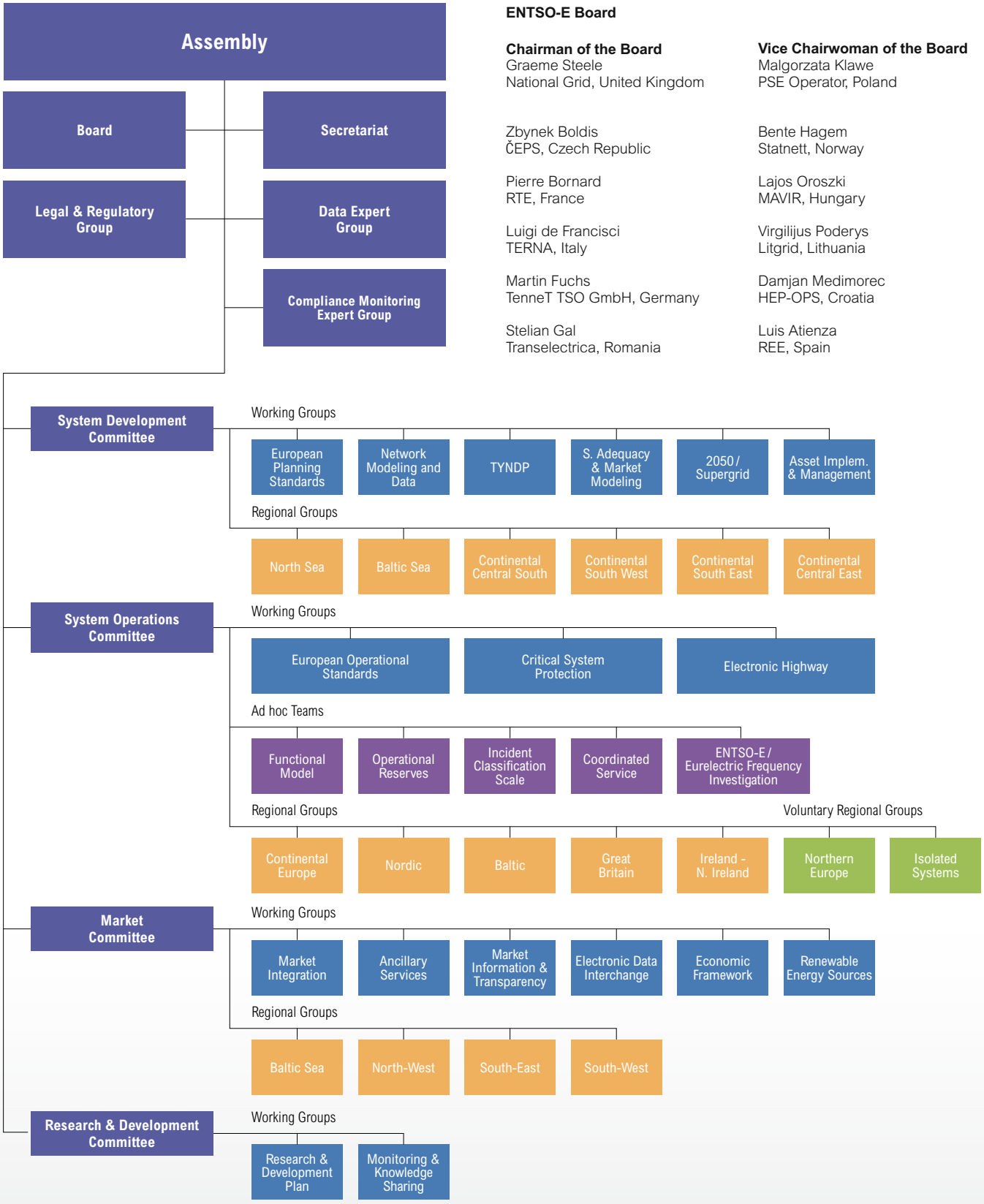
[3] Since September 2010 in trial parallel interconnection with the continental European system

