



European Network of
Transmission System Operators
for Electricity

DRAFT ENTSO-E WORK PROGRAMME

2012 THROUGH DECEMBER 2013

VERSION: 18 MARCH FINAL
POST ACER OPINION

1. INTRODUCTION	3
2. PROGRESSING AND DELIVERING NETWORK CODES	4
3. PLANNING & DELIVERING EUROPE'S ENERGY FUTURE NETWORKS	8
4. IMPLEMENTING AND ENHANCING THE INTERNAL ELECTRICITY MARKET.....	11
5. RESEARCH AND DEVELOPMENT TOWARDS STRONGER AND SMARTER GRIDS INCLUDING THE 2050 E-HIGHWAYS PROJECT	13
6. ENHANCING TSO COOPERATION.....	14
7. CONCLUSION.....	17
8. CALENDAR OF ENTSO-E'S WORK PROGRAMME 2012-2013	18

1. INTRODUCTION

ENTSO-E's fourth Work Programme for the year 2013 is characterized by a plateau of very intense activity. This Work Programme describes the tasks ahead, covering all the nine network codes essential for the completion of the Internal Electricity Market, further major improvements in Ten-Year Network Development Plan methodologies and data in the context of the new infrastructure legislation, and tackling growing challenges to secure system operations through further improved operational coordination between TSOs. It is now well understood that the vast majority of ENTSO-E's work implements or relates to legal EU mandates from the 3rd Package, that network codes become binding laws through Comitology, and that stakeholder consultations are of extreme importance to both ENTSO-E and the stakeholders. But also the public and the lawmakers are realizing ever more that the key objectives of European energy policy all depend on stronger transmission networks: security of supply, affordability and sustainability, i.e. climate protection and renewable energy sources.

ENTSO-E's work in 2013 will respond to this environment full of changes, challenges and opportunities. It combines the necessary formality and systematic approach with strong strategic alignment with the EU policy goals, and with a pro-active attitude towards early identification and early solution of problems. The lawmakers' and the public's realization of the crucial role of electricity transmission presents a window of opportunity that must not be missed. Technical, market and communications work products can and must combine to convince citizens, lawmakers and regulatory decision-makers of the need for a stronger grid, for streamlined permitting and regulatory incentives.

This Work Programme is built on four main deliverables:

- Progressing and delivering key network codes essential for the completion of the Internal Electricity Market;
- Planning Europe's future energy networks and improving the conditions to build new infrastructure them on time;
- Implementing and enhancing the Internal Electricity Market;
- Pursuing research and development towards stronger and smarter grids including the 2050 E-Highways project.

Network codes and TYNDPs are deliverables mandated by Regulation 714/2009 and thus of especially high priority. Nonetheless the other goals geared towards long-term improvements also need to be addressed if the viability and resilience of the electricity system are to be safeguarded.

Whilst the preparation of an annual work programme is a legal duty, ENTSO-E does not develop this Programme on its own. The priorities in this Work Programme recognize the European Council's goal of completing the Internal Electricity Market by the end of 2014, and the Three-Year Plan for network code work jointly developed with the European Commission and the Agency for the Co-operation of Energy Regulators (ACER). Stakeholder comments received during the Work Programme consultation will also help to improve it, given that most ENTSO-E activities require successful cooperation with market participants, grid users, and for some topics especially with distribution system operators (DSOs). Because of the required ACER opinion of this Work Programme, and because the ACER and ENTSO-E work depend strongly on each other, coordination with the ACER

Work Programme is especially relevant.

The 2011/12 annual Work Programme received a positive ACER opinion on 2 December 2011. ACER highlighted the importance of TSOs cooperation to deliver the four cross regional road maps aiming at implementing the target model, and hence, complementing the CACM network code. ACER commented on the workload required to deliver the TYNDP and network codes; to develop cost benefit methodology for the TYNDP and the Projects of Common Interest (PCIs) under the Infrastructure Regulation; and on the need to enhance the involvement of stakeholders in the codes development process. Six months into 2012 ENTSO-E has worked into its development plans and processes its response to these challenges, in particular improving the consultation process and establishing a plan with further significant enhancements to the TYNDP process for 2014. The major deliverables identified in last year's plan are on track.

2. PROGRESSING AND DELIVERING NETWORK CODES

2.1. INTRODUCTION

2013 will be a year in which the network codes, which ENTSO-E is required to deliver under Regulation 714/2009, continue to represent a very significant part of the Association's work. As described in the EC-ACER-ENTSO-E Three-Year Plan and consistent with the EC 2013 priorities and the ACER Work Programme, network code development work will take place in 2013 on balancing and forward markets, HVDC connections, operational security, operational planning & scheduling, and on load-frequency control & reserves. In addition, related work on transparency and governance, which have very important interactions with the network codes, will pass important milestones, and very significant effort will be needed at regional level to continue to develop market integration projects.

2013 will also see the first codes becoming legally binding, with ENTSO-E assisting the Comitology process, especially for the NCs on Capacity Allocation and Congestion Management, Requirements for Generators, and Demand Connection. The process of developing network codes sequentially and matching network codes to framework guidelines aims to separate network codes into self-contained laws which can be independently approved, and later on amended, as technical or market developments dictate. Nonetheless all network codes must form a coherent package, despite this package growing and adjusting over time. This creates the strong need, especially during 2013 with so many codes being worked on, to effectively coordinate work between those codes¹.

2.2. THE IMPORTANCE OF STAKEHOLDERS ENGAGEMENT

The network codes developed by ENTSO-E become law after the Comitology process. Those laws apply to all market players in all parts of the European electricity market. ENTSO-E will therefore devote considerable time during 2013 to seeking and listening to the views of stakeholders. This will take place through different routes including workshops, stakeholder groups, presentations, bilateral meetings, a 2-month public web-based consultation on each code, and by taking a transparent approach involving the publication of significant information about each network code and the codes

¹ For example the Operational Security NC has a fundamental impact on the way capacities are calculated for congestion management. Capacity calculation feeds into market design in all timeframes – from forwards to balancing – but balancing is directly related to the issues covered by the Load Frequency Control and Reserves NC. In addition, wider interactions, such as those related to transparency and governance feed into each of these codes.

as a whole early in each process. ENTSO-E will publish on its website a detailed timetable for consultations to facilitate stakeholder preparation and participation.

