European Network of
Transmission System Operators
for Electricity

ENTSO-E WORK PROGRAM

2010 THROUGH DECEMBER 2011

1 OCTOBER 2010

1. INTRODUCTION

The preparation of an annual Work Program is one of the key deliverables required of ENTSO-E by the EU's third Energy Package (Article 6, Regulation 714/2009). As the Third Package began its implementation phase in 2009 (which will be largely complete by March 2011), ENTSO-E is now publishing its second annual Work Program such that we can make best use of the implementation period to progress those issues of most interest to stakeholders, regulators and the European Commission. One particular goal is that formal work on network code development can progress rapidly after March 2011. This formal process can only begin after the Agency for the Cooperation of Energy Regulators (ACER) is legally able to execute the tasks, such as the production of framework guidelines, required of it by the Third Package. This will occur as of 3 March 2011. The Work Program shows how the shared preparatory work involving the European Commission, ERGEG and stakeholders in support of ENTSO-E can lead to rapid progress on network codes later in 2011.

We have therefore structured our Work Program into the following sections:

- **Network code preparatory work**
- **Ten year network development plan (TYNDP)**
- **Further key areas of TSO cooperation**
- **Conclusion**
- **Indicative calendar**

Network codes are very important deliverables of ENTSO-E. The Third Package defines the code development process in great detail and lists 12 topic areas for network codes (see below). More importantly, Comitology procedures are foreseen to make ENTSO-E's network codes binding not only for TSOs but also for other affected market participants and for Distribution System Operators (DSOs). The involvement of the European Commission, Member States, ACER and extensive consultation will ensure that the codes are well balanced. Making the codes binding for other market participants remedies a shortcoming of the European energy market rules in place before the 3rd Package, i.e. that TSOs could make their operational rules binding for themselves through instruments such as Operation Handbooks and Multilateral Agreements. At European level, however, no party could impose these rules on other market participants – whose cooperation is often crucial for operational security and market integration.

Section 2 outlines the choice of priority network code areas: generation connection (pilot code), preparations for market integration-related codes, operational security, primary/secondary/tertiary reserves.

Other outstanding priorities that are also required of ENTSO-E by the Third Package are highlighted in sections 3 and 4. These sections focus on the Ten-Year Network Development Plan, the development of a consolidated Research and Development (R&D) plan and measures for improved operational co-ordination. The chosen priorities have been informed by other pieces of legislation relevant to TSOs in addition to the third Package. The priorities in this Work Program are also consistent with the three-year planning approach which has been jointly undertaken by the European Commission, ERGEG, ENTSO-E and ENTSOG to identify work in respect of network codes and in other areas where co-ordination is required such that the highest priorities can be achieved with the available resources and such that stakeholder consultations can be sequenced adequately. All ENTSO-E work products aim at

contributing to security of supply, a seamless pan-European electricity market, the secure integration of renewable resources and a reliable future-oriented grid, well suited to energy policy goals.

Following public consultation stakeholders have expressed their support for the overall direction and priorities set out in the 2011 Work Program.

2. NETWORK CODE PREPARATORY WORK

In addition to the reasons given in the Introduction, the importance of network codes also stems from the extensive list of operations, development and market-related problems they are to cover (in accordance with Article 8 (6) of the Electricity Regulation):

1) Operations-related code topics:
   - (a) Network security and reliability rules including rules for technical transmission reserve capacity for operational network security;
   - (e) Interoperability rules;
   - (f) Operational procedures in an emergency;
   - (j) Balancing rules including network-related reserve power rules;

2) Development-related code topics:
   - (b) Network connection rules;
   - (l) Energy efficiency regarding electricity networks;

3) Market-related code topics:
   - (c) Third-party access rules;
   - (d) Data exchange and settlement rules;
   - (g) Capacity allocation and congestion management rules;
   - (h) Rules for trading related to the technical and operational provision of network access services and system balancing;
   - (i) Transparency rules;
   - (k) Rules regarding harmonised transmission tariff structures, including locational signals and inter-transmission system operator compensation rules.