ENTSO-E MEMBER TSOs

Country	Company	Abbreviation
AT | Austria	APG – Austrian Power Grid AG	APG
	VKW-Netz AG	VKW-Netz
BA | Bosnia and Herzegovina	Nezavisni operator sustava u Bosni i Hercegovini	ISO 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	EnBW Transportnetze AG	EnBW TNG
	TenneT TSO GmbH	TenneT TSO
	Amprion GmbH	Amprion
	50hertz Transmission GmbH	50Hertz
DK | Denmark	Energinet.dk	Energinet.dk
EE | Estonia	Elering OÜ	Elering OÜ
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 and Southern Energy plc	SSE
	Scottish Power Transmission plc	SPTransmission
GR | Greece	Hellenic Transmission System Operator S.A.	HTSO

Country	Company	Abbreviation
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
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 tïkls	Augstsprieguma tïkls
ME | Montenegro	Crnogorski elektroprenosni sistem AD	Crnogorski elektroprenosni sistem
MK | FYROM	Macedonian Transmission System Operator AD	MEPSO
NL | Netherlands	TenneT TSO B.V.	TenneT TSO
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

Chairman of the Board
Graeme Steele
National Grid, United Kingdom

Vice Chairwoman of the Board
Malgorzata Klawe
PSE Operator, Poland

Zbynek Boldis
ČEPS, Czech Republic

Bente Hagem
Statnett, Norway

Pierre Bornard
RTE, France

Lajos Oroszki
MAVIR, Hungary

Luigi de Francisci
TERNA, Italy

Virgilijus Poderys
Litgrid, Lithuania

Martin Fuchs
TenneT TSO GmbH, Germany

Damjan Medimorec
HEP-OPS, Croatia

Stelian Gal
Transelectrica, Romania

Luis Atienza
REE, Spain

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, regional groups as well as voluntary regional groups.

- The System Development Committee coordinates at pan-European level the network development and prepares the Ten-Year Network Development Plan as well as the Pilot Network Code.
- 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 exchanges, network models and forecasts.
- The Market Committee works towards an integrated and seamless European electricity market and is in charge of the 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 grids 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 greater emphasis of the EU 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. Expert groups on data and compliance monitoring provide their 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.

ENTSO-E OFFICE HOLDERS

President
Daniel Dobbeni,
Elia System
Operator (BE)

Vice President
Jukka Ruusunen,
Fingrid (FI)

Chairman of the Board
Graeme Steele,
National Grid (UK)

Vice Chairwoman of the Board
Malgorzata Klawe,
PSE Operator (PL)

Chairman System Development Committee
Jean Verseille,
Réseau de transport
d'électricité (FR)