Enhanced stakeholder engagement is a priority activity for ENTSO-E. The Secretariat has appointed a Consultation Manager to consistently apply the learning points gained from network code consultations to date and to enhance stakeholder interactions in workshops and in less formal situations. The Consultation Manager has the additional task of assuring consistency between codes and managing all ENTSO-E consultation processes optimally.

2.3. THE IMPORTANCE OF STAKEHOLDERS ENGAGEMENT

The Network Code on “Requirements for Generators” (NC RfG) is the first European network code on electricity to be delivered by ENTSO-E and to be submitted to ACER end June 2012 on the basis of ACER’s Framework Guidelines on Electricity Grid Connection published on 20 July 2011. Following this step ACER shall deliver an opinion on the network code within three months and may recommend the code to the EC for adoption as European binding legislation.

NC RfG is one crucial element for ensuring security of electricity supply and for allowing the attainment of EU energy and climate policies. Ensuring security for the entire electricity system requires crucial contributions from generators. The rapid implementation of the NC RfG will prepare the power system to successfully ride through the challenges due to the massive integration of intermittent and decentralised generation into the system, combined with the progressive replacement of old large power units. It will achieve this by creating a level playing field throughout EU and beyond where the level of indispensable ancillary services available to the system operator shall be maintained by progressively requiring smaller units to adapt to the system needs, and distribution systems to prepare for new operational paradigms.

In 2012 ENTSO-E ran an intense stakeholder consultation comprising of bilateral meetings, workshops, a stakeholder user group, a DSO Technical Expert Group, and an 8-week web-based consultation. The interest in the code has been high, and comments that help ENTSO-E improve its contents were numerous. In the last months of 2012 and in 2013 ENTSO-E will work closely with ACER and the Commission to promote a common understanding towards stakeholders and especially the Comitology committee on the unique quality of the NC RfG to provide for secure, sustainable and economic electricity to EU citizens.

On 5 January 2012 ENTSO-E received the formal EC mandate to develop a network code on rules for electricity grid connections for DSOs and industrial loads within 12 months (Demand Connection Code, DCC). This code complements the NC RfG by implementing a completely new approach for some requirements at European level. Most countries have already a few connection requirements for demand users of the grid, but there has never been before a need for a common set of requirements for demand users across Europe. Now, the increasing use of RES, implementation of smart grids and the seamless functioning of the Internal Electricity Market require the NC DCC to define common requirements. Some of them will be completely new, to face the new challenges and some others may not have been widely used in Europe before.

Building on the NC RfG experience, ENTSO-E has run bilateral discussions throughout the first half of 2012 with stakeholders and formed a stakeholder user group to accompany the development of the code. On 5 April 2012, ENTSO-E launched an open call for evidence for better preparing the code’s novel requirements where stakeholders responded positively. The web-based consultation takes place between end June to mid-September 2012, including a public workshop on 9 August.

ACER is expected to deliver an opinion on this code at the end of March 2013 with a subsequent launch by the EC of the Comitology process. During these phases, ENTSO-E shall accompany the Agency and the Commission to support the implementation preparations of the code.

In addition to RfG and DCC, two further network codes are scheduled to be developed within ACER's Framework Guidelines on Electricity Grid Connections, one on HVDC connections and one on connection procedures. In earlier agreed versions of the EC-ACER-ENTSO-E Three-Year Plan, these two codes were given a lower priority with no set target date. Given the rapid development of offshore generation connections, as well as onshore DC tie lines, ENTSO-E suggested to move the development of the HVDC Connection NC forward. The formal mandate is expected to start in early 2013, with the scoping phase starting in 2012. A formal consultation on a draft network code is scheduled to commence in Q2/2013.

The grid connection codes take up over 10% of the ENTSO-E Secretariat staff's time and involve about 50 member TSO experts.

2.4. MARKET NETWORK CODES

The market rules will be contained in three network codes which meet two framework guidelines. These rules, when combined with the experience gained through implementing projects to create markets at regional level, will provide the crucial legally binding framework necessary for completing the Internal Electricity Market. Market integration in itself presents a significant challenge, which all three NCs (and the regional projects) will contribute to facilitating. The steep increases in renewable energy capacities, especially fluctuating wind and solar generation, make market integration and especially the intraday and balancing parts particularly important. Only with a strong network and a fully functioning Europe-wide market does Europe have a chance to integrate the amounts of fluctuating RES foreseen according to the RES Directive of 2009, since they allow RES surpluses at certain times in certain regions to be used all over Europe, and allow regions without strong conventional generation to import surpluses from elsewhere to safeguard their security of supply.

The Capacity Allocation & Congestion Management (CACM) network code, which covers day ahead markets, intraday markets and coordinated capacity calculation, is expected to enter the Comitology phase in early 2013. The code will enter Comitology at the same time as a governance guideline developed by the European commission which will identify roles and responsibilities for the European market. Hence consistency between the two documents will be vital. ENTSO-E and its member TSOs will have a key role in explaining the rationale for elements of the code and assisting the Commission and Member States in this process.

In addition, the CACM code creates a number of tasks and obligations to be fulfilled after the entry European law. During 2013, ENTSO-E will be taking steps to ensure the timely implementation of the CACM tasks and obligations once the code enters into force.

The ACER Framework Guideline on CACM also covers forward markets. ENTSO-E has received an official request from the EC to develop a NC on Forward Capacity Allocation on 18 September, meaning that 2013 will see extensive consultation and discussion of the code before it is finalised and submitted to ACER in before end September 2013.

The Balancing NC, which will be written to meet a framework guideline being consulted on by ACER

in April-June 2012 and formally submitted to the EC on September 2012, will also be developed with a view to be delivered to ACER by November 2013. In light of the limited experience of balancing market harmonisation across Europe, this will be a challenging task, demanding significant resources and extensive interaction with the Commission, ACER and stakeholders.

The effectiveness of the market rules created through implementation projects and as a result of the network codes will depend on the timely and transparent publication of information. Therefore the European Commission's Transparency Regulation, which will become law in early 2013, will have an important interaction with ENTSO-E's work. This is further discussed in Chapter 4.1.

As discussed in Chapter 3.5 and depending on joint scoping with the EC and ACER in 2012, there will also be work on a possible network code or European guideline on investment incentives and/or tariff harmonisation.

