

OPINION No 03/2020
OF THE EUROPEAN UNION AGENCY
FOR THE COOPERATION OF ENERGY REGULATORS

of 6 May 2020

**on the ENTSO-E draft 3rd guideline for cost benefit analysis
of grid development projects**

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators¹ and, in particular, Article 11(c) thereof,

Having regard to Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009² and, in particular, Article 11(6) in conjunction with Article 11(2) thereof,

Having regard to the outcome of the consultation with the Agency's Electricity Working Group,

Having regard to the favourable opinion of the Board of Regulators of 24 April 2020, delivered pursuant to Article 24(2) of Regulation (EU) 2019/942,

Whereas:

1. INTRODUCTION

- (1) Article 11(6) of Regulation (EU) No 347/2013 requires the cost benefit analysis methodology prepared by the European Network of Transmission System Operators for Electricity ('ENTSO-E') to be updated and improved regularly in accordance with Articles 11(1) to 11(5) of the same Regulation.
- (2) Article 11(1) of Regulation (EU) No 347/2013 requires ENTSO-E to publish and to submit to Member States, the Commission and the Agency its methodology, including

¹ OJ L158, 14.6.2019, p. 22.

² OJ L115, 25.4.2013, p. 39.

on network and market modelling, for a harmonised energy system-wide cost-benefit analysis at Union level for projects of common interest, to be applied for the preparation of each subsequent ten-year network development plan ('TYNDP') developed by ENTSO-E. The cost benefit analysis methodology shall be drawn up in line with the principles laid down in Annex V of Regulation (EU) No 347/2013 and be consistent with the rules and indicators set out in Annex IV of the same Regulation.

- (3) Article 11(2) of Regulation (EU) No 347/2013 sets out that, within three months of the day of receipt of the methodology, the Agency shall provide an opinion on it and publish it.
- (4) On 11 February 2020, ENTSO-E submitted to the Agency its updated draft methodology for cost benefit analysis ('draft 3rd CBA Guideline'), composed of the following documents:
 - a main methodology document;
 - stakeholders' answers to the ENTSO-E's consultation performed from 25 October 2019 until 9 December 2019; and
 - ENTSO-E's considerations on the inclusion of comments from stakeholders.
- (5) Before submitting the draft 3rd CBA Guideline to the Agency and the EC for an Opinion, ENTSO-E conducted a public consultation during the period 25 October 2019 to 9 December 2019.

2. SUMMARY OF ENTSO-E DRAFT 3RD CBA GUIDELINE

- (6) The draft 3rd CBA Guideline presents the third version of the ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects.
- (7) According to ENTSO-E, the draft 3rd CBA Guideline exhibits improved methodologies for already existing indicators and an introduction to new indicators. Among these, some new indicators stem from the lessons learnt from the 'Missing Benefits' process³ that was established for the TYNDP 2018.
- (8) In ENTSO-E's view, the indicators that have been developed allow for a harmonised, system-wide cost-benefit analysis of projects. They facilitate a uniform approach in which all projects (including storage and transmission projects) and promoters (either transmission system operator or third party) are treated and assessed in the same way.

³ The "missing benefits" process was an additional process introduced by ENTSO-E for the development of the TYNDP 2018, which provided 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, 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. ASSESSMENT OF THE DOCUMENT

3.1. The process for preparing the draft 3rd CBA Guideline

- (9) ENTSO-E undertook various activities in the course of the preparation of the draft 3rd CBA Guideline in 2017 and 2018, which are described in Annex I to this Opinion.
- (10) A public consultation from 25 October 2019 to 9 December 2019, based on a list of questions, was undertaken by ENTSO-E on an updated draft CBA Guideline, and a public workshop was held by ENTSO-E on 8 November 2019. The Agency's comments and recommendations on the structure of the public consultation are provided in Annex I.2 to this Opinion.
- (11) The Agency notes that the extended CBA development timeline (compared to the initial ENTSO-E Work Programme 2019) allowed more in-depth discussions which contributed to improvements (see Section 3.2 of this Opinion).
- (12) Twelve organisations participated to the public consultation, and most of them were project promoters. In Annex I, Section I.3 to this Opinion, more information on the participants and the main comments provided are presented. The most important requests of the respondents, which are also supported by the Agency, are the following:
- the transparency and the replicability of the CBA calculations (including market and grid simulations) should be assured;
 - better definition and more clarity on the calculation of some benefits is needed;
 - the calculations of the losses-related benefit should be simplified (cf. Annex I.3, Point 7, letter b).

3.2. Improvements introduced in the draft 3rd CBA Guideline

- (13) The Agency welcomes the improvements introduced in the draft 3rd CBA Guideline, among which:
- the introduction of a complementary document, named "Implementation Guidelines"⁴, which is envisaged to contain the specific methods, values of parameters and other assumptions to be used for CBA implementation in each TYNDP. According to the draft 3rd CBA Guideline (p.8), the application of CBA for the TYNDP is further supported with supplemental Implementation Guidelines that are to be provided separately. In the Agency's view, the Implementation Guidelines add flexibility to the CBA Guideline, by allowing updates on detailed methodological aspects at each TYNDP edition, and are expected to provide more transparency in its implementation;

⁴ Draft 3rd CBA Guideline, page 6.

- the inclusion, in the draft 3rd CBA Guideline, of specific reference⁵ to the data that will have to be determined in the Implementation Guidelines, although the current proposals need to be significantly expanded (see Annex III to this Opinion);
- the introduction of the provision that “*only those projects whose timely commissioning is reasonably certain are to be included in the reference network*”⁶, and that “*the proof of maturity needs to be given in the study following the guideline given in the respective implementation guidelines*”;
- the introduction of the provision that “*in case an internal project has a cross-border impact, the Δ NTC [increase of the Net Transfer Capacity] values have to be reported*”⁷, completing the already clear and transparent rules on reporting transfer capability increases;
- the removal of the limitation of the currently approved version of the ENTSO-E CBA methodology (‘2nd CBA Guideline’) allowing to conduct re-dispatch simulations only for internal projects (i.e. projects that provide capacity increases only within a bidding zone and not across them);
- regarding the guidelines for the Investment Value Calculation:
 - the inclusion of formulas for the calculation of the net present value and the benefit-over-cost ratio of a project (although some details have to be improved, as further discussed in this Opinion);
 - the clear distinction between “*the useful life*” of an asset and the “*assessment period*” for CBA purposes, “*over which it is reasonable, given the uncertainty to expect value to be attributed to the investment*”;
 - the identification of the duration to be used for the CBA assessment period (25 years)⁸ and of the social discount rate (4% real per annum);
 - the removal of the statement that “*monetized costs and benefits must first be estimated using the same assumptions (e.g. inflation, taxes)*”⁹ and the introduced clarification that “*no inflation is taken into account and, therefore, no forecasts for future inflation are necessary*”¹⁰;
 - the clarification of how some of the elements needed for the calculation of the Net Present Value (NPV) should be considered, i.e. “*the benefits are accounted for from the first year after commissioning*”, the use of a notional year for projects with multiple investments, and the handling of one-off costs during lifetime;
- the replacement of the vague benefit indicator “*Variation in societal well-being as a result of RES [Renewable Energy Resources] integration and variation in CO₂ emissions*” with a new benefit indicator “*Additional Societal benefit due to CO₂ variation*” (indicator B2);

⁵ Draft 3rd CBA Guideline, pages 49-50.

⁶ Draft 3rd CBA Guideline, page 14.

⁷ Draft 3rd CBA Guideline, page 26, footnote 11.

⁸ Such an assessment period is aligned with the maximum reference period for energy sector projects, as defined by Commission Delegated Regulation 480/2014. It also contributes to “*a uniform approach in which all projects (including storage and transmission projects) are treated and assessed in the same way*” (p. 5 of the draft 3rd CBA Guideline).

