

**OPINION No 07/2023**  
**OF THE EUROPEAN UNION AGENCY**  
**FOR THE COOPERATION OF ENERGY REGULATORS**

**of 18 July 2023**

**on the draft 4<sup>th</sup> ENTSO-E Guideline for Cost Benefit Analysis  
of Grid Development Projects**

THE EUROPEAN UNION AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

Having regard to Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013<sup>1</sup> and, in particular, Article 11(3) thereof,

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 Regulators<sup>2</sup> and, in particular, Article 11(3)(a) thereof,

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

Having regard to the favourable opinion of the Board of Regulators of 12 July 2023, delivered pursuant to Article 24(2) of Regulation (EU) 2019/942,

Whereas:

## **1. INTRODUCTION**

- (1) Article 11(1) of Regulation (EU) 2022/869 (the “TEN-E Regulation”) requires the European Network of Transmission System Operators for Electricity (‘ENTSO-E’) to publish and to submit to Member States, the Commission and ACER by 24 April 2023 its draft methodology, including the network and market model, for a harmonised energy system-wide cost-benefit analysis at Union level for projects on the Union list falling under the energy infrastructure categories set out in point (1)(a), (b), (d) and (f) of Annex II of the same Regulation, to be applied for the preparation of each subsequent ten-year network development plan (‘TYNDP’) developed by ENTSO-E.

---

<sup>1</sup> OJ L 152, 3.6.2022, p. 45

<sup>2</sup> OJ L 158, 14.6.2019, p. 22

- (2) According to the TEN-E Regulation the cost benefit analysis methodology shall be drawn up in line with the principles laid down in Annex V and the rules and indicators set out in Annex IV of the same Regulation.
- (3) Article 11(3) of the TEN-E Regulation sets out that, within three months of the day of receipt of the methodology, ACER shall provide an opinion on it and publish it.
- (4) A public consultation was conducted by ENTSO-E before the draft 4<sup>th</sup> CBA Guideline was submitted to ACER and the EC for an Opinion.
- (5) On 24 April 2023, ENTSO-E submitted to ACER its draft methodology for cost benefit analysis ('draft 4<sup>th</sup> CBA Guideline'), composed of the following documents:
  - a main methodology document;
  - an accompanying document containing the compliance of the methodology with the requirements of the TEN-E Regulation, the main changes introduced, the engagement of ENTSO-E with the stakeholders, and the structure of the methodology document;
  - "*ENTSO-E responses to consultation feedback on the 4<sup>th</sup> CBA Guideline*" a document containing the stakeholders' answers to the ENTSO-E's consultation performed from 15 December 2022 until 15 February 2023, and ENTSO-E's responses to them.

## **2. SUMMARY OF ENTSO-E DRAFT 4<sup>TH</sup> CBA GUIDELINE**

- (6) The draft 4<sup>th</sup> CBA Guideline presents the fourth version of the ENTSO-E CBA Guideline, and according to ENTSO-E, compared to the 3<sup>rd</sup> CBA Guideline, it introduces new methodologies (e.g. assessment of hybrid projects, and assessment of commission dates), and includes corrections of errors, and improvements in the consistency and clarity of the text.

## **3. ASSESSMENT OF THE DOCUMENT**

### **3.1. Objectives of the ACER assessment**

- (7) The aim of this opinion is to evaluate the following:
  - the compliance of the proposed methodology with the stipulations of the revised TEN-E Regulation, and in particular with Article 4, Article 11, Annex IV and Annex V;
  - the robustness of the proposed methodology, by evaluating whether it captures, to the extent possible, all relevant costs and benefits, and whether it sufficiently considers uncertainties;
  - the transparency and objectivity the proposed methodology, by evaluating whether it describes with clarity the assumptions and the inputs to be used, and whether the proposed methods are transparent, non-discriminatory, accessible to all stakeholders and sufficiently consulted;

- the compliance of the proposed methodology with the ACER Position Paper towards greater consistency of CBA methodologies<sup>3</sup>, which was published by ACER in March 2023, pursuant to Article 11(8) of the TEN-E Regulation.

### **3.2. The process for preparing the draft 4<sup>th</sup> CBA Guideline**

- (8) The draft CBA Guideline accompanied by a list of 16 questions was set on public consultation from 15 December 2022 to 15 February 2023. Also, a public workshop was held by ENTSO-E on 17 January 2023. Eight organisations participated to the public consultation: EDF (Électricité de France), Copenhagen School of Regulation, Ørsted, CurrENT Europe, WindEurope, while the other three participants chose to remain anonymous.
- (9) The most important comments of the respondents, which are also supported by the Agency, are the following:
- regarding option 2 of the evaluation of offshore hybrid projects, two participants requested the description of the “sanity check” of the benefits of RES integration to be included in the 4<sup>th</sup> CBA Guideline, and one participant raised concern on the use of the Producer Surplus as a proxy for the costs of the RES installed capacity;
  - regarding the usefulness of indicator B8.2-Blackstart services, 3 participants agreed that it is useful, while one replied that black start services are rather of rare use and therefore maybe not of the most relevance for the CBA compared to the other ancillary services.

