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**OPINION OF THE AGENCY FOR THE COOPERATION OF ENERGY  
REGULATORS No. 06/2012**

**of 5 September 2012**

**ON THE EUROPEAN TEN-YEAR NETWORK DEVELOPMENT  
PLAN 2012**

THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

HAVING REGARD to Regulation (EC) No 713/2009 of the European Parliament and of the Council of 13 July 2009 establishing a European Agency for the Cooperation of Energy Regulators<sup>1</sup> (hereafter referred to as the “Agency”), and, in particular, Article 6(3)(b) thereof;

HAVING REGARD to 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>2</sup>, and, in particular, Article 9(2) thereof;

HAVING REGARD to the favourable opinion of the Board of Regulators of 4 September 2012,

WHEREAS:

- (1) ENTSO-E submitted to the Agency its Ten-Year Network Development Plan 2012 (hereafter referred to as “TYNDP”) via a letter dated 6 July 2012, received by the Agency on 9 July 2012.
- (2) When reviewing the TYNDP, the Agency evaluated each aspect of the TYNDP process and the applied methodology, albeit with certain impediments as regards the consistency assessment of national and community-wide TYNDPs and as regards the criteria underlying the cost-benefit analysis,

HAS ADOPTED the Opinion on the European Ten-Year Network Development Plan 2012, as annexed.

Done at Ljubljana on 5 September 2012.

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<sup>1</sup> OJ L 211, 14.8.2009, p. 1

<sup>2</sup> OJ L 211, 14.8.2009, p. 15

For the Agency:

  
Alberto Pototschnig  
Director

# **ACER opinion on the ENTSO-E Ten-Year Network Development Plan 2012**

**Ref: 06/2012**

**5-September-2012**

This Document contains the opinion of the Agency for the Cooperation of Energy Regulators (the Agency) on the European Ten-Year Network Development Plan (TYNDP) 2012 published by the European Network of Transmission System Operators for Electricity (ENTSO-E). The Agency has prepared this opinion pursuant to Article 6(3)(b) of Regulation (EC) No 713/2009.

## Related Documents

- ERGEG Opinion on the ENTSO-E Pilot Community-wide Ten-year Electricity Network Development Plan, 7 December 2010, Ref: E10-ENM-22-04.  
[http://www.energy-regulators.eu/portal/page/portal/EER\\_HOME/EER\\_PUBLICATIONS/CEER\\_PAPERS/Electricity/2010/E10-ENM-22-04\\_TYNDP%20opinion\\_7-Dec-2010.pdf](http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/2010/E10-ENM-22-04_TYNDP%20opinion_7-Dec-2010.pdf)
- Final Advice on the Community-wide-Ten-year Electricity Network Development Plan, 10 June 2010, Ref: E10-ENM-22-03.  
[http://www.energy-regulators.eu/portal/page/portal/EER\\_HOME/EER\\_PUBLICATIONS/CEER\\_PAPERS/Electricity/2010/E10-ENM-22-03\\_TYNDP%20advice\\_10-Jun-2010.pdf](http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/2010/E10-ENM-22-03_TYNDP%20advice_10-Jun-2010.pdf)
- Ten Year Network Development Plan, 2012-2022, 5 July 2012, ENTSO-E.  
[https://www.entsoe.eu/fileadmin/user\\_upload/library/SDC/TYNDP/2012/120705\\_TYNDP\\_2012\\_report\\_FINAL.pdf](https://www.entsoe.eu/fileadmin/user_upload/library/SDC/TYNDP/2012/120705_TYNDP_2012_report_FINAL.pdf)
- 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>

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## 1 Scope

The main purpose of the Ten-Year Network Development Plan (TYNDP) is to identify investment necessary for facilitating the development of cross-border trade, the integration of renewable energies into the electricity system and for guaranteeing security of supply. The TYNDP must provide a shared vision on the European power system for the foreseeable future and ensure greater transparency with regard to the development of the entire electricity transmission network. It shall include modelling of the integrated network, the development of an EU-wide demand-supply scenario and of a European generation adequacy outlook and an assessment of the resilience of the system. It shall build on national investment plans. When preparing the TYNDP, the European Network of Transmission System Operators for Electricity (ENTSO-E) shall conduct an extensive consultation process, involving all relevant market participants.

When forming its opinion, the Agency evaluates each aspect of the TYNDP process and the applied methodology, addressing the following questions in particular:

- Has ENTSO-E developed scenarios at EU-wide, regional and national level?
- Has modelling of the integrated network been included in the plan?
- Has consultation of all relevant stakeholders been conducted by ENTSO-E and has the outcome of these consultations been documented?
- Has an assessment of the system resilience been conducted?
- Have European, regional and national generation outlooks been prepared and are they consistent with each other?
- Is there coherence between national, regional and European TYNDPs?