⁹ 2nd CBA Guideline, page 24.

¹⁰ Draft 3rd CBA Guideline, pages 28 and 45.

- the inclusion of a new benefit related to non-greenhouse emissions (indicator B4);
- the improvement of the calculation of Expected Energy Not Supplied for indicator B6 by introducing Monte Carlo simulations, and the provision for a sanity check of the obtained results;
- the inclusion of a methodology to quantify the frequency quality (sub-indicator B8.1.1) within indicator B8 – System stability;
- the inclusion of the new benefit “Reduction of necessary reserve for re-dispatch power plants” (indicator B10), although its scope is limited only to projects located in countries that apply today redispatch reserve contracting;
- the improved accuracy and transparency of cost reporting:
 - improved transparency by splitting the former Capital Expenditures (CAPEX) indicator of capital expenditure into C1a inception CAPEX and C1b sustaining CAPEX;
 - the quantification of the minimum and maximum complexity factors per investment type (for the reporting of non-mature projects);
 - clarity on which projects are considered “mature” and “non-mature investments” for the purpose of cost quantification.

3.3. Necessary improvements to align with the EC approved gas CBA methodology

- (14) The Agency considers that an alignment of the cost benefit analysis methodologies across electricity and gas sectors would increase the consistency of project-related decision-making at European and national level and would favour a fair comparison of electricity and gas infrastructures, when they are potentially competing.
- (15) This principle of alignment applies to various aspects, including the input data and the specific assumptions adopted for the implementation of CBA in the electricity and gas TYNDPs. However, this section focuses only on the necessary improvements of the text of the draft 3rd CBA Guideline, to align it to the ENTSOG cost benefit analysis methodology, which was approved by the European Commission in February 2019.
- (16) The ENTSOG CBA methodology describes the main scenarios elements and assumptions to be used for the analysis (Section 1.1, pages 7-11). While acknowledging that scenarios and CBA matters are, and should be, separated, the draft 3rd CBA Guideline is too succinct in the description of the key assumptions. Section 2.1 of the draft 3rd CBA Guideline should be therefore duly expanded including to ensure that the data sets used for electricity and gas respectively are compatible, notably with regard to assumptions on prices and volumes in each market, pursuant to Annex V.2 of Regulation (EU) No 347/2013. Among other adaptations of the draft 3rd CBA Guideline, a clear reference to joint electricity and gas scenario building should be added¹¹.

¹¹ The text (p.9) “All analyses of TYNDP projects are based on the scenarios developed by ENTSO-E” should be amended too.

- (17) The ENTSOG CBA methodology indicates (p. 12) that the topology of the gas infrastructure and the corresponding capacities should be made publicly available as part of the TYNDP development process to allow for its use in further fields of application of the CBA methodology. The same transparency requirement should be added in the 3rd CBA Guideline.¹²
- (18) More recommendations on the alignment of the cost benefit analysis methodologies across electricity and gas sectors are provided in Annex II to this Opinion.

3.4. Agency's remarks and recommendations for improvements of the draft 3rd CBA Guideline

- (19) The cost benefit analysis methodology shall be drawn up in line with the principles laid down in Annex V of Regulation (EU) No 347/2013 and be consistent with the rules and indicators set out in Annex IV¹³ of the same Regulation. Despite the improvements introduced in the draft 3rd CBA Guideline, which are mentioned in section 3.2, the Agency still notes some important shortages.

3.4.1. TYNDP Implementation Guidelines and other complementary documents

- (20) Although in chapter 1.1 of the draft 3rd CBA Guideline it is mentioned that the Implementation Guidelines will contain “all relevant input data, data sources, and assumptions utilised during CBA implementation”, many elements that need to be determined in the Implementation Guidelines or in other complementary documents are missing from Table 2 “*Summary of indicators for which complementary documents are to be defined*”. The Agency recommends ENTSO-E to include in Table 2 all the elements indicated in Annex III to this Opinion.
- (21) Furthermore, since the Implementation Guidelines include many aspects with great impact on the project assessment and pertain to the specific implementation of the 3rd CBA Guideline, for which a consultation is foreseen in Regulation (EU) No 347/2013, there should be a clear reference in the draft 3rd CBA Guideline that ENTSO-E commits to sufficiently consult on the TYNDP Implementation Guidelines before their adoption.

3.4.2. Structure and content of the 3rd CBA Guideline

- (22) Although the structure and the content of the draft 3rd CBA Guideline was improved compared to the draft under consultation, clarity issues and inconsistencies are still

¹² e.g. by amending the “baseline/reference network” row in table 2, page 49 of the draft 3rd CBA Guideline.

¹³ In its Position Paper on the Energy Infrastructure Package of 22 June 2016 (http://www.acer.europa.eu/Official_documents/Position_Papers/Position%20papers/ACER%20Position%20on%20EIP.pdf), the Agency observed that the detailed list of indicators to be used for the CBA methodologies provided in Annexes IV.2 and IV.3 of Regulation (EU) No 347/2013 presents unnecessary legal limitations. The Agency noted that “the validity of these annexes should be reassessed”.

present in the draft 3rd CBA Guideline, as indicated in Annex II to this Opinion. Therefore, the Agency recommends that ENTSO-E further streamlines the structure and the content of the 3rd CBA Guideline, to improve its clarity and precision and eliminate inconsistencies.

3.4.3. Study Horizons

- (23) The Agency reiterates its view that the use of fixed years (rounded to full five years) could facilitate data availability, comparability and consistency checks over time.
- (24) The approach taken by ENTSO-E in the draft 3rd CBA Guideline to make reference to two study years in the mid-term horizon¹⁴, plus the long-term horizon¹⁵ (which is interpreted to mean at least one additional study year), seems not to fully reflect the principle in Annex V.1 of Regulation (EU) No 347/2013 about the n+5, n+10, n+15, n+20 years of input data sets.
- (25) The Agency asks ENTSO-E to amend and align chapters 2.2 and 3.2.5 of the draft 3rd CBA Guideline in order to provide more clarity on the required study years (instead of providing a “general recommendation”). More generally, the Agency maintains its position that ENTSO-E should evaluate the appropriateness of fully implementing the provision of Annex V.1 of Regulation (EU) No 347/2013 about the study years.

3.4.4. Reference network

- (26) The Agency appreciates that, in chapter 2.5 (p. 14) of the draft 3rd CBA Guideline, it is mentioned that “*only those projects whose timely commissioning is reasonably certain are to be included in the reference network*”.
- (27) However, the seven criteria proposed in the same chapter as options to support project inclusion in the reference grid, regarding projects in ‘*permitting*’ or ‘*planned, but not yet in permitting*’, do not sufficiently contribute to the principle of “reasonable certainty”, as they are either too generic and do not set clear milestones of project advancement¹⁶, or they are inappropriate¹⁷.
- (28) Regarding the first study year of the mid-term horizon, ‘*Planned but not yet permitting*’ projects cannot be considered mature enough to be included, except when “*the permitting and construction phase can be assumed to be short, such as for transformers*”¹⁸ (but also

¹⁴ Draft 3rd CBA Guideline, pages 10-11.

¹⁵ Draft 3rd CBA Guideline, p. 29: “*it is generally recommended to study at least two horizons: one mid-term and one long-term horizon*”.

¹⁶ Bullets 4 and 5 of p. 14.

¹⁷ Bullets 1 and 2 of p. 14 should always be fulfilled for any project, and bullet 3 is likely not applicable for projects in the ‘*permitting*’ or ‘*planned, but not yet permitting*’ phases.

¹⁸ This possible differentiation is already mentioned in the draft 3rd CBA Guideline, p. 14.

phase shifters, line upgrading, replacement of existing lines, removal of limitations and other low-impact activities). Instead, projects, which successfully completed the environmental procedures, could be a criterion.