The market codes take up over 10% of the ENTSO-E Secretariat staff's time and involve over 50 member TSO experts. Typically for drafting teams, each code's drafting team meets more than once a month, often in 2-week intervals and often for multiple days, to discuss technical details and how to take stakeholder comments into account.

2.5. SYSETM OPERATIONS RELATED NETWORK CODES

A single Framework Guideline on System Operations provides the basis for all the network codes which will govern the coordinated operation of the pan European power system. Three network codes are under development; with a further two codes envisaged in the long run:

The Network Code on Operational Security aims to define common, pan-European operational security standards. These standards are designed to harmonize and, where possible, improve the quality of system operation and to promote the coordination of operational activities. This is particularly important due to the challenges for TSOs posed by the integration of large volumes of renewable energy sources and by continental-scale power transfers. The Operational Security NC will be submitted to ACER at the end of February 2013. Hence the ACER assessment is expected by end of May 2013 and the Comitology process is expected to start around the middle of the year.

The Operational Planning and Scheduling NC were started one month after the Operational Security NC. As such, it will be finalised within ENTSO-E by the end of March 2013, before being submitted to ACER. In turn, the Load Frequency Control and Reserves NC was started 3 months after the code on operational planning and scheduling. Hence work to assess responses to the public consultation and refine the code will take place during the first half of 2013, with a view to delivering it to ACER for its 3-month opinion process at the end of June 2013. These two NCs will refine the basic operational rules from the OS NC and for example describe TSO coordination on security calculations for operational planning as well as rules for defining and calculating reserve requirements in the future power system. The code on Load Frequency Control and Reserves will require particularly close interaction with the code on balancing which will be developed in parallel.

Thus all these three operational NCs will also require ENTSO-E to accompany the Comitology process in 2013. The stakeholder consultation for these NCs comprises bilateral meetings, workshops, a DSO Technical Expert Group, and a 2-month web-based consultation.

Scoping work on the network code on operational training and the network code on operational procedures in an emergency may begin during 2013 but will not have the same priority as the work on the three other operational NCs.

However, with the three most important operational codes being finalized in 2013, ENTSO-E will know which operational rules will continue to require regional inter-TSO contracts. These regional contracts, and the common operations rules they refer to, will then need to be adjusted, beginning in 2013, so that they are fully consistent with and complementary to the new network codes.

The operations codes take up over 10% of the ENTSO-E Secretariat staff's time, and involve about 50 member TSO experts.

2.6. NETWORK CODE SUMMARY

With the first network codes becoming law in 2013, ENTSO-E's legal mandate in Regulation 714/2009 for implementation monitoring also becomes relevant. With an Expert Group on Implementation and Compliance Monitoring, ENTSO-E has been preparing for this task. An Implementation Monitoring IT-tool is planned to be operative in autumn 2013 with a readiness for an implementation monitoring campaign. Also an Expert Group handling the future monitoring campaigns will be established during summer 2013. The ENTSO-E implementation monitoring system and processes should be fully operative by the end of 2013.

In aggregate, ENTSO-E's network code work takes up about 40% of its Secretariat staff's time and involves over 150 member TSO experts. This translates into roughly 50 FTE in total, the majority of which is needed for stakeholder interactions and ensuring that stakeholder comments are taken into account optimally.

3. PLANNING & DELIVERING EUROPE'S ENERGY FUTURE NETWORKS

3.1. OVERVIEW

ENTSO-E plays a central role in identifying the future needs of Europe's transmission networks and in ensuring that conditions are in place to enable the very large volumes of investment to be delivered that are required to enhance security of supply, create competitive markets and integrate renewable energy. Central to our planning process is the Ten-Year Network Development Plan (TYNDP), while our wider activities target social acceptance, planning and permitting delays, and issues related to the financing of investment. In addition, our regular outlook and adequacy reports provide a crucial barometer of security of supply in Europe. These issues are briefly summarized in this section.

3.2. DELIVERING FURTHER IMPROVEMENTS IN THE 2014 TYNDP

According to Regulation 714/2009, ENTSO-E is required to publish a TYNDP every 2 years. In June 2012 ENTSO-E releases the first TYNDP since the entry into application of the relevant parts of Regulation 714/2009, and the second one since the creation of the Association (Pilot TYNDP in 2010). The TYNDP 2012, which ENTSO-E will present to numerous stakeholders and policy makers during the second half of 2012, is a package of reports (8 in total) which underline not only the pan-European view but also the regional perspective:

- the Union-wide TYNDP report 2012;

- the 6 Regional Investment Plans 2012; and
- the Scenario Outlook and Adequacy Forecast 2012.

To meet increasing challenges and expectations, the TYNDP and its methodology need to evolve. As ENTSO-E's data management and methodological capabilities grow systematically, the ambitious goals of the TSOs themselves for the best possible joint planning, as well as the challenging expectations from ACER, EC and stakeholders, will be met better and better every two years with enhanced TYNDP deliveries. The methodology and data for the 2014 TYNDP will build on the significant improvements the 2012 TYNDP made compared to the previous pilot report in 2010:

- 20-year, Europe-wide visions, each displaying a valid generation adequacy assessment, encompassing jointly all foreseeable futures and matching EU 2020 targets (see SOAF 2012);
- A new top-down scenario 2020 based on the National Renewable Energy Action Plans and a nuclear sensitivity analysis, additionally to the common bottom up scenario (scenario B, best estimate of the TSOs);
- generic planning standards (see "Guidelines for Grid Development", in Appendix 3);
- an integrated market and network modeling combining market and network studies in an iterative process;
- multi-criteria approach for assessing the benefits of the pan-European projects (Appendix 3);
- a process for determining the inclusion of 3rd party projects;
- 10 European and regional workshops to increase understanding and get feedback from stakeholders.

Preparation for the TYNDP 2014 has started already in Q2 2012, and market modelling and network modelling will continue intensely throughout 2013. First, the study horizon of the TYNDP 2014 will be extended to 2030 in order to create a more comprehensive outlook of the system needs driven by policy developments. Already in the TYNDP 2012, ENTSO-E outlined four visions for the system in 2030. These visions are to be translated to planning scenarios and consulted in Q4 2012. Also a new database will be used as the foundation for more efficient and more consistent handling of the network and market data underlying the scenarios over the many analysed cases. A stakeholder user group is created to accompany the evolution of the TYNDP throughout 2013, and information sessions at regional level will complement the Europe-wide ENTSO-E communications.