The Agency's initial analysis of the national TYNDPs according to the provisions of the 'Third Package'<sup>1</sup> reveals that in most Member States these are still being developed. Therefore, a consistency assessment of national and Community-wide TYNDPs cannot at this stage be carried out by the Agency.

Furthermore, detailed comments on the criteria underlying the cost-benefit analysis are not included in the present opinion as there is ongoing cooperation between the Agency, ENTSO-E and the European Commission on this issue in the context of the preparatory work for the Energy Infrastructure Package (EIP)<sup>2</sup>.

The present opinion covers the process adopted by ENTSO-E to support the development of the 2012 TYNDP (Section 2 on stakeholder involvement and Section 3 on other general issues) and the methodology used in the plan (from Section 4 to Section 12, focusing on specific sections and subsections of the 2012 TYNDP). **Due to the on-going efforts to develop a sound cost-benefit analysis methodology and due to the fact that national TYNDPs are still being drafted, the Agency cannot yet evaluate the investment needs identified by ENTSO-E in the 2012 TYNDP.**

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<sup>1</sup> Directive 2009/72/EC.

<sup>2</sup> European Commission, Proposal for a Regulation of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC, Brussels, 19.10.2011, COM(2011) 658 final. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0658:FIN:EN:PDF>

## 2 Consultation processes and stakeholder involvement

ENTSO-E organised the following workshops at EU and regional levels:

- a public workshop on scenarios on 10 January 2011;
- a stakeholder workshop on assessment of projects of European interest on 15 June 2011;
- six regional workshops on regional investment plans (RIPs) at the end of 2011; and
- a workshop on the TYNDP package on 28 March 2012.

In June 2011 ENTSO-E published a document entailing the principles of ENTSO-E consultation practices<sup>3</sup>.

In February/March 2011 ENTSO-E conducted a one-month public consultation on the scenarios. Five responses were received. ENTSO-E provided a summary and an assessment of stakeholders' comments<sup>4</sup>.

From 1 March to 26 April 2012 ENTSO-E held an open public consultation on the "TYNDP 2012 package" i.e. on the community-wide TYNDP report, the six RIPs and the System Outlook and Adequacy Forecast (SO&AF). ENTSO-E kept the Agency informed about bilateral meetings with stakeholders. Despite ENTSO-E's efforts, stakeholder involvement was low.

With regard to provision of stakeholder information and earlier stakeholder involvement in the TYNDP consultation process, the Agency recognises the progress made in the past two years i.e. from the 2010 TYNDP. Nevertheless, early stakeholder consultations did not bear the results to match the importance of the TYNDP process despite ENTSO-E's increased efforts towards higher stakeholder involvement.

As stated in the "TYNDP public consultation report on received comments"<sup>5</sup>, ENTSO-E and the Agency are currently working on identifying the optimal way to further integrate and increase stakeholder participation. Ideas proposed so far include, among others, the setting up of a stakeholder group, as proposed at the workshop of 28 March.

Pursuant to Article 10(2) of Regulation (EC) No 714/2009, ENTSO-E should provide minutes from all the individual workshops and not only summaries of multiple workshops<sup>6</sup>. The

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<sup>3</sup> ENTSO-E, "ENTSO-E consultation process - 2011 Edition", 28 June 2011.  
[https://www.entsoe.eu/fileadmin/user\\_upload/\\_library/consultations/110628\\_Consultation\\_Process\\_Description.pdf](https://www.entsoe.eu/fileadmin/user_upload/_library/consultations/110628_Consultation_Process_Description.pdf)

<sup>4</sup> ENTSO-E, "ENTSO-E public consultation on background scenarios for the next TYNDP - Summary and assessment of stakeholders' comments"  
[www.entsoe.eu/fileadmin/user\\_upload/\\_library/consultations/SOAF\\_2011\\_Scenarios\\_Consultation\\_Answers.pdf](http://www.entsoe.eu/fileadmin/user_upload/_library/consultations/SOAF_2011_Scenarios_Consultation_Answers.pdf)

<sup>5</sup> ENTSO-E, "TYNDP public consultation report on received comments", 10 July 2011.  
[www.entsoe.eu/fileadmin/user\\_upload/\\_library/SDC/TYNDP/2012/120705\\_TYNDP\\_Report\\_on\\_consultation\\_FINAL.pdf](http://www.entsoe.eu/fileadmin/user_upload/_library/SDC/TYNDP/2012/120705_TYNDP_Report_on_consultation_FINAL.pdf)

<sup>6</sup> ENTSO-E, "TYNDP and Regional Investment Plans workshop results summary", 2012.  
[www.entsoe.eu/fileadmin/user\\_upload/\\_library/events/Workshops/TYNDP\\_2012\\_Regional/120309\\_workshops\\_summray\\_v6.pdf](http://www.entsoe.eu/fileadmin/user_upload/_library/events/Workshops/TYNDP_2012_Regional/120309_workshops_summray_v6.pdf)

Agency has no evidence that the minutes from most of the individual workshops have been made public.