### **3.3. Improvements introduced in the draft 4<sup>th</sup> CBA Guideline**

- (10) Since this version of the CBA Guideline is the fourth in the last 11 years, an evaluation of the progress made since the first introduction of the CBA guideline is useful. In the “ACER Position on the ENTSO-E Guideline to Cost Benefit Analysis of Grid Development Projects”<sup>4</sup>, of January 2013, a list of 11 benefit components were proposed to be included in the CBA, out of which 5 were not included in the proposed by ENTSO-E CBA Guideline (version December 2012). Since then, progress is noted regarding many of these benefits, as follows:
- variation in losses, which is now monetised;
  - security of supply, which is now monetised;
  - variation in generation curtailments, which is now quantified;
  - releasing national constraints (regarding congestion costs), which is now monetised (although not calculated centrally by ENTSO-E);
  - future costs for new (avoided/delayed) generation investments which is now monetised (although not calculated centrally by ENTSO-E);

---

<sup>3</sup> [https://www.acer.europa.eu/Position%20Papers/ACER\\_Consistency%20of%20CBA%20methodologies.pdf](https://www.acer.europa.eu/Position%20Papers/ACER_Consistency%20of%20CBA%20methodologies.pdf)

<sup>4</sup>

[https://documents.acer.europa.eu/en/Electricity/Infrastructure\\_and\\_network%20development/Infrastructure/Pages/ACER-Position-on-the-draft-electricity-CBA.aspx](https://documents.acer.europa.eu/en/Electricity/Infrastructure_and_network%20development/Infrastructure/Pages/ACER-Position-on-the-draft-electricity-CBA.aspx)

Whereas, lack of or little progress is noted regarding the following benefits:

- future costs for new (avoided/delayed) transmission investments, which is still not included;
- optimisation of regulating power and ancillary services, which is still qualitative and covering only very few aspects;
- effects on competition and market power, which is still not included;
- technical resilience (system safety margin) which is still not included;
- Social and environmental sensibility, which remains qualitative;

ACER reiterates its view that further progress is needed regarding the above benefits, and specific recommendations are made hereinto.

(11) Comparing the draft 4<sup>th</sup> CBA Guideline to the previous version of the CBA Guideline, ACER welcomes the considerable improvements introduced, among which the following:

- Regarding the sensitivity analyses, the stipulation included in section 2.6, according to which, “*detailed information explaining the criteria and methodologies used to select the parameters to conduct the respective sensitivity analysis must be given within the study-specific Implementation Guidelines*”.
- Regarding the definition of the reference grid the following improvements:
  - Clearer text for the criteria to be used for the reference grid of the first study year of the mid-term horizon: “*the reference grid for the first study year of the mid-term horizon has to be based on the criteria given under a) and b)*”.
  - The fact that “*the assessment date of the projects [by ENTSO-E] also has to be considered when defining the reference grid*”. Also, that “*for all projects falling under the category of reference grid candidates, the commissioning dates need to be agreed between the national TSOs and respective National Regulatory Authorities (NRAs)*”.
- The inclusion of a methodology for the assessment of hybrid projects, with the caveat of the remarks mentioned in section 3.4.2.
- The extension of the assessment of commissioning dates to all TYNDP projects, the description of a specific assessment methodology, and the stipulation that the result of the assessment of commissioning dates has to be published in the TYNDP project sheets as additional information.
- The stipulation that the TYNDP Implementation Guidelines will be publicly consulted on, although in ACER’s view the consultation should take place before the commencement of the CBA implementation process, and not together with the rest of the package.
- Regarding the guidelines for the Investment Value Calculation, the stipulation that the commissioning year of the project is determined by the commissioning year of the latest investment, instead of the average of the commissioning year of the earliest and the latest investment.
- The inclusion of a methodology to quantify sub-indicator B8.1 - frequency stability (energy aspect) within indicator B8 – System stability.
- The expansion of the scope of indicator B9- Reduction of Necessary Reserve for Redispatch Power Plants to countries which do not currently apply a re-dispatch reserve contracting, by the addition of reference that the necessary assumptions for

its calculation for these countries will be added in the TYNDP Implementation Guidelines.

### **3.4. Main remarks and recommendations for improvements of the draft 4<sup>th</sup> CBA Guideline**

- (12) Despite the considerable improvements referred to in the previous section, ACER still notes some shortages, the most important of which are presented in this section.