- (29) Regarding the second study year of the mid-term horizon, and the long-term horizon, there is an absence of principles on how to construct the reference grid, e.g. whether a top-down approach would be the appropriate one. Therefore, ENTSO-E should include in the 3rd CBA Guideline such principles, taking care not to allow a discrimination of TSOs' vs. non-TSOs' projects.
- (30) The way interdependent projects (complementary and competing ones) are handled, and how the criteria are applied for these projects when the reference grid is constructed, are missing and should be added in the 3rd CBA Guideline.

3.4.5. Consideration of the year of commissioning

- (31) The mere consideration of the year of commissioning without additional criteria to assess its reasonability may, on one hand, lead to biased indication of projects' commissioning dates by promoters, and, on the other hand, provides no certainty on the timely completion of the projects¹⁹.
- (32) ENTSO-E should propose concrete and effective criteria to assess the validity of the commissioning dates indicated by promoters, e.g. by including benchmarking of the commissioning dates with statistics of similar projects in the previous years or by considering as qualifying only strong indications of the sufficient advancement of the projects.

3.4.6. Sensitivities

- (33) According to the draft 3rd CBA Guideline²⁰, sensitivity analyses to evaluate the impact of one or more planning parameters on possible futures are purely optional. The text of the 3rd CBA Guideline should be more committing on the obligation of project promoters to perform such analyses when executing CBAs of individual projects. Also, a clear reference should be added regarding the obligation of project promoters to explain which criteria or methodology they used to select the parameters to conduct a sensitivity (or a scenario) analysis.
- (34) The 3rd CBA Guideline should specifically identify what actions are needed for each proposed "sensitivity analysis"²¹ (e.g. ex-post calculations, only some simulations, new

¹⁹ Based on ACER's past PCI monitoring reports for the last 3 years, 37%-45% of the monitored projects postpone their commissioning dates every year due to delays and/or rescheduling.

²⁰ Draft 3rd CBA Guideline, page 15.

²¹ While there is no clear distinction between sensitivity analysis and scenario analysis in ENTSO-E text, it assumed that a sensitivity analysis would involve the variation of one (or very few) input parameter at the time in

scenario/complete extra-run of all simulations). In this respect, it is noted that some of the listed parameters (e.g. fuel and CO₂ price) would actually require the implementation of extra scenarios (e.g. the assumed variation of fuel and CO₂ prices affect the development of the generation set and the level of electricity demand) and corresponding simulations. Also, climate variability should not be a subject of a sensitivity analysis, as it has an impact also on various other system assumptions (e.g. demand, RES infeed) which are affected by climate conditions. The Agency, therefore, recommends deleting the above parameters from chapter 2.6 sensitivities²².

3.4.7. Redispatch simulations

- (35) With respect to the redispatch simulations described in the draft 3rd CBA Guideline, the Agency recommends ENTSO-E to perform the redispatch analysis centrally on the most relevant projects, and not the promoters, in order to render more reliable and consistent results. Also, the conducting of re-dispatch simulations by the promoters is contradicting the treatment of indicator B1 – redispatch component, and B10 Reduction of Necessary Reserve for Redispatch Power Plants indicator, as these indicators are supposed to be calculated by ENTSO-E, and not by the promoters.
- (36) The Agency also observes that, in the relevant chapters of the draft 3rd CBA Guideline on redispatching, there is no indication on how the re-dispatch benefit related to internal congestions is calculated. Also, it is noted that the details of “*simulation step 3*” mentioned in p. 110, i.e. input datasets, tools to be used and outputs, are not provided. Therefore, the Agency recommends ENTSO-E to provide in the 3rd CBA Guideline the above missing methodological aspects.

3.4.8. Clustering

- (37) The Agency recommends the amendment of the clustering rules included in the draft 3rd CBA Guideline as follows:
- The rule stated in p.20 “*Investments can only be clustered if they are at maximum one stage of maturity apart from each other*” is not enough to ensure an effective clustering. As the “planned” investments have significantly higher perspectives to be implemented than the under consideration ones, an extra rule should be introduced not allowing that investments “under consideration” are clustered together with investments at any other status;
 - The meaning of “significantly delayed” investment is not well-defined and needs clarification. A “5-years-apart” rule in cases where one investment is delayed and

case it is reasonable to assume that its variation would not involve significant changes in other input parameters (e.g. sensitivity analysis on minimum load level for must-run generation units). On the other hand, it is assumed that a scenario analysis is required when the change of the input parameter will involve systematic changes, by affecting also other input parameter by requiring, as the name implies, the definition of an ad hoc scenario.

²² If deemed relevant, the text on different climate years should be moved to chapter 2.1 regarding scenarios.

another is on time, should be applied as a limit, if necessary allowing exceptions with robust justification.

3.4.9. Transfer Capability Calculation

(38) The Agency recommends that the aim and the scope of this section are clearly identified, and the necessary modelling activities clearly described, in order the draft 3rd CBA Guideline to be in line with Annex V.3 of Regulation (EU) No 347/2013.

(39) Regarding the calculation of Net Transfer Capacity (NTC), the Agency recommends the following:

- The draft 3rd CBA Guideline should clearly describe what types of constraints are considered in the NTC calculation, in agreement with the analyses performed (e.g. thermal constraints, voltage constraints, stability constraints). Also, the types of constraints that may (or may not) be relaxed for operational reasons (e.g. if a temporary violation of thermal limits can be allowed, if voltage constraints can be slightly violated) should be mentioned. In this regard, it is unclear why the “Annex - Technical Criteria for Planning” (which was Annex 1 to the 2nd CBA Guideline) has been deleted in the draft 3rd CBA Guideline;
- The draft 3rd CBA Guideline should clarify the treatment of the generation when moving from zonal (market simulation) to nodal level (redispatch or network simulations) in case generation is aggregated at zonal level per technology in the market simulations, as the approach could add a degree of discretion;
- The draft 3rd CBA Guideline should be more explicit in including the possibility to have a more detailed time granularity on how NTC values (both baseline/reference NTC and NTC increases) are provided (seasonal, etc.).

3.4.10. Project level assessment (including Section 26: Project level assessment based on promoters' input)

(40) Chapter 3.4 and Section 6.26 of the draft 3rd CBA Guideline introduce the concept of “*project level assessment based on promoters' input*”. As the need for promoters to provide their own assessments for some benefits may be applicable only for a limited period of time, chapters 3.4 and 6.26 should be tackled in the Implementation Guidelines, therefore the Agency recommends that these chapters are not included in the 3rd CBA Guideline.

3.4.11. Guidelines for investment value calculation

(41) As already mentioned in section 3.2 of this Opinion, a number of important improvements compared to the 2nd CBA Guideline are introduced regarding this topic, which are welcome by the Agency. Still, beyond the recommendations provided in Section 3.3 of this Opinion, the Agency notes the following needs for improvements:

- With regard to projects with more than one investment, according to the proposed rule²³, the benefits of the projects are accounted for starting from the year which is the average of the year of commissioning of the earliest and latest investments of the project. This treatment is contradicting the notion of “clustering” of investments in one project, as the clustering assumes that all investments are necessary for a project to render its benefit, therefore the full benefit of the project can be rendered only when all investment items have come into operation. Therefore, the Agency recommends that the above rule changes, so that the benefits of such projects are taken into account only after the last investment is commissioned. CAPEX and yearly OPEX should continue to be considered at the year of expected occurrence of each investment.
- Footnote 14 of p. 27 mentions the possibility to disaggregate benefits e.g. on a Member State basis. However, the draft 3rd CBA Guideline misses to require the identification of Member States which have net positive impacts and those who have net negative impacts from a project, pursuant to Annex V.11 of Regulation (EU) No 347/2013. As this requirement is particularly important for the cost benefit analysis related to cross border cost allocation decisions, the 3rd CBA Guideline should incorporate it.
- Footnote 15 of p. 28, according to which “*the duration of the assessment period could be reviewed in the Implementation Guidelines*” should be amended or deleted, as it introduces ambiguity on the CBA provisions.

