

OPINION No 11/2019
OF THE AGENCY FOR THE COOPERATION OF
ENERGY REGULATORS

of 25 March 2019

ON THE ENTSO-E DRAFT TEN-YEAR NETWORK DEVELOPMENT
PLAN 2018

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 an Agency for the Cooperation of Energy Regulators¹, and, in particular, Articles 6(3)(b) and 6(4) 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, and, in particular, Articles 8(3)(b) and 9(2) thereof,

Having regard to the favourable opinion of the Board of Regulators of 20 March 2019, delivered pursuant to Article 15(1) of Regulation (EC) No 713/2009,

Whereas:

1. INTRODUCTION

- (1) Article 9(2) of Regulation (EC) No 714/2009, first subparagraph, requires the European Network of Transmission System Operators for Electricity ('ENTSO-E') to submit the draft Community-wide network development plan (hereafter the Ten-Year Network Development Plan – 'TYNDP'), including the information regarding the consultation process, to the Agency for the Cooperation of Energy Regulators ('the Agency') for its opinion.

¹ OJ L211, 14.8.2009, p. 1.

- (2) Pursuant to Article 6(3)(b) of Regulation (EC) No 713/2009, the Agency shall provide an opinion to ENTSO-E, in accordance with the first subparagraph of Article 9(2) of Regulation (EC) No 714/2009, on the TYNDP, taking into account the objectives of non-discrimination, effective competition and the efficient and secure functioning of the internal markets in electricity and natural gas.
- (3) Article 9(2), second subparagraph, of Regulation (EC) No 714/2009 requires that the Agency provide, within two months from the day of receipt, a duly reasoned opinion as well as recommendations to ENTSO-E and to the Commission where it considers that the draft TYNDP submitted by ENTSO-E does not contribute to non-discrimination, effective competition, the efficient functioning of the market or a sufficient level of cross-border interconnection open to third-party access.
- (4) Pursuant to Article 6(4) of Regulation (EC) No 713/2009, the Agency shall, based on matters of fact, provide a duly reasoned opinion as well as recommendations to ENTSO-E, the European Parliament, the Council and the Commission, where it considers that the draft TYNDP does not contribute to non-discrimination, effective competition and the efficient functioning of the market or a sufficient level of cross-border interconnection open to third-party access, or do not comply with the relevant provisions of Directive 2009/72/EC and Regulation (EC) No 714/2009.
- (5) On 28 November 2018, ENTSO-E submitted a first part of the draft TYNDP 2018 to the Agency.
- (6) On 31 January 2019, ENTSO-E completed its submission by providing additional clarifications.

2. SUMMARY OF THE DRAFT ENTSO-E TYNDP 2018

- (7) For the purpose of the present Opinion, the Agency considered the following documents within the draft TYNDP 2018:
 - The TYNDP 2018 Executive Report ‘Connecting Europe: Electricity 2025-2030-2040’ (‘TYNDP 2018 Executive Summary’).
 - The TYNDP 2018 Annexes.
 - The TYNDP 2018 Project Sheets.
 - The following insight reports:
 - “*Improvements of TYNDP 2018*”.
 - “*Stakeholder Engagement*”.

- “TYNDP CBA from assessment indicators to investment decisions”.
 - “Data and expertise as key ingredients”.
 - “Technologies for Transmission System”.
 - “The Identification of System Needs”.
- The 2018 Mid Term Adequacy Forecast (MAF);
 - Stakeholders’ consultation responses to the draft TYNDP 2018².
 - Implementation methodology of the 2nd ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects in the TYNDP 2018 (‘CBA Implementation document 2018’).
- (8) On the Scenario Development Report, the 2nd ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects (‘CBA methodology 2.0’) and the ENTSO-E’s practical implementation document for inclusion of transmission and storage projects in the TYNDP 2018 (‘TYNDP Guidelines’), the Agency issued separate Opinions³.
- (9) The draft TYNDP 2018, in addition to the description of the adopted methodologies and their implementation, contains a description and assessment of 165 transmission projects, corresponding to 359 investment items, and 20 storage projects. In accordance with its Opinions No 01/2017 and 08/2017 related to the draft TYNDP 2016, the Agency does not consider project 271 (‘Northern Seas Offshore Grid infrastructure’ - a Long Term Conceptual Project) and its corresponding investment item 1264 (which is described in

² Also published on ENTSO-E’s website:

https://www.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/consultation/TYNDP2018_consultation_responses.xlsx

³ The Agency’s Opinion No 10/2018 on the ENTSOs’ Scenario Development Report 2018 is available here:

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2010-2018%20on%20the%20ENTSO-E%20and%20ENTSOG%20draft%20TYNDP%202018%20Scenario%20Report.pdf

The Agency’s Opinion No 05/2017 on the CBA 2.0 methodology is available here:

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2005-2017.pdf

The Agency’s Opinion No 22/2017 on ENTSO-E’s practical implementation document for inclusion of transmission and storage projects in the TYNDP 2018 is available here:

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2022-2017.pdf

the relevant draft EU TYNDP 2018 project sheet as a list of individual TYNDP projects, which will develop into a global scheme for Offshore Grid Infrastructure in the Northern Seas) as part of the draft TYNDP 2018 and recalls its view that the project 271 is a corridor rather than a project and does not display any concrete investment description.

- (10) Table 1 presents a classification of the transmission projects according to the number of investment items included in each project, based on the draft ENTSO-E TYNDP 2018 project sheets. The Agency points out that the number of clusters and investment items within the projects should be lower, if projects indicated in recital (37) and (68) cannot demonstrate that they meet all criteria, including technical criteria p) of the TYNDP Guidelines.

Table 1: Summary of the transmission projects in the draft TYNDP 2018

	Number of projects in the draft TYNDP 2018	Number of investment items
Cluster with 1 investment item	98	98
Cluster with 2 investment items	23	46
Cluster with 3 investment items	18	54
Cluster with 4 investment items	13	52
Cluster with 5 investment items	6	30
Cluster with 6 investment items	3	18
Cluster with 7 investment items	2	14
Cluster with 15 investment items	1	15
Cluster with 32 investment items	1	32
TYNDP 2018	165	359
TYNDP 2016	168	420
TYNDP 2014	127	371

- (11) Table 2 displays the overall investment cost of the draft TYNDP 2018, under the assumption that, according to the ENTSO-E CBA methodology 2.0, the investment costs refer to the year of the TYNDP (i.e. 2018).

Table 2: Estimated investment cost of the draft TYNDP 2018 investment items and cost confidence of the draft TYNDP 2018

Status	Number of investment items (with available cost data)	Estimated investment costs (M€)	Cost confidence ⁴ (uncertainty range, when given) (%)
Under consideration	86 (81)	30505.9	+19.4% -16.6%
Planned, but not yet in permitting	96 (96)	21064.2	+9.6% -9.6%
Permitting	123 (122)	64771.7	+12.4% - 12.2%
Under construction	53 (50)	20033.2	Not significant
Commissioned ⁵	1 (1)	65.7	N/A
Total	359 (350)	136440.6	

3. ASSESSMENT OF THE DRAFT ENTSO-E TYNDP 2018

(12) The Agency assessed the draft TYNDP 2018 on the basis of the following main criteria:

- a. The objectives set out in Articles 6(3)(b) and 6(4) of Regulation (EC) No 713/2009 and Article 9(2) of Regulation (EC) No 714/2009.
- b. The essential requirements of the TYNDP, as specified in Article 8(10) of Regulation (EC) No 714/2009, as amended by Regulation (EU) No 347/2013.
- c. The requirements of the consultation process when preparing the draft TYNDP, as specified in Article 10 of Regulation (EC) No 714/2009.

⁴ Uncertainty ranges were not provided for 73 (20%) out of 350 draft TYNDP 2018 investment items with available investment costs data, including 16 investment items under consideration, 18 planned, but not yet in permitting, 21 in permitting and 18 under construction, which reduces the reliability of the aggregated cost confidence, particularly for the under-construction category. In several instances, only one value was provided for the cost uncertainty range of the investment without any indication of whether it is an upward or downward variation. For the purpose of this Opinion, the Agency considered these values as symmetrical (i.e. valid for both upward and downward uncertainty of the investment).

⁵ Investment item 1492 of project 94 'GerPol improvements' was commissioned in 2016 according to the draft EU TYNDP 2018 project sheets.

- (13) Furthermore, the Agency took into account its previous opinions, recommendations and positions, including those related to:
- a. The draft TYNDP 2012, the draft TYNDP 2014 and the draft TYNDP 2016.
 - b. The TYNDP Guidelines.
 - c. The scenarios to be used in the draft TYNDP 2014, in the draft TYNDP 2016 and in the draft TYNDP 2018.
 - d. The ENTSO-E CBA methodologies to be used in the TYNDPs.
 - e. The selection of electricity projects of common interest (PCIs) in 2013, 2015 and 2017.
 - f. The consistency of the TYNDP with national network developments plans.
 - g. The monitoring of the implementation of investments in electricity transmission networks, as published by the Agency in 2014, 2016 and 2018.

3.1. Improvements with respect to the previous TYNDP

- (14) The Agency acknowledges that the TYNDP process is complex and resource intensive, and needs to be carried out within a relatively short two-year timeframe.
- (15) The Agency acknowledges in particular the following improvements implemented by ENTSO-E:
- a. The publication of the TYNDP Guidelines.
 - b. The preparation of a stand-alone report on “identification of system needs”, although the need of significant improvement of this activity still remains as further discussed in this Opinion.
 - c. A reduction in the average number of the investments included in a project (clustering ratio: investments / clusters equal to 2.17) as compared to TYNDP 2016 (ratio: 2.50).
 - d. A significant increase of the share of TYNDP projects which are “planned, but not yet in permitting” or in a more advanced status, and a corresponding reduction of the “under consideration” projects (which correspond to about 22% of the total capital expenditures (CAPEX) in the draft TYNDP 2018 compared to around 50% CAPEX share of “future clusters” in the TYNDP 2016).