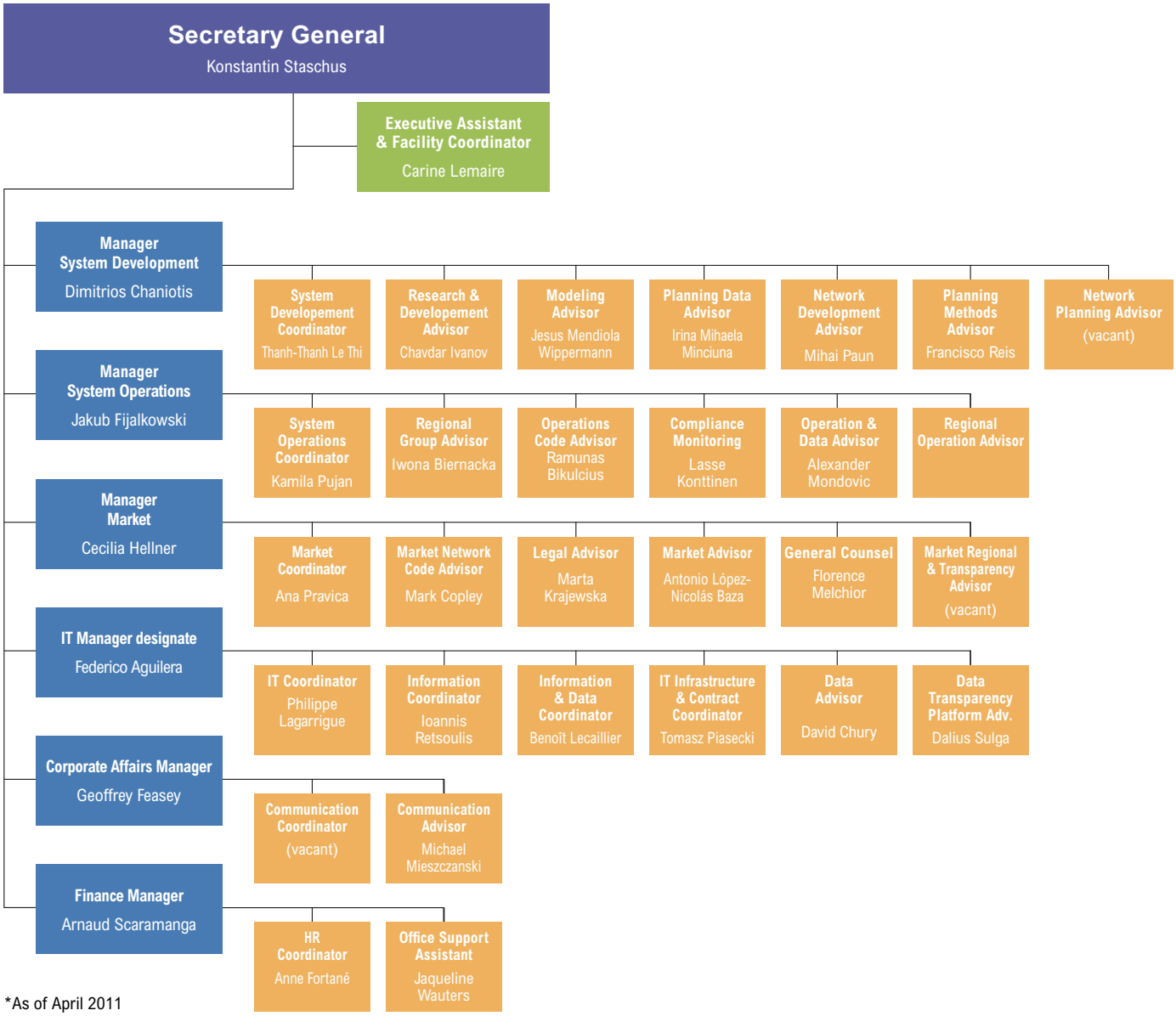
Chairman System Operations Committee
Klaus Kleinekorte
Amprion (DE)

Chairman Market Committee
Juha Kekkonen,
Fingrid (FI)

Chairman Research & Development Committee
Hubert Lemmens,
Elia System
Operator (BE)

Chairwoman Legal & Regulatory Group
Jacqueline van Overbeek
de Meyer, TenneT TSO (NE)

ENTSO-E SECRETARIAT*



*As of April 2011

SECRETARIAT MANAGEMENT TEAM


Konstantin Staschus


Dimitrios Chaniotis


Jakub Fijalkowski


Cecilia Hellner


Federico Aguilera


Geoffrey Feasey


Arnaud Scaramanga

ENTSO-E REPORTS & POSITION PAPERS

REPORTS

Q1 2011

February	Scenario Outlook & Adequacy Forecast 2011-2025
	ENTSO-E Factsheet 2011
January	Technical Background and Recommendations for Defence Plans in the Continental European Synchronous Zone

2010

December	Evaluation of Ramping Restrictions in the Energy Market
November	Winter Outlook 2011 & Summer Review 2010
	Statistical Yearbook 2009
September	Work Program 2010/2011
	ENTSO-E Grid Map Update 2010
August	Report on CIM Interoperability Test
July	Overview of Transmission Tariffs in Europe 2009 and 2010
June	Pilot Ten-Year Network Development Plan
	System Adequacy Retrospect 2009
	Summer Outlook & Winter Review Report 2010
	Annual Report 2009
May	ENTSO-E and EDSO-SG EEGI Roadmap 2010-2018 and Implementation Plan 2010-2012
	ENTSO-E Memo 2009
March	Transparency Policy, ENTSO-E Research & Development Plan, Status Report Baltic Sea Regional Projects
February	System Adequacy Forecast 2010-2025