3.4.12. Main project assessment categories

- (42) The Net Present Value (NPV) and the Benefit to Cost Ratio (BCR) should be more clearly identified as CBA indicators being part of the assessment framework (for instance, they should be added in figure 9 of the draft 3rd CBA Guideline), which have to be calculated and published in each application of the CBA methodology.
- (43) The draft 3rd CBA Guideline (p. 43) indicates that “*a characterisation of a project is provided through an assessment of the directional Δ NTC increase and the impact on the level of electricity interconnection, relative to the installed production capacity in the Member State. For those countries that have not reached the minimum interconnection ratio, as defined by the European Commission, each project must report the contribution to achieve this minimum threshold*”. While the Agency appreciates the importance of interconnections, in particular for isolated Member States, when they feature a positive benefit-to-cost balance, it considers that a minimum interconnection ratio is not a technical indicator and it would create risks of double counting with project benefits. Accordingly, the Agency recommends to dismiss this indicator from the 3rd CBA Guideline.

²³ p.29 of the draft 3rd CBA Guideline: “*the annualised benefits, losses and operational costs for each investment is accounted for from the same notional year. The notional year is the simple average of the earliest and latest investments that comprise the project.*”

3.4.13. Comments on the benefits

3.4.13.1. *B1 - socio economic welfare (SEW)*

(44) Transparency is needed on the presentation of the SEW benefit, given the different methodologies that can be applied for its calculation. Therefore, the reference in p. 54 of the draft 3rd CBA Guideline: “*Independent of the methodology used to calculate the SEW, the result will be given as a single value in €/yr as received by the respective methodology (i.e., no summation of the values achieved by the different methods)*” should be redrafted to reflect the above need. The Agency recommends ENTSO-E to distinguish the following components²⁴ (and by which tool the benefit is identified) for indicator B1:

- B1.A: SEW related to capacity increases on cross-border boundaries (assessed via market studies);
- B1.B: SEW related to capacity increases on internal boundaries (assessed via market studies);
- B1.C: use of probabilistic network studies to assess benefits due to avoided re-dispatch or generation curtailments beyond those captured by the market studies.

3.4.13.2. *B2 – additional societal benefit due to CO₂ variation*

(45) Acknowledging that the CO₂ Emission Trading Scheme (ETS) prices assumed in the scenarios may not reflect the CO₂ externalities, it is accepted that the reduction of the societal cost can be considered in the benefit calculations as one possible future.

(46) The draft 3rd CBA Guideline suggests that the monetisation of such benefit can be performed ex-post, by applying an external cost value on the quantities of CO₂ already calculated. As stated, the value of the external cost varies a lot depending on the approach followed (net damage approach or willingness to pay approach), and it “*requires reliance on different, and potentially contradicting, reports on the actual long-term harmful effects of CO₂*”.

(47) For these reasons, the value used should be selected with extreme prudence, and the Agency recommends ENTSO-E to include in the 3rd CBA Guideline the following amendments:

- the estimates of the societal cost of CO₂ considered in the benefit calculations should be at the low end of the available spectrum of well-grounded institutional estimates;
- the uncertainties on the societal cost of CO₂, and consequently of the B2 ex-post monetisation should be clearly stated.

²⁴ Alternatively, separate benefit indicators could be introduced.

3.4.13.3. *B5 - losses*

- (48) The Agency recommends that ENTSO-E amends the draft 3rd CBA Guideline to present only the proper (optimal) way to perform network studies, i.e. calculate the monetised losses using hourly AC power flows and marginal prices from market simulations. In particular, the statement “*if AC load-flow cannot be implemented in a reliable way (taking into account modelling assumptions, available input data, and calculation times), then DC load-flow can be used to approximate the active power-flows*” and the subsequent provisions should be deleted in order the draft 3rd CBA Guideline to be in line with Annex V.3 of Regulation (EU) No 347/2013.
- (49) Taking into account the complexity of the proposed calculations for the monetisation of losses and the need for an approach which can be implemented by all interested parties, the Agency recommends that the monetisation of losses is simplified, by fully decoupling the quantification of losses variation from its monetisation. As a first approach, average marginal costs (per zone) could be considered to monetise the indicator B5. If ENTSO-E proves that such a simplification is too strongly affecting the quality of the results, a softer simplification could be adopted by using the hourly marginal costs obtained in market simulations regarding the reference case (for each scenario, for each study year)²⁵.
- (50) Any of these simplified approaches may allow ENTSO-E to re-allocate time and resources to calculate other benefits, which are currently missing, and provide, therefore, a more complete assessment of projects, and may facilitate the quantification of losses-related benefits by non-TSO promoters. They would also allow avoiding capping the marginal costs used for the losses monetisation (c.f. page 66 of the draft 3rd CBA Guideline).

3.4.13.4. *B6 - adequacy to meet demand*

- (51) The draft 3rd CBA Guideline requires an adjustment of the counterfactual case (for the analysis of projects studied via TOOT) so that “*LOLE should be realistic and reasonable. The scenario used to compute the SoS adequacy benefit must abide by this principle. It is advisable to ensure that such a setup is met without the studied project to avoid unrealistically high LOLE when removing the project. TYNDP scenarios are adequate under the reference grid, so for TOOT projects, a small adaptation could be necessary if the countries are no longer adequate when the project is removed. The adaptation would only consider adding a few peaking units*”.
- (52) This adjustment of the reference case deviates from Annex V.10 of Regulation (EU) No 347/2013, according to which the analysis of project benefits should be carried out with and without the project under assessment, without any adjustment of the counterfactual

²⁵ In such a case, ENTSO-E should publish the 8760 hourly marginal costs for each zone for each reference case.

case. It would also raise subjectivity-related risks in the definition of the adjusted counterfactual case.

- (53) For these reasons, the Agency recommends dismissing the adjustment “step 1” in the calculation of the indicator B6. The newly introduced “sanity check” (step 3), by means of capping the adequacy benefit to the value of the generation capacity needed to reach the same adequacy increase, already serves the purpose of avoiding unrealistically high values for this benefit.

3.4.13.5. B7 - system flexibility

- (54) Flexibility services are growing in importance due to the growing rate of penetration of renewable energy sources (RES) in the electrical system across Europe. Since 2014, the Agency has recommended ENTSO-E in all its past Opinions on the CBA Guideline²⁶ the quantification of this benefit.
- (55) Despite the above, for this indicator the draft 3rd CBA guideline does not constitute an improvement compared to the 2nd CBA Guideline. Being generic, vague and inconsistent, it does not provide guideline for the assessment of flexibility services. More specifically:
- Although, in the introduction of Section 6.10 (p.73), it is mentioned that “*This section describes the methodology for a quantitative assessment (non-monetised) of flexibility*”, the first of the two sub-indicators, i.e. B7.1, is largely qualitative (0 / + / ++), while for the second one, i.e. B7.2 not even a specific scope of assessment is proposed.
 - Regarding sub-indicator B7.1- Balancing energy exchange, no methodology for its assessment is proposed, as it is explained in p. 74 that “*The full assessment of balancing energy exchanges can only be realised when platforms for exchanging balancing energy exist. [...] On the other hand, producing full models for balancing energy markets may be too time-consuming.*” Therefore, the assessment of this indicator will remain at the discretion of each project promoter (ENTSO-E will provide a definition of the qualitative indicators only in the Implementation Guidelines).
 - Regarding sub-indicator B7.2- Balancing capacity exchanges/sharing, it is mentioned in p. 77 that “*This section describes the principles behind the AFFR, MFRR, and RR flexibility services, but does not yet put forward a specific methodology to be applied for their quantification or monetisation. [...] The final methodology should follow in a future updated version of this CBA guideline.*”

²⁶ Agency Opinion No 01/2014 on ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2001-2014.pdf and Agency Opinion No 05/2017 on ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2005-2017.pdf

However, the provided text only explains why these types of services are useful and how transmission projects can contribute to reducing the need for such services, without describing any principles of their assessment neither defining any specific assessment scope.