- e. A more detailed and disaggregated indication of project costs, displaying CAPEX and operation expenditures (OPEX) separately, and, in the very large majority of cases, per investment item.
- f. The significant increase in the number of market zones considered for the purpose of market simulations, which was achieved through geographical expansion of the studied areas and the split of some market zones of the modelled area into additional ones and the use of additional climate years for the modelling.
- g. The introduction of an assessment related to the study year 2025, which is based on a “best-estimate” scenario.
- h. A better presentation of the benefit categories B1, B2 and B3, which helps avoid misunderstanding as regards potential double-counting.
- i. Additional information regarding the minimum and maximum results for some of the CBA indicators, making the results more transparent.
- j. An additional process (labelled as “missing benefits” by ENTSO-E) providing some initial analyses on the benefits beyond those already assessed according to the “2nd ENTSO-E Guideline For Cost Benefit Analysis of Grid Development Projects” (ENTSO-E CBA methodology)⁶, as well as an improved calculation of the Security of Supply (SoS) benefit (“experimental SoS”) and alternative values for the monetisation of some benefits.

3.2. The timeline of the TYNDP process

(16) The development of the TYNDP followed the timeline presented below:

- May 2016: start of the scenario development activity by proposing (jointly with ENTSOG) some storylines.
- October 2017: draft Scenario Development Report for consultation⁷.
- October-November 2017: submission of the TYNDP 2018 candidate projects.

⁶ <https://docstore.entsoe.eu/Documents/TYNDP%20documents/Cost%20Benefit%20Analysis/2018-10-11-tyndp-cba-20.pdf>

⁷ <https://consultations.entsoe.eu/tyndp/entso-consults-the-stakeholders-on-the-2018-scenar/>

- February 2018: Regional Investment Plans and System Needs Analysis 2040 for consultation⁸.
 - March 2018: post-consultation version of the Scenario Development Report.
 - May-September 2018: consultation on, collection and justifications of missing benefits (previously named “additional benefits”) by promoters for the TYNDP projects⁹.
 - August 2018: draft TYNDP report for consultation¹⁰.
 - October 2018: Midterm adequacy forecast for consultation¹¹.
 - December 2018: first part of the draft TYNDP 2018 submitted for an Agency’s opinion.
- (17) On 24 January 2019, the Agency requested ENTSO-E to provide further information regarding the TYNDP candidate projects (submission before and after the deadline, application of the administrative and technical criteria for project inclusion in the draft TYNDP 2018). The information was received on 31 January 2019.
- (18) Several delays compared to ENTSO-E’s work programmes (WP) for 2017¹² and 2018¹³ were noted. The six-month delay of the Scenario Development Report played a major role in the overall delay of the draft TYNDP 2018, although it was not the only factor. As a result, the submission of the complete draft TYNDP 2018 to the Agency for its opinion was completed as late as January 2019, despite the legal requirement for the adoption of the TYNDP every two years.

⁸ <https://consultations.entsoe.eu/tyndp/regional-investment-plans-and-system-needs-2040/>

⁹ <https://consultations.entsoe.eu/tyndp/tyndp-2018-additional-benefits/>

¹⁰ <https://consultations.entsoe.eu/tyndp/tyndp-2018-public-consultation/>

¹¹ <https://consultations.entsoe.eu/system-development/mid-term-adequacy-forecast-2018/>

¹² https://docstore.entsoe.eu/Documents/Publications/ENTSO-E%20general%20publications/entsoe_AWP_161221_20.pdf

¹³ <https://docstore.entsoe.eu/Documents/Publications/ENTSO-E%20general%20publications/AWP2018.pdf>

Table 3: Planned and actual dates of the major milestones for the development of the draft TYNDP 2018

Milestones for the development of the TYNDP 2018	Planned date in ENTSO-E Work Programme 2017	Planned date in ENTSO-E Work Programme 2018	Actual date
Scenario Development Report publication	September 2017	(not defined)	30 March 2018
Pan European and Regional system needs, Regional Investment Plans publication	December 2017	January 2018	October 2018
Project applications	July 2017 / November 2017 (i.e. call launches)	September – November 2017	From 2 October 2017 until 31 November 2017

3.3. Remarks on the stakeholder involvement and on the public consultation

- (19) ENTSO-E hosted several public workshops in the development of the TYNDP to consult the associated methodologies and results.
- (20) The Agency regrets that the minutes of such workshops and other accompanying documents (e.g. presentations) are not always available on ENTSO-E's website for each relevant workshop¹⁴. This development is considered by the Agency as a step backwards compared to the TYNDP 2016 where complete information and minutes for the TYNDP-related workshops and meetings were provided.

¹⁴ E.g. TYNDP 2018: Project Promoters Workshops on Project Sheets finalization on 14.05.2018. 18.05.2018. 23.05.2018,

<https://docstore.entsoe.eu/news-events/events/Pages/Events/TYNDP-2018-Project-Promoters-Workshop-on-Project-Sheets-finalization-Brussels.aspx?EventWorkshopId=378>

<https://docstore.entsoe.eu/news-events/events/Pages/Events/TYNDP-2018-Project-Promoters-Workshop-on-Project-Sheets-finalization-Rome.aspx?EventWorkshopId=379>

<https://docstore.entsoe.eu/news-events/events/Pages/Events/TYNDP-2018-Project-Promoters-Workshop-on-Project-Sheets-finalization-Berlin.aspx?EventWorkshopId=380>

- (21) ENTSO-E published the MAF on 3 October 2018, for consultation until 16 November 2018. The version published for consultation is the version of the MAF document submitted to the Agency.
- (22) The Agency regrets that the public consultation did not lead ENTSO-E to review the MAF in light of the stakeholders' comments.
- (23) ENTSO-E published for public consultation i) in February 2018 a 'European Power System 2040 Completing the map - Technical Appendix'¹⁵ and ii) in August 2018 a 'TYNDP 2018 Executive Report Appendix - Version for consultation'¹⁶. These technical appendices are not present in the TYNDP version which ENTSO-E submitted to the Agency.
- (24) The Agency observes that the absence of these important technical documents is contrary to the intrinsic technical nature of the planning activity. It does not help the interested parties (the Agency, NRAs and, especially, project promoters) to grasp the technical insights of ENTSO-E's analyses and to replicate them, where relevant.

3.4. Remarks on the TYNDP Guidelines for the inclusion of projects in the TYNDP 2018

- (25) In its Opinions No 01/2017 and No 08/2017 related to the draft TYNDP 2016, the Agency recommended a clearer and better applied procedure for the identification of projects to be included in the TYNDP¹⁷.
- (26) On 2 October 2017, ENTSO-E published the TYNDP Guidelines for the inclusion of projects in the TYNDP 2018. In its Opinion No 22/2017 on the TYNDP Guidelines, the Agency acknowledged that the inclusion criteria and the information required from project promoters provided more clarity regarding the project application and inclusion in the TYNDP 2018.

¹⁵ https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/System_Need%20Report.pdf

¹⁶

<https://tyndp.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/consultation/Main%20Report/TYNDP18%20Exec%20Report%20appendix.pdf>

¹⁷ According to the Agency's Opinion No 01/2017 (p.5), ENTSO-E should i) include all the projects of the national network development plans (NDP) with cross-border relevance, ii) define, after consultation with stakeholders, a procedure for the inclusion (and exclusion) of additional candidate projects, which are not included in the NDPs and iii) duly apply it.

- (27) The Agency considers that the TYNDP Guidelines could properly serve the objectives of transparency and non-discrimination and eventually improve the quality and credibility of the TYNDP, if they are duly and consistently applied by ENTSO-E and the results of their application are clearly described in the TYNDP.
- (28) In this regard, the Agency notes that some important elements of the application of the TYNDP Guidelines (e.g. the results of the assessment of the criteria for project inclusion) are not or not sufficiently explained in the draft TYNDP 2018. The lack of such information significantly reduces the transparency of the process and hinders the Agency's evaluation of whether the TYNDP Guidelines have been consistently applied by ENTSO-E. These drawbacks are further explained in the following recitals.
- (29) Based on the information provided by ENTSO-E, the project promoters were allowed to submit applications for TYNDP candidate projects between 2 October and 30 November 2017, in line with the timeline indicated in the TYNDP Guidelines. ENTSO-E states that the review of all TYNDP 2018 candidate projects, which submitted an application by the deadline, was performed to assess whether they comply with the administrative and technical criteria.
- (30) According to the draft EU TYNDP 2018 insight report: "stakeholder engagement" (p.5), ENTSO-E collected 195 applications from transmission project promoters within the deadline defined in the TYNDP Guidelines.
- (31) Based on the information provided by ENTSO-E, 28 transmission candidate projects of the TYNDP 2018 have been initially rejected as they did not comply with any of the "alternative administrative criteria". Following clarifications and additional information provided by the project promoters to ENTSO-E, 2 out of the 28 initially rejected¹⁸ candidate projects proved to comply with the criteria and were re-included in the draft TYNDP 2018. ENTSO-E also informed the Agency that no project was excluded from the draft TYNDP 2018 for failure to comply with the technical criteria.
- (32) Based on the above information, the Agency notes that that some of the data on the number of projects in the draft TYNDP 2018 documentation is incorrect - i.e. if out of 195 transmission candidate projects, 26 transmission candidate projects have been rejected, the TYNDP 2018 should include 169 transmission projects and not 166

¹⁸ These projects were: Maali (UK-NO) interconnection promoted by Element Power, Britib (UK-FR-ES) interconnection promoted by ACS Cobra, ASEI (ES-FR-IT) and ANAI (ES-FR-UK) interconnections promoted by ABENGOA and 24 HVDC interconnection projects by Europagrid (these projects were not specified by ENTSO-E). Based on the information provided by ENTSO-E to the Agency, Britib and Maali proved that they comply at least with one alternative administrative criterion.

transmission projects, as suggested by the draft TYNDP 2018 Executive Summary (p.2) and the draft TYNDP 2018 project sheets.