#### **3.4.1. Consideration of extreme weather events when examining network resilience**

- (13) According to Annex IV (3)(c) of the TEN-E Regulation for the purpose of the selection of projects of common interest, “*security of supply, [...] [shall be] measured in line with the analysis made in the latest available Union-wide ten-year network development plan in electricity, in particular by assessing the impact of the project [...] in terms of generation and transmission adequacy [...], taking into account expected changes in climate related extreme weather events and their impact on infrastructure resilience*”.
- (14) ACER notes that the new section 6.5 Climate adaptation measures of the draft 4<sup>th</sup> CBA Guideline, does not cover sufficiently the requirement of the TEN-E Regulation, as it refers only to the extra investments needed to be considered by project promoters “*to cope with possible (predicted) future extreme weather events due to climate change*”, without providing guidance on the assessment of the impacts of the extreme weather events on the project and on security of supply.
- (15) The current calculation of adequacy (indicator B6), according to section 5.6, is based on Monte Carlo market simulations and uses representative past climate year datasets, i.e. historical climatic data. Still, it is out of discussion that climate change already now (and unfortunately likely more in the next years) is increasing the frequency and impact of extreme events. The impact to resilience of high-impact - low-probability events in the future due to climatic change, is not assessed in the draft 4<sup>th</sup> CBA Guideline.
- (16) In order the CBA Guideline to meet the stipulations of the TEN-E Regulation regarding the impact of extreme weather events on security of supply, the SoS assessment should not be limited to the historical occurrence and the impact of past events, but incorporate in the analysis also a plausible development of future extreme events, in terms of higher expected probability of occurrence (compared to the past) and wider impact area.

#### **3.4.2. Assessment of hybrid offshore projects**

- (17) According to section 6.2 of the draft 4<sup>th</sup> CBA Guideline two options are defined for the assessment of hybrid offshore projects. According to Option 1, a hybrid project is built on top of an already existing radial connected offshore generation (which is already considered in the reference case) by adding an additional interconnection leg, while

under Option 2, a project is considered anew as a hybrid interconnector, i.e. both the offshore generation and the interconnection are jointly added, and they are not considered in the reference case.

- (18) This option incurs further complexities to the calculations, as it creates the need to approximate the CAPEX spent for installing the generation capacity, so that it can be deducted from the benefits when implementing the PINT methodology. ENTSO-E proposes to use the producer surplus as a proxy of the generation capacity CAPEX. However, this approximation is a rough one, and may introduce distortion to the benefits calculations. Also, this approach, in its turn, creates the need of a sanity check of the benefits of RES integration. However, the sanity check is not described, but it is to be included in the Implementation Guidelines. Also, according to the CBA Guideline, the choice between CBA option 1 or option 2 is up to the project promoter.
- (19) For the above reasons, the assessment of the projects based on Option 2 should be removed, as it does not seem to render additional value compared to Option 1 configuration. In ACER's view, all offshore projects can be simulated in the TYNDP with Option 1, given that the target offshore capacities are available to ENTSO-E from the sea basin agreements, signed by the involved Member States according to article 14.1 of the TEN-E Regulation.

#### 3.4.3. Identification of beneficiaries and cost bearers at country level

- (20) According to Annex V, Point 7 of the TEN-E Regulation, the CBA Guideline shall “ensure that the Member States on which the project has a net positive impact, the beneficiaries, the Member States on which the project has a net negative impact, and the cost bearers [...] are identified”. Therefore, such identification of beneficiaries and cost bearers at country level should be reflected in the CBA Guideline<sup>5</sup>.

#### 3.4.4. Assessment of ancillary services

- (21) The growing rate of penetration of renewable energy sources (RES) in the electrical system across Europe creates the need for greater flexibility to be available to the electrical system. Since 2014, ACER has recommended ENTSO-E in all its past Opinions on the CBA Guideline<sup>6</sup> the quantification of this benefit.

---

<sup>5</sup> The reference in footnote 19, in p. 40, that “some benefits (socio-economic welfare, CO2...) may also be disaggregated on a smaller geographical scale, like a member state or a TSO area” does not sufficiently cover this requirement.

<sup>6</sup> ACER 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](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2001-2014.pdf) and ACER Opinion No 05/2017 on ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects

- (22) Despite the above, the draft 4<sup>th</sup> CBA guideline does not make a progress compared to the 3<sup>rd</sup> CBA Guideline for this benefit, covered by indicators B7 and B8, as it does not provide sufficient guideline for its assessment. The specific reasons are described in sections 3.5.9.4 and 3.5.9.5. of this Opinion.
- (23) ACER recommends that ENTSO-E redrafts sections 5.7 and 5.8 of the draft 4<sup>th</sup> CBA guideline, taking into account the remarks mentioned in sections 3.5.9.4 and 3.5.9.5 of this Opinion, so that to provide criteria and guidance for a concrete assessment of ancillary services benefits. Furthermore, ACER reiterates its past Opinions' recommendation that ENTSO-E should suggest indicators for quantifying this benefit, and, furthermore, move towards its monetisation.