- (56) The Agency recommends that ENTSO-E redrafts section 6.10 of the draft 3rd CBA guideline in order to provide criteria and guidance for a concrete assessment, especially with regard to indicator B7.2. Furthermore, the Agency reiterates its past Opinions' recommendation that ENTSO-E should suggest indicators for quantifying this benefit, and, furthermore, move towards its monetisation.

3.4.13.6. B8 - system stability

- (57) The Agency has the following remarks regarding the system stability indicator:

- The introduction of a new quantified indicator B8.1 Frequency stability is welcome. However, the risk of double-counting with SEW benefit (in case the market simulations do not account for reserved capacity) is noted, given the statement in p.82 *“if some capacity is reserved for [frequency containment reserve] FCR purposes, it cannot be used for market exchange”*.
- Regarding indicator B8.1.2 Capacity exchange/sharing, no specific methodology is presented, but only principles. Also, it is not clear whether there is intention by ENTSO-E to implement these principles and proceed to the calculation of this indicator within the 3rd CBA Guideline or not given the text in p. 82 *“The final methodology should follow in the implementation guideline or in a future version of the CBA guideline”*.
- Regarding indicator B8.2 blackstart services, no specific methodology is presented, but only principles, and a *“Specific application: Methodology for Synchronisation with Continental Europe”*. Regarding the above specific application, the Agency notes the following:
 - It would be beneficial to connect small systems or poorly connected areas (not only Baltic countries) to a larger system (and not only to Continental Europe), therefore, the name of the specific application should be correspondingly amended into *“synchronisation with other systems”* and the relevant statement of page 86 *“This evaluation method can only be applied to Baltic States or/and other pan-European countries outside European synchronous zones”* should be rephrased to reflect a wider scope.
 - According to the draft 3rd CBA Guideline (p. 86), *“this indicator evaluates extended blackout risks and consequences of such event”*. Based on this description, the calculation of the benefit from the synchronisation or stronger connection or new connection of isolated regions in terms of improvement of the dynamic behaviour of the system in case of a fault or cascading events should be addressed by this benefit. However, no methodological aspects are included in the draft 3rd CBA Guideline, except for the formula for its monetisation (Value of Lost Load times consumption times duration). The 3rd

CBA Guideline should provide the necessary details for the understanding of the “duration” parameter of the formula.

- Regarding indicator B8.3 voltage/reactive power services, the draft 3rd CBA guidelines indicates (p.87) that “*Certain grid development projects (internal or cross border reinforcements) might reduce the need of the total required volume of these services*” and “*alternatively, these services can also be ensured by investments in passive elements or active elements*”, while concrete methodological aspects (namely, the quantification of avoided payments for reactive reserves and the monetisation of avoided investments) are missing. The Agency recommends ENTSO-E to include such methodological aspects in the 3rd CBA Guideline, so that this indicator could be calculated in a consistent manner.

- (58) The Agency recommends that ENTSO-E redrafts the current text, taking into account the above mentioned remarks, in order to provide concrete criteria and guidance for benefit assessment, especially with regard to indicators B8.2 and B8.3. Furthermore, the Agency recommends that ENTSO-E suggests ways for further quantification (and, if possible, also monetisation) of this benefit.
- (59) Last, the Agency notes that Annex V.6 of Regulation (EU) No 347/2013 requires that the cost benefit analysis shall at least take into account impacts on system resilience, including disaster and climate resilience. As it is unclear whether and how these impacts are taken into account in the draft 3rd CBA Guideline, the Agency recommends ENTSO-E to amend the document accordingly.

3.4.13.7. B9 - avoidance of renewal/replacement costs of infrastructure

- (60) According to the methodology presented in the draft 3rd CBA Guideline in p. 88-89, “*For the ability to value the savings in planned maintenance and refurbishment spending, a pre-existing asset management plan is required and would represent the reference point for the valuation. (...) This benefit can only be taken into account if the reference situation (to which the new project is compared to) includes the contribution of the refurbishment.*”
- (61) The ENTSO-E’s text seems intended to avoid a poorly realistic reference (counterfactual) case, with potentially reduced system reliability. However, this adjustment of the reference case deviates from Annex V.10 of Regulation (EU) No 347/2013, according to which the analysis of project benefits should be carried out with and without the project under assessment, without any adjustment of the counterfactual case. Therefore, the counterfactual case should be without the project to be renewed/refurbished and without the project under analysis. Under such an approach, the benefits of maintaining the system reliability and security would be directly accounted for in the analysis of other project benefits.
- (62) In addition, the comparison to a pre-existing asset management plan may allow a wide degree of subjectivity in the identification of the measures initially needed for

refurbishment and therefore to a bias in the quantification of the avoided or deferred costs.

- (63) Last, the description of the newly proposed benefit category seems to imply that every existing transmission infrastructure needs to be renewed at the end of its technical lifetime. However, the need for such renewal actions should not be taken for granted, but should be subject to a positive cost benefit check.
- (64) For the above reasons, the Agency recommends benefit B9, as currently proposed, to be dismissed.
- (65) Such a benefit could be calculated only for investments that will be required because of legal obligations (e.g. layout modifications or special maintenance requirements for electromagnetic compatibility reasons) or other obligations (e.g. dismantling an old line due to environmental constraints set out in the permitting process of a new line), etc. Under such requirements, the costs for the legally due interventions on existing infrastructure can be accounted for as a benefit when evaluating a new project which incorporates them. Due to the change of content, it is also recommended that benefit B9 is renamed to “*accounting for legally due transmission costs*”.

3.4.13.8. *B10 - reserve for re-dispatching*

- (66) Benefit B10 should be applicable to all countries (irrespective of whether they apply today re-dispatch reserve contracting) to safeguard consistency across projects assessed. Appropriate assumptions for such calculation can be introduced by ENTSO-E, as needed.
- (67) Taking into account the recommendation regarding redispatch analysis in Sections 3.4.1 and 3.4.7 of this Opinion, the Agency recommends ENTSO-E to calculate benefit B10 for all countries and as a result of ENTSO-E’s re-dispatching studies.

3.4.14. Residual impacts S1-S3

- (68) The currently proposed methodology for assessing residual social and environmental impacts (not already covered in the project expenditures) provides for a qualitative assessment of projects’ possible negative impacts through indicators S1, S2 and S3, but does not quantify the nature and the importance of these impacts.
- (69) The Agency acknowledges that there are uncertainties affecting these potential impacts, but notes a discrepancy between the efforts made to quantify and monetise environmental and societal positive benefits of the projects and the current state of integration of environmental and societal negative impacts in the draft 3rd CBA Guideline. Thus, the Agency recommends ENTSO-E to develop the methodological framework for the assessment of the societal and environmental impacts of the projects, including those related to the mitigation measures that address environmental and social constraints and

are already included in the investment costs, and to aim at further quantification and if possible monetisation of the residual impacts. This effort would be useful for a better reflection of the societal and environmental footprint of the projects.

3.4.15. Assessment of storage projects

(70) Regarding the assessment of storage projects, the Agency notes the following:

- Although in p. 32 it is mentioned that “*storage plants can be easily introduced in market studies as existing facilities of this type are already modelled*”, no reference in the draft 3rd CBA Guideline or its complementary documents is included on how storage projects are modelled.
- Although in p. 32 it is mentioned that market studies “*can take into account some of the functional constraints and deviations that occur between stored and retrieved energies*”, it is not made clear how the difference between stored and retrieved energy is considered.

