



# **Draft Advice on the Community-wide Ten-year Electricity Network Development Plan**

**Ref: E09-ENM-16-03  
10 December 2009**

## INFORMATION PAGE

### Abstract

This public consultation document (E09-ENM-16-03) provides ERGEG's draft advice on the Community-wide ten-year network development plan.

This paper should be considered as a first step in discussions with ENTSO-E, TSOs and other stakeholders in developing regulators' view on the Community-wide ten-year electricity network development plan, the contents of the plan, the process to draft the plan and monitoring the implementation of the plan.

### Target Audience

Transmission system operators, energy suppliers, traders, electricity customers, electricity industry, consumer representative groups, power exchanges, academics and other interested parties are the target audience for this discussion paper.

### How to respond to this public consultation:

Deadline: **25 February 2010**

Comments should be sent by e-mail to [electricity\\_network\\_planning@ergereg.org](mailto:electricity_network_planning@ergereg.org).

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All responses except confidential material will be published on the website [www.energy-regulators.eu](http://www.energy-regulators.eu).

### Treatment of Confidential Responses

In the interest of transparency, ERGEG:

- will list the names of all respondents (whether confidential or not) or, alternatively, make public the number (but not the names) of confidential responses received;
- requests that any respondent requesting confidentiality submit the confidential sections of their response in a "confidential appendix". ERGEG will publish all sections of responses that are not marked confidential.

For further information on ERGEG's rules, see the ERGEG Guidelines on Consultation Practices<sup>1</sup>.

## Related Documents

CEER/ERGEG documents

- "ERGEG Guidelines on Consultation Practices ", ERGEG, 11 March 2009, Ref. E07-EP-16-03, [http://www.energy-regulators.eu/portal/page/portal/EER\\_HOME/EER\\_CONSULT/E07-EP-16-03\\_PC-Guidelines\\_2009-Mar-11.pdf](http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/E07-EP-16-03_PC-Guidelines_2009-Mar-11.pdf)

External Documents

- Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0055:0093:EN:PDF>
- Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0001:0014:EN:PDF>
- Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:211:0015:0035:EN:PDF>
- Decision No 1364/2006/EC of the European Parliament and of the Council of 6 September 2006 laying down guidelines for trans-European energy networks and repealing Decision 96/391/EC and Decision No 1229/2003/EC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:262:0001:0001:EN:PDF>

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<sup>1</sup>[http://www.energy-regulators.eu/portal/page/portal/EER\\_HOME/EER\\_CONSULT/E07-EP-16-03\\_PC-Guidelines\\_2009-Mar-11.pdf](http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/E07-EP-16-03_PC-Guidelines_2009-Mar-11.pdf)

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## Executive Summary

Regulation (EC) 714/2009<sup>2</sup> (Electricity Regulation) requires that the European Network of Transmission System Operators for Electricity (ENTSO-E) adapt and publish a non-binding Community-wide ten-year electricity network development plan every two years. The plan shall build on national investment plans, taking into account regional investment plans and if appropriate, Community aspects of network planning from TEN-E (Trans-European Energy Networks for Electricity) Guidelines. It also stipulates that the plan will include the modelling of the integrated network, scenario development, a European generation adequacy outlook and an assessment of the resilience of the system.

This document sets out ERGEG's draft advice for the development of the Community-wide ten-year development plan, in accordance with the legislative requirements, as guidance for ENTSO-E's work in this area during the interim period. ERGEG will use this document when giving its duly reasoned opinion on ENTSO-E's draft Community-wide ten-year network development plan.

The draft advice therefore focuses on both the Community-wide ten-year network development plan and the regional investment plans. National plans are mentioned where they have relevance to the Community-wide network development plan, i.e. national plans are the basis for the Community-wide plan and the Community-wide and national network development plans must be consistent.

The document maps the roles and responsibilities of ENTSO-E, TSOs (Transmission System Operators), the Agency for the Cooperation of Energy Regulators (the Agency), National Regulatory Authorities (NRAs) and stakeholders, as set out in the 3<sup>rd</sup> Package<sup>3</sup>. The main tasks in the planning process, stakeholders' involvement and the contents of the Community-wide ten-year network development plan are identified. According to the legislation, the draft Community-wide ten-year network development plan should be developed applying national plans, scenarios and the generation adequacy outlook – and ensuring consistency between them. This development work shall include stakeholder involvement and public consultation. The draft plan shall be submitted to the Agency for its opinion. The Agency's reasoned opinion may include a recommendation to amend the national or Community-wide ten-year network development plans. Afterwards, ENTSO-E shall adapt and publish the plan and the Agency monitors its implementation. The Agency will also report to the Commission on the plan's implementation.

This paper presents the evaluation criteria - both technical and economic - to be applied when alternative reinforcements are compared. Furthermore, specific regulatory criteria applied in the opinion-forming process are addressed.

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<sup>2</sup> Regulation (EC) No 714/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003.

<sup>3</sup> The 3rd legislative Package proposals for the European Internal Market in Energy were finally adopted on 13 July 2009 and include 5 legislative acts: 2 amended Directives on the Directives amending Directive 2003/54/EC and Directive 2003/55/EC concerning common rules for the internal market in electricity (2009/72/EC) and the internal market in natural gas (2009/73/EC), respectively; 2 amended Regulations Amending Regulation (EC) No 1228/2003 on conditions for access to the network for cross-border exchanges in electricity (No 714/2009) and Regulation (EC) No 1775/2005 on conditions for access to the natural gas transmission networks (No 715/2009); and a new Regulation establishing an Agency for the Cooperation of Energy Regulators (No 713/2009). <http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2009:211:SOM:EN:HTML>

In order to gather input and market participant views on the future structure and content of the Community-wide ten-year network development plan, ERGEG invites all stakeholders interested in network planning and development to respond to this consultation. The deadline for responses is **25 February 2010**.

## 1 Problem Identification

### 1.1 Introduction

Before the liberalisation of electricity markets in Europe, TSOs developed their networks mainly to meet national needs. Interconnections to other countries have been built to give market actors on both sides of an interconnection the opportunity to trade, but co-ordination of TSO planning across borders has not been commonly executed. This approach to developing networks has led up to a situation where congestions appear on interconnectors, thereby hampering cross-border trade and market integration. To enhance cross-border trade and integrated European markets, TSOs should co-ordinate and align their network development at regional and European level.

The development of national networks requires a more coordinated approach to ensure efficient and adequate investments in the Internal Electricity Market (IEM). Adaptation to other TSOs' network plans at regional and European level is a prerequisite for an integrated market. Furthermore, an increase in transmission capacity across borders will be needed for market integration. Otherwise congestion across borders will prohibit the efficient functioning of the market. Joint network planning at European level should ascertain that enough transmission capacity is available for national, regional and European needs and that investment is made where most needed.