In accordance with Article 8 of the Electricity Regulation, it is the responsibility of the European Commission to establish an annual priority list identifying the areas set out in Article 8(6) to be included in the development of network codes. ENTSO-E suggests that the network code priorities for 2011 are based on their importance for secure network operation, the integration of renewable energy sources and for market integration, while covering areas in which there is sufficient clarity and consensus between TSOs, regulators and market participants about goals and methods. The formal request by the European Commission for ENTSO-E to draft a network code in a given area will trigger the ENTSO-E network code development process.

From this perspective, and given the expected timescales for ERGEG inputs into framework guidelines, the preparatory work in respect of network codes in the operational area will focus first on operational security; while ENTSO-E expects to begin drafting the most important market integration codes by the

end of 2010 (“as if phase”) and to continue this work throughout 2011. The formal network code development process is expected to begin by the end of the year 2011 with a goal of delivering the draft network codes by mid-2012. Stakeholders will be consulted during the “as if phase” and within the context of the formal network code development process.

ENTSO-E’s 2011 network code preparatory work thus includes:

a. Grid connection with special focus on wind generation (pilot code)

The ENTSO-E pilot network code for grid connection with special focus on wind generation has already provided useful experience of the process of responding to framework guidelines and drafting codes and of the associated consultations, which have been undertaken in close collaboration with ERGEG, required by Article 6 of the Regulation. It is thus demonstrating the efficiency and the practical benefits of the new approaches made possible by the Third Package’s network code processes. For the pilot code topic, an important focus on wind generation connection conditions was chosen by ENTSO-E and ERGEG, with support from the European Commission and the Florence Forum, acknowledging that wind energy is set to shoulder the greatest part of renewable energy growth over the coming years. An important goal is to identify and develop European rules for harmonizing the Grid Code requirements relating to the connection of wind generators to transmission networks across Europe. The advantages of harmonisation were described previously in the 2010 Work Program. A pragmatic approach was adopted to achieve this goal: First, the pilot code will aim at harmonising the structure of national connection codes facilitating the process of identifying the relevant connection requirements for generators. As a second step, the connection requirements should be harmonised to a reasonable extent at a pan-European, or regional (synchronous area) level.

In order to achieve structural harmonisation and to ensure simplicity and maintainability of the code, the core of the pilot code will consist of connection requirements common to all generators, irrespective of technology. Technology specific issues will be dealt with in dedicated sections, with priority given to the section including wind generators. Shortly after the completion of this section, the sections for all other technologies will be incorporated. These sections are also urgent because of the large number of existing power plants retiring over the next decade, of the large number of distributed resources coming on-line, and of the need for consistency between wind generation connection and the connection of other plants. Where needed, issues impacting DSOs will have to be also addressed and included in the network code in a consistent way. On the other hand, grid access issues are outside the scope of the pilot code.

The pilot code will relate to a planned ERGEG framework guideline worked out between March and October 2010. This framework guideline, together with a planned initial impact assessment, will lead regulators to select from a range of possible policy options; the framework guideline will cover the network connection issue as a whole. Preparatory work on the pilot code started in mid-2009 and the European Commission, ERGEG and ENTSO-E agreed that for the pilot project parties should work in parallel to development the framework guidelines and the code. Nonetheless, the code cannot be published for consultation before the corresponding framework guideline is finished. Therefore, completion of the pilot code is foreseen in early 2011, several months after completion of the ERGEG input into the ACER framework guideline. The resulting network code will need to go through the formal code development steps again after the Agency’s tasks are in force, but in light of the extensive work and stakeholder consultations that will have already taken place by 3 March 2011 we expect that the process leading to and through Comitology can run smoothly and quickly. We therefore expect that were an ACER-approved

framework guideline available by circa June 2011, an intense 6-month period of work finalizing and consulting on the network code on a formal basis, could allow the Comitology process to begin in first half of 2012.