The proposed Regulation on trans-European energy infrastructure is expected to have a major impact on the next TYNDPs. In it, ENTSO-E is asked to deliver a cost-benefit analysis methodology to inform the Commission's process for identifying and supporting projects of common interest. This methodology is built upon the current multi-criteria approach in the TYNDP and its finalisation (according to the proposed Regulation) is expected by mid-2014. Therefore it will be fully incorporated in the TYNDP in 2016. Nevertheless, most elements of the methodology will be already applied in the TYNDP 2014. In addition, the TYNDP 2014 will include a new procedure for third-party projects, adapted to the requirements of the proposed Regulation and consulted early with all relevant stakeholders. Therefore, the TYNDP is to be confirmed as the reference tool to drive policy and investment decisions in electricity infrastructure.

3.3. SYSTEM ADEQUACY & OUTLOOK REPORTS

In order to identify the generation and load trends at European level and to determine the actions required for the continuous balancing of generation and demand, ENTSO-E pursues further efforts to

improve existing methodologies on system adequacy. ENTSO-E will continue producing a range of European outlook and adequacy forecasts during 2012:

The ENTSO-E Winter and Summer Outlook Reports present the views of Europe's electricity TSOs regarding national or regional security of supply for the summer and winter period and highlight possibilities for neighbouring countries to contribute to the generation/demand balance in critical situations. EU energy and policy targets have driven massive investments on intermittent generation over the last years, and in many cases with a speed largely surpassing that of developing the transmission network. In parallel, conventional generation is being gradually replaced driven by policy or financial reasons. As a consequence, the electricity system is working closer and closer to its limits and is thus more vulnerable to extreme climatic conditions. These are the reasons why the ENTSO-E short-term adequacy reports are gaining importance and attention throughout the industry. Responding to this, ENTSO-E enhanced its methodology for the quantitative analysis for the Outlook reports to provide a European overview on both generation adequacy to cope with the peak load and incompressibility of generation during off-peak hours.

The ENTSO-E System Adequacy Retrospect aims at providing stakeholders in the European electricity market with an overview of generation, demand and adequacy of the ENTSO-E Power System, with a focus on the power balance, margins and the generation mix. ENTSO-E also publishes the annual Statistical Yearbook that also contains detailed data on system adequacy.

The TYNDPs including regional plans and adequacy forecasts and retrospectives take up about 20% of the ENTSO-E Secretariat staff's time and involve some 200-member TSO experts in six Regional Groups and over five Working Groups. The related database development takes up about 10% of the Secretariat's communications and projects budget.

3.4. FOCUSING ON PUBLIC ACCEPTANCE AND PLANNING OF ELECTRICITY INFRASTRUCTURE

The best market model, the best planning and the best rules and codes will only deliver benefits to customers if there is sufficient capacity to enable cross border trade. Slow permitting procedures and a lack of public acceptance of new transmission infrastructure, and a lack of understanding of the importance grid infrastructure to maintaining modern society are highly significant impediments to system development. ENTSO-E work in this area will be to test European-wide messaging on the importance of grid infrastructure to inform citizens on the continuing need regardless of energy sources.

In ENTSO-E's view, a dramatic improvement in permitting and acceptance must be achieved very soon if the new lines planned in the TYNDP are to materialize, and thus if their benefits for security of supply, market integration and renewable energy integration are to be realized. ENTSO-E will gather best practice examples from TSOs and others under the auspices of Working Group Asset Investment Management, to consolidate the more successful experiences, this work will be informed by wider contributions from NGOs and academic institutions.

The Commission's October 2011 draft Infrastructure Regulation contains important improvements to the European legal framework for permitting and financing transmission. It is hoped to take effect in early 2013. During the remainder of 2012 and into 2013, ENTSO-E will continue working with the European Parliament, Council and Commission to explain the need for streamlining of permitting procedures and European rules on investment incentives so that the content will be a positive tool in achieving the objectives. In the Commission, some Member States and also in ENTSO-E, general

plans for campaigns to improve public acceptance of new transmission infrastructure are taking shape. Such European campaigns will need to emphasize the importance of additional transmission capacity for the very challenging transformation of the energy system towards CO₂ neutrality, and at the same time, highlight the central role of the energy system for our society. The goal is an image campaign by TSOs and supported by the Commission to address the many citizens interested in climate protection and energy developments nationally, regionally and in their communities, and to explain the need for integrated electricity systems for these goals.

In 2013 the implementation of the Infrastructure Regulation will require significant ENTSO-E work, especially to provide input to Regional Groups' selection processes for Projects of Common Interest with contributions to cost-benefit analyses and evaluation of multiple criteria.

3.5. THE CHALLENGES OF FINANCING INFRASTRUCTURE

As well as tackling planning and social acceptance, it is vital that the regulatory and financial barriers to making infrastructure investments are tackled. This includes ensuring that regulatory regimes are sufficiently attractive and stable to attract the volumes of investment (over 100 billion Euros) required to expand infrastructure, i.e. to attract investors and to ensure that incentives exist to prioritise these projects. ENTSO-E will work with the Commission and ACER to encourage National Regulatory Authorities and Member States to improve the regulatory certainty for investors in transmission projects to encourage investors to invest. In particular, ENTSO-E will work closely with ACER and lawmakers so that appropriate Europe-wide rules on investment incentives can be made binding.

The public affairs work in general and public acceptance work in particular take up about 5% of the Secretariat staff's time and involve about 50 member TSO experts.

4. IMPLEMENTING AND ENHANCING THE INTERNAL ELECTRICITY MARKET

The first of the European Council's four commitments to achieve competitive, sustainable and secure energy for Europe was to complete the internal energy market by 2014. This is a very considerable task which will need a concerted and urgent effort by stakeholders from across the industry. The work which ENTSO-E will undertake in 2013, in tandem with regulators, generators, traders, power exchanges, member states and the Commission is likely to be key to ensuring the overall success of this objective. This work aims at complementing the substantial work that ENTSO-E plans to undertake to develop network codes in market related areas as mentioned in Section 2 of this document.

4.1. FUNDAMENTAL ELECTRICITY AND DATA TRANSPARENCY

The transparent and timely provision of market information is critical to building confidence and enhancing the efficient operation of markets. ENTSO-E will be involved in very significant amounts of work to ensure information is provided in a consistent and coordinated manner which complies with the requirements of new regulation.