The amount of intermittent generation is set to increase in Europe in order to meet the energy policy targets for 2020<sup>4</sup>. The flexibility of the power system should be increased to fully utilise this generation technology. This flexibility may be achieved by increasing transmission capacity across borders. The need for cross-border transmission capacity and related investments should be identified jointly by European TSOs, as overall European energy policy may be difficult to implement efficiently if needs for transmission are only identified at national level by TSOs. There is a need for a European and regional approach to network development through common scenarios and joint grid planning.

Stakeholders have requested more transparency in the network planning process. The reasons and scenarios behind the network plans are of particular interest. Applying a more unified and joint network planning process across the European Union (EU) contributes also to transparency of the entire EU network and its development. Moreover, it gives the opportunity to foster an integrated European planning process leading to adequate investments at a European scale, directly linked to the national and regional scale. This implies that viable transmission networks and necessary regional interconnections, relevant from trading and a security of supply point of view within the IEM should be considered.

With the above in mind, ERGEG's draft advice aims to provide guidance to ENTSO-E on the development and content of the Community-wide ten-year network development plan which is now required under the 3<sup>rd</sup> Package.

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<sup>4</sup> These EU targets for the year 2020 include 20% reduction in greenhouse gas emissions, 20% EU renewables share and 20% savings in consumption by improving energy efficiency.

## 1.2 Questions for Public Consultation

In addition to inviting stakeholders and market participants to respond generally to this consultation and participate in the discussions on this document, ERGEG seeks the opinion of respondents on a number of specific issues related to the scope and applicability of the document.

The respondents are therefore invited to reply and provide comments on the following questions:

1. The document presents the regulators' view on the planning process to achieve a non-binding Community-wide network development plan. Does this view contribute to the objectives set in the Section 2 and especially transparency of planning? What should be added / deleted within the planning process in this respect?
2. The document describes the contents of the Community-wide network development plan. Does it reflect the topics needed for the plan? What should be added / deleted within the contents of the plan?
3. The document addresses European generation adequacy outlook. What should be added / deleted in this respect when ERGEG gives its advice?
4. The document describes the topics (existing and decided infrastructure, identification of future bottlenecks in the network, identified investment projects, technical and economic description of the investment projects) for the assessment of resilience of the system. Is this description appropriate? Should it be changed and if so, how?
5. The document sets out criteria for regulatory opinion. Are these criteria clear and unambiguous? If not, how they should be amended?
6. Compatibility between the national, regional and Community-wide ten-year network development plans shall be ensured. How can this compatibility be measured and evaluated? How may inconsistencies be identified?
7. The Agency monitors the implementation of the Community-wide ten-year network development plan. Are there any specific issues to be taken into account in monitoring besides those described in the document?

## 2 General Provisions and Objectives of this Draft Advice

The objective of this document (draft advice) is to explain and propose an intended comprehensive regulatory approach for the assessment of the non-binding Community-wide ten-year electricity network development plan for European transmission grids, to be prepared by ENTSO-E according to the provisions of the 3<sup>rd</sup> Package<sup>5</sup>.

The overall / strategic objective of this draft advice is to create a better and more stable environment for TSOs and regulators / Agency:

- By setting out explicitly what should be included in the Community-wide network development plan, such that ENTSO-E will know precisely how to create it and what to include in it;
- By defining the criteria for fulfilment / quality of the plan, such that the Agency will know how to evaluate and what (possibly) to request further should something be missing;
- By defining the process for preparing the Community-wide ten-year network development plan, such that the Agency will be able evaluate if all stakeholders have been consulted and if scenarios and planning principles behind the plan are transparently communicated to the stakeholders;

The preparation of the plan shall be done in accordance with the practical needs and considerations which support the achievement of the following key objectives:

- Enabling security of electricity supply;
- Providing for adequate conditions to ensure operational security and meeting the grid connection and access requirements of the grid users;
- Evolution of the European electricity market, most notably increasing cross-border trade and physical electricity exchanges;
- Integration of the European electricity market within and between regions to increase competition and efficiency;
- Transmission infrastructure development in Europe, according to the needs emerging from the increased intermittent generation and targets for 2020;
- Transparency of planning decisions by the TSOs.

The scope of the Community-wide ten-year network development plan mainly concerns investments of a broader European dimension which involve at least two Member States (MS), have an impact on neighbouring grids or on cross-border transmission capacity. The Community-wide ten-year network development plan should mainly focus on cross-border investments and internal investments that have an effect on cross-border transmission capacity. The plan shall include both regulated and exempted (according to Article 17, Electricity Regulation) investment projects.

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<sup>5</sup> See Footnote 3.

Financing and cost-sharing of the investments are outside of the scope of this document. However, the estimated cost figures of the projects foreseen in the Community-wide ten-year network development plan are mentioned.

### 3 Legal Framework

Article 8 of the Electricity Regulation provides that the Community-wide ten-year network development plan shall, in particular:

- (a) build on national investment plans, taking into account regional investment plans as referred in Article 12(1) of the Electricity Regulation, and, if appropriate, Community aspects of network planning including the guidelines for trans-European energy networks in accordance with Decision No 1364/2006/EC (TEN-E Guidelines)<sup>6</sup>;
- (b) regarding cross-border interconnections, also build on the reasonable needs of different system users and integrate long-term commitment from investors referred to in Article 8 and Articles 13 and 22 of Directive 2009/72/EC<sup>7</sup> (Electricity Directive); and
- (c) identify investment gaps, notably with respect to cross-border capacities.

Regarding point (c), a review of barriers to the increase of cross-border capacity of the network arising from different approval procedures or practices may be annexed to the plan.

The Community-wide ten-year network development plan shall include the modelling of the integrated network, scenario development, a European generation adequacy outlook and assessment of the resilience of the system.

According to Article 7 of the Electricity Regulation, the European generation adequacy outlook included in the non-binding Community-wide ten-year network development plan shall cover the overall adequacy of the electricity system to supply current and projected demands for electricity for the next 5-year period as well as for the period between 5 and 15 years from the date of that outlook. The European generation adequacy outlook shall build on national generation adequacy outlooks prepared by the individual TSOs.

### 4 Roles and Responsibilities

The roles and responsibilities of the Agency, NRAs, ENTSO-E and TSOs are specified in detail in the 3<sup>rd</sup> Package. This Section provides a summary of these roles, based on the relevant Articles of the Electricity Regulation and the Electricity Directive.

With regard to stakeholders, their roles and responsibilities (Section 4.5) are not mentioned in detail in the legislation, as they are not explicitly regulated. Nevertheless, it is essential that all stakeholders contribute their input and information to the development of the Community-wide ten-year network development plan. Moreover, it is important that stakeholders do this in a regular and systematic manner and in relation to the different timeframes: for the long-term perspective the European stakeholders' input is particularly important; for the short-term

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<sup>6</sup> Decision No 1364/2006/EC of the European Parliament and of the Council of 6 September 2006 laying down guidelines for trans-European energy networks and repealing Decision 96/391/EC and Decision No 1229/2003/EC

<sup>7</sup> Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC

perspective and updates of the ten-year network development plan, national stakeholders' contributions are also important.