### **3.5. Other remarks and recommendations for improvement of the draft 4th CBA Guideline**

- (24) Further to the main remarks mentioned in section 3.4 above, ACER notes that many remarks and recommendations provided in its Opinion no 3/2020 on the ENTSO-E draft 3<sup>rd</sup> Guideline for cost benefit analysis of grid development projects<sup>7</sup> were not addressed in the draft 4<sup>th</sup> CBA Guideline and, therefore, they remain relevant. In this section, ACER reiterates these relevant remarks and recommendations, and notes new ones, where deemed necessary, i.e. in sections 3.5.1 (recital 27), 3.5.3 (recitals 29 and 31), 3.5.4, 3.5.7 (recitals 37 and 38), 3.5.8, 3.5.9.1 (recital 42), 3.5.9.3 (recital 47 and 48) and 3.5.9.6 (recital 53) of this Opinion.

#### **3.5.1. Consistency of CBA methodologies**

- (25) In order the draft 4<sup>th</sup> CBA Guideline to be in line with Annex V.3 of the TEN-E Regulation, section 2.1 of the draft 4<sup>th</sup> CBA Guideline should be duly expanded to ensure that the data sets used for electricity and gas respectively are compatible, notably with regard to the assumptions on prices and volumes in each market.
- (26) The ENTSG Single-sector CBA methodology<sup>8</sup>, currently under consultation, indicates (in p. 20) that the topology of the gas infrastructure and the corresponding capacities should be made publicly available as part of the TYNDP development

---

[http://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Opinions/Opinions/ACER%20Opinion%2005-2017.pdf](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2005-2017.pdf)

[https://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf](https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf)

<sup>7</sup>

[https://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf](https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf)

<sup>8</sup> [https://www.entsog.eu/sites/default/files/2023-03/Preliminary%20Draft%20CBA%20Methodology%20for%20Public%20Consultation\\_update.pdf](https://www.entsog.eu/sites/default/files/2023-03/Preliminary%20Draft%20CBA%20Methodology%20for%20Public%20Consultation_update.pdf)

process to allow for its use in further fields of application of the CBA methodology. The same transparency requirement should be added in the 4<sup>th</sup> CBA Guideline.<sup>9</sup>

- (27) In the same methodology of ENTSOG it is stated that when discussing possible sensitivity analyses on hydrogen market factors (demand, renewables, fuel and CO<sub>2</sub> prices, supply) “*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.61). On the contrary, the draft 4<sup>th</sup> CBA Guideline stipulates in p.28 that “*the aim of a sensitivity analysis is not to define complete new sets of scenarios but quick insights in the system behaviour with respect to single (few) changes in specific parameters*”. Consistency should be achieved between all CBA methodologies, as according to Annex V of the TEN-E Regulation, “*the methodologies for cost-benefit analyses developed by the ENTSO for Electricity and the ENTSO for Gas shall be consistent with each other, taking into account sectorial specificities, [and] [...] shall be uniform for all infrastructure categories, unless specific divergences are justified*”. Therefore, ACER recommends ENTSO-E to agree with ENTSOG on a common approach regarding the analyses to be performed on the parameters which are interdependent, as well as on the project-specific data (e.g. CAPEX, OPEX and commissioning dates) and project-specific parameters (e.g. monetisation coefficient for benefits, assumptions for the economic analysis).

### 3.5.2. TYNDP Implementation Guidelines and other complementary documents

- (28) Although in section 1.1 of the draft 4<sup>th</sup> CBA Guideline it is mentioned that the Implementation Guidelines will contain “*all relevant input data, data sources, and assumptions utilised in the CBA implementation*”, many elements that need to be determined in the Implementation Guidelines or in other complementary documents are missing from Table 1 “*Summary of indicators for which complementary documents are to be defined*”. ACER recommends ENTSO-E to include in Table 1 all the elements indicated in Annex II to this Opinion.

