European Network of
Transmission System Operators
for Electricity

ENTSO-E WORK PROGRAM

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1. INTRODUCTION

ENTSO-E's third published work program, covering the remainder of 2011 and the year 2012, is especially important for three reasons:

- It is the first ENTSO-E work program published after 3 March 2011, i.e. since the 3rd Internal Energy Market package and especially Regulation 714/2009 applies. This Regulation on cross-border electricity trading assigns important tasks to ENTSO-E. Many ENTSO-E tasks are now performed in legally defined, formal cooperation with regulators and the European Commission, and with stakeholders and network users. This legal formality is the basis for some ENTSO-E work products, such as network codes, to become EU legislation through Comitology.

- There is a high level of citizen, national, regional and European Union – wide interest in many aspects of energy supply. The public is realizing how important transmission is for the desired changes in energy supply, especially those related to climate protection and renewable energy sources.

- The lawmakers in the European countries and in the EU – Council, Parliament and Commission – have realized that the key objectives of European energy policy all depend on stronger transmission networks: security of supply, sustainability and affordability. They now support streamlined infrastructure permitting procedures and regulatory incentives necessary for the large expansion and changes Europe's transmission network needs to undergo.

ENTSO-E's work in 2011-2012 responds to this new 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.

This work program is built on five main deliverables:

- Progressing key network codes
- Preparation and publication of the 2012 Ten Year Network Development Plan
- Investigating the form and need for electricity highways
- Championing public acceptance of electricity infrastructure
- Pursuing research and development towards stronger and smarter grids

In addition the ENTSO-E work program identifies subjects for regional TSO cooperation and significant IT projects.

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 program is a legal duty, ENTSO-E does not develop this program on its own. The priorities in this work program 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 program consultation also helped 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).

2. DEVELOPING NETWORK CODES

The preparation of network codes is a major task assigned to ENTSO-E by Regulation 714/2009. The Regulation includes a list of subject areas which together cover most technical and market details important for the effective implementation of the Internal Electricity Market (IEM), and the formal code development process. This process involves European Commission prioritization, preparation (by ACER) of a Framework Guideline (FG), a Commission request (to ENTSO-E) to draft a network code in line with the FG. A network code must be completed within a 12 month period, and in accordance with the ENTSO-E network code development process, which includes extensive stakeholder consultation. Once a code is completed (and has been approved by the ENTSO-E Assembly) it is submitted to ACER for an opinion. Assuming a favourable opinion is forthcoming, a Comitology procedure is then undertaken in order to translate the codes into European law and make them binding for TSOs, Distribution System Operators (DSOs), generators and other market participants.

Important aspects of this process are described in ENTSO-E's Rules of Procedure and especially in the Rules' Consultation Process and Network Code Development Process documents. Although ENTSO-E appreciates the strong stakeholder interest in how these processes are generally performed by ENTSO-E, this Work Program is not the place to duplicate these processes' descriptions. In particular, ENTSO-E will ensure at all times that these processes in an appropriate way:

- Involve operators of distribution systems where their role differs from that of other consulted network users,
- Support the Commission's need to provide impact assessments, possibly involving benefit-cost analyses on important policy issues, for the new legislation it proposes to Comitology on the basis of network codes,
- Ensure the network codes are compatible with energy policy goals for 2020 and beyond,
- Ensure the network codes focus on cross-border issues.

The Three-Year Plan agreed between ENTSO-E, ACER and the Commission provides an indicative schedule for development of network codes and related consultations. In developing and updating the Three-Year Plan, the Commission, ACER and ENTSO-E pay particular attention to possible inter-relationships between different codes, and in drafting the codes ENTSO-E pays constant attention to the best possible consistency between them. Furthermore, consistent with the Three-Year Plan but providing additional detail, ENTSO-E will publish on its website in a timely manner a detailed timetable for foreseen consultations to foster efficient stakeholder preparations and participation.

In line with the Commission's priorities and the Commission/ACER/ENTSO-E Three-Year Plan, ENTSO-E's 2012 network code work will cover the most important topics for completion of the IEM, the integration of renewable energy and security of supply:

a. <u>Codes for Grid Connection</u>

ACER issued on 20 July 2011 the FG on Electricity Grid Connection. This FG topic was chosen along with the generation connection network code topic as a pilot project to practice the new procedures in the interim period between Regulation 714/2009 taking effect in 2009 and applying from 3 March 2011 on. The pilot project was not only successful for this practice purpose, but is also enabling both ACER and ENTSO-E to complete their tasks on the first FG and the first code shorter than normal time, now that the formal process applies. Four network codes are foreseen to result from this FG:

- Network Codes on Generation Connection, and on Demand Connection, have been identified as necessary for the effective implementation of the IEM, and these will be progressed as a first priority. A formal invitation letter relating to the code on generation connection is expected shortly after the finalization of the FG.

- Depending on the results of future scoping discussions, codes on connection procedures and a HVDC connection code will be developed at a later date.

The grid connection codes take up over 10% of the ENTSO-E Secretariat staff's time and involve about 30 member TSO experts. Typically for drafting teams, it meets about once a month to discuss technical details and how to take stakeholder comments into account. The Secretariat's web site is being updated to handle the expected multitude of stakeholder comments for these and all other network codes as transparently as possible.