#### **4.1 ENTSO-E**

ENTSO-E has the primary responsibility for delivering the Community-wide ten-year network development plan.

In order to ensure greater transparency of the entire electricity transmission network in the EU, Article 8(10) of the Electricity Regulation requires ENTSO-E to adopt, publish and regularly update a non-binding Community-wide ten-year network development plan, including a European generation outlook every two years. Viable electricity transmission networks and necessary regional interconnections, relevant from a commercial or security of supply point of view, should be included in that network development plan.

Within ENTSO-E, TSOs shall establish regional cooperation and in particular, they shall publish a regional investment plan every two years, and may take investment decisions based on that regional investment plan.

In addition, ENTSO-E shall submit the draft Community-wide ten-year network development plan, including the information regarding the consultation process, to the Agency for its opinion.

Article 10 places an obligation on ENTSO-E to conduct an extensive consultation on the plan, at an early stage and in an open and transparent manner, involving all relevant market participants, and, in particular, the organisations representing all stakeholders, in accordance with the rules of procedure referred to in Article 5(1) of the Electricity Regulation. That consultation shall also involve NRAs and other national authorities, supply and generation undertakings, system users including customers, distribution system operators, including relevant industry associations, technical bodies and stakeholder platforms. It shall aim at identifying the views and proposals of all relevant parties during the decision-making process. All documents and minutes of meetings related to the consultation shall be made public.

Furthermore and as regards the Agency's monitoring of the implementation of the plan (set out in Article 9(2) of the Electricity Regulation), ENTSO-E shall make available all information required by the Agency to fulfil its monitoring activity.

#### **4.2 TSOs**

The TSOs have a role and responsibility to collect information and data within their system and based on this information to plan their network to meet the reasonable needs of customers (both, those who generate and those who consume electric power) and to cooperate at regional and European level to adapt and publish the Community-wide ten-year network development plan.

Among other things, Article 12 of the Electricity Directive states that TSOs are responsible for:

- (a) Ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity, operating, maintaining and developing under economic conditions secure, reliable and efficient transmission systems with due regard to the

- environment;
- (b) Ensuring adequate means to meet service obligations;
  - (c) Contributing to security of supply through adequate transmission capacity and system reliability;
  - (d) Managing electricity flows on the system, taking into account exchanges with other interconnected systems. To that end, the transmission system operator shall be responsible for ensuring a secure, reliable and efficient electricity system and, in that context, for ensuring the availability of all necessary ancillary services, including those provided by demand response, insofar as such availability is independent from any other transmission system with which its system is interconnected;
  - (e) Providing to the operator of any other system with which its system is interconnected, sufficient information to ensure the secure and efficient operation, coordinated development and interoperability of the interconnected system.

Meanwhile, Article 12 of the Electricity Regulation places an obligation on TSOs to establish regional cooperation within ENTSO-E. This includes the publication of a regional investment plan every two years. TSOs may take investment decisions based on that regional investment plan. TSOs acting as the Independent System Operator (ISO) or the Independent Transmission Operator (ITO) may have additional tasks and responsibilities within network investment planning. Since this draft advice focuses on ownership-unbundled TSOs, these additional tasks are not addressed further in this document.

### 4.3 Agency

Article 9(2) of the Electricity Regulation as well as Article 6(4) of Regulation (EC) No 713/2009 establishing the Agency<sup>8</sup> (Agency Regulation) place an obligation on the Agency to provide (based on matters of fact) a duly reasoned opinion as well as recommendations to ENTSO-E, the European Parliament, the Council and the Commission on the draft non-binding Community-wide ten-year network development plan, taking into account the objectives of non-discrimination, effective competition and the efficient and secure functioning of the internal electricity market and a sufficient level of cross-border interconnection open to third-party access (TPA). The opinion shall be provided within a period of two months from the day of receipt and include recommendations where it considers that the draft Community-wide ten-year network development plan submitted by ENTSO-E does not contribute to the objectives mentioned above.

In addition, Article 8(11) of the Electricity Regulation stipulates that the Agency shall provide an opinion on the national ten-year network development plans to assess their consistency with the Community-wide ten-year network development plan. If the Agency identifies inconsistencies between a national ten-year network development plan and the Community-wide ten-year network development plan, it shall recommend amending the national ten-year network development plan or the Community-wide ten-year network development plan as appropriate.

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<sup>8</sup> Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing an Agency for the Cooperation of Energy Regulators.

Article 6(8) of the Agency Regulation further details the Agency's monitoring of the implementation of the Community-wide ten-year network development plan: if it identifies inconsistencies between the plan and its implementation, it shall investigate the reasons for the inconsistencies and make recommendations to the transmission system operators, the national regulatory authorities or other competent bodies concerned with a view to implementing the investments in accordance with the Community-wide ten-year network development plan.

The Agency Regulation (Article 6(7)) also foresees that the Agency monitors progress as regards the implementation of investment projects to create new interconnector capacity. The Agency (Article 6(4)) also monitors the execution of ENTSO-E tasks referred to in Article 8(3) of the Electricity Regulation (adaptation of a non-binding Community-wide ten-year network development plan) and report to the Commission. It will further monitor (Article 6(9)) the regional co-operation of TSOs according to Article 12 of the Electricity Regulation, in particular that TSOs shall publish a regional investment plan every two years and may take investment decisions based on the regional investment plan. The Agency takes into account the outcome of this co-operation when formulating its opinions, recommendations and decisions.

#### **4.4 National Regulators**

As set out in Article 36 of the Electricity Directive, NRAs must take all reasonable measures in pursuit of eliminating restrictions on trade in electricity between Member States, including developing appropriate cross-border transmission capacity to meet demand and enhancing the integration of national markets which may facilitate electricity flows across the EU.

NRAs must report annually on their activity and the fulfillment of their duties to the relevant authorities of the Member States, the Agency and the Commission. The report must cover the steps taken and the results obtained as regards each of the tasks listed in Article 37 of the Electricity Directive, such as monitoring investments. NRAs must monitor the TSO investment plans, and provide in the annual report assessment of the plans as regards their consistency with the Community-wide ten-year network development plan; such an assessment may include recommendations to amend those investment plans.

The NRAs should also provide information on the market to permit the European Commission to exercise its role of observing and monitoring the internal market in electricity and its short, medium and long-term evolution, including aspects such as transmission and distribution infrastructure and investments.

The NRAs must co-operate with regard to cross-border issues with the regulatory authority or authorities of the Member States concerned and with the Agency.