Furthermore, the Agency deems it necessary that the minutes include comments from stakeholders raised during the workshops in order, firstly, to provide more transparency and, secondly, to report on discussions at regional level. In addition to this, a subsequent clarification should be provided by ENTSO-E on how stakeholder feedback has been taken into account in the TYNDP process.

The public consultation on the draft TYNDP was well followed by stakeholders. ENTSO-E received approximately 250 comments from more than 20 stakeholders. On the basis of this public consultation, ENTSO-E updated the final edition of the 2012 TYNDP and published a document detailing all the comments from the public consultation that were taken into account and the main changes introduced in the final edition<sup>7</sup> as follows:

- inclusion of illustrative transmission adequacy maps; and
- inclusion of approximately 20 additional projects mainly coming from German TSOs.

The ENTSO-E's report on received comments does not clearly illustrate the rationale behind the inclusion of these additional projects, whereas the TYNDP indicates that "the TYNDP package has also been updated with the most recent information related to the German national development plan under consultation. Provisional data was introduced in the draft submitted to consultation and the final TYNDP needed only to be marginally adapted". The Agency assumes that the purpose of this inclusion is to ensure consistency between the EU-wide TYNDP and the German national plan; however the Agency cannot definitely assess the necessity of the inclusion of the additional projects, as this would require further explanations on how the additional projects have been assessed.

The Agency recommends that ENTSO-E develops an enhanced approach to stakeholder involvement for the 2014 TYNDP and future plans. The Agency considers it necessary for the envisaged stakeholders' group to be involved in particular in the following areas: scenario development, definition of the expected level of information provided in the TYNDP and revision of the procedures for the inclusion of third party projects.

The Agency expects reports on public consultation, related documents and minutes from the meetings to be made public, and expects visibility on the way in which stakeholders' feedback in the TYNDP preparation process is taken into account by ENTSO-E.

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<sup>7</sup> ENTSO-E, "TYNDP public consultation report on received comments", 10 July 2011.  
[www.entsoe.eu/fileadmin/user\\_upload/library/SDC/TYNDP/2012/120705\\_TYNDP\\_Report\\_on\\_consultation\\_FINAL.pdf](http://www.entsoe.eu/fileadmin/user_upload/library/SDC/TYNDP/2012/120705_TYNDP_Report_on_consultation_FINAL.pdf)

### 3 Other general issues on the TYNDP process

#### 3.1 Ensuring transparent information

In the TYNDP and in the RIs a sufficient level of transparency of scenarios, inputs and results is required. Transparency of the selection process of the most economically and technically efficient projects is crucial for stakeholders.

The Agency believes that a higher degree of transparency will in turn improve the efficiency in the planning process. Therefore, the TYNDP should merge information from individual market players into appropriate statistics and analyses, providing sufficient level of stakeholder information, while preserving the confidentiality of commercially sensitive information.

The TYNDP, and particularly its market studies, provides plenty of information. Stakeholders must have a good understanding of where and when congestions will occur in the next ten years and a clear view of increased capacity needs. This information is given in different forms and levels of detail from one regional plan to another. The Agency appreciates that the form is region-specific to provide clearer and the most relevant information for each region. Nevertheless, a harmonised level of information with regard to market study results should be achieved.

Furthermore, since it is difficult to define a fair level of information to be provided to the stakeholders, a compromise has to be found between being exhaustive and understandable, and stakeholders could give their opinion about what they consider as a fair level within the consultation process and the envisaged stakeholders' group (see section 2.1).

The Agency sees room for improvement in explaining and expanding the information supplied in specific sections of the TYNDP. Specific comments are therefore provided in the corresponding sections of this Opinion.

#### 3.2 Data consistency throughout the EU, regional and national levels

The current structure of the ENTSO-E regional approach comes under a pan-EU framework and methodology. The Agency acknowledges that when providing information and forecasts to ENTSO-E, this structure relies on the efforts of national TSOs and requires a high level of cooperation.