### 3.5.3. Reference network

- (29) In section 2.5 of the draft 4<sup>th</sup> CBA Guideline, p.26, it is mentioned that “*a project should only be included in the reference grid when its capacity is available in the year for which a simulation is performed.*” In cases where a project is commissioned after the beginning of the year for which a simulation is performed, its capacity is not reasonable to be considered “available” for the whole year. For this reason, the above phrase should be amended as follows: “*a project should only be included in the reference grid when its capacity is available earlier than the year for which a simulation is performed.*”
- (30) Despite the improved text regarding the construction of the reference network, there is no change to the criteria for inclusion of projects in ‘*permitting*’ or ‘*planned, but not yet in permitting*’ mentioned under bullet (c) of section 2.5. These criteria do not

---

<sup>9</sup> e.g. by amending the “reference network” row in table 1, page 19 of the draft 4<sup>th</sup> CBA Guideline.



sufficiently contribute to the principle of “reasonable certainty”, as they are either too generic and do not set clear milestones of project advancement<sup>10</sup>, or they are inappropriate<sup>11</sup>.

- (31) Regarding the way interdependent projects are handled, the provision (p.26) “*it may be the case that [...] one (or more) of the interdependent projects is (are) included in the reference grid although the project(s) it depends on is (are) not*” seems unreasonable and the text should be amended to read that that if the enabling project is not in the reference grid then also the enabled project should not be included.

#### 3.5.4. Sensitivities

- (32) According to section 2.6 of the draft 4<sup>th</sup> ENTSO-E CBA Guideline, a sensitivity analysis can be performed in two ways: “*on a uniform level, i.e. [...] to all projects under assessment*” or “*only for specific projects*”. Regarding the former way, ENTSO-E notes that “*the aim of a sensitivity analysis is not to define complete new sets of scenarios but quick insights in the system behaviour with respect to single (few) changes in specific parameters*”. In ACER’s view, when the variation of one parameter has an impact on other parameters, the variance of these parameters needs to be considered in the simulations. In this case, the CBA should foresee transparency of the sensitivity analysis regarding not only the analysed parameters, but also the affected ones.
- (33) Regarding the project-specific sensitivity analysis, in ACER’s view, it can be implemented on project-specific data (e.g. on CAPEX, OPEX and commissioning dates) and project-specific parameters (e.g. monetisation coefficient for benefits, assumptions for the economic analysis), and, therefore, the CBA text should be amended accordingly.

#### 3.5.5. Redispatch simulations

- (34) With respect to the redispatch simulations described in the draft 4<sup>th</sup> CBA Guideline, ACER recommends ENTSO-E to perform the redispatch analysis centrally on the most relevant projects, and not leave it to the responsibility of 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 B9 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.
- (35) In case of redispatch calculations, the 4<sup>th</sup> CBA Guideline should stipulate that the details of the implementation of the methodology described in section 6.3, and especially regarding “simulation step 3” mentioned in p. 111, should be provided in the relevant

---

<sup>10</sup> Bullets 4 and 5 of p. 26.

<sup>11</sup> Bullets 1 and 2 of p. 26 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.

TYNDP. These details should include the type of simulation (AC or DC load flows), the time granularity of the studies (year around or representative points in time), the method of mapping the market simulation results to the grid model (i.e. the distribution of market node level results to nodal level in the grid model), the perimeter of the redispatch simulations, the optimisation measures considered, whether market simulations only or also network simulations were used as an input for the redispatch simulations.

#### 3.5.6. Transfer Capability Calculation

- (36) Regarding the calculation of Net Transfer Capacity (NTC), ACER recommends the following:
- The draft 4<sup>th</sup> 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 2<sup>nd</sup> CBA Guideline) has been deleted in the draft 4<sup>th</sup> CBA Guideline.
  - The draft 4<sup>th</sup> 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 4<sup>th</sup> 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.).

#### 3.5.7. Investment value calculation

- (37) According to Annex V(8) of the TEN-E Regulation, the CBA methodology shall “include a mandatory methodology to calculate benefit-to-cost ration and the net present value, as well as a differentiation of benefits in accordance with the level of reliability of their estimation methods”. Therefore, 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 8 of the draft 4<sup>th</sup> CBA Guideline), which have to be calculated and published in each application of the CBA methodology.
- (38) Also, for the CBA Guideline to align with the above stipulation of the TEN-E Regulation, ACER recommends that the CBA Guideline should foresee the calculation of two versions of the NPV and BCR indicators, one including only the more reliable benefits (e.g. leaving out benefits which are based on non-unilaterally accepted assumptions, like indicator B2-Additional societal benefit due to CO<sub>2</sub> variation) and one with all benefits included.