2013 will see the first release of the new Electricity Market Fundamental Information Platform (EMFIP). EMFIP will replace the existing entsoe.net platform and will act as a comprehensive source of data on all matters related to markets and networks. The platform is planned to be fully operational by the end of 2014. The Comitology process which will make Fundamental Electricity Data Transparency Regulation binding will make the draft Transparency Regulation Fundamental Electricity Data Transparency will

begin in November 2012 and is expected to be finalised in spring 2013. As such, a key challenge for the EMFIP project lies in ensuring that the platform delivers this data in an accessible and complete manner.

4.2. ENSURING COORDINATED REGIONAL MARKET DEVELOPMENT

The process of market integration has been underway for a very significant amount of time. Across Europe regional cooperation has led to the creation of regional projects in different market timeframes. These projects have proved very important in informing the development of a Target Model for market design and have been drawn on significantly in developing network codes.

During 2013 there will be many regional activities to develop regional markets as described in the four ACER cross regional roadmaps to which ENTSO-E contributed significantly. In the day ahead timeframe, NWE solution will be extended to include other neighboring regions and move closer to single market coupling in Europe, more projects on intraday trading should kick off, substantial work on flow based implementation especially in CWE and CEE level, and balancing projects, such as BALIT and International Grid Control Cooperation, should gain maturity and potentially be extended.

While the projects are led by the TSOs themselves, i.e. the ENTSO-E members, they coordinate in the Association to develop consistently towards the Target Model. ENTSO-E has created two groups on the Day-Ahead and Intraday projects to pave the way for further extension of the target model to other regions and ultimately across Europe. These are the Intraday Monitoring Group, which monitors the NWE Intraday project and ensures that the views of non-NWE TSOs are considered, and the Task Force on Coordination of European Market Coupling that aims at enhancing the information exchange and cooperation between market coupling initiatives.

ENTSO-E members are deeply committed in ensuring market integration across all timeframes. In this respect, ENTSO-E plans to keep working in long term market integration together with ACER in connection with the obligations being defined in the Forwards Capacity Allocation network code.

The Association is also playing a key role in the European wide processes that accompany the regional development, such as the cooperation with EuroPEX on intraday or the assessment of the Price Coupling of Regions algorithm for day-head market coupling, and engaging regulators on the technical and implantational aspects of this work.

4.3. LONG TERM MARKET DEVELOPMENT

In addition to the challenging work to deliver market integration in the short term, we also need to be aware that the European power system is changing fast and going through a paradigm shift. As renewable generation, often with patterns of output which change frequently and are difficult to predict with certainty, accounts for an ever larger proportion of energy production, it is imperative that TSOs work proactively to ensure that the system and the market remain fit for purpose.

With this in mind, ENTSO-E will continue to consider issues relating to the long-term needs of the power system and the ways to ensure that the integrated European market can deliver these needs.

This will include analyzing complex issues such as the need for and design of capacity remuneration mechanisms (or mechanisms to incentivise the provision of the services which the system requires), considering whether amendments in market design (consistent with the overall Target Model) could

increase efficiency, and seeking to remove barriers to the efficient functioning of the market. This work will include developing further the role of ancillary services in a properly functioning market.

The data transparency work and the development of coordinated regional market developments take up some 10% of Secretariat staff's time and involve some 100 member TSO experts.

5. RESEARCH AND DEVELOPMENT TOWARDS STRONGER AND SMARTER GRIDS INCLUDING THE 2050 E-HIGHWAYS PROJECT

5.1. THE RESEARCH AND DEVELOPMENT PLAN (R&D PLAN)

The ENTSO-E R&D Plan, last updated in late 2011, is closely tied to the EU's Strategic Energy Technology (SET) Plan and in particular to the European Electricity Grid Initiative (EEGI), one of the SET Plan's industrial initiatives combining EU and Member State R&D activities to achieve synergies.

From 2012 on the ENTSO-E deliverables on R&D will include the following:

- ENTSO-E R&D Roadmap - a document which is released every 5 years. The R&D Roadmap is defining the R&D activities for the next 10 years, but taking into account a 20 years' time horizon, hence providing the a link with other documents such as Strategic research Agenda 2035 by European Technology Platform on Smart Grids or Energy Roadmap 2050 by the European Commission.
- ENTSO-E R&D Implementation Plan - a document which is released every year. The Implementation Plan presents R&D activities for the next 3 years.
- ENTSO-E Annual Work Programme will have a chapter which will contain relevant references to the ENTSO-E R&D Implementation Plan and/or highlight R&D activities for the following year.

The next release of the ENTSO-E R&D Roadmap 2013-2022 and the Implementation Plan 2014-2016 will be in December 2012. The R&D Roadmap was announced for a public consultation on 17 September 2012. This allowed all stakeholders to submit their comments within one month. R&D Roadmap and Implementation Plan produced in 2012 are the basis of the transmission part of the EEGI Roadmap and Implementation Plan. ENTSO-E monitors R&D activities performed in the transmission area the portfolio of TSOs' R&D innovation projects to facilitate the work towards Europe-wide implementation of successful R&D results.

ENTSO-E takes part in a consortium for GRID+ project which is to support the EEGI activities over the years 2012-2014, both within and beyond the European borders, thus enhancing the delivery by the European network operators of the new knowledge needed to deploy smart grid solutions in EU27 in the most effective way.

Following the discussions in EEGI and taking into account the priorities for TSOs, ENTSO-E is supporting the creation of consortia to answer upcoming calls based on the FP7 Work Programme 2013. The calls are on the following topics:

- Large scale demonstration of innovative solutions for increasing the integration of renewable energy sources

- Novel strategies and tools for future pan-European network reliability and observability
- Advanced tools and mechanisms for capacity calculation and congestion management

Upon successful evaluation these projects can start research activities in 2013 in order to bring results in 2016 and be basis for further projects from the ENTSO-E R&D Roadmap.

In 2013 ENTSO-E will be working on the next Implementation Plan 2015-2017 and therefore preparing future projects to be funded by EC Horizon 2020 or other funding mechanisms.