- (33) The draft EU TYNDP 2018 insight report: ‘stakeholder engagement’ (p.5) indicates that from October to November 2017, ENTSO-E collected 12 applications from storage project promoters. ENTSO-E also informed the Agency that 8 additional TYNDP 2018 storage candidate projects¹⁹ submitted information after the closure of the submission deadline. According to the information provided by ENTSO-E these candidate projects were eventually all included in the draft EU TYNDP 2018 since they had a PCI status or because they were able to justify the delay. In total, based on the draft EU TYNDP 2018 project sheets, 20 storage projects are included in the draft TYNDP 2018.
- (34) Even though the Agency considers that it is a duty of any diligent project promoter to keep track of the TYNDP developments, all third-party project promoters of the previous TYNDP should be contacted by ENTSO-E directly when opening the project submission window and asked for a clear confirmation that they are aware of the project submission requirements and timeline.
- (35) Furthermore, the Agency also notes that the draft TYNDP 2018, in different sections, refers to incorrect numbers of included storage projects (e.g. ENTSO-E’s TYNDP 2018 Executive Report (p.2) claims that 15 storage projects were proposed in the draft EU TYNDP 2018, while the same report (p.43) refers to 13 storage projects).
- (36) According to the TYNDP Guidelines (p.10), all the project characteristics necessary to model the project in the network tool used by ENTSO-E in the assessment process - the date of commissioning, the status as well as the CAPEX and OPEX of each of the investment items part of the project - should be provided by the project promoters for each TYNDP candidate project. Failure to provide such information should result in the exclusion of the project from the TYNDP 2018 (and therefore no assessment of the project is necessary).
- (37) The Agency notes that, based on the draft TYNDP 2018 project sheets²⁰, such information is not available for all investment items of the projects in the draft TYNDP

¹⁹ Projects 1013 ‘CAES Zuidwending, NL’, 1022 ‘CARES (Compressed Air Renewable Energy Storage)’, 1023 ‘Cheshire Gas CAES’, 1003 ‘Hydro-pumped storage in Bulgaria – Yadenitsa’, 1004 ‘Estonian PHES (pumped-hydro energy storage)’, 1006 ‘HPS AMFILOCHIA’, 1009 Kruonis pumped storage power plant extension project, 1014 ‘Coire Glas’

²⁰ The commissioning date is not provided for the following 5 investment items of 4 projects: ‘SELL-DUNG Reconductoring’ of project 74 (‘Thames Estuary Cluster (NEMO-Link)’); 779 ‘F.Alentejo-Ourique-Tavira’ and 780 ‘Extension of Ourique substation’ of project 85 (Integration of RES in Alentejo); and 1648 ‘MAREX Wind Infeed cable 2’ of project 349 (‘MAREX Organic Power Interconnector’). Investment costs and/or annual OPEX

2018. Furthermore, no explanation is provided why these projects, despite the missing information, are included in the draft TYNDP 2018. The Agency recalls that, in order to reach the objectives of the TYNDP Guidelines, their provisions should be duly applied²¹. Projects for which the project promoters do not provide the mandatory data should be excluded from the TYNDP 2018 in line with the provisions of the TYNDP Guidelines (p.10).

- (38) Based on the responses to the public consultation on the draft TYNDP 2018²², the Agency notes that, while project promoters have the right to request a review of the assessment of their projects, in some instances the information provided by ENTSO-E is insufficient for third-party promoters to understand ENTSO-E's calculations (for example, full simulation data was not made available to non-TSO promoters, which could harm equal treatment of project promoters). Furthermore, some respondents to the public consultation on the draft TYNDP 2018 considered the TYNDP 2018 process as too complex and stressed the need for an earlier publication of the TYNDP Guidelines to allow project promoters to have an accurate representation of what will be asked from them when applying. In this regard, the Agency recalls its recommendation to ENTSO-E to publish the TYNDP Guidelines for consultation at least 4 months before the beginning of the process for the inclusion of projects in the TYNDPs beyond 2018 to allow for stakeholders' and the Agency's comments to be taken into account²³.

3.5. Remarks on the TYNDP scenarios and their use for cost benefit analyses

- (39) The Agency already issued its Opinion No 10/2018 on the ENTSOs draft TYNDP 2018 scenario report, in which the Agency:
- a. welcomed the cross-sectoral development of scenarios and the extension of the scenario period up to the year 2040;
 - b. noted the too lengthy period for the development of scenarios which brings the risk of outdated assumptions and too compressed timeframes for the subsequent TYNDP analyses;

are not provided for all investment items of the project in 16 instances. For the list of the relevant projects and investment items, please refer to recital (68).

²¹ Agency's Opinion No 22/2017 on TYNDP Guidelines, p.3.

²² draft TYNDP 2018 consultation responses:

https://www.entsoe.eu/Documents/TYNDP%20documents/TYNDP2018/consultation/TYNDP2018_consultation_responses.xlsx

²³ Agency's Opinion No 22/2017 on the TYNDP Guidelines, p.3.

- c. recommended that ENTSOs ensure the timely and non-discriminatory availability of all data to all project promoters;
 - d. observed that the ENTSOs failed to consider a wide spectrum of possible futures, as two out of three scenarios feature “high economic growth”, while the third has a “moderate [i.e. average] growth”.
- (40) Specifically, regarding the electricity sector, the Agency observes that no cost benefit analysis in the draft TYNDP 2018 has addressed the study year 2040, although the data were prepared in the scenario development activity.
- (41) According to Annex V(1) and (4) of Regulation (EU) No 347/2013, the cost-benefit analysis should cover multiple study years (at least the years $n+5$, $n+10$, $n+15$, and $n+20$, where n is the year in which the analysis is performed). Also, according to section 2.1 of the ENTSO-E CBA methodology, the analysis should cover multiple time horizons, at least two study years for the mid-term horizon and one for the long-term and very long-term horizon. Despite the above stipulations, and the fact that scenarios were prepared for the year 2040, no benefits calculations were prepared for this study horizon or any other one, limiting the visibility of the projects benefits over a longer horizon.
- (42) Regarding an important input data for the cost benefit analyses for electricity projects, the Agency observes that yearly transfer capacities (i.e. the same value for all 8760 hours of the year) appear to be indicated in the ENTSO-E documents. The lack of consideration of season- and time- differentiated reduces the quality of the CBA results.

3.6. Remarks on the identification of infrastructure investment needs

- (43) The Agency, in its Opinions No. 01/2017 on the draft ENTSO-E TYNDP 2016 (p.10-11) and No 14/2017 on the draft regional lists of electricity projects of common interest (p.4, p.18, p.28), provided the following considerations and recommendations that ENTSO-E:
- a. perform the identification of infrastructure investment needs for all study years, all scenarios and all three categories, i.e. market integration, security of supply, and new generation connection;
 - b. ensure quantification of the infrastructure needs (and when possible, monetisation according to specific metrics) by clearly indicating the target capacities for each boundary, based solely on technical-economic assessments;
 - c. provide comprehensive information on the criteria and the thresholds applied, as well as the reference costs that were considered on each boundary;
 - d. explain the methodology used for deriving the target capacities for each boundary (on the socio-economic welfare - SEW - calculations, the reference costs used, the

- size of capacity increase steps and, if applicable, the additional parameters taken into account);
- e. provide output data (of the needs identification process) that pertain to an appropriate time horizon;
 - f. aim at including in the PCI selection process an assessment of more cost-effective alternatives to infrastructure development.
- (44) ENTSO-E released the “European Power System 2040 - Completing the map: The Ten-Year Network Development Plan 2018 System Needs Analysis” (SNA) for public consultation from 31 January to 28 February 2018.
- (45) ENTSO-E did not release an updated version of the draft SNA taking into account the inputs of the public consultation²⁴.
- (46) The Agency positively acknowledges the new approach of ENTSO-E to introduce a new step to assess future system needs at a European scale before proceeding to the next step of the TYNDP, i.e. the project assessment through a CBA.
- (47) The Agency also positively acknowledges the effort of ENTSO-E to identify the needed additional capacities at nearly all borders between the modelled zones. This approach should continue in the future and be significantly improved (see Section 4 of this Opinion).
- (48) On 19 March 2018, following the public consultation, the Agency provided its preliminary informal feedback on this draft report, proposing specific improvements to be applied, scaled in time, i.e. specific actions for the finalisation of the report and long term actions for the TYNDP processes beyond 2018.
- (49) The Agency regrets to note that none of the recommendations, provided to ENTSO-E on the consultation document, were implemented. Therefore, the main remarks on the draft SNA remain:
- a. The outcomes of the methodology applied, i.e. the calculated target capacities at each boundary (in quantitative terms) are missing. More specifically, although these outcomes were published for public consultation in a Technical Appendix to the document, this part is not included in the package delivered to the Agency for its opinion.

²⁴ Some results of the public consultation were published in August 2018, after the launch of the consultation of the TYNDP 2018.

- b. The reference network considered for the needs identification is not clearly defined. More specifically, it is noted that the draft SNA is unclear on the projects included, and consequently the interconnection capacities considered in the reference network for the analysis, and that the current definition of “reference network”, on p.51 of the draft SNA, seems not to comply with the practice described in section 7 of the draft SNA²⁵. Also, projects, which are not currently certain to be commissioned by the study year, have been included in the reference grid (e.g. projects under consideration²⁶).
- c. The infrastructure needs analysis was not performed for study years relevant to the cost benefit analysis of the TYNDP 2018, i.e. 2025 and 2030, but only for 2040. More specifically, the analysis of infrastructure investment needs for the study year 2040 is a potentially useful insight to detect new ideas and concepts for future (studies and subsequent) projects, as well as to confirm the usefulness of already studied/planned investments in a very long-term horizon. However, the purpose of the TYNDP is also to confirm that the currently planned projects are actually needed around the date when they are expected to be operational, as well as to detect new projects which should be urgently developed. Therefore, the analysis of more study years, which are closer to present day, is needed. Furthermore, the study year 2040 is characterised by a high uncertainty of scenario-related assumptions and a lack of comparability with the national scenarios, as the latter in many instances may not cover as far as the year 2040.
- d. Considering that the draft SNA was based on the TYNDP 2016 scenarios, which are considerably different from the 2018 ones, the results of this needs identification analysis do not fit the TYNDP 2018 framework.
- e. The consideration regarding the Renewable Energy Sources (RES) and SoS needs are not clear in the draft SNA. More specifically, regarding the methodology applied, section 7 of the draft SNA mentions that market simulations were used by

²⁵ More specifically, although according to the definition of p.51, the reference network is “*The existing network plus all mature TYNDP developments*”, the identified capacity increases at the borders indicated in figures 2-5 of the SNA include “*increases already identified in TYNDP 2016*“, although the TYNDP 2016 did not feature any explicit needs identification process. More confusion is added by the fact that “*Increases already identified in TYNDP 2016 refer to the reference capacities of TYNDP 2016 for 2030 which for some borders had been adjusted for the TYNDP 2018 purpose*” (Executive summary, p. 2).

²⁶ E.g. some investment items of project 170 (‘Baltics synchro with CE’).

the regional and market experts of ENTSO-E for the estimation of these needs. However, the indicators mentioned for this assessment²⁷ lead to the conclusion that the RES and SoS needs were identified at zonal level, without explaining how zonal results have been used to calculate RES and SoS needs per boundary (as displayed, for example, in figures 3, 4 and 5 of the draft SNA). Also, it is not clear which thresholds were used for these needs identification, and whether an economic test was performed before including them in the boundary needs.