(71) Therefore, beyond the recommendations already provided in section 3.4.1 of this Opinion, the Agency recommends the 3rd CBA Guideline:

- to clarify how the difference between stored and retrieved energy is considered;
- to require displaying the yearly energy stored by the storage project under assessment, and the yearly energy injected,

HAS ADOPTED THIS OPINION:

Overall, the draft 3rd CBA Guideline provides some improvements compared to the 2nd CBA Guideline in various aspects as listed in Section 3.2 of this Opinion.

The draft 3rd CBA Guideline defines rules and indicators, which are not consistent with Annex IV.2 of Regulation (EU) No 347/2013, but which are consistent with the specific criteria of Article 4(2)(a) of Regulation (EU) No 347/2013, which are further detailed in such Annex IV.2.

The draft 3rd CBA Guideline is, to a large extent, in line with the principles in Annex V of Regulation (EU) No 347/2013, even if, formally, some of the principles of Annex V.1, 2, 3, 6, 10 and 11 (years of input data set, compatibility of data sets used for electricity and gas, guidance for use of network and market modelling especially with regard to the modelling for losses and the Transfer Capability calculations, impact on system resilience, including disaster and climate resilience, with-and-without-project approach, identification of beneficiaries and cost bearers) are not reflected in the draft 3rd CBA Guideline.

The draft 3rd CBA Guideline misses some important elements indicated in sections 3.3 and 3.4 of this Opinion. The Agency, therefore, encourages ENTSO-E to adapt the draft 3rd CBA Guideline, in accordance with the Agency's recommendations regarding the aforementioned elements before submitting it to the European Commission for the final approval.

This Opinion is addressed to ENTSO-E.

Done at Ljubljana, on 6 May 2020.

- SIGNED -

For the Agency
The Director
C. ZINGLERSEN

Annex I – Main activities for the development of the draft 3rd CBA and results of public consultation

I.1 Main activities for the development of the draft 3rd CBA in 2017 and 2018

The main activities of ENTSO-E for the development of the draft 3rd CBA in 2017 and 2018 included:

- the organisation of an introductory public workshop by ENTSO-E on 7 December 2017;
- the organisation of physical meetings and web conferences with ENTSO-E and stakeholders from December 2017 to April 2018 on three topics identified during the 2017 workshop: security of supply, assessment of storage projects and the concept of socio-economic welfare resulting in a report by ENTSO-E; and
- the organisation of a public workshop on 18 December 2018.

I.2 ENTSO-E public consultation and ACER remarks and recommendations

A public consultation from 25 October 2019 to 9 December 2019 was undertaken by ENTSO-E on the updated draft CBA Guideline, and a public workshop was held by ENTSO-E on 8 November 2019.

- a. The public consultation was supported by a list of questions to stakeholders. ACER appreciates the list of questions, which facilitates more focused reactions by the stakeholders, and was significantly more developed than the list of questions proposed for the April 2016 consultation on the 2nd CBA Guideline. However, a question on the relevance of different elements of the methodology (e.g. the more relevant benefits to be addressed) was missing and should be added in the future.
- b. The question “*Having in mind the variety of users and usage of the CBA, would you choose a multi-criteria or a one figure approach?*” (already present in the 2016 consultation questions) should have been omitted, as it is not meaningful and favours misunderstandings. Indeed, the current focus on a combined multi-criteria and cost benefit analysis is properly stated in Section 3.1 and Section 6.24 of the draft 3rd CBA Guideline.

I.3 Participation in the public consultation and main comments provided

Twelve organisations participated to the public consultation, among which six non - Transmission System Operator (TSO) promoters (two of which developing transmission projects and four of which active in storage projects), one affiliate of a TSO dealing with non-regulated activities, and one association of cable manufacturers, while 4 participants requested for anonymity of their identity²⁷. The main comments provided by the participants are presented in short below.

²⁷ One of these participants asked for full confidentiality of their answers and could not be considered here.

1. Many stakeholders highlighted the efforts made by ENTSO-E to elaborate on the CBA guideline and provide more details on the indicators. Also, the workshops with stakeholders for the improvement of the CBA were welcomed as a good start for more interaction with stakeholders.
2. The usefulness of the draft 3rd CBA Guideline for investment decisions was criticised by some stakeholders due to the heterogeneity of the calculated benefits (which in some instances are only qualitative), the lack of transparency of the inputs considered²⁸ and of some calculations, the missing elements for the storage project benefit calculations, the limited coverage of benefits of storage and of innovative projects²⁹, and the short study horizon which leads to under-estimation of the benefits of some projects.
3. Especially regarding the transparency, several stakeholders requested more transparency on the grid and market simulation, as well as on the concrete data and metrics taken into account, so that replicability of the analysis is reassured. In particular, several stakeholders pointed out that despite better explanations in the updated Guideline, the calculations based on the CBA Guideline would be hardly replicable as several methodological elements and inputs to be considered are missing from the methodology and *“promoters must rely on ENTSO-E’s results and cannot for the most part provide any valuable insights or comment on the results”*. In addition, several stakeholders regretted that the reference values to be taken into account for the different benefits will only be provided in the Implementation Guidelines. Also, two stakeholders raised concerns on the sufficiency of consultation of the methodology with third party project developers.
4. Several stakeholders raised questions on the conditions, the criteria, and the decision making for project inclusion in the reference grid.
5. Several stakeholders also called for more clarity and development on the benefits regarding the reduction of non-greenhouse gas emissions, variation of losses, and security of supply, flexibility, stability as well as the avoidance of the renewal/replacement costs of infrastructure.
6. One stakeholder pointed out that environmental costs were not adequately taken into account, and that the cost of mitigation should be presented distinctly.
7. The following comments were raised on particular benefits:
 - a. Regarding the adequacy benefit, one stakeholder regretted that the assessment of the benefit would be done on the basis of a European wide statistical analysis excluding some extreme event cases. Three stakeholders point out insufficient integration of the generation in the calculation proposed due to a lack of

²⁸ Inputs such as the derivation of the reference grid, commodity pricing, supply/demand balance expectations

²⁹ E.g. non-traditional transmission projects like multi-purpose interconnectors (combining offshore wind and interconnectors), power-to-gas, power-to-X, hydrogen projects, or some combination of these options which can be described as “offshore hybrid assets”.

- consideration of avoided generation CAPEX or a lack of clarity of the interactions between generation availability and interconnections use in the modelling. Whilst some stakeholders considered the proposal for calculation of the benefit as clear, other expressed their wishes for more elaboration or concerns for its implementation in practice.
- b. Regarding the benefit on the variation of losses, most of the stakeholders noted that the double counting of the 2nd CBA Guideline on losses was an issue that prevented the use of the methodology for investment decision and welcomed efforts made by ENTSO-E to solve this issue. Several stakeholders asked for more transparency on the scope considered in the variation of losses as well as on the expected accuracy of the results after the improvement made by ENTSO-E (it was noted that it was not clear in the text whether ENTSO has been able to address the shortfalls noticed in the last TYNDP for the calculation of this indicator). One stakeholder noted that the calculation of losses must be made on a case by case basis (as it would be hard to consider all the needed information in the CBA), another pointed out the need of clarification in the CBA of the sign for losses, while another stakeholder noted that in the past the results of losses modelling were inconsistent and contradictory, and due to the fact that non all of the data is available to third-party promoters, it was nearly impossible to fully replicate them. Also, one stakeholder proposed ENTSO-E to use average power prices in the calculation, as this would provide a better estimation of the value, it would reduce the complexity of the calculation without undermining the credibility of the result, allowing TSO's valuable time and resource to calculate other benefits and provide a more complete assessment of projects.
 - c. The inclusion of a benefit on flexibility was welcomed by most of the stakeholders. It was acknowledged that the European works on balancing exchange platforms are still at an early stage and that the indicator should be further developed when they will be implemented. Four stakeholders also considered that further elaboration was necessary for a better capture of the flexibility benefit, especially of storage and innovative hybrid projects, while one raised the issue of more involvement in its development. In addition, one stakeholder indicated that the ability of High Voltage Direct Current interconnectors to provide short-term overload capability should also be integrated in the benefit assessment, and another one the technical minimums of storage plants.
 - d. Regarding the renewal/replacement costs of infrastructure, it was noted that no definition or specific indicators for "project reinforcement" is provided.
8. Several stakeholders requested additional guidance on the presentation of clusters of projects.
 9. Regarding the cost reporting, it was proposed that for clarity and transparency, the current standard costs (i.e. applied to TYNDP 2018) should be added in the Guideline, and an explanation justifying the range boundaries of the complexity factors is needed. Also, ENTSO-E should provide a comprehensive definition of CAPEX and OPEX together with a pro-forma spreadsheet identifying these costs.