Generation Connection

This pilot code addresses urgent issues arising as a consequence of high and rising volumes of renewable energy connecting to Europe's networks. Non-harmonized and outdated technical connection conditions for wind, solar and other generation equipment was threatening secure system operations. The pilot process was especially valuable since it allowed earlier engagement of the many affected stakeholders, i.e. the owners, operators and manufacturers of generation equipment of all technologies, sizes and connection voltage levels, and thus allowed a fuller consideration of the complex issues involved in generation connection. ENTSO-E released the current version of the pilot code on generator requirements in March 2011. Following receipt of the European Commission's invitation letter in summer 2011, ENTSO-E will comprehensively review the pilot code against the requirements in ACER's final FG and make updates and revisions where appropriate. ENTSO-E will seek views from stakeholders in the last quarter of 2011 and first quarter of 2012, aiming to to deliver the final draft code by June 2012.

Demand Connection

The Network Code on Demand Connection will complement the code on generation connection by setting out requirements which will apply to the demand side of the power system and will contribute to system security and efficient load management.

Scoping and preparatory work will be conducted throughout 2011 and the draft code is expected to be finished in the 1st quarter of 2012. Consequently, the formal consultation process is expected to be conducted in the 2nd quarter of 2012 with the aim of delivering the final draft Code by the end of 2012. Informal consultations and intense discussions especially with DSOs will take place already in the drafting phase.

b. Codes for developing the Internal Energy Market

Congested transmission capacities are one major reason why the full benefits of an integrated European wholesale market have not been achieved yet; this is why a stronger grid is such high priority (see following sections). But much has been learned over past decades about the best methods for allocating scarce capacities and managing congestion, leading to the European electricity market target model agreed by all stakeholders in the Florence Forum in December 2009. ENTSO-E and its member TSOs, in close cooperation with power exchanges, have been already and will continue to enlarge the areas of regional day-ahead price coupling and implicit intraday trading in line with the target model, e.g. in Northwestern Europe. But network codes will be needed to ensure harmonized implementation of the target model in all of Europe. During 2012, significant work will be undertaken in developing network codes which specify rules for allocating capacity and managing congestion in different time horizons.

Capacity Allocation and Congestion Management (CACM)

The CACM network code will set out methods of capacity allocation in the day-ahead and intra-day timescales and will outline the way in which capacity on cross border lines will be calculated.

In order to ensure that sufficient time is available to develop and consult on the network code, ENTSO-E launched the scoping and preparatory phase of drafting the CACM network code in Q1 2011, including systematic stakeholder involvement. ENTSO-E expects to receive the official invitation letter to begin developing the CACM Network Code in the 3rd quarter of 2011. Informal and formal consultation on the draft network code will take place during the second half of 2011 and 2012. .

The CACM network code will have important interactions with the “Governance Guideline” being developed by the European Commission which outlines the respective roles and responsibilities of parties within the market coupling process. This guideline is expected to be developed and consulted on during late 2011 and early 2012.

A forward markets network code is expected to be developed after the CACM network code, and will build on and complement it. The official invitation letter by the European Commission is expected in the 3rd quarter of 2012.

Balancing Network Code

The timeframe closest to real-time addressed in the target model is balancing, but the target model provides few details. Scoping by ACER and ENTSO-E of the appropriate content is especially important for this FG and code. It is expected that the FG on balancing will be developed by ACER during 2011 and issued in 2012. The Balancing Network Code will have important market and operational aspects and is, e.g., closely related to capacity calculation and intraday trading rules. Therefore, formal work on the code is expected to start after submission of the final draft of the Network Code CACM, and after the draft Network Code on Load-Frequency Control and Reserves (see below) has entered its consultation phase, i.e. in late 2012.

The market codes take up about 10% of the ENTSO-E Secretariat staff’s time and will involve about 50 member TSO experts as well as a stakeholder group.

c. System operation related network codes

ACER plans to complete the FG on System Operation in the 4th quarter of 2011. The FG is expected to cover three topics each of which will require separate network codes to be prepared. These codes are:

- A network code on operational security;
- A network code on operational planning and scheduling; and
- A network code on load-frequency control and reserves.

The official invitation letter by the European Commission to draft the first of these codes is expected in the 4th quarter of 2011. In light of available resources, relative urgency and the need for close coordination with market related network codes, ENTSO-E plans to develop the system operations network codes adopting the following priority..

Network Code on Operational Security

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.

Once developed, the standards defined in the network code will be applicable to TSOs, DSOs, generators and consumption. Scoping work on the Network Code on Operational Security has been underway for some time and was recently completed. During the second half of 2011 and 1st quarter of 2012 work will be consolidated and prepared for formal consultation with stakeholders, which will be conducted in the 2nd quarter of 2012. However, informal consultations will take place already in 2011 so that stakeholders become aware how connection, market and operational codes form a consistent set of rules. The final draft of the Code is expected in the 4th quarter of 2012.

Network Code on Operational Planning & Scheduling

ENTSO-E recently stepped up efforts to plan the Network Code on Operational Planning and Scheduling. The decision to accelerate work in this area was taken in light of the increasing complexity being experienced by Europe's system operators. As the amount of fluctuating wind and photovoltaic energy connected to networks increases, the system operation challenge becomes more complex and the need for consistent and coordinated approaches becomes more pressing. The challenges which staff in TSOs' control centers face require increased levels of standardization in order to enable best practice based approaches to be undertaken in all control centers and to identify investments in operational tools or human resources required to overcome these challenges.