- f. Regarding the outcomes of the above process, the identified capacity needs (solely due to RES and SoS, separately from market integration), and at which zones and/or borders, are not quantified.
- g. The justification of why ENTSO-E included in the needs analysis the “15% interconnection ratio criteria (15% of RES installed capacity)” is missing, and the specific methodology according to which these criteria were investigated is not clear. Also, the outcomes of the above investigation, as well as the specific additional capacity increases per border are missing.
- h. The network approach used for the identification of internal bottlenecks and its specific outcomes are not clear. More specifically, the overall methodology used, including the steps at a sufficient level of granularity, the criteria for assuming specific future projects at specific grid nodes, and the interaction of the results of the network studies with the market studies (e.g. whether these results were used for running more iterations of the market models) are not explained. Furthermore, the outcomes of its implementation (e.g. the specific future projects assumed, the additional capacity considered for eliminating identified bottlenecks at specific borders) are missing.
- i. The transparency of the process of needs identification and of its final outcomes is limited in the draft SNA. More specifically, the following elements are missing²⁸:
 - I. Description of the representation of the market, in particular of the number of zones/nodes and the number of branches/arcs²⁹ in the model.
 - II. Quantified / monetised information on the identified needs, i.e. SEW/GTC (expressed in M€/GW) for the last “accepted” standard capacity increase of

²⁷ i.e. the Remaining Capacity for SoS and the curtailed energy for RES integration.

²⁸ Although some of these elements are provided in the RIP for some regions, they should be provided in a consolidated and systematic way in the TYNDP.

²⁹ The terms „branch“ or „arc“ of the model is equivalent to the term „boundary“ between two zones.

500 MW for each boundary; generation curtailments (GWh/year) per zone; and energy unserved (GWh/year) per zone.

III. Although aggregated results per regional group regarding annual marginal costs and their spreads (figures 8 and 9), and energy unserved (figures 11 and 12) are displayed in the SNA, the specific results to ensure transparency are missing regarding the following:

- Directional average of hourly marginal cost spreads per boundary in €/MWh.
- Average annual marginal cost per zone in €/MWh.
- A zone-by-zone indication of the energy unserved results in GWh/year, needed also to confirm the avoidance of double counting effects, which could be originated by the (multiple) presence of the same country in various regions³⁰.
- Reference costs (M€ / GW) assumed for developing capacity at each boundary/branch are missing. The inclusion of graphical presentations in the Regional Investment Plans (Standard cost maps, presenting the costs considered in ranges of 500 or 1000 M€/1GW) is inadequate to ensure the necessary transparency on this important assumption.

3.7. Remarks on the calculation of costs and benefits

3.7.1. Methodology and modelling approach for benefit calculations

- (50) The Agency welcomes the improvements introduced in the market modelling compared to the TYNDP 2016, i.e. the significant expansion to new geographical areas (Tunisia, Israel, Iceland, Malta, Turkey, the Greek island of Crete, and the French island of Corsica), the increase of the market areas considered by splitting the market zones considered in the TYNDP 2016 into more areas (e.g. Italy and Scandinavian countries).
- (51) Also, the Agency notes positively the use of three climate years and the better alignment between market modelling tools achieved due to the consideration of the maintenance profiles for each piece of infrastructure.
- (52) As far as the methodology used for assessing projects is concerned, i.e. the implementation of the CBA methodology and the modelling approach used, it is expected that it should be sufficiently described and explained in the TYNDP package, so that to allow project promoters easily to duplicate its results. However, the transparency of the

³⁰ It should be clearer in the report which countries/zones are included in each region.

implementation of the CBA methodology could be improved in some important respects (which are analysed in Section 3.7.3 of this Opinion). The transparency of the implementation of the CBA methodology deteriorated further with the removal, without any reasoning, of the “appendix to the Executive Summary” that was included in the TYNDP package for consultation, but not in the package submitted to the Agency for opinion, and which provided some insight on methodological aspects, such as the alternative calculation of the benefit B6 (SoS-Adequacy). Furthermore, clarity is missing regarding the modelling approach followed, despite the Agency’s recommendation, in its Opinion No. 01/2017 on the draft ENTSO-E TYNDP 2016 (p.12), that ENTSO-E provide clarifications regarding the consistency of the modelling assumptions considered in the market modelling tools. More specifically:

- a. Regarding the market modelling tools used, except for a non-exclusive list of seven tools (Antares, BID, JMM, Plexos, PowerSym, PROMED, Pymas), which is contained in the insight report “Data and expertise as key ingredients”, their main features and their differences (with a potential impact on the estimated benefits) are not presented, and consequently the impact of the modelling options of each tool on the estimated benefits cannot be estimated.
- b. Also, although an adequate level of consistency of the costs considered in all market modelling tools was expected (e.g. for generation: variable fuel costs, internalised cost of CO2 emissions, variable operation and maintenance costs, start-up and shut-down costs), from the text of page 4 of the “Data and expertise as key ingredients” insight report - “*All market studies, with whatever simulation tool, are done for the whole ENTSO-E perimeter and they are all performed based on a full-year 8760-hour dispatch optimisation. [...] For particular infrastructure projects more detailed modelling assumptions were tested, such as [...]*” - one can conclude that different assumptions were considered for particular projects leading to a reduced overall consistency of the modelling assumptions considered in the various market modelling tools.
- c. Regarding the selection of the benefit indicators results, as indicated in the insight report “Improvements of TYNDP 2018” (p.9) “*To avoid distortions in the accuracy of the results the outlying results have been excluded from the computation of the final CBA indicators. [...] the final results were filtered considering the sensitivity of the algorithms of the market modelling software tools while keeping in mind the consistency of the market indicator dimension.*” The mechanism of exclusion of outlying results is not further explained, neither the impact of the discretionary “filtering” applied by ENTSO-E.
- d. ENTSO-E’s modelling approach used in the TYNDP 2018 does not consider various available capacity calculation methodologies, which could, amongst other, depict the effects of loop-flows on the transfer capacity.

3.7.2. Clustering

- (53) Specific rules apply for clustering investment items according to the ENTSO-E CBA methodology (p.21), i.e. a) investments significantly delayed compared to the previous TYNDP cannot be clustered within the same project and b) investments can only be clustered if they are at maximum one stage of maturity apart from each other. These rules are generally met, with the exception of two projects, project 164 ('*N-S Eastern DE_central section*') and 200 ('*CZ Northwest-South corridor*'), for which one investment item (685 ('*Mecklar – Grafenrheinfeld*') and 312 ('*upgrade of Mirovka substation*'), respectively) is delayed by 5 years compared to the TYNDP 2016, resulting into commissioning dates for these investment items which are delayed by 7 and 6 years, respectively, compared to the earliest commissioning dates of the investment items in their respective projects. This fact raises concerns on whether the clustering of these projects meets the first rule of the ENTSO-E CBA methodology.
- (54) ENTSO-E should avoid clustering an "under consideration" investment and a "planned" investment due to different status of the investments (approved vs. non-approved), unless duly justified in exceptional cases.
- (55) Furthermore, the necessity of clustering is not demonstrated for any project, and no main investment item is identified, despite the fact that, according to the ENTSO-E CBA methodology, "*When investments are clustered, it must be clearly demonstrated why this is necessary. Investments should only be clustered together if an investment contributes to the realization of the full potential of another (main) investment. [...] When clustering investments, one must explicitly define a main investment (e.g., an interconnector), which is supported by one or more supporting investments.*"
- (56) It is noted that, in several instances and without any justification, investments are included in the draft TYNDP 2018 with a new investment item number compared to their appearance in the TYNDP 2016³¹.

³¹ For example:

- '*New interconnection between Gabčíkovo (SK) – Gönyü (HU)*' and the '*New interconnections between Rimavská Sobota and Sajóvátka*' within project 48 ('*New SK-HU intercon. - phase 1*') have investment IDs 1500 and 1501 in draft TYNDP 2018 vs. investment IDs 214 and 695 in TYNDP 2016
- '*Installation of new PSTs in Vierraden*' and '*Installation of a new PST in Mikulowa*' have the investment IDs 1492 and 1493 within project 94 ('*GerPol Improvements*') vs. investment IDs 799 and 992 in the TYNDP 2016.
- '*Cirkovce (SI) Heviz (HU) / Zerjavinec (HR)*' has an investment ID 1558 in the draft TYNDP 2018 within project 320 ('*Slovenia-Hungary/Croatia interconnection*') vs. investment ID 223 in TYNDP 2016 within Project 141 ('*Slovenia-Hungary corridor*').

3.7.3. Outcomes of the Cost and Benefit calculations

Reference grid

- (57) Given that the “reference grid” is used as a starting point³² in the TYNDP CBA for the calculation of project benefits, it has a strong impact on the overall CBA results. According to the document “Implementation methodology of the 2nd ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects in the TYNDP 2018” (hereafter the “CBA Implementation document 2018”), p. 4, the criteria for the inclusion of projects in the reference grid were projects a) having a foreseen commissioning date by 2027 and b) being either under construction or in the permitting phase (in the latter case, acknowledgement by a competent body that the permitting has started is required).
- (58) In the Agency’s view, the criterion for the inclusion of projects in the reference grid is not robust enough as it does not sufficiently guarantee that the commissioning date of the considered projects will actually be met, which adds uncertainty regarding the plausibility of the reference grid³³.
- (59) Moreover, it is noted that the above lax criteria were not even met for many projects included in the reference grid. More specifically, the Agency detected 6 cases of projects included in the reference grid which include one or more investment items with a commissioning year later than 2027³⁴, and 16 cases of projects with a status less advanced than permitting³⁵.
- (60) For the above reasons, the reference grid as constructed by ENTSO-E cannot be considered as reliable, and the plausibility of the benefit projections is consequently

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- “Wullenstetten (DE) – DE/AT border area line” has an investment ID 1476 in the draft TYNDP 2018 within project 322 (‘Wullenstetten – border Area (DE-AT)’) vs. investment ID 986 in TYNDP 2016 within project 198 (‘Area of Lake Constance’).

³² Market and network models simulations with the project under examination either added to the reference grid or removed from it, are compared to the reference grid situation to calculate the various benefits of the project.

³³ As it can be deduced from Figure 6.5- Investments by evolution status of the Executive Summary Report, ENTSO-E acknowledges that 45% of the investments existing already in the TYNDP 2016 are either delayed or rescheduled in a two-year period. Therefore, it is expected that the really constructed grid of 2027 will be very different from the one currently considered in the reference grid based on the assumption that all projects with a commissioning date by 2027 will be constructed.