### 3.5.8. Further comments regarding the assessment of hybrid offshore projects

- (39) In section 6.2.3.2 of the draft 4<sup>th</sup> CBA Guideline (p. 108) it is mentioned that there are “*three different setups possible for CBA option 2*”. The description of setup 2 seems to be the same to Option 1, from the point of view of transmission. In the document “*ENTSO-E responses to consultation feedback on the 4<sup>th</sup> CBA Guideline*” ENTSO-E provided clarifications in reply to a relevant comment submitted by EDF, noting that the second leg added to the project includes new RES capacity. This clarification needs to be added also in section 6.2.3.2 of the draft 4<sup>th</sup> CBA Guideline.
- (40) Regarding the setup 3 of option 2, it seems to be a generation connection issue, as the radial project could be connected without the planned interconnector. Therefore, it seems to set no case from a transmission planning perspective.

### 3.5.9. Comments on the benefits

#### 3.5.9.1. *B1 - Socio Economic Welfare (SEW)*

- (41) 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. 56 of the draft 4<sup>th</sup> 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. ACER recommends ENTSO-E to distinguish the following components<sup>12</sup> (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.
- (42) Regarding the multi-sectorial SEW and the calculation of cross-sector rents as proposed by ENTSO-E under indicator B1 and the related Annex II, ACER finds the description provided in the CBA Methodology insufficient for a comprehensive understanding of the indicator and its replicability. ACER suggests the inclusion of additional clarifications regarding the scope of its application, including examples, the necessary steps for its calculation, and how the risk of cross-sectorial double-counting should be addressed. ACER also notices that a similar indicator is proposed in ENTSOG preliminary draft CBA methodology<sup>13</sup>. In line with its Position Paper “*towards greater consistency of cost benefit analysis methodologies*”, ACER recommends ENTSO-E and ENTSOG to ensure alignment in their definitions and their methodologies for computing the multi-sectorial SEW.

<sup>12</sup> Alternatively, separate benefit indicators could be introduced.

<sup>13</sup> Indicator B2 “Cross-Sectoral Social Economic Welfare” (page 43).

3.5.9.2. *B5 - losses*

- (43) ACER recommends that ENTSO-E amends the draft 4<sup>th</sup> 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 4<sup>th</sup> CBA Guideline to be in line with Annex V.4 of the TEN-E Regulation.
- (44) 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, ACER 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)<sup>14</sup>.
- (45) Any of these simplified approaches may allow ENTSO-E to re-allocate time and resources to extend the scope of the calculations (e.g. regarding calculation of  $\Delta$ NTCs, redispatching or missing benefits), 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 69 of the draft 4<sup>th</sup> CBA Guideline).

3.5.9.3. *B6 - Adequacy to meet demand*

- (46) The draft 4<sup>th</sup> 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*”.
- (47) Given that the selection of the additional peaking units may have a significant impact on the results of the calculations of the expected energy not supplied, ACER recommends that ENTSO-E should add in the CBA Guideline the requirement that in case “step 1” is deemed necessary, the adaptations made (i.e. the type, the capacity and the location of the added peaking units) are provided in the TYNDP.

---

<sup>14</sup> In such a case, ENTSO-E should publish the 8760 hourly marginal costs for each zone for each reference case.

- (48) In p. 74 of section 5.6 of the draft 4<sup>th</sup> CBA Guideline it is mentioned that “*Several hundreds of Monte Carlo years are consequently necessary using the several climate year datasets combined with plant (and if possible grid) outage patterns.*” The consideration of grid outages should be an important part of the adequacy assessment, and not a potential one, therefore, the draft 4<sup>th</sup> CBA Guideline should be amended accordingly.

#### 3.5.9.4. B7- System flexibility

- (49) 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, ACER has recommended ENTSO-E in all its past Opinions on the CBA Guideline<sup>15</sup> the quantification of this benefit.
- (50) Despite the above, for this indicator the draft 4<sup>th</sup> CBA guideline does not constitute an improvement compared to the 3<sup>rd</sup> 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 5.7 (p.76), 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 (aFRR, mFRR, RR), no methodology for its assessment is proposed, as it is explained in p. 77 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 (aFRR, mFRR, RR), it is mentioned in p. 80 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*

---

<sup>15</sup> 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](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](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2005-2017.pdf)  
[https://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf](https://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2003-2020%20on%20ENTSO-E%20Guideline%20for%20cost%20benefit%20analysis.pdf)

*guideline.*” 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.