5.2. ELECTRICITY HIGHWAYS

In 2011 ENTSO-E delivered a three year Study Roadmap defining the relevant technical/technological, financial/economic and political/socio-political issues to be analysed in order to deliver a Modular Development Plan for a Pan-European Electricity Highways System as recommended by the Commission in its November 2010 Communication “Energy infrastructure priorities for 2020 and beyond”. This study, an outcome of close interaction of ENTSO-E with stakeholders, has been the basis of Collaborative Project call Energy-2012.7.2.1 Planning for European Electricity Highways to ensure the reliable delivery of renewable electricity and pan-European market integration.

ENTSO-E in 2012 drove the creation of a consortium of partners (ENTSO-E, TSOs, universities, manufacturers, industry associations, etc.) with a wide geographical representation and a combination of all necessary expertise to apply for the project. ENTSO-E activities in 2013 will focus on its contribution to the eHighway2050 project and in particular the dissemination of its results in all phases of the study.

The R&D and Electricity Highways work in general takes up about 10% of Secretariat staff’s time and involves about 60 member TSO experts.

6 ENHANCING TSO COOPERATION

TSO cooperation is at the core of everything which ENTSO-E does. ENTSO-E is active in a very broad range of areas and, in all cases, seeks to support our members in coordinating more effectively to develop networks which can help facilitate Europe’s energy policy objectives. This document does not seek to outline every area in which TSO cooperation is being improved, but focuses on a small number of areas which are complementary to the work discussed in the prior sections of this document. These areas are: promoting the coordination of system operation practices, integrating renewable energy into Europe’s networks, IT development and relationships across borders.

6.1. COORDINATION OF NETWORK OPERATION

The adoption of common network operation tools to ensure coordination of network operation in normal and emergency conditions is a very important task for ENTSO-E according to Regulation 714/2009 (Art. 8(3)). In addition to the network codes on system operation described in section 2 which contribute to the standardization and harmonization of certain operational tools and procedures, other operations-related ENTSO-E initiatives have already begun and will continue throughout 2013 to work towards common network operation tools. This includes a wide variety of efforts which complement each other and which together form the necessary framework to successfully tackle

challenges to secure European and regional system operation over the next years, such as the strongly fluctuating power flows on regional scales due to growing penetrations of wind and solar energy. For example, the real-time information exchange in the new ENTSO-E Awareness System complements the newly institutionalized Regional Security Coordination Initiatives which focus on the operational planning timeframes and provide sufficient time before real-time to identify regional threats to (n-1)-security and coordinate regional remedial actions:

- The ENTSO-E Awareness System (EAS) provides instantaneous (i.e. real-time) exchange of operational information between TSOs, enabling them to react immediately in case of unusual system conditions. Installation of the EAS in many TSOs is scheduled in 2012; these installations will be completed and fine-tuned in 2013. It will be followed by an analysis of TSOs' experiences of the system and potential additional functionality.
- The experience of TSOs' Regional Security Coordination Initiatives such as Coreso, SSC, TSC as well as Iberian and Nordic initiatives will continue to be analyzed in a working group with a view to defining where in Europe such initiatives may still be needed, and how power flow security calculations with common grid models are performed in best practice to identify operational risks which are visible only in regional analyses (and not in national analyses), as a foundation for coordinating regional remedial actions. This work is also strongly related to the operational NCs, in particular the Operational Planning and Scheduling NC. The year 2013 will be crucial for completing the necessary definitions of the roles and possible tools for these Regional Initiatives.
- ENTSO-E has established a communication network (Electronic Highway - EH) that provides the necessary infrastructure to support all data exchanges among TSOs, including the EAS. The EH is a private network that operates under the responsibility of the member TSOs. During 2012 and 2013, important upgrades to the EH bandwidth will be planned and implemented.
- The new Incident Classification Scale published in March 2012 will continue to be implemented with improving software in 2013.
- Analyses of frequency deviations will continue to inform the network code work, and the work on updating regional TSO contracts to make operation handbooks binding for details not included in NCs, not mentioned in framework guidelines and not affecting 3rd parties.
- Job-related education and training of engineers continues to be an ENTSO-E emphasis so as to ensure the development of skills and in-depth knowledge required for different roles to operate, plan and manage the European transmission systems. Although measures to support education and training already exist at individual TSOs, ENTSO-E is creating an Academy to further selected TSO-specific aspects of education and training on the pan-European level. The initial scope of the Academy is on system operation and security of supply issues.

The support of operational coordination, Working and Regional Groups take up about 10% of the Secretariat staff's time and involves about 200 member TSO experts.

6.2. INTEGRATING RENEWABLE ENERGY

The integration of large volumes of renewable energy sources will remain a significant driver of work across ENTSO-E during 2012. The work of all Committees and activities described above will be affected:

- the development of intra-day and balancing markets will be important in enhancing security and reducing risk; a particular goal is the optimization of cross-border trading possibilities in order to promote the integration of energy from RES generation;
- the TYNDP and work on offshore grids will identify the system design criteria and investment needs required to integrate large volumes of RES generation, as well as anticipating needs in generation/storage equipment to maintain the necessary system flexibility;
- system operations work will contribute to ensuring that customers continue enjoying the high levels of system security experienced to date and making sure that the sufficient technical requirements and control for RES generators are in place; and
- the Research & Development Committee will consider future challenges and identify opportunities to innovate and collaborate to develop best practice.

ENTSO-E is coordinating the work on Renewable energy issues across the organization by an-hoc group made of senior representatives of the four ENTSO-E Committees.

6.3. INTERACTIONS WITH GAS SYSTEM ISSUES

Over the last years, cross-relationships between the Europe-wide systems for electricity and for gas have become more relevant, for example during the cold spell in Feb. 2012. Responding to stakeholder, Commission and ACER suggestions to consider such cross-relationships, ENTSO-E stay in close contact with ENTSG to appropriately coordinate priorities and in some cases also basic assumptions underlying work products. For example, visions, scenarios and in future years also certain models for network development plans need to be informed by the corresponding gas planning visions and scenarios. Other such cross-relationships can affect summer and winter outlooks.

6.4. POWER SYSTEMS DATA, IT DEVELOPMENT AND RELATIONS ACROSS BORDERS

In addition to the high priority items listed in this Work Programme, ENTSO-E's Committees, groups and Secretariat will continue to carry out other activities, partly continuing the important work of prior associations or work requested of it by the EC. This includes compiling and auditing statistical and technical data, developing network maps, defining electronic data interchange (EDI) and data exchange (Common Information Model) standards, IT support in general and developing an ENTSO-E Network Modeling Database, considering critical systems protection, analyzing asset implementation and management, and engaging with legal and regulatory issues affecting a wide range of work, including that relating to network codes.