With regard to the TYNDP, TSOs are expected to deliver a minimum level of information to ENTSO-E. Such a minimum level of information is however required to feed in a bottom-up approach, as well as to enable the development of the pan-EU database in support of regional and pan-EU studies. Both, the minimum level and quality of information delivered to ENTSO-E by the TSOs needs to be further unified, which represents an essential step to ensure consistency between national and regional or European plans. The latter can only be achieved through providing sufficient amount of national information and TSOs' strong cooperation within the ENTSO-E structure.

### 3.3 Treatment of third party projects

The Agency acknowledges ENTSO-E's efforts from early 2011<sup>8</sup> in developing a procedure for inclusion of third party projects<sup>9</sup>, in line with which ENTSO-E invited stakeholders to make preliminary contacts. ENTSO-E did not receive any comments from stakeholders on this procedure. Due to this and because none of the five third-party projects having applied for the current TYNDP met the criteria set out by ENTSO-E, none of the projects has been taken into account during the development of the TYNDP and has been included in the table of projects.

The Agency emphasises the importance of ensuring equal treatment of TSOs' and the third-party's projects. For this reason ENTSO-E should allow all third party projects to be included in the future TYNDPs, requiring third party projects to provide the same kind of market and grid studies as TSO projects and to provide sufficient level of detail with regard to capacity levels open to non-discriminatory third-party access. The Agency also encourages dissemination of the procedure to a wider audience to ensure that there is full transparency and stakeholder involvement throughout this process.

The Agency recommends ENTSO-E to add in an appendix of future TYNDPs all the third party projects which have applied and to explain how they are treated within the TYNDP.

### 3.4 Investments involving non-ENTSO-E countries

Market and grid modelling of non-ENTSO-E countries<sup>10</sup> has been run on a case-by-case basis depending on cooperation frameworks with these countries. For instance, the Agency observes that such an analysis, elaborated in more detail during a workshop<sup>11</sup>, has been used in the context of the interconnection with Turkey<sup>12</sup>. Hardly any information has however been provided for other non-ENTSO-E countries.

It is the Agency's opinion therefore that the current TYNDP does not sufficiently reflect the level of coordination and cooperation regarding investments in non-ENTSO-E countries which can be of great importance for the grid studies in the ENTSO-E countries.

Grid development in non-ENTSO-E countries is an important issue, affecting the prospect of development of interconnections at the border of the ENTSO-E's system and thus of the integration of areas with high potential of renewable energies.

<sup>8</sup> ENTSO-E, "Inclusion of third party projects in the 2012 release of the TYNDP - A guidance document", 1 February 2011.

[www.entsoe.eu/fileadmin/user\\_upload/library/SDC/TYNDP/2012/3rd\\_parties\\_projects\\_guidance.pdf](http://www.entsoe.eu/fileadmin/user_upload/library/SDC/TYNDP/2012/3rd_parties_projects_guidance.pdf)

<sup>9</sup> Third party projects are projects carried by non-ENTSO-E promoters.

<sup>10</sup> The network of ENTSO-E is currently interconnected with the electricity systems of seven non ENTSO-E countries: Albania, Belarus, Moldova, Morocco, Russian Federation, Turkey, Ukraine. In addition, Annex I of the TYNDP includes future interconnections with Algeria and Tunisia.

<sup>11</sup> Continental South East regional workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results", Zagreb, 12 December 2011. <https://www.entsoe.eu/events/tyndp-2012-regip/>

<sup>12</sup> Continental South East regional workshop with stakeholders on "TYNDP & RgIP 2012 methodologies and results", Zagreb, 12 December 2011. <https://www.entsoe.eu/events/tyndp-2012-regip/>

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The Agency recommends greater transparency around the cooperation frameworks and enhanced cooperation with non-ENTSO-E countries, in particular to understand the implications beyond 2020 and to provide a complete picture of grid development.

### 3.5 Cooperation with long-term development initiatives

The Agency acknowledges ENTSO-E's consideration of other prospective development initiatives<sup>13</sup>. The long-term development approaches adopted in the North Seas Countries' Offshore Grid Initiative (NSCOGI)<sup>14</sup> and the Electricity Highways 2050<sup>15</sup> are complementary with the TYNDP.

The links between these long-term development approaches and the TYNDP should be enhanced to ensure consistency in the future TYNDPs and to take advantage of the results and conclusions of these different initiatives.

## 4 Scenarios

Already in the SO&AF 2011<sup>16</sup>, ENTSO-E provided its plan to deliver the SO&AF reports on annual basis.

The Agency observes that the minimum frequency for the adequacy report defined by Article 8(4) of Regulation (EC) No 714/2009 is every two years and that ENTSO-E occasionally presents in the SO&AF 2012 comparisons between assumptions and results from the SO&AF 2012 and from the SO&AF 2011.