#### 3.5.9.5. B8- System stability

- (51) ACER has the following remarks regarding the system stability indicator:
- The inclusion of a methodology for indicator B8.1 Frequency stability (energy aspect) is welcome.
  - Regarding indicator B8.2 Frequency stability (capacity aspect), like in the 3<sup>rd</sup> CBA Guideline, no specific methodology is presented, but only principles. Also, it is not clear whether there is an intention by ENTSO-E to implement these principles and proceed with a methodology for to the calculation of this indicator within the 4<sup>th</sup> CBA Guideline or not, given the text in p. 85 “*The final methodology should follow in the Implementation Guideline or in a future version of the CBA guideline*”.
  - Regarding indicator B8.3 - Blackstart services, no specific methodology is presented, despite the statement in p.87 “*This section proposes a methodology for how to assess black start services’ contribution to the SEW of Europe*”, nor is there a reference to a methodology to be proposed in the Implementation Guidelines. ACER doubts on the value of this indicator without any description or methodology of calculation.
  - Regarding indicator B8.4 - Voltage/reactive power services, the draft 4<sup>th</sup> CBA Guideline provides no methodological aspects, and even reference to potential valuations that existed in the 3<sup>rd</sup> CBA Guideline is deleted. ACER doubts on the value of this indicator without any description or methodology of calculation, and recommends ENTSO-E to include in the 4<sup>th</sup> CBA Guideline the methodological aspects necessary for its quantification, such as the quantification of avoided payments for reactive reserves and the monetisation of avoided investments, so that this indicator could be calculated in a consistent manner.
- (52) ACER recommends that ENTSO-E redrafts section 5.8 of the draft 4<sup>th</sup> CBA guideline in order to provide criteria and guidance for a concrete assessment, especially with regard to indicators B8.3 and B8.4. Furthermore, ACER reiterates its past Opinions’ recommendation that ENTSO-E should suggest ways for further quantification (and, if possible, also monetisation) of this benefit.

#### 3.5.9.6. B9- Reduction of Necessary Reserve for Redispatch Power Plants

- (53) Benefit B9 should be applicable to all countries (irrespective of whether they apply today re-dispatch reserve contracting) to safeguard consistency across projects assessed. Therefore, ACER welcomes the addition of the following text: “*If such a mechanism does not exist for the respective countries, an assumption for the allocation-costs has to be made within the study-specific Implementation Guideline*”, and expects

the appropriate assumptions for such calculation to be introduced in the Implementation Guidelines, as needed.

- (54) Taking into account the recommendation regarding redispatch analysis in section 3.5.5 of this Opinion, ACER recommends ENTSO-E to calculate benefit B9 for all countries and as a result of ENTSO-E's re-dispatching studies.

*3.5.9.7. Residual impacts S1-S3*

- (55) 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.
- (56) ACER 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 4<sup>th</sup> CBA Guideline. Thus, ACER reiterates its recommendation to 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,

**HAS ADOPTED THIS OPINION:**

Overall, the draft 4<sup>th</sup> CBA Guideline provides substantial improvements compared to the previous draft CBA, which was assessed by ACER Opinion 03/3020, in various aspects as listed in section 3.3 of this Opinion.

The draft 4<sup>th</sup> CBA Guideline defines rules and indicators, which are consistent with Annex IV(3) of the TEN-E Regulation, except for the consideration of the impact of projects on infrastructure resilience stipulated in Annex IV(3)(c). The defined rules and indicators are also consistent with the specific criteria of Article 4(3)(a) of the TEN-E Regulation, which are further detailed in Annex IV(3).

The draft 4<sup>th</sup> CBA Guideline is, to a large extent, in line with the principles in Annex V of the TEN-E Regulation, even if, formally, some of the principles of Annex V.3, 4, and 7 (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, with-and-without-project approach, identification of beneficiaries and cost bearers) are not reflected in the draft 4<sup>th</sup> CBA Guideline.

The draft 4<sup>th</sup> CBA Guideline misses some important elements indicated in sections 3.4 and 3.5 of this Opinion. ACER, therefore, encourages ENTSO-E to adapt the draft 4<sup>th</sup> CBA Guideline, in accordance with ACER'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 18 July 2023.

**- SIGNED -**

*For the Agency*  
*The Director*  
C. ZINGLERSEN

*Annexes:*

*Annex I – Other ACER recommendations*

*Annex II – Elements that should be added in Table 1 of the draft 4th CBA Guideline*



## **Annex I – Other ACER recommendations**

### *1.1 Other remarks and recommendations on the structure and content of the 4<sup>th</sup> CBA Guideline:*

- a. Especially with regard to chapters 5.1 – 5.9, 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 benefits<sup>16</sup>, and the summarising table at the end of each benefit text should always be present<sup>17</sup>. 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.
- b. Some editing mistakes must be corrected, i.e. the list of non-mature indicators mentioned in p. 46 should be updated to reflect the changes introduced in the sections 5.8.1 – 5.8.5, as well as the text in the grey box and the list of sub-indicators regarding indicator B8 in p.81.
- c. In many instances there is reference in the draft 4<sup>th</sup> CBA Guideline to “*study-specific Implementation Guidelines*”<sup>18</sup>. It has to be clarified whether the TYNDP Implementation Guidelines are meant by this reference.