Scoping and preparation of the draft Network Code will take place during the remainder of 2011 and during the 1st and 2nd quarters of 2012. The process of formally consulting stakeholders is expected to take place in the 3rd quarter of 2012 with the final draft Code being delivered in the 1st quarter of 2013.

Network Code on Load Frequency Control & Reserves

The Network Code on Load-Frequency Control and Reserves is also urgent because the uncertainties related to transactions in the liberalized market and the increasing amounts of fluctuating renewable energy make real-time balancing management an increasingly difficult challenge. The existing rules in the five synchronous areas have to be analyzed identifying as many areas as possible that lend themselves to the development of pan-European standards.

Scoping and preparation of this Network Code will last throughout 2011 and will be intensified in 2012. The draft Code is expected to be finished in the 3rd quarter of 2012, with formal consultation taking place in the 4th quarter of 2012. Thus, the final draft Network Code on Load-Frequency Control and Reserves is expected in the 2nd quarter of 2013.

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

d. Conclusion

It is important to recognize that the network codes prepared by ENTSO-E are not intended to replace the national codes and regulatory frameworks that relate to non-cross-border issues. However, all codes will require close co-operation among TSOs, and between TSOs, system users and other markets participants, in order to achieve the objective of creating an integrated pan-European electricity market. TSOs will also continue working within the regional structures of ENTSO-E whilst ensuring that any results developed at the regional level fit together on a Europe-wide basis. ENTSO-E recognizes the importance of a transparent process and extensive stakeholder engagement and expects that issues impacting stakeholders will be addressed through informal consultations early in the process of developing network codes and in formal consultations as codes become more established.

In aggregate, ENTSO-E's network code work takes up about 30% of its Secretariat staff's time and involves over 100 member TSO experts.

3. THE TEN-YEAR NETWORK DEVELOPMENT PLAN (TYNDP)

According to the 3rd IEM Package, ENTSO-E is required, every two years, to develop a Ten-Year Network Development Plan (TYNDP). The TYNDP aims to ensure greater transparency regarding the requirements for grid development at a European level, thus supporting decision making processes at European, regional and national level.

The Pilot TYNDP

The Pilot TYNDP, published in mid 2010, provided a view on required transmission grid developments of pan-European relevance for the next 10 years, and identified the challenges that TSOs are confronted with in the grid development process (e.g. permitting, financing, public opposition). Each of the almost 500 projects outlined in the TYNDP was the outcome of thorough studies, usually involving at least two (and often several) TSOs in one or more regions.

Building on the Pilot - the TYNDP 2012

In comparison with the Pilot TYNDP the TYNDP 2012 will contain:

- A new top-down scenario is included. It is based on the 20-20-20 targets (derived from the National Renewable Energy Action Plans submitted by Member States in summer 2010), and will complement bottom up scenarios for load and generation (scenario B – TSOs' best estimate scenario, and A – TSOs' conservative scenario). Alongside these scenarios, all six ENTSO-E Regional Groups (RG) under the System Development Committee will test their grid against numerous planning cases according to their RG load and generation patterns.

- Integrated market modeling based on a common pan-European market database is performed by all RGs.

- Integrated European network models targeting the year 2020 are made available to all the RG for regional network analyses.

- Clear project assessment indicators are defined, based on new methodologies developed within ENTSO-E.

- 3rd party projects are included according to criteria described in the guideline document "Inclusion on the third party projects in the 2012 release of the TYNDP", made available to all stakeholders in March 2011.

The TYNDP 2012 will be a comprehensive package consisting of: the TYNDP 2012, the six regional investment plans (RgIP), and the Scenario Outlook & Adequacy Forecast (SOAF) 2012-2026. The information within these documents will be complementary.

The wealth of studies and analyses that needs to be performed in order to deliver the TYNDP necessitates a sophisticated data management mechanism. ENTSO-E will take steps to put this mechanism in place during 2012 in the form of a Network Modeling Database (NMD) (and will take steps to refine, develop and improve this tool over subsequent years).

The TYNDP 2012 package will be publicly consulted on for 2 months. We currently expect this period to begin in March 2012 which would enable the release of the final TYNDP package in June 2012. However, recent nuclear developments have made the definition and analysis of realistic scenarios yet more difficult. It is likely that this will lead to intense sensitivity analyses on the market scenarios (chosen already in January 2011) during the final stages of the TYNDP 2012, i.e. in early 2012. It is possible that the overwhelming interest of producing a useful and realistic plan forces ENTSO-E to delay the public consultation and final publication of the 2012 TYNDP by several months.

ENTSO-E considers it crucial that politicians and stakeholders develop a general consensus on the TYNDP's list of European grid projects to be implemented in the next ten years in line with the principles of the forthcoming Energy Infrastructure Package. Therefore, strong efforts have been and are being made to involve stakeholders in the early stages of the TYNDP work process through a public consultation on the TYNDP scenarios accompanied by a public workshop (February 2011), a second public workshop on TYNDP methodologies (June 2011), regional workshops with preliminary results (autumn 2011) and a two-month formal consultation in March 2012, publishing the most important parts of the material ahead and complementing it with a public workshop.

The quality of TYNDP 2012 will build on the pilot TYNDP by applying improved methodologies which are made public. ENTSO-E believes that the transparency of the conducted analysis and material used

towards policy makers and grid users will be an important building block towards the general consensus and support for the grid projects the TSOs plan for.