In addition, NRAs must co-operate at least at a regional level to enable an adequate level of interconnection capacity through new interconnections, within the region and between regions to allow for development of security of supply, without discriminating between supply undertakings in different Member States.

NRAs may have additional tasks and responsibilities within network investment planning, when the TSO acts as an Independent System Operator (ISO) or Independent Transmission Operator (ITO). Since this draft advice focuses on the Community-wide ten-year network development plan (i.e. not provisions related to national considerations) as well as on ownership-unbundled TSOs, these additional tasks are not addressed further in this document.

## 4.5 Stakeholders

The involvement and consultation of stakeholders, such as producers, traders, suppliers, customers and distribution system operators will be developed as a standard practice by ENTSO-E and TSOs from the start of their work on the network development plans. Stakeholders will be consulted and able to comment on this work.

At the request of TSOs, stakeholders will provide TSOs with the relevant data from achieved, actual and future consumption/production/networks.

## 5 Process of European Network Planning

### 5.1 Introduction

During network planning, several documents must be developed and it is important that they are consistent. The process for developing the Community-wide ten-year network development plan must therefore be part of a larger planning process and not an isolated process taking place every second year. The following sections of this document set out ERGEG's views on the key elements of the process and what should be included in the TSO/ENTSO-E work.

Several documents and processes are inter-related when developing the European scheme for grid planning. The most relevant documents are the European and national generation adequacy outlook and the ten-year network development plans at Community-wide, regional and national level, which include system adequacy forecasts for these 3 levels. These documents are developed and published every year or every second year and viewed by different parties (i.e. NRAs, Agency and EC).

The European scheme for grid planning includes both the process and the output of that process, i.e. network plans and generation adequacy outlooks. The regulatory advice on the Community-wide ten-year network development plan includes both processes and documents.

Figure 1 shows the documents in the ten-year network development planning process.

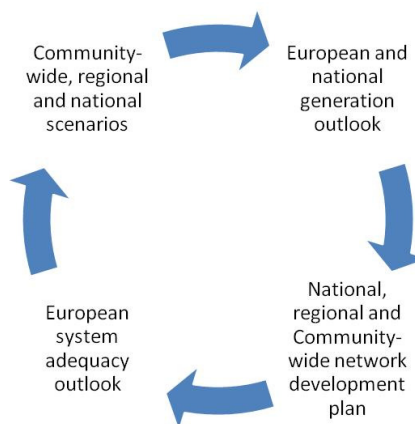


Figure 1: Products (documents) in a European grid planning process

## 5.2 Planning Process

The Community-wide ten-year network development plan shall combine a broad scale European system development with detailed information on investment projects. This requires both a top-down and a bottom-up approach.

The top-down approach requires the ENTSO-E to elaborate scenarios which will address the issues (beyond generation and demand) related e.g. to policy (e.g. 20/20/20 targets), security of supply, competition and market integration. The bottom-up approach relates the collection by TSOs of information from market participants required for identification of the projects, estimation of project costs and the consistency of the European scenarios with actual developments at regional and national level.

Regarding the top-down approach, ENTSO-E shall provide TSOs with information on the main cross-border issues to be resolved, including, where appropriate, priority projects identified in accordance with Decision No 1364/2006/EC (TEN-E Guidelines). This approach should take into account developed scenarios and modelling of the integrated power system. Information from ENTSO-E will be an input for drafting of the regional and national ten-year network investment plans, indicating the priorities at EU level.

In the bottom-up approach, the following steps should be considered (in addition to the national plans):

- Information at national level from market participants to the TSO about plans regarding supply and demand investments (amount, location and timing);
- Assessment of network reinforcements by neighbouring TSOs with consultation of the market participants to supplement the national network investments and to contribute the regional ten-year network development plan;
- Synthesis of needed network reinforcements by ENTSO-E to be included in the Community-wide ten-year network development plan.

In the bottom-up approach, the TSOs have a role and responsibility to collect information and data within their transmission systems and, based on the information collected, to plan their networks to meet the needs of customers.

These approaches should feed into 3<sup>rd</sup> Package obligations for TSOs to establish regional cooperation within ENTSO-E; to publish a regional investment (i.e. network development) plan every two years; and to take investment decisions based on that regional investment plan. The regional investment plan is an important link between the Community-wide and national ten-year network development plans.

Figure 2 presents ERGEG's view of the European grid planning process, as established in the 3<sup>rd</sup> Package.