### *1.2 Other remarks and recommendations on guidelines for investment value calculation*

- a. The statement in p. 42 “*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.
- b. The starting point in the formula of BCR should be the same as the starting point in the NVP formula, i.e.  $t_0$ , to discount the values to the year of the study.
- c. The present value (PV) is presented as a formula (PV(n)) in p. 41, but as n refers to a varying year during the future time period, while the present value is a single value only, “(n)” should be dismissed.

### *1.3 Remark and recommendation on B2 – additional societal benefit due to CO2 variation*

The draft 4<sup>th</sup> CBA Guideline suggests that the monetisation of this 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”. For this reason, the value used should be selected with prudence.

---

<sup>16</sup> E.g. this structure is not followed for indicators B7.2, B8.2, B8.3, B8.4.

<sup>17</sup> E.g. the summarising table is missing for indicators B7.2, B8.0, B8.2, B8.3, B8.4.

<sup>18</sup> E.g. in sections 2.6, 5.2, 5.7.1, 5.8.1

#### *1.4 Remarks and recommendations on B3 (proposed S4) - RES integration*

The text of the draft 4<sup>th</sup> CBA Guideline seems to acknowledge that the RES integration is not a benefit per se, and therefore, ACER recommends this indicator not to be listed under benefits, but to be referred to as an impact indicator<sup>19</sup>.

#### *1.5 Remarks and recommendations on B4 - non-direct greenhouse emissions*

- a. As mentioned in p.64 of the draft 4<sup>th</sup> 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. ACER recommends that the details for calculating this indicator are provided either in the 4<sup>th</sup> CBA Guideline or in the Implementation Guidelines.

#### *1.6 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. 70-72, for all the cases (PINT, TOOT) and under all the different alternative hypotheses presented in p. 72 (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.

#### *1.7 Remarks and recommendations on B6 – adequacy to meet demand*

The text in section 3.1, p.33, of the draft 4<sup>th</sup> CBA Guidelines “*Some benefits have applicable 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.

#### *1.8 Remarks and recommendations on capital expenditures*

In case standard investment costs are used for the “*non-mature investments*”, and the cost of a project is expected to divert from these standard costs, the reasons of divergence should be transparently explained.

---

<sup>19</sup> 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).

For this reason, ACER recommends that section 5.10 should provide for an exclusive list of unbundled complexity factors (e.g. a. CF1: mountainous terrain, b. CF2: routing in densely populated or protected areas, c. CF3: innovative technology), and the promoters should be requested to indicate which factors affect their projects and how.

## **Annex II – Elements that should be added in Table 1 of the draft 4th CBA Guideline**

The elements that should be added in the content of Table 1 of the draft 4<sup>th</sup> CBA Guidelines are the following:

1. 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;
2. A list of the competing projects should be provided in the TYNDP;
3. 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;
4. Regarding NTC calculation the Implementation Guidelines should include the following elements:
  - 4.1. the method for dispatching generation in the nodal model (e.g. economic dispatch or Optimal Power Flow);
  - 4.2. the method for steady state stability analyses (i.e. continuation power flow and rotor angle stability calculation);
5. On indicator B4, in case the emission factors are not considered per power plant, the details for calculating these factors per technology should be provided in the Implementation Guidelines;
6. When calculating benefit B6, 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, the specific projects for which these changes were implemented have to be indicated in the TYNDP<sup>20</sup>, as well as the adaptations made (i.e. which transmission lines were added, and their capacity, the type, the capacity and the location of the added peaking units).
7. On indicator B7.1- Balancing energy exchange (aFRR, mFRR, RR): a description of how the qualitative indicators (0, +,++) will be defined.
8. On indicator B8.1 - Frequency Stability (energy aspect): the detailed motivations and a clear descriptions of the chosen system splits, together with the formula and all relevant parameters for the RoCoF calculation should be provided in the Implementation Guidelines;
9. On indicator B8.2 - Frequency Stability (Capacity aspect): the specific methodology for the calculation of the indicator should be provided in the Implementation Guidelines.

---

<sup>20</sup> In case of projects of large transmission capacity increases that connect areas with limited generation capacity.

- 10.** For the other “*non-mature indicators*’ described in section 5 (i.e. for indicators B7.2, B8.2, B8.3 and B8.4), for which no specific methodology is described in the draft 4<sup>th</sup> CBA Guideline, there should be added reference in Table 1 that the “*Implementation details, including the ENTSO-E review process, for the assessment of these benefits based on promoter inputs will be described in the Implementation Guidelines*”;

If the redispatch simulations cannot be performed centrally, as recommended by ACER in section 3.5.5 of this opinion, ENTSO-E should substantiate the reasons of the decentralised approach in the Implementation Guidelines, 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*”.