TYNDP 2014

Due to the scale of the analysis required to deliver a coherent, pan European assessment, work relating to the TYNDP 2014 will be initiated in June 2012. ENTSO-E will work first on the construction of the planning scenarios focusing on the year 2030 in line with work which is already underway to consider the 2050 time horizon (see below). These scenarios will be the backbone of the SOAF 2013-2027, which will be delivered by ENTSO-E in January 2013. At the same time, ENTSO-E will explore further methodological improvements for the TYNDP on the basis of the continuous feedback of stakeholders. The involvement of stakeholders will also be significant during the elaboration of the TYNDP 2014 scenarios, with a public consultation foreseen at the end of 2012.

Future TYNDPs will aim to identify any development in planning procedures, financing and public acceptance, and highlight best practice approaches adopted by TSOs and Member States to overcome them. This is necessary to adjust the development of local and regional needs, such as the integration of off-shore wind parks.

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.

4. ELECTRICITY HIGHWAYS: A MODULAR DEVELOPMENT APPROACH

While the 3rd IEM Package defined for the first time a responsibility for ten-year network plans and gave that responsibility to ENTSO-E, it has since become clear, partly through the work on and discussion provoked by the Pilot TYNDP, that horizons beyond 10 years also require Europe-wide study. In line with the ENTSO-E R&D Plan published in early 2010, the architecture of the future European transmission grid needs to be studied urgently and systematically. In its November 2010 Communication ""Energy infrastructure priorities for 2020 and beyond", the Commission recommends that a modular development plan on electricity highways should be prepared by ENTSO-E. In December 2010, the 19th Florence Forum supported the proposal to set up a dedicated Electricity Highways Platform led by the European Commission in cooperation with ENTSO-E and regulators, with the involvement of all relevant stakeholders.

ENTSO-E's first deliverable in this context, a draft three-year Study Roadmap, defines the relevant technical/technological, financial/economic and political/socio-political issues to be analyzed in the Modular Development Plan for a Pan-European Electricity Highways System (MoDPEHS). Following public consultation, this Study Roadmap shall be finalized in July 2011. During the second half of 2011, in cooperation with the Electricity Highways Stakeholder Platform, ENTSO-E shall facilitate the establishment of a study consortium (TSOs and external partners) and the submission of an application for EU funds for the three-year in-depth study. ENTSO-E will exercise its influence for the formation of the study consortium and for other aspects of the governance of the study such that the study has the broadest possible input and support from relevant stakeholders. This is important because ENTSO-E intends this study to be the most authoritative basis for future European discussions and decisions

about electricity highways. Continuous information of stakeholders not included in the consortium will be assured through the Electricity Highways stakeholder platform announced at the Florence Forum.

By the end of 2011, ENTSO-E will further contribute to the MoDPEHS by releasing a framework position paper on the boundary conditions. Throughout the three-year period, ENTSO-E shall closely monitor the intermediate deliverables of the study and communicate widely the results.

The MoDPEHS work is forecast to cost about 10 million Euros of TSO, academic, consulting, manufacturer and grid user expertise.

5. PUBLIC ACCEPTANCE OF NEW INFRASTRUCTURE PROJECTS AND INVESTMENT INCENTIVES

Slow permitting procedures and a lack of public acceptance of new transmission infrastructure are highly significant impediments to system development. 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. In 2012 ENTSO-E position papers on streamlining permitting procedures and on methods to increase the public acceptance of transmission infrastructure will be written, updated and refined.

The Commission's November 2010 energy infrastructure communication acknowledges the importance of permitting and public acceptance. In 2012, ENTSO-E intends to continue working with the Commission, regulators and especially with a view on the Energy Council to support the development of campaigns to improve public acceptance of new transmission infrastructure. Such campaigns, with European and national aspects, should be led by national governments and the Council, but supported significantly by TSOs. These campaigns, we expect, will need to emphasize the importance of additional transmission capacity for the very challenging transformation of the energy system towards CO_2 neutrality, and at the same time, highlight the central role of the energy system for our society. ENTSO-E intends to contribute to these arguments by continuing to emphasize information from its TYNDP and 2050 electricity highways work on the overall benefits and costs of transmission development.

Further to permitting and public acceptance issues the Commission's communication highlights the importance of investment incentives. ENTSO-E is strongly committed to collaborate with key stakeholders on developing appropriate financial and regulatory mechanisms to support the required European grid infrastructure investments.

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

6 THE RESEARCH AND DEVELOPMENT PLAN (R&D PLAN)

The R&D plan is an important deliverable of ENTSO-E required by Regulation 714/2009. Because of the quantity and complexity of the consolidated R&D plan for TSO needs for the next eight years, ENTSO-E has chosen to publish its R&D plan separately from its Work Program. Moreover, on 28

September 2010, ENTSO-E created a separate R&D Committee to steer the corresponding ENTSO-E activities.

The R&D Plan 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. 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 preliminary work towards Europe-wide implementation of successful R&D results. ENTSO-E will regularly update the R&D Plan to take account of EEGI developments.

The EEGI was officially launched in June 2010. EEGI Implementation Plan and Roadmap were announced for public consultation in the beginning of 2011. ENTSO-E scheduled to release an updated version of the 1st edition of the ENTSO-E R&D Plan that reflects 2011 status and takes into account the answers obtained through the EEGI public consultation. ENTSO-E also takes part in a consortium for a project which is to support the networking process of the EEGI 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.