³⁴ All or some investment items of projects 35, 381,248, 264, 265 and 322.

³⁵ All or some investment items of projects 1, 33, 47, 123, 164, 170, 192, 206, 207, 209, 230, 244, 262, 266, 285 and 337.

reduced, given the potentially significant distortion of the benefit calculations due to a non-realistic reference grid.

- (61) Furthermore, ENTSO-E did not provide sufficient visibility to the projects included in the reference grid³⁶.
- (62) The ENTSO-E's rules for setting the reference grid are not adequate to assess interdependent projects (considering that the (non-)inclusion of interdependent projects in the reference grid has a strong impact on the CBA results). Especially with regard to competing projects, the criteria on which the projects are selected for inclusion in the reference grid, and the implementation of the "sequential TOOT" approach are sometimes not sufficiently explained, reducing the transparency of the process.

Benefit calculations

- (63) Considering the fact that the ENTSO-E CBA methodology was implemented for the first time in the TYNDP, the Agency expected a transparent description of its actual implementation. However, this is not the case for some CBA indicators, since the CBA Implementation document 2018 included in the TYNDP package mainly repeats the provisions of the ENTSO-E CBA methodology, which allow in some instances alternative ways of calculating benefits, without making clear which specific approach was used for each project. It is noted that, depending on the approach used, the benefit results may vary significantly. More specifically:
- a. Regarding the calculation of the indicator B1 (SEW), there are three alternative methods in the ENTSO-E CBA methodology: i) using market simulations only, ii) using re-dispatch simulations, with a market simulation result as a base, and iii) using a combination of market and network (re-dispatch) simulations.
 - b. In the CBA Implementation document 2018, it is mentioned that "*In the TYNDP 2018, in case internal project had no NTC contribution assumed, one of the internal re-dispatch methods described in 3.1.1 chapter has been used*". Firstly, it is not explained how an internal project can be included in the TYNDP without having an NTC contribution, since the latter is a prerequisite for the inclusion of a project in the TYNDP³⁷. Moreover, the reference to "*one of the internal re-dispatch methods*" without a clear reference in the project sheets to the specific method

³⁶ The information is provided in individual project sheets.

³⁷ See "ENTSO-E Practical implementation document for inclusion of transmission and storage projects in the 10-year network development (TYNDP) 2018", 2 October 2017, Section 4.1.2, Technical Criteria, Initial estimation of the Transfer capacity increase: "*for the internal infrastructure a minimum of 100 MW increase at the border is mandatory*".

- applied, provides no visibility as to which benefits the B1 indicator really includes for internal projects.
- c. Ambiguity on whether the avoided re-dispatching cost is included in the indicator B1 also exists for cross-border projects, since the CBA Implementation document 2018 indicates that the default approach used for “*cross-border projects with NTC contribution*” is the method based on market simulations only, without any reference in the project sheets for which projects the “default” method was applied.
 - d. The indicator B4 (Societal well-being as a result of RES integration and a variation in CO2 emissions), is an indicator calculated by each promoter, and in the “CBA Implementation document 2018”, it is mentioned that “*In the context of TYNDP 2018 this indicator is [...] free-format. It provides an opportunity to project promoters to report any observed, measurable impacts of RES integration and variation in CO2 emissions, which go beyond the effects already captured by indicator B1*”. No specific guidance is provided to promoters, neither in the ENTSO-E CBA methodology nor in the CBA Implementation document 2018. As a result, large divergence is noted in the assumptions and the practices applied by various promoters for the B4-RES sub-category. In some instances³⁸, the compensation rates for the RES curtailments valid in specific countries are used as a proxy of the societal value of the RES, while these compensation rates may vary significantly due to specific regulatory objectives in each country and by no means can they be considered as a fair indication of a RES extra-value for society, if any. In addition, in other cases³⁹, the TYNDP 2016 scenarios are used for the calculation of local RES curtailments and, therefore, of the monetary values indicated under this indicator. Because of the large divergence in the assumptions made and in the applied practices, and the lack of substantiation of the proxies used, the values of B4-RES indicators should not be further considered.
 - e. Regarding the indicator B5 (Variation in grid losses), with reference to the monetisation of losses in the CBA Implementation document 2018, it is mentioned that “*the final results were unexpectedly highly impacted for some projects by the difference in granularity of input variables (such as the climate conditions used) [...] ENTSO-E acknowledges these facts and recommends to use the results of losses computation with cautiousness when conducting any sort of financial analysis*”. The reason of the unexpectedly high results is not clear, and the projects

³⁸ This is the practice used for example for projects 26 (‘*Reschenpass Interconnector Project*’), 325 (‘*AT, SI, IT – South-East Alps Project*’) and 375 (‘*Lienz (AT) – Veneto region (IT) 220 kV*’).

³⁹ For projects 31 (‘*Italy-Switzerland*’) and 150 (‘*Italy-Slovenia*’). If the B4 indicator is used to display avoided RES curtailments due to local effects, they should be additional to those calculated under B1. The use of calculations from previous TYNDP, in addition to a general inconsistency, determines a risk of double counting.

for which the effect was noted are not mentioned. Regarding the calculation of benefit B5, the Agency observes that the ENTSO-E CBA methodology provides conflicting information: on the one hand (in Table 1), it indicates that the variation of losses has to be quantified (via network simulations) and afterwards multiplied by an “average electricity price”; on the other hand it provides (page 35) a complex method which requires market simulations with and without the project. As the latter approach looks prone to double counting effects with B1 SEW, the Agency suggested using the traditional approach.

- f. Regarding the indicator B6 (Security of supply: adequacy to meet demand), no information is provided on how the additional adequacy margin was calculated. As mentioned in the CBA Implementation document 2018, section 3.6.2, “*security of supply (adequacy) problems are identified by defining a scenario in which generation capacity is tight and market nodes rely on one another at different times of the year to fulfil demand*”. The scenario selected for the calculation of the additional adequacy margin of one project is of critical importance for the outcome of this calculation. Therefore, the lack of relevant information makes it impossible to check the validity of the assumptions made. Moreover, using different scenarios than the ones used for the SEW⁴⁰ creates an issue of coherence in the projects’ assessment.
- g. Regarding the indicator B7 (Security of supply: system flexibility), it is noted that no outcomes are indicated for many projects, without justification, e.g. for projects 1 (*RES in north of Portugal*), 13 (*Baza project*) in addition to projects listed in recital (64) for which no benefit calculation was provided for any of the benefit indicators.

(64) Neither benefit calculations nor sufficient justification⁴¹ for such an approach is provided for the following projects:

- a. 4 under construction projects, i.e. 21 (*Italy-France*), 25 (*IFA 2*), 74 (*Thames Estuary Cluster (NEMO-Link)*), and 336 (*Prati (IT) – Steinach (AT)*), which are also included in the reference grid;
- b. 3 under considerations projects, i.e. 256 (*Study to upgrade interconnection DE-NL*), – included in the reference grid, 345 (*Northern East-West connection NL*) and 347 (*Maasvlakte – Noord Brabant connection NL*).

⁴⁰ As explained in the Technical Appendix, which was removed from the TYNDP package submitted to the Agency.

⁴¹ For example, regarding 21 (*Italy-France*), 25 (*IFA 2*), 74 (*Thames Estuary Cluster (NEMO-Link)*) ENTSO-E states that additional CBA compared to the TYNDP 2016 was not necessary.

- (65) The project CBA results show important differences compared to the ones of 2016. Although ENTSO-E indicates that they are due to new scenarios, the modification of the reference grid, and the improvements made to the losses' computation, ENTSO-E should identify the key drivers of these differences for each project.
- (66) Although the Agency, in its Opinion No 01/2017 on the draft TYNDP 2016, had requested ENTSO-E to provide indications on the most important parameters for sensitivity analyses for the mid-term studies, no such identification was performed for the TYNDP 2018, and sensitivity analysis (except versus climate years, as long as this can be deemed a sensitivity) is missing. This absence is particularly critical for the study year 2025 (7-year-ahead), where only a single scenario is simulated.

Cost values

- (67) Regarding the reported costs, it is acknowledged that more clarity is provided compared to the TYNDP 2016, as for the first time not only the expected investment costs of the projects are reported, but also the annual operating costs. Furthermore, in the very large majority of cases, costs are indicated at an investment item level, therefore improving the transparency of the promoters' projections.
- (68) However, the following shortages are noted:
- a. For projects 345 (*'Northern East-West connection NL'*) and 347 (*'Maasvlakte – Noord Brabant connection NL'*), no cost values (neither investment costs nor annual OPEX) are reported⁴².
 - b. For projects 37 (*'Norway - Germany, NordLink'*), 74 (*'Thames Estuary Cluster (NEMO-Link)'*), 231 (*'Concept project Germany-Switzerland'*), 256 (*'Study to upgrade interconnection DE-NL'*), no cost values (neither investment costs nor annual OPEX) are reported for some of their investment items⁴³.
 - c. For projects 77 (*'Anglo-Scottish -1'*), 78 (*'South West Cluster'*), 245 (*'Upgrade Meeden – Diele'*), 263 (*'Lake Constance East'*), 264 (*'Swiss Roof I'*), project 265 (*'Tessin'*), 266 (*'Swiss Ellipse I'*), 333 (*'PST Foretaille'*), 351 (*'Eastern HVDC'*

⁴² Investment item, 1542 *'Northern East-West connection NL'* of project 345; investment item 1545 (*'Maasvlakte – Noord Brabant connection'*) of project 347.

⁴³ Investment items 142 *'Norway-Germany HVDC'* and 406 *'voltage uprating of existing lines in Norway'* of project 37; investment items 449 *'Richborough – Canterbury'* and 450 *'SELL-DUNG Reconductoring'* of project 74; investment item 1457 (*'additional measures'*) of project 231; investments 1529 *'Upgrade interconnection DE-NL'* and 1252 *'Long term upgrade interconnection DE-NL'* of project 256.

Link'), while the investment cost is provided, annual OPEX is not reported for the projects or some of their investment items⁴⁴.