POSITION PAPERS

Q1 2011

25 March	Creating conditions to allow TSOs to finance Europe's transmission investment challenge
7 March	ENTSO-E response to the EC public consultation on the 'External dimension of the EU energy policy'
15 February	ENTSO-E response to the public consultation on the EC communication 'The Future Role of Regional Initiatives'
10 February	ENTSO-E views on the offshore grid development in the North Seas
20 January	Joint paper on the feasibility and technical aspects of partial undergrounding of extra high voltage power transmission lines

2010

10 December	ENTSO-E position to the EC's 'Energy Infrastructure Priorities for 2020 and 2030 - a Blueprint for an Integrated European Energy Network'
10 November	ENTSO-E response to ERGEG public consultation on framework guidelines on capacity allocation and congestion management
21 July	ENTSO-E response to ERGEG draft benchmarking report on medium and long-term electricity transmission capacity allocation rules
29 June	ENTSO-E position paper on permitting procedures for electricity transmission infrastructure
27 April	ENTSO-E response to the CEER call for evidence on 'Generation adequacy treatment in electricity'
29 March	ENTSO-E response to the ERGEG call for evidence on incentive schemes to promote cross-border trade in electricity
1 March	ENTSO-E response to the ERGEG public consultation on the position on 'Smart Grids'
23 March	ENTSO-E's conclusion of the informal pilot network code
24 February	ENTSO-E response to ERGEG's advice on the Community-wide ten-year electricity network development plan.
11 February	ENTSO-E response to the CEER public consultation on the 'Regulatory aspects of the integration of wind generation in European electricity markets'
29 January	ENTSO-E response to ERGEG's public consultation on draft strategy for delivering a more integrated European energy market: the role of the regional initiatives

All ENTSO-E reports and position papers are available at: *www.entsoe.eu/resources*

ENTSO-E WORKSHOPS & CONSULTATIONS

WORKSHOPS

Q1 2011

24 March	Second ENTSO-E Baltic Sea regional stakeholder workshop on the TYNDP 2012 Process and Regional Investment Plan 2012
10 January	Workshop on the roadmap towards ENTSO-E's TYNDP 2012 and the 20/20/20 scenario

2010

1 December	Regional workshop on the TYNDP 2012 Process and Regional Investment Plan 2012
5 November	Stakeholder workshop on draft connection requirements for generators
11 October	Second joint ENTSO-E/ERGEG workshop on fundamental data transparency
16 June	Stakeholder workshop on ENTSO-E R&D Plan
1 June	Joint ENTSO-E/ERGEG workshop on IEM transparency fundamental data, rules and tools
16 April	Stakeholder workshop on draft connection requirements for generators - within the context of the pilot network code for grid connection with special focus on wind generation
19 March	Stakeholder workshop on the Pilot Ten-Year Network Development Plan

CONFERENCE

Q1 2011

10,11 February	ENTSO-E Conference: 'Towards Electricity Infrastructure for a Carbon-Neutral Europe.'

CONSULTATIONS

Q1 2011

16 February - 16 March	Public consultation on background scenarios for the TYNDP 2012

2010

1 July - 2 September	Public consultation on ENTSO-E Work Program 2010-2011
21 May - 2 July	Public consultation on Operation Handbook of ENTSO-E Regional Group Continental Europe
1 March - 15 April	Public consultation on pilot Ten-Year Network Development Plan
11 January - 22 February	Public consultation on R&D Plan EUROGRID 2020

ENTSO-E PRESS RELEASES

Q1 2011

24 March	ENTSO-E puts in place an enduring inter-TSO compensation mechanism
3 March	ENTSO-E welcomes formal establishment of ACER
10 February	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.
17 February	TEIAS parallel trial interconnection to pass into second phase on 21 February
4 February	ENTSO-E releases guidance on the inclusion of third party projects for the TYNDP 2012 release