ENTSO-E plans to issue the 2nd edition of the ENTSO-E R&D Plan by the end of 2012 in line with EU legislation and the EEGI schedule. This edition of the ENTSO-E R&D Plan could cover additional perspectives of the smart grids solutions investigating cyber security and operational security issues. The R&D Plan, R&D Committee and two related Working Groups take up about 5% of the ENTSO-E Secretariat staff's time and involve about 50 member TSO experts.

7 Enhancing TSO cooperation

The previous sections focused on the outputs which ENTSO-E is legally required to deliver. However, ENTSO-E's activities reach far beyond this and span a large number of areas of TSO cooperation. While it is impractical to list all of them here, a limited number of issues especially important during 2012 are summarized below.

a. Coordination of network operation: 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 in 2010 and will continue throughout 2011 and 2012 to work towards common network operation tools to ensure coordination of network operation in normal and emergency conditions:

- 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. The work on EAS will be continued in 2011 leading to implementation of a pilot EAS at the end of the year. The full implementation of EAS can be expected in the 1st quarter of 2012. It will be followed by an analysis of TSOs' experiences in the 3rd quarter of 2012 and completed till the end of 2012 by a plan for possible further EAS functionalities.
- ENTSO-E has established a communication network (Electronic Highway - EH) that provides the necessary infrastructure to support all data exchanges among TSOs. The EH is a private network that operates under the responsibility of the member TSOs. To achieve high quality information exchange among TSOs on a pan-European level, TSO communication standards

are necessary. Defining these standards will be one of key areas of TSO cooperation in 2012. To this end, Policy 6 of the Operation Handbook of the ENTSO-E Regional Group Continental Europe will be used, reworked and adapted for pan-European use.

- As foreseen in the 3rd IEM Package, ENTSO-E already drafted an Incident Classification Scale with the aim to rank the events affecting system operation to their level of importance with regard to system security. This common disturbances classification scale will be tested in 2011 and will be further developed and implemented in 2012.
- Tools and infrastructure necessary for system operation are critical and need to be adequately protected. This requires the identification of rare events with a high impact on the whole system, the so-called High Impact Low Frequency (HILF) events. In 2010 ENTSO-E conducted a survey among TSOs in order to collect data on crisis management, existing and planned countermeasures, and information exchange with relevant authorities as regards electromagnetic impulses, pandemic influence, earth quakes, extreme winds, floods, icing, snow avalanches, landslides, cyber attacks, coordinated physical attacks etc. This work will also take into account lessons learnt from the incidents in Japan after the earthquake, tsunami and nuclear power plant accident, and will continue throughout 2011 and in the first half of 2012 leading to an ENTSO-E position paper on HILF events in the 2nd quarter of 2012.
- Frequency deviations are connected to energy exchange schedules at the change of hours. To alleviate the problem, coordinated activities of TSOs and generators will be necessary. The ENTSO-E/Eurelectric Joint investigation Team on system frequency deviations started its common work in December 2009. These efforts will lead to a final document in the 4th quarter of 2011. Then, a follow-up on the findings of this investigation will be performed in the beginning of 2012.
- ENTSO-E has concluded that job-related education and training of engineers must be an important 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 aims to create an Academy to further selected TSO-specific aspects of education and training on the pan-European level. For an efficient and focused start, the initial scope of the Academy in 2011 and 2012 will be focused on system operation and security of supply issues.
- With increasing contributions from fluctuating renewable energy sources and increasing cross-border trade, day-ahead and intraday power flow analyses going beyond the own control area are becoming a more and more important part of all TSOs' operational planning activities. TSOs have realized this years ago, and today can build on significant experience with wider area power flow analyses for operational planning, including with the DACF (day-ahead congestion forecast) files in ENTSO-E's Regional Group Continental Europe, with TSO cooperation like TSC, CORESO, MIBEL, and lately with inter-TSO balancing platforms. This experience provides a good basis to improve coordinated system operation further. In 2012, ENTSO-E will undertake corresponding actions particularly focusing on improving the security calculations. For this, the requirements of the Network Code on Operational Security will also be taken into account.
- Synchronous operation of the Turkish transmission system with the transmission system of the Regional Group Continental Europe is a matter of Regional Group decisions. The trial synchronous operation of the two systems started on 18 September 2010 and will continue

throughout 2011 and into 2012. Afterwards, an evaluation of this activity will be needed to support the decision about permanent, secure parallel operation. This evaluation is to take place in the first half of 2012.

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, and the EAS project about 30% of the 2011 and over 10% of the 2012 communications and project budget.

b. System development issues:

- 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:
  - ENTSO-E Winter and Summer Outlook Reports which 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 neighboring countries to contribute to the generation/demand balance in critical situations. Recent nuclear policy decisions by some Member States have further increased the importance of these reports, and ENTSO-E will strive to adjust timing and updating of the reports to respond to political and market needs.
  - 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 will participate in working groups of different regional initiatives like the North Seas Countries' Offshore Grid Initiative (NSCOGI), Baltic Energy Market Interconnection Plan (BEMIP), North-South Interconnections WG etc. ENTSO-E will especially observe the consistency of their work from the European system development point of view.