It is important that ENTSO-E explains the background and the main reasons for updating assumptions as well as systematically compares the future SO&AF reports with the previous editions. Such review would also help understand whether an annual or biannual release (in odd years, before the TYNDP) of the SO&AF is more appropriate.

The Agency welcomes ENTSO-E's intention to prepare longer-term scenarios until 2030. With such a timescale, the SO&AF will fully comply with the 15-year provision of Article 8(4) of Regulation (EC) No 714/2009.

ENTSO-E expects significant increases in net generating capacity of wind and solar power plants (245 GW and 100 GW in 2020, respectively)<sup>17</sup>. It indicates that many TSOs included renewable energy sources (wind and solar above all) in the category of non-usable capacity. In fact, non-usable capacity is estimated to reach 385 GW in 2020.

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<sup>13</sup> Section 10.4 of the TYNDP.

<sup>14</sup> European Commission, Directorate General for Energy. Link:  
[http://ec.europa.eu/energy/infrastructure/tent\\_e/coordinators\\_en.htm](http://ec.europa.eu/energy/infrastructure/tent_e/coordinators_en.htm)

<sup>15</sup> ENTSO-E, "Study roadmap towards modular development plan on pan-European electricity highways system 2050", Final version, July 2011.  
[www.entsoe.eu/fileadmin/user\\_upload/\\_library/publications/entsoe/MoDPEHS/2011-07-18\\_MoDPEHS\\_StudyRoadmap\\_final\\_version\\_publication.pdf](http://www.entsoe.eu/fileadmin/user_upload/_library/publications/entsoe/MoDPEHS/2011-07-18_MoDPEHS_StudyRoadmap_final_version_publication.pdf)

<sup>16</sup> ENTSO-E, "Scenario Outlook and System Adequacy Forecast 2011 – 2025".  
<sup>17</sup> Section 4.3 of the ENTSO-E's SO&AF 2012.

The Agency notes that hydro power plants are similarly characterised by restrictions on their output, due to various reasons, as indicated by ENTSO-E in the methodology for the SO&AF report. However, over the years, the TSOs have adopted various models and tools to describe the peculiar features of hydro power plants (e.g. the reservoir capacity, the natural inflows, etc.) in order to derive the hydroelectric potential for reliable generation.

Taking into account the expected growth of power injections and electricity generation from wind and solar power plants, it is important that ENTSO-E promotes new methodological approaches to estimate an expected reliable capacity of wind and solar power plants. Such new approaches could be fostered by ENTSO-E activities under the cluster 4 of its Research and Development Plan, particularly when developing tools for market integration of renewables.

ENTSO-E defines Load Management in the SO&AF as "the potential load reduction under control of each TSO to be deducted from load in the adequacy assessment". However, aggregate statistics are not provided for load management, whereas this is done for the other components of the supply-demand balance (e.g. system services reserve).

Out of 34 ENTSO-E countries, 15 (Belgium, Cyprus, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, The Netherlands, Serbia, Spain, Sweden and the United Kingdom) reported values for load management in the scenario EU2020. The overall load management is expected to slightly increase from about 11 GW in 2012 to about 13 GW in 2020. The increase is largely due to the increase in load management in three countries: Spain (+0.8 GW), Greece (+0.5 GW), Sweden (+0.4 GW).

The Agency invites ENTSO-E to assess the expectations for all components of the generation adequacy outlook, including load management.

The Agency acknowledges the introduction of a top-down scenario (the EU2020 scenario) in addition to the two A and B scenarios in the 2012TYNDP, responding to a previous appeal from stakeholders for an additional top-down approach.

The Agency acknowledges the use of cases (within each scenario) in the 2012 TYNDP and in the 2012 RIPS as the main instrument adopted to deal with uncertainties about future scenarios<sup>18</sup>.

ENTSO-E introduces extended scenarios for a 2030 vision in the new SO&AF 2012, with a view of extending the timescale of the scenario outlook, since it can take more than ten years to build new grid connections. ENTSO-E states that the objective of constructing contrasting visions that differ enough from each other is to capture a realistic range of possible future pathways and different future challenges for the grid. The Agency believes that uncertainties might also be substantial on a ten-year timescale and that a wider difference in scenarios will be required.

The Agency regards as essential the use of a wider span across scenarios and the use of sensitivity analyses on the development of some generation technologies, particularly of nuclear, offshore wind and hydro storage. Furthermore, a more systematic approach to stakeholder engagement should be introduced, ensuring that relevant parties are involved on

<sup>18</sup> Sections 10.1 and 12.2.3 of the TYNDP.

the relevant issues and that a wide range of quantitative inputs are derived from such involvement.

Datasheets for all scenarios in the SO&AF and all sensitivity analyses in the TYNDP should be publicly available.