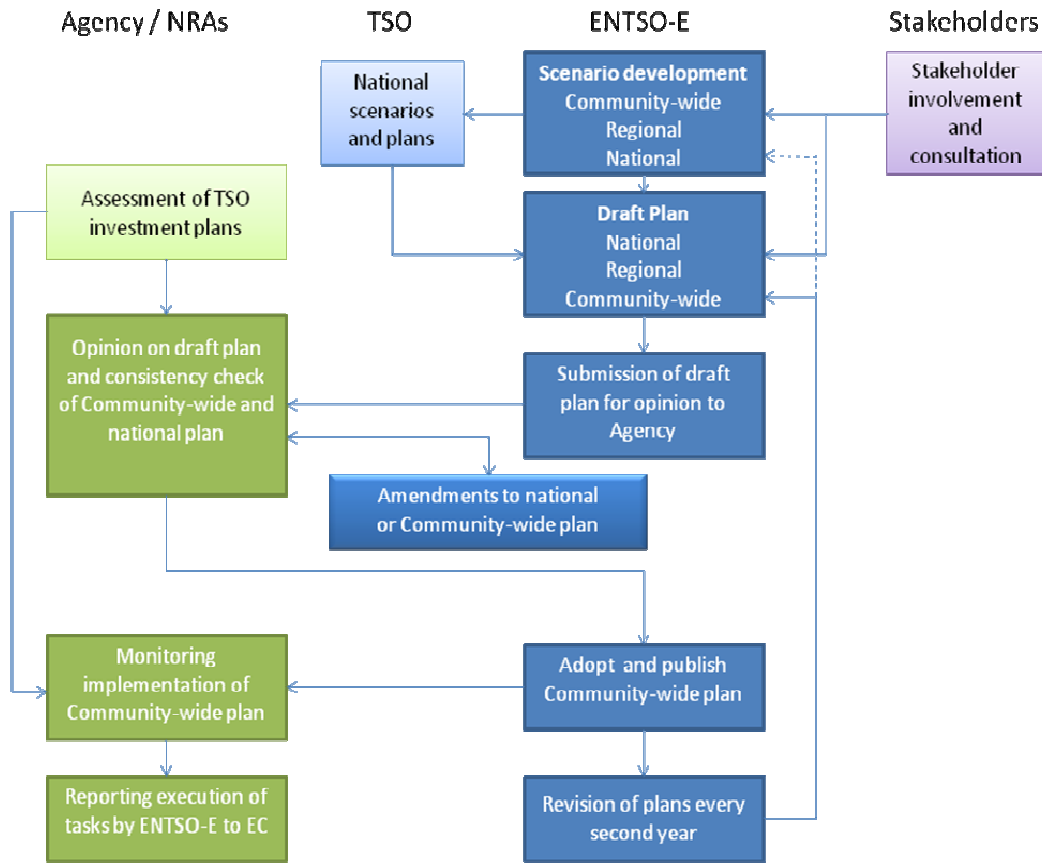


Figure 2: European grid planning process

### 5.3 Stakeholder Involvement and the Consultation Process

The Electricity Regulation stipulates that ENTSO-E will conduct an extensive consultation while preparing the draft Community-wide ten-year network development plan, in order to identify views and proposals from all relevant parties during its drafting process. Rules of procedure for consultation are being prepared (and consulted upon) by ENTSO-E. They must include a description of the process for consultation; a description of the stages when and how stakeholders are consulted; and a list of stakeholders to be consulted.

Scenarios and draft plans should be consulted. The consultation shall be conducted at an early stage and involve all relevant stakeholders, i.e.:

- NRAs and other national authorities;
- Supply and generation undertakings;
- System users including customers;
- DSOs;
- Relevant industry associations;
- Relevant technical bodies;
- Relevant stakeholder platforms.

Consultation shall be conducted in an open and transparent manner. All documents and minutes of the meetings related to the consultation shall be made public.

In addition, the consultation on the draft Community-wide ten-year network development plan should be conducted at national and regional level. At national level, the consultation process should be conducted by the TSO under the NRA's oversight. The national consultation process must comply with the relevant requirements set in the ENTSO-E rules of procedure for consultations. At regional level, the consultation process will be conducted by the concerned TSOs, within the ENTSO-E regional groups and under the oversight of the relevant NRAs.

During the consultation, market participants should express especially their needs for transmission capacity on the national and cross-border level. This information will be included in drafting the national, regional and Community-wide ten-year network development plans.

#### **5.4 Submission of Network Development Plans for Opinion**

The draft Community-wide ten-year network development plan must be submitted to the Agency for opinion every second year. ENTSO-E should propose the time frames for this bi-annual submission and align them with the time frames for the national and regional ten-year network development plans. Furthermore, the national ten-year network development plans should be submitted by the NRA to the Agency for its opinion (to assess their consistency with the Community-wide ten-year network development plan).

The Agency will provide a duly reasoned opinion as well as recommendations to ENTSO-E, the European Parliament, the Council and the Commission on the draft Community-wide ten-year network development plan. The opinion will be provided within two months, if the Agency considers that the draft does not contribute the objectives set for Community-wide ten-year network development plan. If the Agency has requested that the Community-wide ten-year network development plan be revised, the amended plan will be provided by ENTSO-E for a new opinion by the Agency, within a time frame set by the Agency when delivering its first duly reasoned opinion.

The Agency provides an opinion on the national ten-year network development plans to assess their consistency with the Community-wide ten-year network development plan.

## **6 Contents of the Community-wide Ten-Year Electricity Network Development Plan**

### **6.1 Introduction**

The Community-wide ten-year network development plan is non-binding and will be published every second year. It should include also a status review of the previous plan, explaining the deviations between what was foreseen in the previous plan and what has been achieved following the publication of the previous plan.

The Community-wide ten-year network development plan should give as reliable a view as possible of the integrated European electricity market and the infrastructure needs. The objective is to provide visibility to market participants, national TSOs, NRAs and

governments. The Community-wide ten-year network development plan also aims to help make investment decisions in a timely manner and to coordinate neighbouring TSOs on cross-border infrastructure development, even if the investment process may be managed at a regional or national level. All the main issues related to demand, supply and strategies and projects of market participants should be integrated.

The Community-wide ten-year network development plan should identify congestion on interconnections as well as internal congestion having an effect on cross-border activities.

The Community-wide ten-year network development plan should focus on the following issues:

- Development of infrastructure for generation to be introduced to the European market and to provide for meeting demand (supplying consumption);
- Removal of internal and cross-border bottlenecks;
- Security of supply.

Figure 3 shows the key components to be included in the Community wide ten-year network development plan. Furthermore, the Community-wide ten-year network development plan must include information regarding the consultation process.

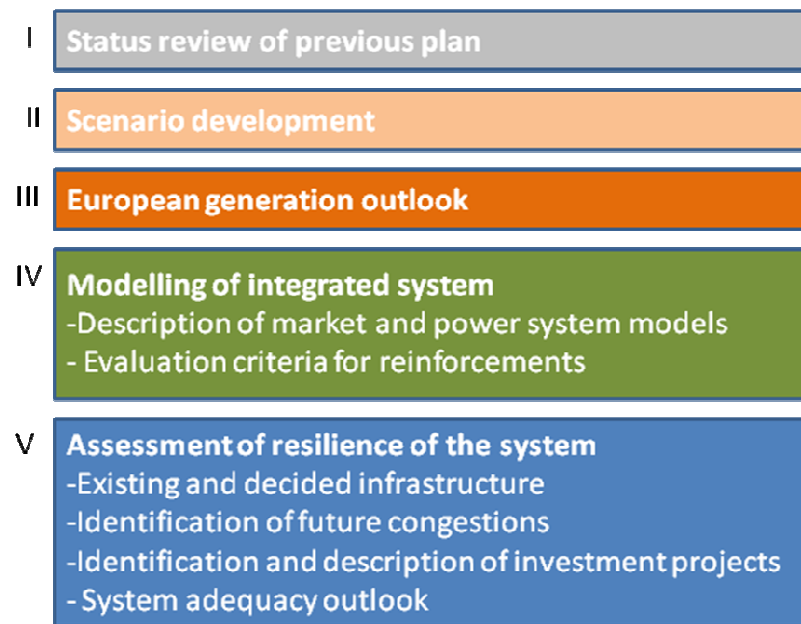


Figure 3: Contents of the Community-wide ten-year network development plan

## 6.2 Scenario Development

Traditionally, deterministic or probabilistic (and sometimes a combination of both) methods have been used for network planning. However, long-term network planning must take into account different possibilities for future developments and include relevant stakeholders in the process. For this purpose, scenarios are needed. Scenarios are snapshots of possible future situations and developments, based on a consideration of major relevant trends and system and market developments.

Long-term development in the electricity market is the key feature of the Community-wide ten-year network development plan. ENTSO-E is responsible for running and initialising the scenario development process. ENTSO-E should therefore build scenarios providing paths to the possible future of the European electricity market. The views from relevant stakeholders, including TSOs, DSOs, producers, large consumers, suppliers and traders are to be taken into account to develop these scenarios. Relevant stakeholders could also directly take part in the scenario development process. At national level, TSOs is responsible that the relevant national stakeholders are included in the development of scenarios.