2010

3 December	ENTSO-E confirms commitment to North Seas Offshore Grid Initiative
1 December	ENTSO-E releases its Winter Outlook 2010/2011
17 November	ENTSO-E supports the Commission's 'Energy Infrastructure Priorities for 2020 and 2030 - a Blueprint for an Integrated European Energy Network
10 November	ENTSO-E position on the Commission's 'Energy Infrastructure Priorities for 2020 And 2030 - a Blueprint for an integrated European Energy Network'
10 November	Successful launch on 9 November 2010 of Central West European and Nordic market coupling
29 September	ENTSO-E establishes new Research & Development Committee
20 September	TEIAS parallel trial interconnection with ENTSO-E's Continental Europe Synchronous Area started succesfully 18 September
20 July	Future ENTSO-E CIM-based data exchange format verified in large-scale CIM interoperability test
13 July	Overview of Transmission Tariffs in Europe 2009 and 2010
2 July	ENTSO-E interconnection test with the LEJS synchronous area conducted
30 June	System Adequacy Retrospect: sufficient electricity generation capacity throughout all of 2009 in the ENTSO-E power system
30 June	ENTSO-E publishes its final pilot Ten-Year Network Development Plan
7 June	Trial parallel operation of Turkish TSO TEIAS planned to start in September 2010
1 June	No particular risk of shortage to be expected for the European electricity systems throughout the summer 2010
27 May	ENTSO-E and EDSO-SG publish EEGI Roadmap 2010-2018 and Implementation Plan 2010-12
19 May	Energy Commissioner Günther Oettinger meets ENTSO-E Board
31 March	ENTSO-E releases Research & Development Plan
9 March	ENTSO-E publishes transparency policy
1 March	ENTSO-E publishes on 1 March pilot Ten-Year Network Development Plan for public consultation
10 February	ENTSO-E announcement of a public consultation and stakeholder workshop on its first Ten-Year Network Development Plan
29 January	ENTSO-E releases System Adequacy Forecast 2010-2025
22 January	ENTSO-E launches first grid map
11 January	ENTSO-E launches public consultation on R&D Plan EUROGRID 2020

ABBREVIATIONS

AC	Alternating current
ACER	Agency for the Cooperation of Energy Regulators
AHAG	Ad-hoc advisory group
CACM	Capacity allocation & congestion management
CEFIC	European Chemical Industry Council
CIO	Central Issuing Office
CGM	Common grid model
CMP	Compliance monitoring program
DC	Direct current
DSO	Distribution system operator
EAD	ENTSO-E acknowledgement process
EAS	ENTSO-E awareness system
EC	European Commission
EDI	Electronic data interchange
EEGI	European Electricity Grid Initiative
EIC	Energy identification codes
EIP	Energy infrastructure priorities
EFET	European Federation of Energy Traders
EOD	ENTSO-E outage document
EMCC	European Market Coupling Company
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
EP	European Parliament
ERGEG	European Regulator's Group for Electricity & Gas
ESP	ENTSO-E settlement process
ETSO	European Transmission System Operators
EWIS	European Wind Integration Study
IEC	International Electrotechnical Commission
IEM	Internal Energy Market
ITVC	Interim tight volume coupling
MW	Megawatt
NCDP	Network code development process
NREAP	National renewable energy action plan
NEW	North West Europe
RD&D	Research development & demonstration
RES	Renewable energy sources
RGCE	ENTSO-E Regional Group Continental Europe
RIP	Regional investment plan
SAF	System Adequacy Forecast
SCADA	Supervisory control and data acquisition
SDC	System Development Committee
SO&AF	Scenario Outlook & System Adequacy Forecast
SOC	System Operations Committee
TSO	Transmission system operator
TYNDP	Ten-Year Network Development Plan
TW	Terawatt
UCTE	Union for the Co-ordination of Transmission of Electricity

Imprint

Publisher: ENTSO-E AISBL

Avenue de Cortenbergh 100, 1000 Brussels, Belgium

Editor-in-Chief: Konstantin Staschus, Ph.D.

Managing Editor: Michael Mieszczanski

Design & Layout: Strategy International Communications, Brussels

Printed by: Imprimerie Oberlander, Charleroi

Photos: ENTSO-E, GettyImages, i-stock, Shutterstock

Contact

ENTSO-E AISBL

Avenue de Cortenbergh 100
1000 Brussels – Belgium

Tel +32 2 741 09 50
Fax +32 2 741 09 51

info@entsoe.eu
www.entsoe.eu

European Network of
Transmission System Operators
for Electricity