## 5 Modelling approach

ENTSO-E's TYNDP projects are proposed in two steps: a) market and b) grid studies. Both groups of studies are subject to an iterative process, bearing results in the form of the most economically and technically efficient projects. Whereas grid studies are traditionally in TSOs' domain, the current TYNDP positively introduces and applies market studies at European level in order to highlight the needs for increased exchange capacities and to assess the economics of projects. The market studies constitute a major new feature of this TYNDP.

Pan-European co-operation and consistency are key issues for both market and grid modelling.

### 5.1 Market Modelling

Market models are intended for defining the grid development needs, in order to predict the way in which new investments will be used by the market and thus to assign an economic value to these projects.

The market studies are run according to a European methodology and based on a pan-European database including the current Net Transfer Capacities (NTC), the costs of the different generation technologies and assumptions on the generation mix of the different countries.

The Agency expects ENTSO-E to indicate the assumptions adopted on fuel prices, including fuel price differentials across regions, and on CO<sub>2</sub> emission prices. A merit order diagram (e.g. figure 11 of the Regional Investment Plan Continental South East), including MW figures for each aggregate of generation technologies at European and at regional level, would increase transparency.

As stated above, market modelling is part of the iterative TYNDP preparation process. It simulates the expected commercial power flows across boundaries on the basis of a large number of possible market situations in several forms (power flows or use rate of the capacity with a monotone curve) and provides the most representative market situations to run the grid studies. Step by step, the methodology aims at bringing out an efficiently designed project for each investment need. Moreover, market studies produce several indicators, in particular the socio-economic welfare (SEW) for every set of projects, comparing the situations with and without their implementation.

The introduction of market studies has been successfully addressed. This is a newly introduced feature, representing coordinated efforts at the EU level. The results of these efforts are essential for ensuring transparency of the project selection methodology.

It is important that the data used for running the market studies is provided in the SO&AF. The Agency considers this to be essential for ensuring a good level of transparency for all stakeholders. In particular, the Agency recommends clarifying and enhancing the approach for modelling generation profile from renewable sources.

Market studies and grid studies are part of an iterative process designed to optimise the increase of grid transfer capacity. The Agency considers it important that this methodology is well understood by stakeholders, and therefore recommends that clearer information about the inputs and outputs of the successive steps and on the depth of the iterative process (e.g. through an illustrative example based on one of the projects of the TYNDP) is provided.

The Agency acknowledges the ENTSO-E's efforts with regard to pan-European modelling. It recognises that the currently applied regional approach makes it easier to consider national specificities. The coherence issue stemming from this approach has been addressed by ENTSO-E. Regional studies have been run in line with a coherent European methodology, thanks to overlapping study perimeters and harmonisation at different levels of regional studies, including cross checks for results and border conditions.

The Agency regards it essential for ENTSO-E to provide clear information on the sensitivity of the market study results to the considered scenarios.

## 5.2 Network modelling

Network studies answer the following question: "Will the dispatch of generation and load given in every case generated by the market study results in power flows that endanger the safe operation of the system (accounting especially for the well-known N-1 rule)?"

Network studies build on the data from a pan-European database, that is fed from internal data from each TSO, on TSOs' assumptions about localisation of generation, on regional market studies and, especially, on the most representative situations among the market modelling studies: either very frequent situations, or more "extreme" situations that are chosen by the TSOs for their ability to encompass representative grid constraints.

The outputs of the network studies are physical power flows induced by the commercial ones, grid constraints remaining after implementation of projects and technical indicators of each project. These indicators, combined with the ones derived from market studies (e.g. the socio-economic welfare) enable the multi-criteria analysis.

Network studies are based on TSOs' expertise to run robust models. ENTSO-E provides an insight into the criteria and practices that the TSOs use to run these studies. The Agency considers it important that ENTSO-E continues elaborating further on these practices in line with the System Operation Network Codes under development.

Network modelling covers voltage collapse and stability studies. The criteria for these studies are explained in Appendix 3 of the TYNDP. The Agency appreciates that the contingency issue is highlighted, which is an improvement compared to the 2010 TYNDP. Nevertheless, this section should be further elaborated following the pace at which homogeneous practices are being implemented.

Regional studies allow for consideration of local aspects and particularities and for ensuring consistency with the national investment plans. European consistency is nevertheless ensured due to the use of a pan-European database and of overlapping study perimeters.

## 6 Multi-criteria analysis

As an outcome of the market and network studies, a set of criteria is introduced to illustrate the benefits of projects from a European perspective as part of a cost-benefit analysis.

The Agency recognises ENTSO-E's efforts towards developing a multi-criteria assessment approach of projects of a pan-European significance.

