



European Network of
Transmission System Operators
for Electricity

ENTSO-E WORK PROGRAM

2010 THROUGH DECEMBER 2011

DRAFT FOR PUBLIC CONSULTATION,
1 JULY 2010

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1. INTRODUCTION

The preparation of an annual Work Program is one of the key deliverables required from ENTSO-E under the EU's third Energy Package (Article 6, Regulation 714/2009). As the third Package has begun its implementation phase in 2009 (which will be largely complete in 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 goal is that formal work on network code developments can progress rapidly after March 2011. The formal process can only begin after the Agency for the Cooperation of Energy Regulators ACER can execute its tasks, i.e. from 3 March 2011, as the code process includes major ACER tasks such as framework guidelines. This Work Program shows how the shared preparatory work involving besides ENTSO-E primarily the European Commission and ERGEG but also stakeholders is to lead to fast 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. The involvement of the European Commission, the Member States, ACER and extensive consultation will ensure that the codes are well balanced. Making the codes binding for others remedies a difficult shortcoming of the European energy market 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, but at a European level no one could impose these rules on other market participants whose cooperation is often crucial for operational security and market integration.

Section 2 motivates the choices 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 in the third Package are highlighted in sections 3 and 4, i.e. the Ten-Year Network Development Plan, a consolidated R&D plan, and measures for improved operational coordination. Overall, the chosen priorities are not only informed by the third Package but also by the other pieces of legislation relevant to TSOs. The priorities in this Work Program are also consistent with the three-year planning approach jointly undertaken by the European Commission, ERGEG, ENTSO-E and ENTSG to plan network codes and other work products that require interfaces between them such that the highest priorities can be achieved with available resources, and also 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, a

secure integration of renewable resources and a reliable future-oriented grid, adequate to energy policy goals.

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 according to 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 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 the importance for secure network operation, integration of renewable energy sources and market integration, and on the other hand on enough clarity and consensus between TSOs, regulators and market participants on 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 currently known plans for ERGEG inputs to framework guidelines, the preparatory work aiming at 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 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 to deliver the draft network codes by mid 2012.

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 the hoped-for experience with the process of framework guidelines and code drafting and the associated consultations according to the Regulation's Article 6, in close collaboration with ERGEG. It is thus demonstrating the efficiency and the practical benefits for the new approaches made possible by the 3rd Package's network code processes. For the pilot code topic, one 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 next years. A goal is to identify and develop European rules harmonizing Grid Code requirements particularly relevant to connecting wind generators to transmission networks across Europe. The advantages of harmonisation were described already 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 the structural harmonisation and to ensure simplicity and maintainability of the code, the pilot code core will consist of connection requirements common to all generators irrespective of technology. Technology specifics will be dealt with in dedicated sections, with priority given to the one including wind generators. Shortly after, the sections for all other technology specifics 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 Distribution System Operators (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.

This 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 shall lead regulators to select between possible policy options; the framework guideline will cover the network connection issue as a whole. Preparatory work on the pilot code already started in mid-2009, and the European Commission, ERGEG and ENTSO-E agreed that for this pilot project, parallel and closely coordinated work should proceed on framework guideline and 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 to the later ACER framework guideline. The resulting network code will need to go through the formal steps again after the Agency's tasks are in force, but with 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 fast. This means availability of an ACER-approved framework guideline by about June 2011, and intense 6-month work finalizing the network code on that formal basis, primarily focusing on consultation. Comitology could thus begin in first half of 2012.

b. Market codesDesign for market integration

The highest priority of the Market Committee and its most important preparatory work for network codes concerns designs for market integration. Acknowledging the Florence Forum's support of the target model, the three market integration projects set up in the framework of the Ad-hoc Advisory Group are expected to provide substantial input to a framework guideline on capacity allocation and congestion management, and to related network codes on subject matters such as capacity calculation, intraday market and day-ahead market during 2010. ERGEG is expected to deliver a draft framework guideline on capacity allocation and congestion management for the autumn 2010, acting "as if". 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 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, followed by the formal network code development process. Taking into account the outcome of the work done during the "as if" phase it is expected that the formal network code development process may be shortened to 6 months for these codes, i.e. 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 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 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, and also 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 two codes are drafted at the same time. Scoping work on the following two codes has already begun in early 2010, will continue jointly with ERGEG until ERGEG begins its framework guideline work in Fall 2010, and will continue in parallel with the framework guideline work until mid-2011. Thereafter formal network code work is foreseen, 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 are to ensure that the high operational security standards already reached in the different synchronous areas can be harmonized and improved while challenges to secure operation increase markedly, from 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 reliability of transmission, quality of electricity, stability for system and coordination of system operation. This includes requirements mostly to TSOs but also to

DSOs, generators and consumption units connected to the grids. These principles shall be the basis for other, more detailed codes later.

- 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 a more and more difficult challenge. The preparatory work will analyze the existing rules in the five synchronous areas and derive as many as possible aspects that can be formulated as pan-European rules. As other operational codes, this one is thus 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 consists in comparing and analyzing the frameworks existing in all five synchronous areas. Based on those analyses, the areas and detailed scope of the network codes are being developed.

The network codes prepared by ENTSO-E are not intended to replace the necessary national network codes for non-cross-border issues. But all codes focus on close cooperation among the TSOs, and among TSOs and system users, to reach the main goal – an integrated pan-European electricity market built on a secure operational platform. TSOs will continue working in regional structures within the overall ENTSO-E cooperation structure, whilst ensuring that results at the regional level are compatible Europe-wide.