- d. For projects 285 (*GridLink*), 296 (*Britib*) and 325 (*AT, SI, IT - South-East Alps Project*), the total investment cost is different from the investment cost of the single investment item. For project 325 (*AT, SI, IT - South-East Alps*), the total investment cost is different from the sum of the costs of the investment items.
- e. For a significant percentage of the projects (22%), the uncertainty range of the expected investment cost is not reported.
- f. Although, according to the past practice, the reference year of the project investment costs reported is the year of commissioning, no clear reference is made in the draft TYNDP 2018 to the reference year of the reported values.
- g. According to the ENTSO-E CBA methodology, CAPEX includes not only the expected costs related to the construction of a project before it becomes operational, but also the "*Expected costs for devices that have to be replaced within the given period*" and the "*Dismantling costs at the end of the equipment life-cycle*". Currently, only an overall number is provided for the CAPEX of a project, but given that the latter two categories of costs are incurred at different points in time, affecting the overall cost estimate of the project, they should be, in the Agency's view, reported as distinct figures.

3.7.4. Missing benefits and alternative benefit calculations

- (69) The purpose of this analysis, performed for the first time in draft TYNDP 2018, was the inclusion of values of benefits (called "missing benefits"), which are either not captured by the ENTSO-E CBA methodology or which are captured, but not adequately calculated in the TYNDP 2018, and to present alternative ways of calculating quantified/monetised values of some CBA indicators (called "Declared values of CBA indicators").
- (70) ENTSO-E released a "*Guideline on the declaration of Missing benefits and declared values of CBA indicators in the TYNDP 2018*" on 1 August 2018, after consultation.

⁴⁴ Investment item 452 '*Western HVDC Link*' of project 77; investment item 458 '*HINP-SEAB New Double Circuit*' of project 78; investment item 1246 '*Upgrade Meeden – Diele*' of project 245; investment item 1258 '*Rüthi - Bonaduz/Mettlen*' of project 263; investment items 1259 '*Beznau – Mettlen*', 1284 '*Pradella - La Punt*', 1287 '*Bassecourt – Mühleberg*', 1288 '*Mettlen – Ulrichen*' of project 264; investment item 1290 '*Magadino – Ulrichen*' of project 265; investment items 1285 '*Magadino*', 1286 '*Chippis – Lavorgo*' and 1261 '*Bickigen - Chippis – Chamason*' of project 266, investment item 1496 '*PST Foretaille*' of project 333; investment item 1547 '*Eastern HVDC Link*' of project 351.

- (71) The following categories of “missing benefits” were defined by ENTSO-E:
- A) Missing benefits not captured by the current 2nd CBA Guideline*
 - A.1 Reductions of costs for ancillary services.*
 - A.2 Reduction of emissions (non-CO2).*
 - B) Missing benefits not covered by the current 2nd CBA Guideline applying to transmission projects only.*
 - B.1 Synchronisation with Continental Europe (for Baltic States).*
 - B.2 Avoidance of the renewal/replacement costs of infrastructure.*
 - C) Missing benefits not adequately covered by the TYNDP 2018 implementation of the current 2nd CBA Guideline applying to transmission and/or storage projects*
 - C.1 Reduction of necessary reserve for re-dispatch power plants.*
- (72) Promoters were asked to provide their own calculations for the benefits included in the aforementioned document by 15 September 2018, based on the principles and the guidance provided in it. The short deadline allowed for inputs disfavoured the provision of inputs by non-TSO promoters, and for this reason, ENTSO-E allowed them longer time for submitting the results.
- (73) In the Agency’s view, it is in principle appropriate that ENTSO-E include in the TYNDP calculations some benefits not covered by the CBA methodology in force or alternative calculations of benefits already covered, as this approach could provide a more holistic view of the project benefits and favour subsequent methodological improvements. It is also positively noted that the guidelines for the calculations were subject to consultation.
- (74) However, as specifically noted below, in some instances the need for an alternative calculation is not sufficiently justified, the guidelines given were in many cases unclear and allowed double counting of benefits already considered with the current indicators. Furthermore, the process timeline was particularly tight, not allowing i) ENTSO-E sufficient time to provide better quality guidelines, and ii) promoters sufficiently to prepare for such analyses, including via consultancy studies.
- (75) For the above reasons, the exact repetition of the process of calculation of additional benefits on top of the already established CBA benefits should be avoided in the coming TYNDPs. The results of this process should be used by ENTSO-E to propose an updated CBA methodology, so that, as a first step, this methodology could cover more extensively the actual spectrum of project benefits – with an emphasis on the increasing needs for flexibility of the European electrical system due to the increasing penetration of RES, and, as a second step, benefits are calculated with properly consulted and more sound methodologies. Indeed, when updating the CBA methodology, ENTSO-E should take duly into account the comments received in the extra benefits process to improve the methodologies used for this exercise.

- (76) Furthermore, as stated in the ENTSO-E letter accompanying the TYNDP submission to the Agency, ENTSO-E do not wish their preliminary assessment of the validity of the missing benefits and alternative indicators declared by project promoters to be published. However, since the preparation of the TYNDP is clearly the responsibility of ENTSO-E, the TYNDP should include also ENTSO-E's analysis/validation, and not only, indistinctively, whatever the project promoters submitted⁴⁵.
- (77) Regarding the benefits included in the ENTSO-E Guideline on the declaration of missing benefits and declared values of CBA indicators in the TYNDP 2018, the following are noted:
- a. Regarding the benefit "*A.1 Reductions of costs for ancillary services*", no clear guidance is given on which methodologies will be accepted by ENTSO-E for each ancillary service, but only examples of national practices, and the clarification that this benefit "*should focus mainly on the effects of capacity reservation [...] without looking at energy activation costs of ancillary at first, as this methodology is still to be developed as improvement for the B7 indicator*".
 - b. Regarding the benefit "*B.1 Synchronisation with Continental Europe (for Baltic States)*", no guidance is given on the requirements of the methodologies that are to be considered as admissible, but only a reference is made to an on-going study carried out by four TSOs.
 - c. Regarding the benefit "*C.1 Reduction of necessary reserve for re-dispatch power plants*", although a clear distinction is made between what is calculated by the current CBA indicator (i.e. the start-up and fuel costs of generation re-dispatch for internal projects) and the fact that it does not include "*the full cost of the fixed costs of retention of generation to be available for re-dispatch*", the guidance given for the monetisation of the indicator, i.e. "*by statistical analysis of the costs of reserve from power plants i.e. from changing capacity constraint payments*", is vague and may result into double counting of costs with the indicator B1. Also, the lack of transparency regarding the projects for which the re-dispatch costs were included in the analysis, increases the risk of double counting of costs with the indicator B1.
 - d. Regarding the Declared value of "*D.1 Contribution to the removal of infrastructure bottlenecks which are caused by loop flows or transit flows*", although it is mentioned that "*Several benefits of a projects contribution to the removal of loop or transit flows are already captured in the CBA through the "SEW" indicator – congestion rent and "Variation in losses" indicator*", it is unclear which part of this benefit is currently not captured, leaving therefore the scope of this indicator

⁴⁵ The same consideration applies to the benefit indicators B4-RES and B4-CO2, as they were submitted by project promoters.

unclear and open to double counting. Furthermore, the guidance given for the calculation of the benefit is too vague, referring in general to “*market and network studies*” or to assessment “*by application of generation shift methodologies*”, without reference to a specific methodology.

- e. Regarding the Declared value of “*D.2 B6 indicator: Security of Supply - Adequacy to meet demand*”, the guidance for the monetisation of the Energy Not Served “*according to the value given to Energy not Served by customers*” (instead of the generic value assumed by ENTSO-E: 10000 €/MWh not served) is not sufficiently detailed.
 - f. Regarding the declared value of “*D3 Monetisation of B7 indicator: security of supply – system flexibility*”: the methodology to assess the future need for reserves in the concerned electrical systems should be strengthened, as well as the impact of a cross-border project to this need (increase, or decrease).
- (78) Regarding the specific benefits submitted by promoters in the process, the Agency asked the involved NRAs to provide their assessment, which is described in the following recitals. Due to relatively late receipt of ENTSO-E inputs, an evaluation of the consistency of approaches followed by the NRAs was possible only to a limited extent.
- (79) In the following two tables the statistics of NRA assessment for transmission projects is presented. Regarding the storage projects, 32 missing benefits and 12 alternative values were submitted for 13 projects in total.

Table 4: Statistics of transmission missing benefits

Missing benefit		Number of submitted benefits	NRA assessment					Missing replies
			Approved	Rejected	Corrected	Divergent views	Not able to assess	
A1	Reductions of costs for ancillary services	27	8	14	2	-	2	1
A2	Reduction of emissions (non-CO2)	23	7	11	-	3	2	-
B1	Synchronisation with Continental Europe (for Baltic States)	1	1	-	-	-	-	-
B2	Avoidance of the renewal/replacement costs of infrastructure	3	2	-	1	-	-	-
C1	Reduction of necessary reserve for re-dispatch power plants	23	15	6	-	-	1	1
Total		77	33	31	3	3	5	2

Table 5: Statistics of declared values/alternative calculations

Declared values/alternative calculations	Number of submitted benefits	NRA assessment					Missing replies
		Approved	Rejected	Corrected	Divergent views	Not able to assess	
B6 indicator: SoS - Adequacy to meet demand	21	4	14	1	-	1	1
Monetisation of B7 indicator SoS- System Flexibility	6	-	2	-	2	1	1
Removal of infrastructure bottlenecks which are caused by loop flows or transit flows	9	4	4	-	-	1	-
Total	36	8	20	1	2	3	2

- (80) As noted in Table 4, most of the indicated ancillary services and reduction of non-CO₂ emissions-related benefits were rejected. The most frequent reason was the lack of data or sufficient substantiation. This fact, in conjunction with the high interest indicated by promoters to indicate these benefits, underscores the need for ENTSO-E to develop appropriate methodologies and clear guidance to cover (at least) some of the benefits that projects can render due to the provision of ancillary services and for the monetisation of the benefit due to the reduction of non CO₂ emissions.
- (81) It is also noted from Table 4 that most of the C1 benefits “*reduction of reserve capacity for re-dispatching*” were approved by the involved NRAs. The methodologies used for the approved benefits may be a useful input to ENTSO-E when considering the expansion of the CBA methodology.
- (82) Regarding the declared values / alternative calculations, it is noted from Table 5 that most of the submitted calculations were rejected due to lack of data, non-approved methodologies or use of different scenarios, or duplication of the calculations. Also, the few approved ones refer to non-quantified benefits, and especially regarding the alternative benefit “*Contribution to the removal of infrastructure bottlenecks which are caused by loop flows or transit flows*”, only qualitative justification was provided. The above facts indicate that, in order for the alternative calculations to be improved in the future, ENTSO-E should develop the appropriate methodologies that are currently missing and improve the existing ones.