In the context of the European Commission's proposal for the EIP, ENTSO-E is expected to propose a cost-benefit methodology for the assessment of projects to become the basis for the selection of Projects of Common Interest (PCIs). The Agency acknowledges the proposed multi-criteria approach as the first step in the development of the expected methodology for a cost-benefit analysis. Nevertheless, the multi-criteria project assessment, which the current TYNDP is based on, needs to be further elaborated in light of the forthcoming EIP. Furthermore, since the TYNDP is to be used as the basis for the PCI selection process, it is essential that the 2014 TYNDP takes advantage of the ongoing developments in the field of a cost-benefit analysis methodology. The criteria is therefore to be robust and well established to avoid any shadows of a doubt expressed by the European Commission or other relevant stakeholders.

Considering the currently proposed set of indicators in the analysis, some economic effects linked to the indicators might be double-counted (e.g. for the CO<sub>2</sub> indicator). Special attention should therefore be paid to avoid possible double counting of economic effects when developing a cost-benefit analysis.

With regard to the assessment of projects of a pan-European significance, the Agency expects that the assessment methodology is explained clearly, particularly when this is performed within the whole iterative process of market and grid studies.

The Agency supports the development of a social and economic welfare indicator that leverages the market study approach and highlights the benefits of projects from the perspective of a European electricity market.

The Agency welcomes the introduction of a risk indicator of social acceptance depicting the probability of completing the projects by the planned commissioning date on the basis of expert assessment or preliminary environmental studies. In addition to this indicator, the Agency suggests specifying the number of new overhead / underground lines attributed to each investment item. Furthermore, an explanation of how ENTSO-E addresses the refurbishment of existing lines in the process of project assessment is considered to be essential.

The Agency expects ENTSO-E to integrate the on-going efforts in improving the methodology for the cost-benefit analysis in the next TYNDP, especially in the light of the development of the PCI selection methodology within the EIP.

## 7 Clustering of investments

ENTSO-E addresses the call for the clustering of projects by defining a project of pan-European significance as a set of single investments that addresses the same transmission need. In total, 503 investment items are clustered into just over 100 projects. In this way, clusters encompass investment items that jointly contribute to the same grid transfer capability.

The Agency appreciates the clustering of single investments into projects of pan-European significance to highlight the interdependence of investment items and to provide a more global view of proposed investments necessary to meet the requirements. Showing how certain bottlenecks can be overcome and displaying them via maps is very helpful. However, the graphical presentation should be more consistent and more detailed so as to be more closely aligned with the RIPs, in particular at the cluster level for the largest ones.

At the same time, the Agency cannot definitely confirm the necessity of every single investment in the corresponding cluster, as the importance of each item on the whole cluster has not yet been provided in any detail.

The Agency regards the further development of the clustering methodology as essential for the provision of a consistent clustering approach throughout Europe. This is of great importance for overall transparency.

The Agency expects ENTSO-E to provide further details on the importance of an investment item and its possible impacts on the whole cluster. The Agency recommends that costs be presented for each individual investment item inside each project cluster.

## 8 Investment requirements

As a result of the network and market study process, ENTSO-E has identified almost 100 possible bottlenecks in Europe in the coming decade. The likely bottlenecks have been classified according to three types of concerns: the security of supply; generation direct connection; and market integration. With regard to the latter, 40% of the 100 bottlenecks are of a cross-border nature.

In Figure 6.5, ENTSO-E presents the bulk power flows associated with market integration concerns by adopting the following ranges: i) less than 2000 MW; ii) 2000 - 4500 MW; iii) 4500 – 10000 MW; iv) greater than 10000 MW.

Since the main purpose of the TYNDP is to identify the investment gaps, notably with respect to cross border capacities, the Agency expects ENTSO-E to develop a specific assessment of cross-border capacities. The aim should be to identify a target value (MW) for the additional transfer capacities at cross-border boundaries.

The Agency acknowledges the complexity of quantifying such a target and the possible need to provide capacity ranges depending on the assumptions for each scenario and for each sensitivity case.

## 9 Additional information provided on projects

In addition to the indicators resulting from the multi-criteria analysis, the table of projects included in the TYNDP provides additional information on the status of projects and expected commissioning dates.

The Agency acknowledges the progress made since the pilot 2010 TYNDP in displaying structured information on projects and investment items.

An explanation should be given as to how certain commissioning dates have been set. Moreover, the Agency draws ENTSO-E's attention to the risk of a delay in long-term projects and to the importance of providing realistic commissioning dates for projects.

Additionally, a more thorough explanation of the terms used in the status column of the table of projects would be welcome. Therefore, the Agency suggests an additional column indicating the type of investment items (overhead line, underground line, substation...).