ENTSO-E ensures that assumptions for developing scenarios are coherent across the EU and that European scenarios are fed into the regional and national scenario processes.

Upon written request, stakeholders should submit the required information to ENTSO-E within a reasonable time frame, especially with regard to assessing the existing and potential bottlenecks for transmission capacity.

The time horizon for the scenario development is 10-20 years. Scenarios should address at least the following issues:

- Energy policy and climate change;
- Availability of primary energy resources at national, European and worldwide level;
- Demography, GDP and financial resources;
- Price of primary energy;
- Price of electricity;
- New technologies to produce, to transmit and to consume energy.

Further issues, relating in particular to the European generation adequacy outlook are referred to in Section 6.3.

Consistency is to be ensured between the scenarios developed in the gas sector by ENTSO-G and in the electricity sector by ENTSO-E. Scenarios published by other organisations, like EC and IEA should be monitored and referred where appropriate.

Because scenarios reflect major trends, it is not necessary to develop but only to revise scenarios every second year when the Community wide ten-year network investment plan is adopted and published. When ENTSO-E starts a new scenario process the TSOs, the Agency and the NRAs should be notified. ENTSO-E should present the results of the scenario work to the Agency for an opinion before launching the actual work on the network development plans.

### 6.3 European Generation Adequacy Outlook

European energy regulators support the view that the well-functioning electricity market should be able to deliver security of supply and generation adequacy. Additional mechanisms beyond the market may be introduced only after a careful consideration of barriers to investment and possible adverse effects of such additional mechanisms to the integrated electricity market.

Generation adequacy means that adequate generation capacity for meeting demand is available, taking into account network constraints. Within that scope, timeframes have to be considered from the present up to 5 years (e.g. sufficient margin during peak load) and from 5-15 years ahead (investments in new generation capacities).

In the time frame from the present situation up to 5 years, the evaluation of generation adequacy is based on the decided and planned generation projects. In the longer time frame up to 15 years, the scenarios should be developed to evaluate generation adequacy. In this scenario development, issues to be considered and taken into account should include:

- Diversity of different production technologies;
- Evolution of a liquid electricity market to foster financial feasibility of future generation investment;
- Efficient electricity market by enhancing demand response of consumption;
- Decommissioning of old power plants;
- Environmental policy objectives and their effect on the new and old generation technologies;
- Authorisation procedures for new generation and grid enforcements and their effect on the commissioning time frame.

The European generation adequacy outlook must cover the overall adequacy of the electricity system to supply current and projected demands for electricity for the next 5-year period as well as for the period between 5 and 15 years from the date of that outlook. The European generation adequacy outlook builds on national generation adequacy outlooks prepared by each individual TSO.

ENTSO-E will propose the method for evaluating the generation adequacy, the contents of generation adequacy outlooks and the situations (e.g. details of scenario in terms of peak load) where generation adequacy is to be evaluated. This method should be applied when the TSOs prepare their national outlooks and map situations which may lead security of supply problems. In their national generation adequacy outlooks, TSOs indicate, as the system responsible party, the appropriate level of generation reserve capacity needed to ensure system security. The European generation adequacy outlook shall be published within the context of the Community wide ten-year network development plan.

The consistency of methods and situations between the national generation adequacy outlooks is to be ensured by ENTSO-E when preparing the European generation adequacy outlook based on the national outlooks. In so doing, ENTSO-E should take into account the possible overlap or alternative generation investment plans described in these national outlooks. ENTSO-E should also take care that the European outlook is not a mere compilation of the national ones but a coordinated European generation adequacy outlook.

Every TSO prepares its national generation adequacy outlook consisting of outlooks for total generation differentiated per primary energy source. National generation and demand should

be defined in the identified scenarios in the future 5-15 years time frame. Balance between supply and demand should also be identified for this period.

The European generation adequacy outlook for the next 5-year period should mainly include the decided and planned generation investment projects, decided and planned decommissioning of generation plants and forecasted demand (taking into account the peak load forecasts). Based on these demand and supply outlooks, the balance between supply and demand for this period can be identified. The national generation adequacy outlooks include at least the same issues, within the same timeframe of 5 years. When drafting the national generation outlook, the TSOs will indicate whether sufficient network transmission capacity is available for a decided or planned generation investment project and announce time table and network investments to solve the problem.

ENTSO-E must describe transparently the method and results of evaluation in the Community-wide ten-year network development plan.

## 6.4 Modelling of Integrated Network

The impact of the identified scenarios on the power system is to be studied by applying modelling of integrated network. Models of the electricity market and the power system will be used to determine the transmission needs required by each scenario. Market model includes an analysis of the energy flows in the identified scenarios across Europe. The model should include all relevant parameters having an influence on the market. Where and how much energy is traded in the market depends on the primary energy sources and price levels of generated electricity in different countries and regions. Within a scenario, these parameters define the balance between supply and demand within a national network and across a region and Europe. The duration curves for transmission between the identified demand areas are calculated along with the costs of congestion if limitations in transmission between these demand areas occur.

Based on the analysis made with the market model, ENTSO-E and TSOs will evaluate potential congestion in transmission capacity and the resulting lack of market integration and competition in the identified scenarios.

A power system model analyses transmission capacity and its limitations for existing grids and alternative reinforcement solutions for the identified scenarios under different operating situations. Information from the market model about energy flows in the grid provides important background information regarding the need for transmission capacity in the important cross-sections of the network. The calculations should be executed with load flow and dynamic simulation software and a relevant grid model applying the technical criteria described in Section 6.5. The result of this analysis will be transmission capacity for the identified scenario, with planned network reinforcements.

The power system model will map all the necessary existing components of a grid. It is important not just to display each region or national network itself but to have a view of the whole system in order to ensure that efficient investments are made to integrate European markets.

Preferably, TSOs and ENTSO-E should apply analysis tools which include both market and power system models. If this is not possible then an iterative planning process should be used where separate market and power system analysis tools are applied sequentially.

TSOs and ENTSO-E shall also apply compatible analysis tools, where data exchange between different tools shall be ensured by proper conversion.

To ensure consistency between the national, regional and Community-wide ten-year network development plans, compatible assumptions and modelling is to be used for all 3 types of ten-year network development plans.

ENTSO-E must include a description of the modelling, as well as all assumptions, in the Community-wide ten-year network development plan. The TSOs must include same information in the national and regional ten-year network development plans.

## **6.5 Evaluation Criteria for Reinforcements**

The four steps in the evaluation of the required network reinforcements include the following:

1. The need for the network reinforcements should be prioritised based on the technical and economic criteria;
2. Alternative solutions should be evaluated based on the scenarios, generation outlooks and market and power system modelling;
3. As a result of this evaluation, the relevant requirements for network reinforcements shall be identified;
4. Finally, alternative network reinforcements from step 3 should be mapped, applying both technical and economic criteria.