b. Market codes

Design for market integration

The highest priority for the Market Committee and its most important preparatory work for network codes concerns designs for market integration. Acknowledging the Florence Forum's support for the target model, the three market integration projects set up in the framework of the Ad-hoc Advisory Group (AHAG) are expected to provide substantial input into a framework guideline on capacity allocation and congestion management and to related network codes on subjects such as capacity calculation, intraday markets and day-ahead markets during 2010. ERGEG is expected to deliver a draft framework guideline on capacity allocation and congestion management by the autumn of 2010, acting on an "as if" basis. Once operational, in March 2011, ACER is expected to repeat consultations on the draft framework guideline on capacity allocation and congestion management and to adopt it in the third quarter of 2011. Against this background, ENTSO-E expects to launch the drafting of the first network codes in this area, on an intraday platform and on day-ahead markets, by the end of 2010 (acting "as if") with a goal to deliver the draft network codes within 12 months, i.e. by the end of 2011, with the formal network code development process occurring after this point. Taking into account the outcome of the work undertaken during the "as if" phase, it is expected that the formal network code development process may be shortened to 6 months for these codes, meaning that ENTSO-E plans to deliver the network codes by mid-2012. In addition, the ongoing market integration projects are expected to deliver advice to the European Commission with regard to the need for legislation on the governance of day-ahead markets. Recalling the Commission's option to prepare a guideline which becomes binding following approval by comitology, ENTSO-E is committed to delivering input to such a process. ENTSO-E will also support the implementation of the Commission Guidelines on Inter-TSO compensation and tariffs.

c. System operation codes

ERGEG plans to complete a framework guideline on operational security in the first quarter of 2011. This is to combine three of the Regulation's topics, i.e. operational procedures in an emergency, security and reliability rules and interoperability. This one framework guideline can and should correspond to several network codes (as the three-year plan the 2010 ERGEG Work Program and the Commission's discussion paper of 18 September 2009 foresee). In light of available resources and also relative urgency, ENTSO-E plans to develop system operations network codes sequentially such that two codes are drafted at the same time. Scoping work, involving ENTSO-E and ERGEG, on the two codes described in more detail below began in early 2010, and will continue until Autumn 2010 when ERGEG will begin drafting framework guidelines. From this point work will continue in parallel until mid-2011. Thereafter formal network code work is expected to be completed in 2012.

The two most important operational network codes, governing the basis of the functioning of power systems, in normal conditions, are:

- Network code on operational security – the main objective is to define common, pan-European operational security principles. These principles are designed to ensure that

the high operational security standards already reached in the different synchronous areas can be harmonized and improved as challenges to secure operation increase markedly, as a result of, for example, increasing integration of fluctuating renewable resources and continental-scale power transfers. The scope of this code is thus to determine common operational principles to ensure the reliability of transmission systems, to ensure a consistently high quality of electricity supply, to ensure system security and promote the co-ordination of system operation. This includes developing requirements which will apply to TSOs but also be applicable to DSOs, generators and consumption units connected to grids. These principles shall form the basis for the development of more detailed codes at a later date.

- Network code on primary, secondary and tertiary control and reserves – this is particularly urgent because increasing amounts of fluctuating renewable energy make load flow management an increasingly difficult challenge. The preparatory work will analyze the existing rules in the five synchronous areas and identify as many areas as possible which lend themselves to the development of pan-European rules. As with other operational codes, this code is needed to ensure a high standard of operational security of the European electricity transmission systems within the framework of liberalised energy markets.

Thus, the preparatory phase for the development of the operational network codes involves comparing and analyzing the frameworks which exist in all five synchronous areas. This analysis will then allow the areas and the detailed scope of the network codes to be developed.

The network codes prepared by ENTSO-E are not intended to replace the national network codes which relate to non-cross-border issues. However, all codes will require close co-operation among TSOs and between TSOs and system users in order to achieve the key objective of creating an integrated pan-European electricity market built on a secure operational platform. TSOs will continue working within regional structures within the overall ENTSO-E co-operation structure, whilst ensuring that any results developed at the regional level are applicable on a Europe-wide basis. Issues impacting stakeholders, including DSOs, will be addressed through informal consultations early in the process and in formal consultations on draft network codes.

3. TEN-YEAR NETWORK DEVELOPMENT PLAN (TYNDP)

The Ten-Year Network Development Plan (TYNDP) is a very important new task given to TSOs and ENTSO-E by the Third Package. ENTSO-E published its pilot TYNDP after consultation, on 30 June 2010 and described, as part of the Plan, the intention to make methodological developments ahead of the next releases of the TYNDP in 2012 and 2014. Input from ERGEG, the Commission and stakeholders will of course play an important role in influencing these developments.