Furthermore, the Agency suggests that ENTSO-E publishes a unified labelling of projects in European and national plans.

ENTSO-E calculates the grid transfer capacity increase given by each project and, in Figure 7.5 of the TYNDP, provides an outcome of capacity increases across all boundaries in Europe. The following ranges are used: i) 0 - 999 MW; ii) 1000 - 1999 MW; iii) 2000 - 4000 MW; iv) 4001 - 16000 MW.

The Agency expects ENTSO-E to focus further on cross-border capacities. For each border, the aim should be to provide the total amount of additional transfer capacity (MW) provided by the TYNDP projects (including the capacity increase given by third party projects) and to compare it with the investment gap, identified according to Section 8. Reasons for any differences should be analysed.

## 10 Analysis of resilience

In the TYNDP and in the RIPs, ENTSO-E has detailed an approach designed to ensure the resilience of the system.

With regard to the background scenarios and the sensitivity analyses, the most restrictive cases based on the possible future situations have been considered in regional studies in order to check the secure functioning of the grid once the projects are commissioned.

The Agency acknowledges that the resilience of the system forms part of a consistent approach in the TYNDP and in the RIPs. The Agency considers it important that ENTSO-E pursues its efforts in maintaining consistency between European and regional levels in its analysis of resilience.

## 11 Transmission adequacy

Transmission adequacy forms an essential part of the TYNDP, ensuring that the proposed set of projects matches the requirements. The project selection methodology, and especially the multi-criteria analyses, enables the selection of projects to address a specific need, and thus achieving a net positive impact. The purpose of this part of the TYNDP is to check whether all the requirements identified from a European perspective have been addressed; its aim is to highlight residual congestions or potential additional investment needs. In the final edition of the TYNDP, following the TYNDP public consultation, ENTSO-E has introduced illustrative maps of potential remaining investment requirements which sketched out a first transmission adequacy approach.

The Agency acknowledges ENTSO-E's efforts to assess transmission adequacy. The information presented by ENTSO-E in the transmission adequacy sections of the TYNDP and of the RIPS is a first step which should be further developed to highlight the possible gaps and residual congestions as this part was not addressed in the pilot 2010 TYNDP. The Agency considers it to be a key issue for stakeholders, that the projects which would be able to meet the investment requirements are presented. The Agency particularly welcomes the illustrative maps that ENTSO-E introduced in the final edition of the TYNDP to highlight potential remaining investment requirements.

On the basis of the first approach outlined in the current TYNDP, the Agency expects ENTSO-E to pursue its efforts in structuring the transmission adequacy approach that aims to provide information on residual congestion and possible additional investment requirements when relevant from a social and economic point of view.

## 12 Monitoring of previous plans

Chapter 3 of the TYNDP provides information on the comparison of the 2012 TYNDP with the previous edition in 2010.

The first part of the chapter shows how projects from the 2010 edition are considered in the current TYNDP. The second part reports on the current status of the projects. Further information on the evolution of the status of the projects is provided in the table of projects<sup>19</sup>.

In the Agency's view, the project assessment methodology already included in the 2010 TYNDP should be further explained, enhanced and benefit from best-practices implemented in some RIPS.

The Agency considers that full transparency of the evolution of projects should be provided in the corresponding chapter in the RIPS, especially on delayed and cancelled investments. All cancelled investments should be listed and the reason for cancelation should be displayed in the TYNDP. The same should also apply to delayed investments, since at present the reason for their delay cannot always be easily established, neither in the chapter on assessment of the previous TYNDP, nor in the list of projects.

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<sup>19</sup> Annex I of the TYNDP.

Additionally, the Agency and ENTSO-E should further discuss and coordinate the monitoring of investments in line with the Agency's monitoring duties. To this end, more detailed information on the project status will probably have to be provided to the Agency.

The input data is illustrated quite differently in the TYNDP and in the RIPv. The data seems more detailed in the RIPv and is not easily comparable with the information provided in the TYNDP.

In future TYNDPs, the Agency expects a greater level of detail regarding project cancelations and delays.

## Appendix 1: Abbreviations

ACER	Agency for the Cooperation of Energy Regulators
EIP	Energy Infrastructure Package
EU	European Union
ENTSO-E	European Network of Transmission System Operator for Electricity
ERGEG	European Regulators' Group for Electricity and Gas
NSCOGI	North Seas Countries' Offshore Grid Initiative
NTC	Net Transfer Capacity
PCI	Project of Common Interest
RIP	Regional Investment Plan
SEW	Socio-Economic Welfare
SO&AF	System Outlook and Adequacy Forecast
TSO	Transmission System Operator
TYNDP	Ten-Year Network Development Plan



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