### **6.5.1 Technical Criteria**

Possible investments identified in the ten-year network development plan must be assessed according to technical planning criteria defined by ENTSO-E and TSOs. These criteria should include pre-fault operating conditions, faults to be applied in simulations (e.g. (N-1)-criterion) and acceptable post-fault consequences.

The technical criteria to be checked include:

- **Thermal criterion**  
This criterion consists determining the load flow of the grid for studied demand and supply cases during normal operation and disturbances.  
The most severe operating conditions where thermal criterion shall also be fulfilled are:  
(a) unscheduled outage of the largest generating unit in an area short in generation capacity occurs or;  
(b) maximum generation in an area with surplus in generation capacity is delivered.  
ENTSO-E together with TSOs shall define the most severe operating conditions, which shall be described transparently in the Community-wide ten-year network development plan.
- **Stability criterion**  
The criterion consists in determining load flows and voltage levels through the network after an incident, e.g. loss of line or generator with or without a fault.

ENTSO-E together with TSOs must define the criteria (e.g. voltage and power fluctuations, voltage angle difference after the line outage, damping of these fluctuations, maximum duration of a fault, reclosing after the disconnection) for stable operation after the incident.

- Voltage and reactive power criterion

This criterion consists in determining the voltage level in all network nodes for all relevant normal and disturbed operational states. For reactive power compensation equipment, the criterion shall ensure that:

(a) the reactive power generation equipment necessary for maintaining the voltage within the allowed range and reducing losses in a normal operating state is performing for maximum demand situations; and

(b) the reactive power absorption equipment necessary for maintaining the voltage within the allowed range is performing for the minimum demand situations.

- Short-circuit criterion

This criterion consists in determining the short circuit currents for the primary switching equipment in the network. The requirement for this criterion is for the short circuit currents to be smaller than the allowed limits of the primary switching equipments installed in the network.

ENTSO-E and TSOs must define the applied technical planning criteria to assess possible investments. Technical planning criteria must be described transparently in the Community-wide ten-year network development plan and they must be consistent with those applied in the regional and national ten-year network development plans. Any deviation from these criteria in the national or regional ten-year network development plan should be justified and communicated transparently to the market participants when the national and regional ten-year network development plans are published.

## 6.5.2 Economic Criteria

Economic criteria must be based on socio-economic evaluation of the benefits and costs of the possible investments at European level.

The planning criteria can be roughly divided into two parts:

- (1) Investment (business) plan
- (2) (Socio-)Economic criteria

These shall include at least for:

- (1)
  - Investment costs;
  - Project risk analysis;
  - Change in losses;
  - Possible synergies and dependencies between the projects.

and for

(2)

- Exchange of ancillary services;
- Value of more integrated market, e.g. managing price differentials effectively across congested areas;
- Potential socio-economic value of the higher welfare for the end-customers within the European market;
- Risk for energy and/or power shortage and cost of shortage, i.e. security of supply;
- Generation optimisation according to the costs of generation (i.e. supporting optimal merit order, so that the cheapest generation can always be run).

ENTSO-E and TSOs must define the economic planning criteria to assess the costs and benefits of possible investments. Economic planning criteria shall be transparently described in the Community-wide ten-year network development plan and they must be consistent with those applied in the regional and national ten-year network development plans. As with the technical criteria, any deviation from these economic criteria in the national or regional ten-year network development plan should be justified and communicated transparently to the market participants when the national and regional ten-year network development plans are published.

## **6.6 Assessment of Resilience of the System**

### **6.6.1 Existing and Decided Infrastructure**

The Community-wide ten-year network development plan must provide a map of existing and decided infrastructure, both regulated and exempted. ENTSO-E must publish the capacity information at all interconnections based on information from TSOs:

- Transmission capacity;
- Rate of transmission capacity use on an annual (and monthly) basis for the previous 5 years;
- Additional transmission capacity decided to be built.

Main transmission routes across the European power system must be presented to provide a clear view to identify the bottlenecks in the transmission grid.

### **6.6.2 Identification of Future Bottlenecks in the Network**

The Community-wide ten-year network development plan must identify gaps in transmission capacity. For that purpose, the modelling of the market and the network will be used to provide for:

- Investments needed (lines, substations, other equipment) to increase or maintain the transmission capacity across borders and within the national power system;
- Investments in new technologies to increase or maintain transmission capacity.

### 6.6.3 Identified Investment Projects

The Community-wide ten-year network development plan must:

- (a) Indicate to market participants the main transmission infrastructure that needs to be built or upgraded over the next 10 years and their project costs;
- (b) Present the implementation stage of the previously adopted plan outlining the reasons for delays (including different and/or inefficient approval procedures or practices), project cancellation, progress achieved and new projects and the reporting date of the changes by NRAs and ENTSO-E/TSOs to the Agency/NRA;
- (c) Present the changes to the previous investment plan (e.g. delays, project cancellations, progress achieved, new included projects) and corresponding justifications;
- (d) Contain all the investments already decided and identify new investments which have to be executed in the next 3 years; and
- (e) Overview of timeframes.

Beyond that, the Community-wide ten-year network development plan may include also a review of barriers to increasing network capacity (including different and/or inefficient approval procedures or practices).

The Community-wide ten-year network development plan must also include a summary of investment plans as well as investment gaps identified at national level and any additional input from the regional plans.

The Community-wide ten-year network development plan must include an analysis of whether the transmission network reinforced with the proposed investments is sufficient to satisfy the transmission needs from supply and demand based on the applied scenarios. This analysis must include an evaluation of the system adequacy for the adapted Community-wide ten-year network development plan.

It might be possible in certain cases for the number of realistic options for investment projects to be limited. However, at least one option is needed and must be specified as the preferred one.

The Community-wide ten-year network development plan should, where appropriate, identify alternative investments to fulfil transmission needs and adjust the plans accordingly to needs of integrated electricity markets. The Community-wide ten-year network development plan should describe, in as much detail as possible, the alternative investments in order for NRAs and market participants to assess these projects.

The reasons for selecting a specific investment project from several options should be clearly explained in the Community-wide ten-year network development plan.

#### **6.6.4 Technical and Economic Description of Investment Projects**

The Community-wide ten-year network development plan must present a technical and economic description of the identified investment projects under point (a) in Section 6.6.3, including at least the following issues:

- Technical aspects e.g. transmission capacity, length of line, date of commissioning, map/grid scheme;
- Economic aspects e.g. estimated cost of investment;
- Risks for timely implementation e.g. dependence on other infrastructure projects, environmental issues, compliance with studied scenarios;
- Contribution to system operation (e.g. improved operational security), market and economic benefits (e.g. reduced losses, improved social welfare in terms of enabling the most economic generation units to run) and evaluation of what would happen if the investment is not implemented (i.e. “no-option”).