As foreseen in the 3rd IEM Package, ENTSO-E intends to monitor and analyze the implementation on the network codes. An Expert Group is preparing the corresponding processes, and specifications for the needed IT tools. In 2013, implementation and further development will take place.

ENTSO-E supports technical evaluation and synchronous trials of neighboring third party power systems to members TSOs. The two relationships under study in the second half of 2012 and beyond involve technical discussions with the Russian government and the Russian system operator on developing joint operating arrangements with the EU's Baltic TSOs. This work is also likely to involve Belarus. ENTSO-E is working with the Turkish system operator in conducting synchronous connection

to the ENTSO-E system. These trials have been planned and underway for several years and the conclusions of the monitoring and performance analysis are expected in the Autumn.

In addition to the third party systems described above ENTSO-E's Regional Group Continental Europe will continue its active programme of other system extension projects. This work covers technical programmes for enhanced cooperation with synchronous connections and the encouraged adoption of the 'operational handbook' as a means of ensuring common styles of system operations across observable boundaries.

The support of this data activity and development and external relationships takes some 5% of the Secretariat resources and some 80 member TSO experts.

7 Conclusion

ENTSO-E's 4th Work Programme focuses on the important tasks assigned to TSOs at pan-European level. It also demonstrates the very considerable involvement and effort by Europe's TSOs, who are major contributors to turning Europe's energy policy goals into reality.

8 CALENDAR OF ENTSO-E'S WORK PROGRAMME 2012-2013

Deliverable	Goal	Status	Expected start (Qx/yr)	Expected end (Qx/yr)	Expected public consultation (Qx/yr)
Progressing and delivering network codes - Connection					
Network Code on Requirements for Generators	Deliver to ACER draft binding EU legislation for generation connection to underpin system development fit for the future	Code submitted to ACER in October 2010. ENTSO-E undertaking additional assessment and stakeholder engagement in light of the ACER reasoned opinion. To be resubmitted March 2013	Q3/2011	Q2/2012	taken place throughout the project
	Support ACER Opinion and Comitology phases		Q1/2013	Q4/2013	
Network Code on DSO and Industrial Load Connection	Deliver to ACER draft binding EU legislation for demand connection to underpin system development fit for the future	Network code submitted to ACER on 4 January 2013.	Q1/2012	Q1/2013	Q3/2012
	Support ACER Opinion and Comitology phases	Expected to begin some time after an ACER opinion to be received in March 2013	Q1/2013	2014	
Network Code on HVDC Connections	Deliver to ACER draft binding EU legislation for HVDC connections to underpin system development fit for the future	Drafting team established and scoping work underway.	End Q4/2012 / Q1/2013	Q2/2014	to be confirmed, expected late 2013
Progressing and delivering network codes - Market					
Network Code on Capacity Allocation and Congestion	Deliver to ACER draft binding EU legislation for market integration, especially allocating capacity in the day-ahead and intra-day	Code delivered to ACER on 27/9/12. Discussions with ACER/EC to find	Q3/2011	End Q3/2012	Q1-Q2/2012

Management	timeframe, for calculating the levels of available cross border capacity, and for allocating and recovering costs Support ACER Opinion and Comitology phases	compromises in light of the ACER reasoned opinion. Recommendation expected March 2013.	Q4/2012	2013	
Network Code on Forward Markets	Deliver to ACER draft binding EU legislation for forward market integration	Code undergoing internal approvals ahead of public consultation.	Q3/2012	Q3/2013	Q2/2013
Network Code on Balancing	Deliver to ACER draft binding EU legislation for market integration and system security, especially the cross border exchange of reserves and balancing energy	First draft produced and stakeholder engagement ongoing,	Q4/2012	Q4/2013	Q2/2013
Progressing and delivering network codes - System Operations					
Network Code on Operational Security	Deliver to ACER draft binding EU legislation for operational security based on TSO coordination Support ACER Opinion and Comitology phases	Delivered to ACER on 28/2/13	Q1/2012 Q1/2013	Q1/2013 2013-14	Q3-Q4/ 2012
Network Code on Operational Planning and Scheduling.	Deliver to ACER draft binding EU legislation for operational planning and scheduling based on TSO coordination Support ACER Opinion and Comitology phases	To be delivered to ACER by the end of March 2013	Q2/2012 Q2/2013	Q1/2013 2013-14	Q4/2012
Network Code on	Deliver to ACER draft binding EU legislation	Being consulted on	Q3/2012	Q2/2013	Q1/2013

Load-Frequency Control and Reserves	for the definition and dimensioning of reserves and for load- frequency control, based on TSO coordination and the requirements for generators Support ACER Opinion and Comitology phases	between February and April 2013.			
			Q4/2013	2014	
Consultation Tool Improvements	To enhance the ENTSO-E consultation tool	Ongoing attempts to improve the user experience and interface with the tool. Several updates already made (e.g. uploading excel templates)	Q4/2012	Q2/2013	-
Planning & delivering Europe's future energy networks - Ten-Year Network Development Plan (TYNDP), system adequacy reports					
TYNDP 2012	Present to stakeholders and policy makers the trends, needs and future development of the transmission network at pan-European level based on common market and network models in the 2012 TYNDP	Final approval	Q2/2010	5 July 2012	Q1/2012
Adequacy reports	Build scenarios for the TYNDP 2014 and deliver the Scenario Outlook & System Adequacy Forecast 2013 Winter Outlook 2012/2013/Summer Review Summer Outlook 2013/Winter Review Winter Outlook 2013/2014/Summer Review	Continued discussions on scenarios, stakeholder interactions Not yet started	Q2/2012 Q3/2012 Q1/2013 Q3/2013	Q1/2013 Q4/2012 Q2/2013 Q4/2013	
TYNDP 2014	Prepare the 2014 TYNDP with common market and network models to derive the trends, needs and future development of the transmission network at pan-European level	Preparation of methodologies and stakeholder interactions	Q2/2012	Mid 2014	Consultation on TYNDP 2014 scenarios: Q4/2012 Long-Term Network Development Stakeholder Group: 2012-2014
Procedure – Inclusion of the third party projects in the 2014 version of	Increase the transparency on the necessary future grid infrastructure (Regulation 714/2009), by including in the European view	Finalised	21 January 2013	1 March 2013 for project submission – End April for finalisation	Consultation with the EC, ACER and relevant stakeholders – Q3-Q4/2012