The pilot Plan provides the first pan-European view of required grid developments of European relevance. Each of the almost 500 projects has been subject to intensive market and network studies, usually involving at least two and often several TSOs in a region or, in some cases, across Europe. An appendix gives examples of several such regional studies. Methodological improvements planned for the next TYNDP releases include applying market and network modeling criteria and methods that are harmonized in ENTSO-E. The first harmonization will address network modeling issues which will lead to the creation of regional network plans for the six ENTSO-E system development regions within 2011. These regional plans will be made public alongside the TYNDP in 2012. The 2012 TYNDP will build on

those regional plans and thus on harmonized network models. Market modeling, as an important driver of network planning, is to be introduced on a regional basis and harmonized, where applicable, with respect to criteria and methods for the 2012 TYNDP, but at the latest for the 2014 TYNDP.

An important piece of feedback which arose from the 2010 TYNDP consultation was the urgency generation owners and investors place on a coordinated European grid development, i.e. the urgency with which they wish ENTSO-E to go beyond the regional modeling that was the basis of the pilot Plan. The methodological improvements cannot be sped up beyond the already very ambitious plans described – given that criteria and modeling features need to be agreed on, software specifications described, software developers and/or vendors identified and evaluated, software developed and tested, and then applied on the TSOs' data. However, given stakeholders' message of urgency, a top-down pan-European approach will be applied as soon as it is available. The following developments are already foreseen during 2011: The January 2011 ENTSO-E System Adequacy Forecast will inter alia present a top-down scenario based on the June 2010 Member States National Renewable Energy Action Plans (NREAPs) after a dedicated consultation towards the end of 2010. If this system adequacy data suggests a significantly different generation scenario for 2020 from the scenarios included in the pilot TYNDP, ENTSO-E will analyze and describe the effects on the 2020 grid in mid-2011.

Following the publication of a position paper on permitting procedures for electricity transmission infrastructure in June 2010, ENTSO-E will continue work in this area during 2011 in order to deliver input into the EC process of developing an EU Electricity Infrastructure Package. Moreover, ENTSO-E plans to intensify its discussions with ENTSOG on interactions between the gas and electricity Ten-year plans and its work on 2050 and "supergrid" scenarios (see below).

4. FURTHER KEY AREAS OF TSO COOPERATION

Among the other activities and products to be developed by ENTSO-E in 2011, the main focus will on following areas:

a. A consolidated R&D Plan for TSO needs: Because of the quantity and complexity of the TSO R&D Plan for the next eight years, ENTSO-E has chosen to make publish its R&D plan separately. It is ENTSO-E's intention to update this plan every two years. The 2010 publication was issued for consultation on 11 January 2010 and as a final product on 31 March 2010. The R&D Plan is closely tied to the Strategic Energy Technology Plan and in particular to the European Electricity Grid Initiative. Through its R&D Plan, ENTSO-E ensures the co-ordination of all research subjects which are relevant to TSOs. ENTSO-E will also monitor R&D as a whole, the portfolio of TSOs' R&D innovation projects and launch the preliminary work towards the Europe-wide implementation of successful R&D results. For details, please refer to the R&D Plan itself.

b. Co-ordination of network operation: In addition to the operational network codes described in section 2 above which will contribute to the harmonization of certain operational tools, the initiatives which begun in 2010 to work towards "common network operation tools to ensure co-ordination of network operation in normal and emergency conditions" will continue during 2011. An important element of this process is the preparation of an ENTSO-E Awareness System, providing real-time information about system status and thus enabling TSOs to react immediately in case of unusual system conditions. Complementarily, ENTSO-E will implement crisis communication procedures which will enable TSOs to provide more accurate and timelier information to the public in case of emergency situations. In addition, following up on the deliverables of 2010, ENTSO-E will implement the Incident Classification Scale procedure. Existing processes to forecast possible congestion e.g. the

Day Ahead Congestion Forecast (DACF) will be further developed and made capable of Europe wide application. The System Operations Committee will also continue to facilitate the exchange of experiences in the operational area, including organizing of dedicated internal workshops focusing on topics such as voltage stability. In addition, a project to investigate options for "pooling" wind power forecasts will be launched in 2011. In the area of ancillary services, ENTSO-E will also address, in cooperation with stakeholders, the issue of deteriorating quality of the system frequency (especially in the Continental Europe and Nordic systems) and will continue to analyze and investigate options for creating a common pan-European approach to the determination of operational reserves.