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 has already published a pilot TYNDP for consultation on 1 March 2010, and has described as part of the Plan the intentions for methodological developments towards the next releases in 2012 and 2014. ERGEG, Commission and stakeholder input from the consultation and from ERGEG's evaluation of the TYNDP will of course influence these intentions.

The pilot Plan shows for the first time a pan-European view on necessary grid developments of European relevance. Each of the almost 500 projects has been subject to market and network intense studies, usually involving at least two and often several TSOs in a region or even Europe-wide. An appendix gives some examples of several such regional studies. Methodological improvement 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 which will lead to the elaboration of regional network plans for the six ENTSO-E system development regions within 2011 and based on harmonized criteria and methods. 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 one important driver for network planning, is to be introduced on a regional basis and harmonized with respect to criteria and methods for the 2012 TYNDP, where applicable, but latest for the 2014 TYNDP.

An important feedback from the 2010 TYNDP consultation was the urgency with which generation owners and investors view a Europe-wide coordinated 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 it is available. The following update is foreseen during 2011 already: 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 end 2010. If those system adequacy data suggest a significantly different generation scenario for 2020 from the ones in the pilot TYNDP, ENTSO-E is to analyse and describe the potential different effects on the 2020 grid in mid-2011.

ENTSO-E also plans to intensify during 2011 its discussions with ENTSOG on interactions between the gas and electricity Ten-year plans and its works 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 be given to the 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 its R&D Plan not a part of this Work Program but to publish it separately. It is the intention of ENTSO-E to update this plan every two years. The 2010 publication occurred 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 of course especially to its European Electricity Grid Initiative. Through its R&D Plan, ENTSO-E ensures the cross-functional coordination over all TSO research subjects. ENTSO-E will launch projects through an open selection procedure. 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. Coordination of operation of the network: In addition to the operational network code described in section 2 above, which will contribute to a certain harmonization of operational tools, the initiatives begun in 2010 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 that is the preparation of an ENTSO-E Awareness System, providing the real-time information about system status and by this enabling TSOs to react immediately in case of unusual system conditions. Complementarily, ENTSO-E will implement the crisis communication procedures allowing TSOs better and timely information to the public in case of emergency situations in the system and following up on the deliverables of 2010, ENTSO-E will implement the Incident Classification Scale procedure. The already existing processes to forecast possible congestions e.g. the Day Ahead Congestion Forecast (DACF) will be further developed and made compatible for European wide application. The System Operations Committee will also continue exchange of experiences in the operational area, including organization of dedicated internal workshops; in 2011 focusing on voltage stability. 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 analyses and investigation of the common pan-European approach regarding 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 aiming at achieving common planning standards has been conducted during 2010 and will be further elaborated in 2011.

- d. Long-term system/grid strategy: In early 2010, systematic work on a roadmap towards a pan-European power system 2050 was kicked off; this will be continued 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 by them within ENTSO-E. A further input to the long-term future consists of progress with studies on possible extensions of synchronous operation which will be on-going. These studies will continue to be performed under very close consultation with the European Commission. Finally, possible off-shore grid designs will continue to be an area of study for ENTSO-E.
- e. Other system development issues: Additionally, as already in 2010, position papers on such topics as transmission infrastructure technology, EMF and licensing procedures will be written. In this context, ENTSO-E position papers will propose common visions on the modalities of using innovative technologies, develop argumentation lines for speeding up licensing procedures, and prepare contributions to any debate on electro-magnetic fields (EMF) concerning exposure of the general public and/or exposure to workers. They 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 functioning, 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 carried out in close co-operation with ENTSO-E in an ad hoc joint Working Group between 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 in 2011. This implementation will require substantial development of the ENTSO-E transparency platform entsoe.net in order deliver in due time reliable information on a larger volume of data than is done today. In this context, ENTSO-E will also follow up on the Transparency Workshop with stakeholders, held in 2010.
- g. Other market development issues: Investment incentive schemes, a work area described in the new Electricity Regulation, is also a priority work area 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 of the costs of new transmission with 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 focuses again on the important new tasks assigned to the TSOs at pan-European level: network development planning, R&D, operations coordination, and in particular network codes and TYNDP. Especially the development of network codes are subject to intense 3-year planning with the Commission, ERGEG and ENTSO-E, 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 all of these, major progress on the way towards Comitology and Europe-wide binding implementation is planned for 2011.

In addition to the high priority items listed in this Work Program, ENTSO-E's Committees and groups carry out many other activities, largely in continuation of the work of the prior associations. Examples are statistical and technical data, network maps, electronic data interchange (EDI) and data exchange (Common Information Model) standards, critical systems protection, asset implementation and management, requests for extensions of the continental Europe synchronous area, and legal and regulatory issues affecting many work items including 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 only due in 2011 and may also lead to work items fine-tuning those basic 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 formal monitoring of 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	<p>The three market integration projects provide structured input to:</p> <ul style="list-style-type: none"> - a framework guideline on capacity allocation and congestion management: - network codes on subject matters as capacity calculation, intraday market and day-ahead market <p>Drafting of codes ("as if")/(formal network code development process)</p> <ul style="list-style-type: none"> - 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	<p>Structured input to the Network Codes on:</p> <ul style="list-style-type: none"> - 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	<p>Completion of the pilot code (under assumption that ERGEG framework guideline is completed and the EC letter is received by the end of 2010)</p> <p>Q1/2011 – Q4/2011</p>	Stakeholder consultations will take place Q1/2011

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

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