the TYNDP	the relevant third party projects. Answer to the new EIP regulation which asks TYNDP to be the base for the EC PCI process.				
Publication of the updated table of projects TYNDP 2012	Present the latest status of the projects incorporated in the TYNDP 2012	On-going	June/2013	June/2013	
Cost-benefit analysis in the Energy Infrastructure legislation context	Deliver methodologies for cost-benefit analyses of transmission infrastructure (TYNDP; Projects of Common Interest) for a pragmatic and comprehensive approach to drive policy, incentives and investment decisions	On-going	Q2/2012	Q4/2013	Q2/2013
Planning & delivering Europe's future energy networks - Public acceptance for power infrastructure, financing					
Contributions to the Infrastructure Regulation	Contribute expertise on permitting, financing and transmission investment evaluations to the draft Regulation; potential development of a guideline on investment incentive schemes and on cross-border trade	Legislative discussions; scoping with ACER on investment incentives	2011	2013	
A public campaign coordinated between EC, ENTSO-E and TSOs	Definition, proposal and launch of a campaign, aimed at EU citizens, that reconnects people with electricity and how it is delivered to their community, so they recognize the need for power infrastructure to maintain or enhance living standards	Scoping, interaction with EC and selected stakeholders	Q4/2012	2013-14	
Permitting and Public Acceptance Best Practice	Collection and consolidation of best practices on activities related to permitting and public acceptance processes. This work will be informed by other activities undertaken by TSOs in various external relationships as well as stakeholder input within the Long-Term Network Development Stakeholder Group.	Yet to commence	Q1/2013	Q1/2014	

Implementing and enhancing the internal electricity market					
Electricity Market Fundamental Information Platform	Implementing the EC Guidelines on Fundamental Data Transparency in an integrated IT system for all of Europe	Tendering for IT vendor selection	2010	2014	
Support and pan-European guidance to regional market integration developments	Ensure that regional developments continue to develop in a manner consistent with the overall EU Target Model. Establish a coherent vision for market integration.	Regional market development discussions are well underway with different regions at various stages of cooperation and development	2009	2014	
Shaping discussions around the optimal design for the European electricity market	Proactively considering issues around market design and the creation and promotion of an effectively competitive market. This will include issues such as remunerating capacity.	Discussions with stakeholders have been underway for some time	2011	Throughout 2013	
Research and Development towards stronger and smarter grids including the 2050 E-Highways project					
R&D Roadmap, R&D Implementation Plans	Foster TSO coordination on R&D, with strong links to the SET Plan and EEGI, by: <ul style="list-style-type: none"> - Publishing and disseminating the ENTSO-E R&D Roadmap 2013-2022 - Publishing and disseminating the ENTSO-E Implementation Plan 2014-2016 - Publishing and disseminating the ENTSO-E Implementation Plan 2015-2017 - Facilitate the process for creating consortia to answer FP7 2013 calls 	R&D planning work ongoing;	Q1/2012 Q1/2012 Q1/2013 Q1/2012	Q4/2012 Q4/2012 Q4/2013 Q3/2012	Q3-Q4/2012
Implementation of the R&D Plan/R&D Roadmap	Monitoring and managing implementation of the R&D Plan Monitoring and managing implementation of the R&D Roadmap 2013-2022 Contributing in the Grid+ project activities	published Q3/2012	Monitor the R&D Plan edition 2011: 2011-2012 Q1/2013	2013-2014 Q4/2013	

Modular Development Plan on Pan-European Electricity Highways System – E-Highways 2050	Contribute to the e-Highway2050 R&D consortium, e.g. through the dissemination work package, so that the study becomes the definitive study on the methodologies long-term future grid fit for 2050 goals and architecture (e.g. voltage levels) of the	Kickoff	Preparatory work since 2010	End 2014/early 2015	
Enhancing TSO cooperation – Coordination of network operation					
ENTSO-E Awareness System (EAS)	Effective implementation of a pan-European Awareness System for instantaneous exchange of operational information among TSOs	Deployment to all TSOs	2010	2013	
Electronic Highway	Implement bandwidth upgrades to meet the increased challenges and coordination needs of the future, incl. for EAS	Planning and individual link upgrades in progress	2009	2013	
Incident Classification Scale (ICS)	Implementation with ICS software and software upgrades	ICS documents published Q1/2012	2010	2013	
Recommendations on reducing frequency deviations	Follow-up on with recommendations for concrete remedies to the findings of the joint investigation with Eurelectric on frequency deviations	In progress	2011	Q1 2013	
ENTSO-E Academy	Deployment of the activities of the ENTSO- E Academy: 1) ToR definition 2) Courses: common training for common projects (EAS (2012) and others) 3) Workshops: 3 WS's in 2012 and 4 to 6 in 2013 4) Training material compilation 5) Academy web development	1) Completed 2) Scheduled 3) Scheduled 4) Preliminary phase 5) Preliminary phase	1) Q1 2012 2) Q3 2012 3) Q2 2012 4) Q3 2012 5) Q2 2012	1) Q1 2012 2) Q4 2013 3) Q4 2013 4) Q2 2013 5) Q4 2012	
Regional Security Coordination Initiatives (RSCIs)	Continued learning from existing RSCIs to define best practice (in network codes)	Ongoing work, incl. on cross-border redispatch	2011	2013	
Enhancing TSO cooperation – Integrating renewable energy					
Coordination for best possible integration of renewable energy	Supporting the integration of large volumes of RES through coordination of various ENTSO-E and TSO activities incl. many of	Ongoing	2010	2014	

sources (RES)	the above deliverables.				
Enhancing TSO cooperation – Interactions with gas system issues, power systems data, IT development and relationships across borders					
Various supporting activities	Accounting for gas cross-relationships in various work products; statistical and technical data, network maps, electronic data interchange (EDI), Common Information Model, IT support in general and developing an ENTSO-E Network Modelling Database, considering critical systems protection, analysing asset implementation and management, engaging with legal and regulatory issues, monitoring network code implementations, compliance monitoring, Baltic study Advisory Body support, evaluating the synchronous trial operation with Turkey, technical discussions with the Russian system operator	Ongoing	2009	Indefinite	