  These system development works take up about 10% of the Secretariat staff's time and involve six Regional and one Working Group with up to 100 member TSO experts.

c. Market issues

- Supporting the development of European markets at regional level – Creating a European market requires both network codes and considerable implementation work at regional level. Regional projects, such as the Interim Tight Volume Coupling of day-ahead markets in the Nordic and Central-West regions have coupled markets and provide a basis from which further integration can develop. In this process, the Northwestern European day-ahead and intra-day pilot projects are expected to play a key role in the integration of the European markets. They also provide a useful guide regarding the rules and challenges, which network codes will need to tackle. Work in this area will continue, including setting out of cross-regional roadmaps to progressively integrate markets towards the vision of a single market by the end of 2014, building on the work of the Ad-hoc Advisory Group (AHAG), and carried forward by the ACER Electricity Stakeholder Advisory Group (AESAG).
- Transparency of fundamental data - Enhancing transparency is a key part of creating well functioning, efficient, liquid and competitive wholesale markets and thus to effective implementation of the integrated IEM. ENTSO-E has been working closely with stakeholders to

enhance transparency at the European level. ERGEG issued draft Comitology Guidelines on fundamental data transparency at the end of 2010. Subject to approval by Comitology (a procedure which is expected to start at the end of 2011), the Guidelines will be issued and become legally binding in 2012. Prior to this, ENTSO-E will conduct a public consultation on detailed definitions on fundamental data transparency to be used on the ENTSO-E transparency platform, with necessary changes and adaptations being made in 2012. This implementation will require substantial development of the ENTSO-E transparency platform (entsoe.net) in order to deliver reliable information derived from a larger volume of data than is currently the case, in line with the new Guidelines. User-friendliness, clear definitions and responsibilities, possibilities to add useful statistical analyses, and the most efficient use of existing regional platforms in line with the Guidelines will also feature in ENTSO-E's software development for the new platform.

- Ensuring TSOs face fit-for-purpose regulatory regimes and can finance investment - During 2012 ENTSO-E will continue its work on issues relating to regulation, investment incentives, financing of infrastructure and incentives-related aspects of transmission tariffs. Priorities for the year are expected to involve work on tools and recommendations developed as part of the European Commission's Energy Infrastructure Package, with ENTSO-E roles to include making legislative suggestions and later monitoring implementation. Considerable time will also be devoted to managing ENTSO-E's input to expected Comitology Guidelines on investment incentives and, potentially, developing appropriate incentives for promoting cross border trade.
- Evaluating other aspects of market design - During 2012 ENTSO-E will also continue to consider issues related to the design of markets. This work is expected to cover issues such as the interaction between capacity markets and the Europe wide target models for capacity allocation and congestion management, and the development of balancing schemes at European and regional level. Moreover, ENTSO-E plans to contribute to the assessment of the annual cross-border infrastructure compensation sum under the Inter-TSO Compensation (ITC) Guidelines that ACER intends to do in 2012.

  These market-related tasks take up about 10% of the Secretariat staff's time and involve six Regional and several Working Groups with some 200 member TSO experts. The new fundamental data transparency platform takes up about 20% of the 2011 and over 50% of the 2012 communications and projects budget.

d. Renewable energy issues - 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 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.

  A key challenge for ENTSO-E will lie in effectively and clearly communicating our role as facilitators of a low carbon economy.

e. Communication issues: In 2012, ENTSO-E will continue its activities in the area of internal and

   external communication of information relevant for the member TSOs and stakeholders. The focus will be on the processes related to network code public consultations, and final draft delivery of the Network Codes on Generation Connection, DSO and Industrial Load Connection, Capacity Allocation & Congestion Management, Operational Security, and Operational Planning and Scheduling. Publishing of the TYNDP 2012 will also deserve the full attention of the communication team. Moreover, in 2012, ENTSO-E intends to support the development of campaigns to improve public acceptance of new transmission (see section 5), to revamp its webpage and to fully implement its corporate design.

f. Supporting functions: In addition to the high priority items listed in this Work Program, ENTSO-E's

   Committees, groups and Secretariat will continue to carry out many other activities, partly 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, IT support in general and developing an ENTSO-E Power Systems Database (as mentioned under "c." in this chapter), 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 2012, the choice of a solution, implementation and further development will take place.

   In order to increase the level of collaboration in the association work, reduce unproductive travel time and enable involvement of more members in joint projects, ENTSO-E will continue improving its use of web and video conferencing.

   The supporting functions take up about 10% of the Secretariat staff's time and about 25% of the communications and projects budget, and involve about 100 member TSO experts.

   The attached table summarizes the work program with expected start, end and consultation time frames.

8 CONCLUSION

ENTSO-E's 3rd Work Program 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.