c. Common planning standards: In order to ensure coordinated and sufficiently forward-looking planning and sound technical evolution of the transmission system, preparatory work aimed at achieving common planning standards was conducted during 2010 and will be further developed in 2011.
d. Long-term system/grid strategy: In early 2010 systematic work on developing a roadmap towards a pan-European power system in 2050 was kicked off. This will continue throughout 2011 such that the technological basis and the generation and load drivers for the long-term future grid will not only be better understood by the TSOs but can be jointly planned within ENTSO-E. A further input involves progressing studies on possible extensions of synchronous operation. These studies will continue to be performed under very close consultation with the European Commission. Finally, possible offshore grid designs will continue to be an area of study for ENTSO-E.
e. Other system development issues: Additionally, as has been the case in 2010, position papers on such topics as transmission infrastructure technology, electro-magnetic fields (EMF) and licensing procedures will be written. ENTSO-E position papers will propose common visions on the modalities of using innovative technologies develop lines of argument to support the speeding up licensing procedures and prepare contributions to any debate on EMF concerning exposure of the general public and/or exposure to workers. These papers will take account of the need for shorter-term developments to fit into longer-term system development strategies.
f. Transparency of fundamental data: Transparency is essential to achieve well funcitioning, efficient, liquid and competitive wholesale markets and thus a fully developed IEM. Acknowledging the need for further legislation to improve transparency on a European scale, the European Commission launched a request to ERGEG to prepare a draft Comitology guideline on fundamental data transparency by the end of 2010. Further to the Commission's request, this work is being carried out in close co-operation with ENTSO-E in an ad hoc joint Working Group involving the EC, ERGEG and ENTSO-E. Subject to approval by Comitology, the guideline will become legally binding, possibly in 2011. ENTSO-E will support its implementation during this period. This implementation will require substantial developments to the ENTSO-E transparency platform (entsoe.net) in order to deliver reliable information in respect of a larger volume of data than is currently the case. In this context, ENTSO-E will also follow up on the Transparency Workshop held in 2010.
g. Other market development issues: Investment incentive schemes, an area of work described in the new Electricity Regulation, is also a priority area of focus for ENTSO-E. Work on this topic will be combined with continuing work on tariff harmonization and with urgent work developing ideas for the funding the costs of new transmission infrastructure which delivers significant European-scale benefits (but perhaps less clear national benefits). The latter topic is likely to be an important aspect of the European Commission's infrastructure package announced for late 2010 and ENTSO-E intends to contribute intensively to the legislative process. Developing ancillary services, in particular

focusing on cross border balancing, is another priority area in light of the EU energy policy goals for renewables.

5. CONCLUSION

ENTSO-E's second Work Program again focuses on the important new tasks assigned to TSOs at pan-European level. These tasks include: network development planning, R&D, the co-ordination of operations and, in particular, the development of network codes and the TYNDP. The development of network codes in particular has been subject to intensive 3-year planning with the Commission, ERGEG and ENTSOG and the network code schedules and priorities described in this Work Program are consistent with that 3-year plan. Generation connection, market integration and operational codes are the corresponding highest priorities. On each of these issues significant progress towards the goal of approving policies via the Comitology process and implementing binding Europe-wide network codes is planned during 2011. In addition to the high priority items listed in this Work Program, ENTSO-E's Committees and groups will continue to carry out many other activities, largely continuing the important work of prior associations. Examples are compiling and auditing statistical and technical data, developing network maps, defining electronic data interchange (EDI) and data exchange (Common Information Model) standards, considering critical systems protection, analyzing asset implementation and management, dealing with requests for extensions to the continental Europe synchronous area and engaging with legal and regulatory issues affecting a wide range of work, including that relating to network codes. Opinions from the European Commission and ACER on the ENTSO-E Articles of Association (Statutes) and Rules of Procedure according to Article 5 of the Electricity Regulation are due in 2011 and may also lead to work to fine tune these core ENTSO-E documents. It is therefore important that the ENTSO-E Work Program leaves room for flexibility in work planning within the internal ENTSO-E working structures (Committees and Working Groups) that will reassess their priorities and scheduled actions periodically. Also, in addition to the monitoring by ENTSO-E of the implementation of network codes and guidelines required in Article 8(8) of Regulation 714/2009, ENTSO-E plans to institute processes to formally monitor the efficiency and effectiveness of its own activities, in comparison for example to its Work Programs.