10. Specific comments were raised regarding the parameters related to the assessment of storage projects. It was proposed that more storage specific benefits should be included in the CBA, like inertia provided to the system, smoothing of peak prices, and monetization of non CO₂ emissions. One stakeholder noted that contrary to the statement in the guidelines, storage is not so easily modelled, because the dispatch models take no account of emissions and other services. Some stakeholders also asked for an adaptation of the draft 3rd CBA Guideline in order to address the case of innovative projects.
11. One promoter also noted that the approach to the identification of system needs remains largely a bottom-up approach (since it is performed after projects have been submitted) rather than a top-down one.

Annex II – Other Agency recommendations

II.1. Other recommendations on the alignment with the EC approved gas CBA methodology

- a. Regarding the guidelines for the Investment Value Calculation, the following elements of section 3.2.5 of the draft 3rd CBA Guideline should be adjusted:
 - the NPV and Benefit to Cost Ratio (BCR) formulas should cover the period from year f (first year where costs are incurred) to year c+24 (being c the first year of full operation);
 - the CBA interpolation rule (page 29, first bullet) should be amended to align with the preceding text “*The benefits are accounted for from the first year after commissioning*” mentioned in page 29 of the draft 3rd CBA Guideline;
 - the (1+r) denominator in the NPV and BCR formulas should feature an exponent (t-n), where n is the year of analysis, in order to discount the values to the year of the study.
- b. The ENTSOG CBA methodology states, when discussing possible sensitivity analyses on gas market factors (demand, renewables, fuel and CO₂ prices, supply) that “*it is recommended to have a scenario-based approach, as some of the elements (such as gas demand and prices) are interdependent over time*” (p.59). The 3rd CBA Guideline should provide the same clarity regarding sensitivity analysis and parameters (such as fuel and CO₂ prices, c.f. Section 2.6 of the draft 3rd CBA Guideline), which require a scenario-based approach.
- c. Last, the ENTSOG CBA methodology features a simpler structure, with two main chapters: the “assessment framework” and the “project-specific assessment”. In this regard, the Agency suggests ENTSO-E to streamline accordingly the 3rd CBA guideline by merging sections 3, 4 and 6 into a single “project assessment” section and by deleting section 5 “concluding remarks”³⁰.

II.2. Other remarks and recommendations on the structure and content of the 3rd CBA Guideline:

- a. Further improvement and streamlining is needed, so that the structure is fit to a guideline and the text is coherent and clear to the reader. In particular, some chapters or sub-chapters do not seem to be necessary and can be deleted and their contents can be moved to more appropriate chapters³¹, in other cases there is no clear reason for the need of a chapter³² or paragraphs and chapters are

³⁰ No contents of Section 5 seem essential, as many of them are already provided in the “foreword” of the draft 3rd CBA guideline.

³¹ E.g. for sub-chapter “*Multi-case analysis*” in chapter 2.5, the text on the time granularity of market simulations and the concept of planning cases should be moved to Section 2.4 modelling framework

³² E.g. the existence of chapter “*3.2 General assumptions*” is questionable, given that a chapter “*2 General approach*” is already precedent covering its content, as well as the reason for an extra chapter “*6 Sessions*”.

- misplaced³³. Also, important topics, such as the information that will be included in supplementary documents (i.e. the content of Table 2 of chapter “6.3 Section 3: Main project assessment categories”) is presented in chapters with titles irrelevant to their content.
- b. Given its importance, a separate chapter on “CBA Implementation Guidelines and other complementary documents” should be added in the adapted 3rd CBA Guideline.
 - c. Especially with regard to chapters 6.4 – 6.13, there are multiple structure levels, which perplex the reading. There is not always clarity on the definition of each indicator, of the methodological steps to be followed to arrive to its calculation, whether the text pertains to an applied methodology or to “principles” that need to be further elaborated. The structure of the benefit indicators (i.e. introduction, methodology, monetisation) should be followed consistently for all benefits³⁴, and the summarising table at the end of each benefit text should always be present³⁵. Furthermore, the text boxes introduced in the beginning of each section did not improve the clarity, as the text of each section was not incorporated to the text boxes, but only followed them.
 - d. Section 6.23 of the draft 3rd CBA Guideline claims that “*The Regulation (EU) n.347/2013 project requires that this CBA guideline takes into account the impact of transmission infrastructures on market power in Member States*”. As this requirement is not present in Regulation (EU) No 347/2013, and given that section 6.23 aims at explaining why market power is not accounted for, the Agency recommends deleting section 6.23.

II.3. Other remarks and recommendations on reference network

- a. The following provision in chapter 2.5 (p. 15) of the draft 3rd CBA Guideline “*Whenever the year of the CBA’s first mid-term horizon-study-year exactly corresponds to the mid-term study year of the Mid-Term Adequacy Forecast study, it is required that the scenarios used and the corresponding reference grids are consistent*” should be rephrased to a general principle of consistency between reference networks for network planning studies and reference networks for adequacy studies given that the European Resource Adequacy Assessment will replace the Mid Term Adequacy Forecast study and will assess all future years.
- b. The sentence stating that the reference network “*is used as the starting point for the computation of cost and benefit indicators*” should be amended by deleting the words “costs and”.

³³ E.g. the chapters “6.1 Section 1: General definitions” and “6.2 Section 2: abbreviations” are in the middle of the 3rd CBA Guideline, instead of the beginning or the end, the content of chapter “6.3 Section 3: Main project assessment” regarding the benefits to be assessed in the CBA and the overview of their monetisation status are important elements of the CBA methodology and should be moved to chapter “3.3 Assessment framework”.

³⁴ E.g. this structure is not followed for indicators B7.2, B8.1.2, B8.2, B8.3.

³⁵ E.g. the summarising table is missing for indicators B7.1, B7.2, B8.1, B8.1.1, B8.1.2, B8.2, B8.3.

II.4. Other remarks and recommendations on redispatch simulations

The draft 3rd CBA Guideline text is not clear on which models the re-dispatch simulations are performed with, i.e. by using “market models” or “network models”. The Agency recommends ENTSO-E to clarify the above issue in the 3rd CBA Guideline.

II.5. Other remarks and recommendations on Transfer Capability Calculation

Regarding the statement of p.25 on the Grid Transfer Capability (GTC) “*a situation where (at least) one of the circuits that make up the boundary is loaded at 100% of its thermal capacity*”, the Agency recommends that ENTSO-E considers the fact that other network elements (not belonging to the specific boundary, but close to it) may reach their thermal limits before one of the boundary element does. The draft text may imply that the GTC calculation may not respect the security criteria.