9 INDICATIVE SCHEDULE - ENTSO-E WORK PROGRAM 2011 – 2012

Goal	Deliverable	Status	Expected start (Qx/yr)	Expected end(Qx/yr)	Expected public consultation (Qx/yr)
Network code preparatory work - 1 System Development					
System development	Delivery of the final draft Network Code on Generation Connection	In draft form near-ready for formal consultation	Q2/2011	Q2/2012	Public consultations on the Network Code - Generation Connection: Q1/2012
System development	Scoping, preparing and delivering the Network Code on Demand Connection	Technical work underway	Q1/2012	Q4/2012	Public consultations on the Network Code on Demand Connection to commence Q2/2012
Network code preparatory work - 2 Market					
Capacity Allocation and Congestion Management network code.	Defining, in a single document, clear and consistent rules for allocating capacity in the day-ahead and intra-day timeframe, for calculating the levels of available cross border and for allocating and recovering costs.	Work has commenced on scoping and preparing the draft Capacity Allocation & Congestion Management Network Code (Capacity Calculation, Day-Ahead, and Intra-Day):	Start of formal drafting triggered by official invitation letter by the Commission to draft the Capacity Allocation & Congestion Management Network Code (Capacity Calculation, Day-Ahead, and Intra-Day): Q3/2011	Delivery of the final draft Capacity Allocation & Congestion Management Network Code (Capacity Calculation, Day-Ahead, and Intra-Day): Q3/2012	Informal consultation on the draft CACM code. Q3/Q4 2011 and Q1/Q2 2012. Public consultations on the draft Capacity Allocation & Congestion Management Network Code (Capacity Calculation, Day-Ahead, and Intra-Day): Q1/2012
Network code on Forward markets.	Preparing the Forward Market Network Code	Scoping and preparing the draft Forward Market Code: Q4/2011 and whole 2012	Start of formal drafting triggered by official invitation letter by the Commission to draft the Forward Market Code: Q3/2012	Delivery of the final draft Forward Market Code: Q3/2013	Public consultations on the draft Forward Market Code: Q1/2013
Network code on Balancing	Developing a code clearly setting out rules for the cross border exchange of reserves and balancing energy (consistent with operational standards).	Initial stages only. Scoping and preparing the draft Balancing Network Code: Q3-Q4/2011 and whole 2012	Start of formal drafting triggered by official invitation letter by the Commission to draft the Balancing Network Code: Q3/2012	Delivery of the final draft Balancing Network Code: Q3/2013	Public consultations on the draft Balancing Network Code: Q2/2013

Network code preparatory work - 3 System Operation					
Network Code on Operational Security	Delivery of final draft Network Code Operational Security	Scoping finished Preparing the draft Network Code on Operational Security Q3/2011 - Q1/2012	Start of formal drafting triggered by official invitation letter by the Commission to draft the Network Codes on Operational Security, expected Q4/2011	Delivery of the final draft Network Code on Operational Security: Q4/201	Public consultations on the Network Code on Operational Security: Q2/2012
Network Code Operational Planning and Scheduling.	Delivery of final draft Network Code Operational Planning and Scheduling.	Scoping and preparing the Network Code on Operational Planning and Scheduling has commenced and will run 2011 and Q1-Q2/2012	Start of formal drafting triggered by official invitation letter by the Commission to draft the Network Code Operational Planning and Scheduling expected Q4/2011	Delivery of the final draft Network Code on Operational Planning and Scheduling: Q1/2013	Public consultations on the Network Code on Operational Planning and Scheduling: Q3/2012
Network Code on Load-Frequency Control and Reserves	Delivery of final draft of network code on Load Frequency and Reserves	Scoping and preparing the draft Network Code Load-Frequency Control and Reserves has commenced will run 2011 till Q3/2012	Start of formal drafting triggered by official invitation letter by the Commission to draft the Network Code Load-Frequency Control and Reserves, expected Q4/2011	Delivery of the final draft Network Code on Load-Frequency Control and Reserves: Q2/2013	Public consultations on Load-Frequency Control and Reserves: Q4/2012
Ten-Year Network Development Plan (TYNDP)					
TYNDP 2012	Determine the trends, needs and future development of the transmission network at pan-European level based on common market and network models. Publish the 2012 edition of TYNDP	In initial stages of work	Commenced in 2011 and will run for the whole year Preparation on the 6 regional investment plans	Delivering the draft TYNDP 2012: Q1/2012 Delivering the final TYNDP 2012: Q2/2012	Public consultations on the draft TYNDP 2012: Q2/2012
Scenario Outlook & System Adequacy Forecast	Scenario Outlook & System Adequacy Forecast report 2012 and	Commenced initial discussions on reporting and data requirements	Preparation on the SOAF 2012-2026	Q1/2012	N/A

	Preparation of the 2013 report	Not commenced	Q2/2012	Q1/2013	N/A
TYNDP 2014	Delivery of the SOAF 2013-2027:	Yet to commence			Consultation of TYNDP 2014 scenarios: Q4/2012
Research and Development Plan (R&D Plan)					
Research and Development coordination	ENTSO-E to coordinate across TSOs' research subjects.	Updated version on the 1st edition of the ENTSO-E R&D Plan: Q4/2011	Design (Q1-Q3/2012) and approval (Q3/2012) of the 2nd edition of the ENTSO-E R&D Plan for public consultation (Q4/2012) Survey on the R&D support in the various implementations of the 3rd Energy Package at national level: Q4/2012	Dissemination event on R&D Plan: Q4/2012Support the EC during the launching of Calls for Proposals: 2012	Public consultations on the 2nd edition of the ENTSO-E R&D Plan : Q4/2012
Implementation of the Research and Development Plan	ENTSO-E to monitor and manage implementation of the R&D plan.	Not yet commenced	Monitor the R&D Plan as a whole (report on R&D plan monitoring): 2011-2012	Communication on the R&D plan progress among the technical stakeholder community: 2011-2012	N/A
Modular Development Plan on Pan-European Electricity Highways System					
Modular Development Plan on Pan-European Electricity Highways System	A study road map - Preparing a 3-year in-depth study project on a Modular Development Plan for a Pan-European Electricity Highways System (MoDPEHS) to be finished by end 2014	Work has commenced in discussing the proposal as a FP7 study project with the objective of applying for funding in Q3 2011	Preparation of MoDPEHS and optimal involvement of all relevant stakeholders by usage of the Electricity Highways Stakeholder Platform in the FP7 project structure: whole 2012	Modular Development Plan for a Pan-European Electricity Highways System (MoDPEHS) to be finished by end 2014	Public consultations on "Study Roadmap towards a Modular Development Plan on pan-European Electricity Highways system": Q2/2011