6. INDICATIVE SCHEDULE

Activity	Goal	Deliverable (end of Qx/yr)	Consultation (start Qx/yr)
Network code preparatory work			
Design for market integration	Market Integration network codes design	The three market integration projects provide structured input to: - a framework guideline on capacity allocation and congestion management: - network codes on subject matters such as capacity calculation, intraday markets and day-ahead markets. Drafting of codes ("as if")/(formal network code development process) - Capacity calculation NC (Q3/2011 – Q1/2012) /(Q2/12-Q3/12). - Intra-day platform NC (trading /congestion management): (Q4/2010 – Q3/2011) /(Q4/11-Q1/12). - Day-ahead NC (trading /congestion management) (Q4/2010 – Q3/2011) /(Q4/2011 – Q1/2012). - Forward market NC (Q4/2011 – Q3/2012).	Consultation during "as if" phase: Q3/11, possibly followed by consultation during formal code development phase Q1/12.
System operation	Formal work for network codes on operational security principles and on primary, secondary and tertiary control and reserves.	Structured input to the Network Codes on: - operational security principles Q3/2011 – Q2/2012 (common scoping discussions Q3/2012). - primary, secondary and tertiary control and reserves management Q4/2011 – Q3/2012 (common scoping discussions Q4/2012).	Stakeholder consultations will take place 2012.
Pilot code for grid connection with special focus on wind generation	Based on requirements common to all generation types identify and develop rules harmonizing Grid Code requirements particularly relevant to connecting wind generators to transmission networks across Europe.	Completion of the pilot code (under assumption that the ERGEG framework guideline is completed and the EC letter is received by the end of 2010). (Q1/2011 – Q4/2011)	Stakeholder consultations will take place Q1/2011.

Ten-Year Network Development Plan (TYNDP)			
TYNDP	Determine the trends, needs and future development of the transmission network at European level based on common network and market models. Preparation of the next editions of TYNDP to be published in 2012 and every 2 years afterwards.	Finalize 6 regional investment plans (Q4/2011 for publication alongside the TYNDP in 2012). Define and implement methodologies for market modelling on pan-European scale (2012). Proposal for a EU 2020 targets top-down scenario (Q1/2011). Define a market and network model database (Q4/2011).	
Further key areas of TSO cooperation			
R&D	ENTSO-E ensures the cross-functional coordination over all TSO's research subjects. ENTSO-E ensures a smooth implementation of the R&D plan.	Monitor the R&D Plan as a whole (2010-2011) (report on R&D plan monitoring) Support the EC during the launching of Calls for Proposals (2010-2011) Communication on the R&D plan progress among the technical stakeholder community (2010-2011)Design (Q4/2011) and approval (Q1/2012) of the 2nd edition of the ENTSO-E R&D Plan for public consultation (Q1/2012). Survey on the R&D support in the various implementations of the 3rd energy package at national level (Q4/2011).	Public consultation (Q1/2012)

Coordination of operation of the network	To ensure coordination of network operation in normal and emergency conditions	Preparation of an ENTSO-E Awareness System (Q4/2011). Implementation of the crisis communication procedure (Q4/2011). Implementation of the Incident Classification Scale procedure (Q4/2011). Exchange of experiences in the operational area (focusing on voltage stability) (Q4/2011). Investigation of the issue of deteriorating quality of the system frequency (Q4/2011). Analyses and investigation of the common pan-European approach regarding the determination of operational reserves (Q4/2011).	
Long-term strategy and other system development issues	Roadmap towards a pan - European power system 2050	Systematic preparation work on roadmap (Q2/2010-Q4/2010); consolidated draft (Q1/2011). Preparation of realization of the study package of “Roadmap towards a pan - European power system 2050 (Q4/2011). Position papers on such topics as transmission infrastructure technology, EMF and licensing procedures (2010-2011).	Public consultation (Q2/2011)
Transparency	Implementing the EC guideline on fundamental data transparency	Adapting and developing ENTSO-E transparency platform entsoe.net according to the requirements set by the guideline (Q3/2011)	
TSOs’ economic framework	Investment incentive schemes	Work on this topic will be combined with continuing work on tariff harmonization	