3.7.5. Assessment of storage projects

- (83) As to the CBA methodology 2.0, “*The reference network is then built up of including the most mature projects that are: a) in the construction phase or b) in the ‘permitting’ or ‘planned but not yet permitting’ phase where their timely realisation is most likely e.g. when the country specific legal requirements have stated the need of the projects to being realised.*”⁴⁶. Furthermore, according to the ENTSO-E’s TYNDP Executive Report Appendices⁴⁷, the second CBA Guideline further generalises the treatment of storage projects in order to align them with transmission projects, by using the same methodology to assess both types of projects and by including some storage specific benefits in the methodology. Based on these facts, it is unclear why none of the storage projects are included in the reference grid.
- (84) ENTSO-E should improve the transparency of storage project’s assessments, namely in the part describing the intended *modus operandi* of these projects, due to the differences in their planned operational patterns.

3.8. Remarks on the structure of the draft TYNDP 2018 and the presentation of the CBA results

- (85) Regarding the structure of the draft TYNDP 2018 (executive report and project sheets accompanied by 10 insight reports – out of which the Agency considers 6 within this Opinion as described in recital (7)), the Agency notes that this is similar to the structure of the last TYNDP, for which specific recommendations were made by the Agency in its Opinion No 01/2017. The Agency re-iterates its view that the current structure fails to make the TYNDP comprehensible. The content is fragmented among various separate documents, focuses mostly on presenting limited results of the analysis, and lacks crucial information on the process, the inputs, the applied methodologies and the outputs, as analysed in other Sections of this Opinion, leaving stakeholders with too many ambiguities.
- (86) Regarding the presentation of the project benefits in the draft TYNDP 2018, the Agency notes some improvements: the fuel savings due to the integration of RES and the avoided CO₂ emission costs are presented as part of the indicator B1 (socio-economic welfare), providing more clarity to the fact that the monetary impact of lower RES curtailment and lower CO₂ emissions has been considered in the calculation of the socio-economic welfare, and the results of indicators B1, B2 and B3 are presented for all the 3 climatic years that were examined.
- (87) However, the description of project results (in particular benefits) should be complemented by an assessment of the variations with regard to the previous TYNDP, especially when benefits change significantly compared to the previous TYNDP. An explanation of the result variation due to changes in scenario assumptions would be useful for the readers to understand the determinants of the benefits of a project.

3.9. Adequacy

- (88) The adequacy assessment of the TYNDP 2018 is covered within the MAF document. As ENTSO-E publishes the MAF annually, it is not clear which MAF publication pertains to the TYNDP and regarding which aspects. The Agency considers only the MAF 2018 as relevant for the TYNDP 2018.
- (89) As stipulated by Articles 8(3) and (4) of Regulation (EC) No. 714/2009, ENTSO-E should provide a TYNDP including an adequacy outlook covering a 15-year period. Not only does the MAF 2018 not cover 15 years (MAF 2018 uses 2025 scenarios, covering a 7-year period), it also seems completely detached from the TYNDP besides the use of common scenarios for 2025, as no correlation with the TYNDP 2018 is provided.
- (90) The Agency welcomes continuous improvements of the probabilistic approach made by ENTSO-E. However, ENTSO-E should consider whether the Monte Carlo approach could be enhanced with actual outage statistics and investigate the interdependency of

individual events. For example, such interdependencies could better link higher infrastructure outage probabilities with severe weather conditions.

- (91) It is also unclear from the MAF assessment how strategic reserves are considered, as especially for the mid-to-long-term adequacy assessments, such reserves could potentially be used in case of scarcity.

4. CONCLUSION

- (92) Notwithstanding the various drawbacks reported in Section 3 of this Opinion, the Agency did not identify such elements in the draft TYNDP 2018 that would suggest that the draft TYNDP 2018 have clear negative effects on non-discrimination, effective competition and the efficient and secure functioning of the market.

- (93) The Agency considers that ENTSO-E should further enhance the future TYNDPs by implementing the following Agency's recommendations:

- a. To enhance non-discrimination and equal treatment to all project promoters, regardless of whether they are members of ENTSO-E.
- b. To improve the assessment of projects and address the deficiencies in the applied methodologies (e.g. lack of a robust identification of system needs, CBA implementation) to avoid potentially inefficient system developments.
- c. To improve the evaluation of the benefit category related to SoS and consider further methodological improvements such as the monetisation of the "adequacy to meet demand" indicator, and the quantification - and if possible monetisation - of system flexibility, especially by estimating the benefits of ancillary services enabled by the new projects.

- (94) The Agency addresses the following recommendations to ENTSO-E, as regards the finalisation and adoption of the TYNDP 2018:

- a. Properly apply the TYNDP Guidelines and include or reject candidate projects in the updated TYNDP 2018 based on their rules.
- b. Increase transparency of the projects inclusion process by listing the rejected candidate projects and the reasons for the rejection of each of those projects.
- c. Correct the conflicting information on the number of projects included in the TYNDP.
- d. Include the missing mandatory data listed in technical criteria p) of the TYNDP Guidelines in the relevant draft TYNDP 2018 project sheets.

- e. Publish the reference costs (per border), which are used in the “identification of system needs” activity.
 - f. Regarding the modelling approach, provide further clarifications regarding the consistency of the modelling assumptions considered in the market modelling tools (including costs), and clarify how their results were filtered to provide the presented benefit values, according to the remarks made in Section 3.7.1 of this Opinion.
 - g. Clarify the decisions to apply a “sequential TOOT” approach at some borders/boundaries (and not others), and clarify the transfer capacity sequences used for the purpose of the sequential TOOT calculations.
 - h. Improve the implementation of the clustering rules provisioned in the ENTSO-E CBA methodology, according to the remarks made in Section 3.7.2 of this Opinion.
 - i. Justify why investment numbering is different compared to the TYNDP 2016 and, where non-justified, avoid such differences.
 - j. Provide a clear description of how the CBA methodology was implemented, providing the necessary transparency to the issues noted in Section 3.7.3 of this Opinion.
 - k. Regarding the indicator B4 (Societal well-being as a result of RES integration and a variation in CO₂ emissions), add a disclaimer in the project sheets clearly indicating that the values of this indicator are purely based on promoters’ analysis and not on clear rules provided by the ENTSO-E CBA methodology, and, regarding B4-RES indicator, that the values are not robust, not consistent with each other and they cannot be considered as solid benefits.
 - l. Amend / remove some missing benefits according to the NRA assessment in ANNEX II to this Opinion.
 - m. Increase transparency by publishing all documents and minutes of meetings related to the consultations carried out while preparing the TYNDP in accordance with the provisions of Article 10(2) of Regulation (EC) No 714/2009.
- (95) The Agency regrets the delay in the publication of the various TYNDP elements and expects ENTSO-E to learn from the experience of the TYNDP 2018 and propose solutions to avoid such delays in the development of future TYNDPs.
- (96) The Agency reiterates its view that the application of TYNDP candidate projects, which are not present in the national development plans, should take place after the identification of the infrastructure investment needs, in order to allow the project promoters to respond to those needs.

- (97) Regarding the practical implementation documents for the future TYNDPs, the Agency recommends that ENTSO-E:
- a. Publish the TYNDP Guidelines for consultation at least 4 months before the beginning of the process for the inclusion of projects in the TYNDPs beyond 2018 to allow for stakeholders' and the Agency's comments to be taken into account.
 - b. Include in the TYNDP Guidelines a clear description and timeline for promoters' inputs (regarding projects) and for all stakeholders' inputs (on all TYNDP aspects).
 - c. Properly apply the TYNDP Guidelines and include or reject candidate projects in the future TYNDPs based on their rules.
- (98) Regarding the scenario development activities for the future TYNDPs, the Agency reiterates the recommendations provided in its Opinion No 10/2018.
- (99) Regarding the identification of infrastructure investment needs for the future TYNDPs, the Agency recommends that ENTSO-E:
- a. Provide the outcomes of the applied methodology, i.e. the calculated target capacities at each boundary.
 - b. Clearly define the reference network considered for the needs identification. Given the goal of the needs exercise, i.e. to identify the optimal capacities at each border at the study horizon, the Agency recommends ENTSO-E to include in the reference grid for the needs identification only the projects which, at the time of the needs exercise, have a strong certainty of timely implementation (e.g. successful completion of the environmental procedures).
 - c. Perform the infrastructure needs analysis at more relevant study years, i.e. for situations around 5-year ahead and 10-year-ahead.
 - d. Elaborate at a sufficient level of detail the methodology to identify the needs, especially regarding the consideration of the RES integration and SoS-related needs.
 - e. Eliminate the consideration of the 15% target-related needs, as this is not relevant to this exercise.
 - f. Reconsider the necessity of the network studies in the needs identification exercise (given its complexity) and, if deemed necessary, clearly define the assumptions made and its interaction with the market studies.
 - g. Resolve the transparency issues identified in detail in recital (48) above, including the publication of the standard / reference costs used in the needs assessment, and

provide further insights of their calculation in case they are different from border to border without any obvious reason.

(100) Regarding the reference grid considered for the CBA analysis of future TYNDPs, the Agency recommends the following:

- a. For the short-term horizon (e.g. N+5), ENTSO-E should include all projects which successfully completed the environmental procedures.
- b. For the other study horizons, ENTSO-E should make a proposal based on the principles that i) only reasonably expected projects to be operational at the study horizon should be included, and ii) no discrimination of non-TSO projects can be possible;
- c. With regard to competing projects, i) to elaborate on the criteria for prioritising projects and on the implementation of the “sequential TOOT” approach, and ii) to consult with the concerned NRAs to verify the prioritisation of projects and construct the reference grid accordingly.

(101) Regarding the study horizons for which a CBA analysis is conducted, the Agency recommends ENTSO-E to extend the studies of the TYNDP 2020 at least to one study year after 2030 (namely 2035 or 2040).

(102) Regarding the calculation of the indicator B4 (Societal well-being as a result of RES integration and a variation in CO₂ emissions), it is recommended, for transparency reasons, to split it into two benefit categories: “B4 related to RES” and “B4 related to CO₂”.

- a. For the monetisation of the “B4 related to CO₂” component, ENTSO-E should use a consistent multiplier, rather than allowing promoters to make their own assumptions. A multiplier that could be used is the following: social cost of carbon – CO₂ price.
- b. The “B4 related to RES” component should address only RES curtailments, which are additional to those identified by the market simulations, avoiding double counting of benefits.