	Identifying studies and developing a "Study Roadmap towards a Modular Development Plan on pan-European Electricity Highways system", a study package with special focus on a 2050 supergrid as an overall guideline	Initial discussions with stakeholder but work as not yet commenced	Setting up intermediate milestones in accordance with North Seas Countries' Offshore Grid Initiative (NSCOGI) developments: Q3-Q4/2011	Delivering the final "Study Roadmap towards a Modular Development Plan on pan-European Electricity Highways system": Q3/2011	
Further key areas of TSO cooperation /1/					
ENTSO-E Awareness System (EAS)	Effective implementation of a pan-European Awareness System for instantaneous exchange of operational information among TSOs	Continuation of the preparation of an ENTSO-E Awareness System through 2011	Implementation of pilot EAS: Q4/2011	Full implementation of EAS: Q1/2012 Analysis/survey of TSOs' experiences with EAS: Q3/2012 Plan for possible further EAS functionalities: Q4/2012	NA
Operational communication standards for TSOs	Transfer of Operation Handbook Policy 6 into ENTSO-E wide standards for operational communication among all TSOs	This work has commenced	Further discussion and agreement on final form of standard -all of 2011	Transfer of Policy 6 into ENTSO-E communication standards: 2012	N/A
Critical System Protection	Preparing of an ENTSO-E position paper on High Impact Low Frequency (HILF) events	This work has yet to commence	Commence Q3/2011	Issuing a "HILF events" position paper: Q2/2012	N/A
Investigation on frequency deviation with Eurelectric	Follow-up on the findings of the investigation on frequency deviation	This work has yet to commence	Finalization of the investigation and issuing the final document: Q4/2011	Follow-up on the findings of the investigation on frequency deviation: Q1/2012	N/A
Synchronous operation with Turkey	Evaluation of the trail synchronous operation of the Turkish transmission grid with the transmission grid of the Regional Group Continental Europe	Trial now in final phase of operation	Trial period to conclude in 3Q/2011	Evaluation of the trial synchronous operation: Q2/2012	N/A

Further key areas of TSO cooperation /2/					
ENTSO-E Academy	Deployment of the activities of the ENTSO-E Academy. Offering services and performing activities of the Academy based on exchange of experiences (focusing on voltage stability in the end of 2012),	Focusing on system operation and security of supply issues as depicted in the requirements of the Operation Handbook Policy 8 of the Regional Group Continental Europe.	Exchange of training programs and materials, and training guidance: starting in 2011	Continuing in the whole 2012	N/
System development issues	Methods to increase the social acceptance of transmission infrastructure	Exchange of information among TSOs, defining positions, and preparing and issuing a common paper on methods to increase social acceptance of transmission infrastructure	Commenced In 2011 in particular defining TSO needs in stakeholder workshops managed by lead by the Commission. Work in these and other fora to continue in 2011	Continuing in 2012 on the basis of the Energy Infrastructure Package / Regulations	N/A
Transparency	Implementing the EC Guidelines on fundamental data transparency	Commenced discussions on the content of guidelines	-	Finishing the Comitology procedure on the Transparency Guidelines: 2012 Implementation: adapting and developing ENTSO-E transparency platform entsoe.net according to the requirements set by the Guidelines: 2012	Public consultation on detailed definitions on fundamental data transparency to be used on the transparency platform: Q?2011

Further key areas of TSO cooperation /3/					
Continuing to support regional market development	Ensure that regional developments continue and 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	Progress in coupling markets in all timeframes in a consistent manner (noting that network codes once complete will also facilitate this process):	Throughout 2012	N/A
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.	Timely responses to relevant documents and the development of ENTSO-E positions where required through 2011 and 2012	Throughout 2012.	N/A
Economic and Regulatory Frameworks applying to TSOs	Ongoing monitoring and influencing of the conclusions and consequences of the Energy Infrastructure Package	Discussions with stakeholders have been underway for some time.	Timely responses to relevant documents and the development of ENTSO-E positions where required through 2011 and 2012	Shaping and responding to EC Guidelines on investment incentive schemes and on cross-border trade: 2012 Potential development of a guideline on investment incentive schemes and on cross-border trade: 2012	N/A
Renewable Energy Sources (RES)	Supporting the integration of large volumes of RES. This is an ongoing activity and there are a number of actions planned for the period of the work programme.	The Development of intra-day and balancing markets for enhancing security and reducing risk: 2012 Identification of the investment needs required to integrate large RES volumes (TYNDP and work on offshore grids): 2012 Considering future challenges and identifying opportunities to innovate and collaborate to develop best RES integration practices: 2012 Maintaining a guide including ENTSO-E positions on relevant RES issues, propose priority from TSO perspective and depending on stakeholders to be addressed: 2012			N/A