### **7 Criteria for Regulatory Opinion**

The objective of the Community-wide ten-year network development plan is to eliminate the physical congestion where it is considered to hinder the development of the cross-border trade and market integration.

The Community-wide ten-year network development plan must provide a shared vision on the European power system. For that purpose, the plan must build on complementary processes:

- EU-wide scenarios;
- Development of the infrastructure country by country, based on the developed scenarios and generation adequacy outlook.

This requires both top-down and bottom-up approaches. ENTSO-E must help identify scenarios and provide TSOs with sufficient information on the major cross-border issues to be solved. TSOs must provide national information to ENTSO-E.

The Agency, when forming its opinion on the plan, will evaluate whether the following processes and issues have been executed and fulfilled:

- ENTSO-E has prepared scenarios and these have been applied also at regional and national level;
- Modelling of integrated network has been made applying bottom-up and top-down approaches;
- European and national generation outlooks have been prepared and are consistent with each other;
- Assessment of the resilience of the system has been made
- Consultation of all relevant stakeholders has been conducted at European, regional and national level and the outcome of these consultations has been documented;
- Coherence between the national, regional and Community-wide ten-year network development plan is met; and

- Monitoring report on the implementation of the plans has been prepared.

Furthermore, the (national and Community-wide) ten-year network development plans must ensure:

- Non-discrimination;
- Effective competition;
- Efficient and secure functioning of the internal electricity market; and
- A sufficient level of cross-border interconnection open to TPA.

The power system is to be designed so that demand is met efficiently and safely. This means that the power system should be planned, built and operated so that sufficient transmission capacity is available to deliver generated electricity and to meet the needs of consumption in a way which is economically efficient. In this way, the benefits will be maximised and the costs minimised from the European perspective.

In addition, flexible investment solutions which take into account alternative futures should be promoted. The transmission network should allow for well-performing joint operation. This requires coordination, both in the planning of the power system and at the operating stage.

The planning process should be smooth, efficient, consistent and transparent.

## **8 Coherence between National, Regional and Community-wide Ten-Year Network Development Plan**

The national ten-year network development plans should be coordinated and comparable to the ten-year plans at regional and European level. To that end, it is highly recommended that the national and regional ten-year network development plans follow a compatible and comparable structure and contents as the Community-wide one. National plans should identify infrastructure needs with a wider importance for the EU or for the regions and they should include analyses which are influenced by European policies as well as the national situation. Information requested by ENTSO-E must be included in the national and regional ten-year network development plans, taking into account information and comments from market participants.

Each NRA will monitor whether the national ten-year network development plan is consistent with the Community-wide ten-year network development plan. If any doubt arises as to the consistency with the Community-wide ten-year network development plan, the NRA may recommend that the TSO amend the plan. Each NRA will conduct this assessment in its annual report. Similarly, if the Agency identifies inconsistencies between a national plan and the Community-wide plan, it can recommend either to amend the national or the Community-wide plan.

As has been explained previously, the national ten-year network development plans must be taken into consideration in the preparation of the Community-wide ten-year network investment plan. Nevertheless, the Community-wide ten-year network development plan should not be a consolidated version of all national ten-year network development plans. The Community-wide ten-year development plan must explicitly take into account the European view and seek for the best European, rather than regional and national, solutions. The national ten-year network development plans will help to identify investment needs with EU-

wide importance and will support ENTSO-E in preparing the Community-wide ten-year network development plan.

## **9 Monitoring Implementation of Network Development Plans**

The Agency will monitor the implementation of the Community-wide ten-year network development plan. In parallel, ENTSO-E must prepare a monitoring report to monitor the inconsistencies between the plan and its implementation.

A monitoring report is to be included in the Community-wide ten-year network development plan to identify any deviations in implementation from the previous ten-year network development plan. Any known reasons for such deviations should be also explained in the monitoring report. The monitoring report will provide an update on delays affecting any investment included in the previous plan. Furthermore, TSOs should provide reasons for not proceeding with delayed or cancelled investments.

The Agency will investigate the reasons for inconsistencies and make recommendations to the TSOs or NRAs to implement the investments according to the Community-wide ten-year network development plan.

The Agency will report to the Commission on adaptation of the Community-wide ten-year network development plan by ENTSO-E. The Agency will also monitor that TSOs publish a regional investment plan every two years and that TSOs may take investment decisions based on the regional investment plan.

The ENTSO-E is to make available all information required by the Agency to fulfil its monitoring obligations.

The NRA will monitor the investment plans of the TSOs. The NRA will report annually to the relevant authorities of the Member State, the Agency and the Commission on its activity and on the fulfilment of its duties on monitoring the investments. NRAs should also provide information on transmission and distribution infrastructure and investments to the Commission to allow the Commission to monitor the internal market and its evolution. This reporting occurs through the annual report.

## 10 Conclusions

European energy regulators propose to use the provisions in the 3<sup>rd</sup> Package, as well as the supplementary and related criteria covered in this document to evaluate the TSO and ENTSO-E ten-year network development plans.

The process and plans should cover the various elements outlined in this draft advice (in particular in Sections 5-9), including for example:

- Planning process including stakeholder involvement;
- Contents of the Community-wide ten-year network development plan;
- Evaluation criteria for alternative reinforcements;
- Assessment of resilience of the power system;
- Criteria for regulatory opinion;
- Monitoring implementation of the plans.

In order to ensure a high level of transparency and inclusivity, ERGEG welcomes stakeholders' views on these and the other issues raised in this draft advice. Following the public consultation, ERGEG will review the responses received and reconsider its draft advice, before sending this to TSOs and ENTSO-E as guidance for their future work on the national, regional and Community-wide ten-year network development plans.

## **Annex 1 – ERGEG**

The European Regulators' Group for Electricity and Gas (ERGEG) was set up by the European Commission in 2003 as its advisory group on internal energy market issues. Its members are the energy regulatory authorities of Europe. The work of the ERGEG is structured according to a number of working groups, composed of staff members of the national energy regulatory authorities. These working groups deal with different topics, according to their members' fields of expertise.

This report was prepared by the Electricity Network and Market Task Force (ENM TF) of the Electricity Working Group (EWG).

## Annex 2 – List of abbreviations

Term	Definition
CEER	Council of European Energy Regulators
EC	European Commission
ENTSO-E	European Network of Transmission System Operators for Electricity
ERGEG	European Regulators' Group for Electricity and Gas
EU	European Union
IEA	International Energy Agency
IEM	Internal Electricity Market
ISO	Independent System Operator
ITO	Independent Transmission Operator
MS	Member State
NRA	National Regulatory Authority
TEN-E	Trans-European Networks for Electricity
TPA	Third Party Access
TSO	Transmission System Operator