II.6. Other remarks and recommendations on guidelines for investment value calculation

- a. The statement “*It is generally recommended to study at least two horizons: one mid-term and one long-term horizon*” is not aligned with chapter 2.2, p.10-11, where it is stated that “*For the mid-term horizon, the scenarios must be representative of at least two study years*”, and is not pertaining to investment value calculation, therefore this text should be moved to the “study horizons” chapter, and further clarity and alignment are needed.
- b. The statement in p. 29 “*The inception costs are to be aggregated and represented in the commissioning year of the investment as a single value*” should be left out and moved to the TYNDP Implementation Guidelines, as this is relevant only for the TYNDP.
- c. The index of present value (PV) in the respective formula in p. 27 should be dismissed (rather than n), as n refers to a varying year during the future time period, while the present value is a single value only evaluated by referring to the present.

II.7. Remarks and recommendations on B3 (proposed S4) - RES integration

The text of the draft 3rd CBA Guideline seems to acknowledge that the RES integration is not a benefit per se, and therefore, the Agency recommends this indicator not to be listed under benefits, but to be referred to as an impact indicator³⁶.

³⁶ For example, it could be called S4 (or I4, if ENTSO-E intends to distinguish the scenario-independent impacts under “S” from the scenario-dependent impacts).

II.8. Remarks and recommendations on B4 - non-direct greenhouse emissions

- a. As mentioned in p.62 of the draft 3rd CBA Guideline, for simplicity specific emission factors can be applied per generation plant technology type (and not per plant), but these emission types can differ per country depending on their generation fleet, and this fact need to be reflected when defining the fuel type specific emission factors. Although it is stated that *“if this is not possible because of the lack of sufficient data availability, the reduction to one factor per emission type can also be accepted”*, it is not clarified how the *“one factor per emission type”* will be calculated.
- b. The Agency recommends that the details for calculating this indicator are provided either in the 3rd CBA Guideline or in the Implementation Guidelines.

II.9. Other remarks and recommendations on B5 – losses

With respect to the example *“Illustration of the two assumptions used to deal with double counting using one hour and one market area”* in p. 67-69, for all the cases (PINT, TOOT) and under all the different alternative hypotheses presented in p. 69 (i.e. 1) *“Assume an estimate of A”* and 2) *“Assume that the calculated losses are equal to the assumed losses”*, thus B=0”) ENTSO-E should clearly identify the components of the losses that are i) already internalised in the consumer surplus and ii) the residual components that constitute the B5 benefit. The validity of the suggested alternative hypotheses (e.g. A=2% of the load or B=0) should be also justified.

II.10. Remarks and recommendations on B6 – adequacy to meet demand

The text in Section 6.24 of the draft 3rd CBA Guidelines *“Some benefits have opposable values at a national level, but no common value exists in Europe. This is the case with, for instance, the Value of Lost Load (VOLL), which depends on the structure of consumption in each country (tertiary sector versus industry, importance of electricity in the economy, etc.)”* should be deleted because the different national values are not a difficulty for monetising this benefit.

II.11. Remarks and recommendations on capital expenditures

Although the reporting of costs is significantly improved in the draft 3rd CBA Guideline, to further increase transparency, the Agency recommends that for the *“non-mature investments”* the following elements should be added to Section 6.14 of the draft 3rd CBA Guideline:

- promoters should make it clear whether their figure regarding C1a (Inception CAPEX) is based on “a. detailed project costs information” or “b. on standard costs”;

- in case of providing information based on standard costs, Section 6.14 should provide for an unbundled complexity factor to make clear the reasons for the expected variation of cost. E.g. the split of complexity factors could be the following: a. CF1: mountainous terrain, b. CF2: routing in densely populated or protected areas, c. CF3: innovative technology. Then, the total cost can be calculated by the formula: $Cost_{total} = Cost_{Standard} * CF1 * CF2 * CF3$.

Annex III – Elements that should be added in Table 2 of the draft 3rd CBA Guideline

The elements that should be added in the content of Table 2 are the following:

- The content of the project sheet should be defined in the Implementation Guidelines;
- The criteria to be considered for the determination of the competing projects that will be considered in the reference grid should be defined in the Implementation Guidelines;
- The list of projects selected to be part of the reference grid should be provided in the TYNDP;
- A list of the competing projects should be provided in the TYNDP;
- On network simulations: reference in the Implementation Guidelines whether they are based on AC or DC-load flows or both (e.g. regarding different synchronous systems), and, when applicable, the points in time for which the simulations were run. In case the (preferable) AC power flow approach cannot be performed, and DC power flow analyses are performed, the reasoning of this diversion should be explained in the Implementation Guidelines, and a comparison between AC power flow and DC power flow results for selected number of cases should be provided in the TYNDP or its accompanying documents;
- Regarding NTC and GTC calculation the Implementation Guidelines should include:
 - the steps of the NTC calculation process, including the full sequence of steps in the modelling chain. In particular, for each step the scope, the inputs, the modelling tools and the outputs should be indicated;
 - the identification of the databases used by ENTSO-E in calculating the variation of NTC and GTC, and links to access their data to the extent possible;
 - the method for dispatching generation in the nodal model (e.g. economic dispatch or Optimal Power Flow);
 - the method for steady state stability analyses (i.e. continuation power flow and rotor angle stability calculation);
 - whether Transmission Reliability Margin (TRM) is also considered in the calculation of transfer capacities or only the variation of Total Transfer Capacity (TTC);
 - the quantification of the percentile value to be used as a threshold (e.g. 70%) for the determination of the NTC should be moved from the text of the draft 3rd CBA Guideline to the Implementation Guidelines, in order to learn (and potentially improve) based on TYNDP experience;
- In case of adjustment of the transmission network or the generation profile considered in the counterfactual case for the implementation of the Take Out One at the Time

(TOOT) methodology when calculating benefit B6, the specific projects for which these changes were implemented have to be indicated in the TYNDP;³⁷

- On B1 (SEW): on top of the methodologies to be used in the specific TYNDP (already included in Table 2), the specific projects for which each methodology was implemented should be mentioned in the TYNDP;
- On B6 (adequacy to meet demand): details on how strategic reserves are treated should be given in the TYNDP scenario report;
- On B6 (adequacy to meet demand): the methodology to be applied for the sanity check should be defined in the Implementation Guidelines;
- On B7.1 (Balancing energy exchange): a detailed description of how the qualitative indicators are defined should be provided in the Implementation Guidelines;
- On indicator B8.1.2 (Capacity exchange/sharing): the specific methodology for the calculation of the indicator should be provided in the Implementation Guidelines;
- On CAPEX: the table of the standard costs to be used should be provided in the Implementation Guidelines (or in another document, but prior to the deadline for submission of candidate projects);
- On OPEX: Regarding non-mature investments, standard OPEX costs as a yearly percentage of CAPEX should be defined in the Implementation Guidelines;
- The concept of “project level assessment based on promoters’ input” introduced and described in chapters 3.4 and 6.26 should not be included in the draft 3rd CBA Guideline, as its implementation may be applicable only for a limited period of time. The above chapters should, therefore, be deleted, and for the benefits that an assessment may be performed by promoters, reference in Table 2 should be added that the *“Implementation details including the ENTSO-E review process for the assessment of these benefits based on promoter inputs will be described in detail in the Implementation Guidelines”*;
- If really needed, ENTSO-E should substantiate in the Implementation Guidelines the reasons why “it is currently not possible” to perform redispatch simulations, considering that ENTSO-E itself recognizes (p. 110) that *“most projects also show significant positive benefits that cannot be covered by only increasing the capacities of a certain border, i.e. the reduction of internal congestions”*;
- A section should be added in the Implementation Guidelines clearly describing the main databases developed, managed or used by ENTSO-E for the CBA assessment (e.g. Pan-European Market Modelling Data Base PEMMDB, Pan-European Climate Data Base PECDB). This section would help the reader to understand better which data is used for the calculation of CBA indicators and how;
- Regarding storage project assessment:

³⁷ In case of projects of large transmission capacity increases that connect areas with limited generation capacity.

- reference in the Implementation Guidelines is needed on how storage projects are modelled;
- the simulation data and the profile assumptions of the storage projects will have to be made public in the TYNDP.