(103) Regarding the “missing benefits” and the alternative ways of calculating quantified / monetised values of some CBA indicators, the sole existence of this section in the TYNDP indicates the need for the CBA methodology sufficiently to cover the areas of the benefits currently not captured (with an emphasis on the increasing needs for flexibility to be provided to the European electrical system). Also, the NRAs’ assessment presented in Annex I provides useful input on the areas of expansion of the ENTSO-E CBA methodology.

- (104) Therefore, the “missing benefits” calculations can only be seen as a temporary solution to the need of capturing more benefits, and ENTSO-E is invited to devote the necessary effort so that the CBA methodology is further elaborated sufficiently to cover as many areas of benefits currently not captured as possible, taking into account the comments made by NRAs on the TYNDP missing benefits to improve the methodologies used in this exercise.
- (105) The Agency recommends that ENTSO-E identify the most important parameters for sensitivity analyses for the mid-term studies, together with possible ranges for these parameters and include these sensitivity analyses in the next TYNDPs.
- (106) The Agency recommends that ENTSO-E, in the market modelling of the power system for the calculation of project benefits in the coming TYNDPs, take into account the provision on the minimum level of available capacity for cross-zonal trade foreseen in the recast of the Regulation on the internal market for electricity, that is expected to come into effect in January 2020.
- (107) The Agency recommends that ENTSO-E improves the clarity of the CAPEX values by providing the timeline of expected expenditures, especially in cases where CAPEX is expected to be incurred after the projects becomes operational (e.g. costs for replacement or dismantling at the end of the equipment life-cycle).
- (108) Regarding the structure of the TYNDP, the Agency recommends that ENTSO-E produce one single transparent and detailed full report (separate from the TYNDP Guidelines, the CBA methodology, the Scenario Development and the Needs Identification, which should remain standalone documents), providing interested readers with full information about the process, inputs, methodology and outputs, while an executive report including information relevant to the general public could be concise and streamlined. Two insight reports (or annexes) could be maintained subject to the following amendments:
- a. “technologies for transmission system”, with a much clearer link to the content of TYNDP clusters, e.g. by listing the clusters that foresee network reinforcement via dynamic line rating and other innovative technologies, so as to display how much new technology is actually being progressively exploited in the European network;
 - b. “stakeholder engagement”, with a much more detailed description of the process for building the TYNDP, of the inputs provided by stakeholders and of their evaluation by ENTSO-E.
- (109) Regarding adequacy, ENTSO-E should clarify which annual MAF publication pertains to the TYNDP. To facilitate the integration of the MAF within the TNYDP, the MAF should show how new projects in the TYNDP help reduce potential adequacy issues.
- (110) The Agency recommends that ENTSO-E improve the description of project results in future TYNDPs, by considering the points mentioned in Section 3.8 of this Opinion.

(111) Regarding individual draft TYNDP 2018 projects, the Agency recommends that ENTSO-E:

- a. Amend and de-cluster projects 28 (*Italy-Montenegro*), 164 (*N-S Eastern DE_central section*) and 200 (*CZ Northwest-South corridor*), as they include investment items whose commissioning dates are more than 5-year apart.
- b. Provide the currently unavailable benefit calculations for projects 21 (*Italy-France*), 25 (*IFA 2*), 74 (*Thames Estuary Cluster (Nemo Link)*), 256 (*Study to upgrade interconnection DE-NL*), 336 (*Prati (IT) – Steinach (AT)*), 345 (*Northern East-West connection NL*) and 347 (*Maasvlakte – Noord Brabant connection NL*),
- c. Provide or correct the costs for projects 37 (*Norway - Germany, NordLink*), 74 (*Thames Estuary Cluster (NEMO-Link)*), 77 (*Anglo-Scottish -1*), 78 (*South West Cluster*), 231 (*Concept project Germany-Switzerland*), 245 (*Upgrade Meeden–Diele*), 263 (*Lake Constance East*), 256 (*Study to upgrade interconnection DE-NL*) 264 (*Swiss Roof P*), 265 (*Tessin*), 266 (*Swiss Ellipse P*), 333 (*PST Foretaille*), 345 (*Northern East-West connection NL*), 347 (*Maasvlakte – Noord Brabant connection NL*) and 351 (*Eastern HVDC Link*) and for those projects for which their total investment cost is different from the sum of their individual investment item costs (i.e. 285 (*GridLink*) and 296 (*Britib*) and 325 (*AT, SI, IT - South-East Alps Project*)). In case the costs of these projects are not provided by the promoters, these projects should be excluded from the final TYNDP (as this constitutes a violation of the TYNDP Guidelines).

HAS ADOPTED THIS OPINION:

1. Despite the issues identified in this Opinion, the Agency considers that the draft TYNDP 2018 is broadly in line with Article 6(3) of Regulation (EU) 714/2009.
2. The Agency considers that ENTSO-E should further enhance the TYNDP 2018 and future TYNDPs by implementing the Agency's recommendations provided in the recitals of this Opinion.
3. This Opinion is addressed to ENTSO-E.

Done at Ljubljana on 25 March 2019.


For the Agency
Director ad interim
Alberto POTOTSCHNIG

Annex I – Project specific remarks by NRAs

CRE (France):

Project 16 – Biscay Gulf

REE assessment of the social return of the investment (in the “additional information” part of the project sheet) is not supported by any study or explanation of the methodology. Moreover, when assessing the social value of a project, the analysis would need to be comprehensive to be conclusive (among others, the costs of the projects on the local economy due to the impact of land use, impact on tourism, and so on, should be also integrated). In this case, only part of the impact of the project is considered.

Project 270 - Aragón-Atlantic Pyrenees

This project marked as delayed by two years compared to TYNDP 2016 (commissioning date shifted from 2025 to 2027) and its status is “planned, but not yet permitting”, although the project has not yet received an approval to be included in the French National Development. The project should be in the draft TYNDP 2018 as under consideration”⁴⁸.

The “accelerated project implementation” benefit due to the use of HVDC underground cables instead of conventional AC lines included in the “additional information” part of the project sheet is based on the comparison between a situation in which the project is built with AC lines and a situation in which the project is built with underground HVDC cables (although it is already decided to use HVDC cables due to environmental and societal constraints). The assessment, which objective is to decide on the implementation of the project, and not on its design, should be made comparing a situation where the project is not constructed and a situation where the project is built with HVDC cables. As such, the benefits of one design over another are should not be included in the CBA assessment of the project.

REE assessment of the social return of the investment (in the “additional information” part of the project sheet) is not supported by any study or explanation of the methodology. Moreover, when assessing the social value of a project, the analysis would need to be comprehensive to be conclusive (among others, the costs of the projects on the local economy due to the impact

of land use, impact on tourism, and so on, should be also integrated). In this case, only part of the impact of the project is considered.

Project 276 - Navarra-Landes

This project marked as delayed by two years compared to TYNDP 2016 (commissioning date shifted from 2025 to 2027) and its status is “planned, but not yet permitting”, although the project has not yet received an approval to be included in the French National Development. The project should be in the draft TYNDP 2018 as under consideration”⁴⁹.

The “accelerated project implementation” benefit due to the use of HVDC underground cables instead of conventional AC lines included in the “additional information” part of the project sheet is based on the comparison between a situation in which the project is built with AC lines and a situation in which the project is built with underground HVDC cables (although it is already decided to use HVDC cables due to environmental and societal constraints). The assessment, whose objective is to decide on the implementation of the project, and not on its design, should be made comparing a situation where the project is not constructed and a situation where the project is built with HVDC cables. As such, the benefits of one design over another should not be included in the CBA assessment of the project.

REE assessment of the social return of the investment (in the “additional information” part of the project sheet) is not supported by any study or explanation of the methodology. Moreover, when assessing the social value of a project, the analysis would need to be comprehensive to be conclusive (among others, the costs of the projects on the local economy due to the impact of land use, impact on tourism, and so on, should be also integrated). In this case, only part of the impact of the project is considered.

ARERA (Italy):

Project 28 Italy-Montenegro

The project shall be de-clustered (as phase 1 is under construction and phase 2 is under consideration and there is a 7 years difference between the two phases). Further, the 2nd phase should not be in the reference grid (because it is under consideration)

⁴⁹ Idem.

Project 29 Italy - Tunisia

The project shall not be in the reference grid (because the project is under consideration according to ARERA deliberation 674/2018)

Project 127 Central Southern Italy

ARERA rejects the NTC figure (0 MW in the direction Italy South to Italy Centre-South), vs. ARERA's expectation around 1000 MW. It should be clarified whether this is only an editorial mistake, not affecting the benefit calculations.

Project 150 Italy – Slovenia HVDC

The project shall be under consideration (not “in permitting”), because it is under consideration in Slovenia. Furthermore, according to the project description, the TSOs are evaluating the opportunity to differently implement the project

Project 250 Castasegna (CH) – Mese (IT)

The project shall not be in the reference grid (because the project is under consideration according to ARERA deliberation 674/2018)

Project 323 Dekani (SI) – Zaule (IT)

ARERA rejects the NTC figure (10 MW in the direction Slovenia to Italy). It should be clarified whether this figure is only an editorial mistake, not affecting the benefit calculations.

Project 324 Redipuglia (IT) - Vrtojba (SI)

ARERA rejects the NTC figure (10 MW in the direction Slovenia to Italy). It should be clarified whether this figure is only an editorial mistake, not affecting the benefit calculations.

Project 325 AT, SI, IT - South-East Alps Project

The project shall be amended and de-clustered because the investment 380 kV Lienz – Veneto is cancelled in both countries (see the Agency's Opinion 06/2019, page 7).

Project 375 Lienz (AT) - Veneto region (IT) 220 kV

The project shall not be in the reference grid (because the project is “under consideration” according to ARERA deliberation 674/2018.)

BNetzA (Germany)

Project 206 - Reinforcement Southern Germany

Investment 682 – ‘*AC-extension of the "C corridor" at one ending point in Southern Germany towards the consumption areas allowing the existing grid to deal with the additional flows from DC-link*’ is included in the draft TYNDP 2018 as project “*planned, but not yet in permitting*” while the German NRA indicated that the Investment has not received an approval within the last NDP process and the investment is not part of the latest draft NDP and therefore the investment is only “under consideration”. Project 206 shall be amended and the “under consideration” investment should not be clustered together with the more advanced other investments within this project.

Annex II – NRAs assessment of missing benefits and remarks on the individual TYNDP clusters and investments:

https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/CompanyingdocumenttotheopinionEUeleTYNDP2018/Annex-II-MB.xlsx