

**OPINION OF THE AGENCY FOR THE COOPERATION OF ENERGY  
REGULATORS No 15/2017**

**of 24 October 2017**

**ON THE DRAFT 2<sup>ND</sup> ENTSG COST-BENEFIT ANALYSIS METHODOLOGY**

THE AGENCY FOR THE COOPERATION OF ENERGY REGULATORS,

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 715/2009<sup>1</sup>, and, in particular, Articles 11(6) and 11(2) thereof,

WHEREAS:

- (1) The European Network of Transmission System Operators for Gas (“ENTSG”)’s cost-benefit analysis (“CBA”) methodology shall be applied for the preparation of each subsequent ten-year network development plan (“TYNDP”) developed by ENTSOG. It shall be drawn up in line with the principles laid down in Annex V to Regulation (EU) No 347/2013 and be consistent with the rules and indicators set out in Annex IV thereto. In addition, the CBA methodology shall be applied for sufficiently mature candidate projects of common interest (“PCIs”), for submitting investment requests by project promoters to National Regulatory Authorities (“NRAs”), for decisions by NRAs on granting incentives to PCIs, and for providing evidence on significant positive externalities for the purpose of Union financial assistance to PCIs.
- (2) On 13 February 2014, the Agency published its Opinion No 04/2014 on ENTSOG’s draft first CBA methodology<sup>2</sup>. The Opinion of the Agency was followed, on 27 July 2014, by the Opinion of the European Commission<sup>3</sup>. The Agency’s and the European Commission’s Opinions included lists of necessary adaptations of the draft first ENTSOG CBA methodology, as well as requests for further updates and improvements, to be incorporated into an updated and improved version of the CBA methodology after the approval of the first one (see especially Section B.2 of the Agency’s Opinion No 04/2014).
- (3) On 5 February 2015, the European Commission adopted Decision C(2015)533/F1 “Commission Decision on cost-benefit analysis methodologies concerning trans-European Energy networks”, based on an adapted version of the draft first CBA methodology submitted by ENTSOG.

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<sup>1</sup> OJ L 115, 25.4.2013, p.39.

<sup>2</sup> [http://www.acer.europa.eu/official\\_documents/acts\\_of\\_the\\_agency/opinions/opinions/acer%20opinion%2004-2014.pdf](http://www.acer.europa.eu/official_documents/acts_of_the_agency/opinions/opinions/acer%20opinion%2004-2014.pdf).

<sup>3</sup> C (2014) 5418 final.

- (4) On 13 February 2015, ENTSOG published the “Energy System Wide Cost-Benefit Analysis Methodology”<sup>4</sup> (hereinafter referred to as the “current CBA methodology”).
- (5) Pursuant to Article 11(6) of Regulation (EU) No 347/2013 and in accordance with paragraphs 1 to 5 of the same Article, ENTSOG’s CBA methodology shall be updated and improved regularly.
- (6) Pursuant to Article 11(1) of Regulation (EU) No 347/2013, prior to submitting their respective methodologies, ENTSO-E and ENTSOG shall conduct an extensive consultation process. ENTSOG conducted a web-based public consultation on the principles for updating the current CBA methodology from 19 May to 23 June 2017. Nine stakeholders provided feedback to the public consultation.
- (7) On 24 July 2017, ENTSOG submitted to the Agency for its Opinion a document named “2<sup>nd</sup> ENTSOG methodology for cost-benefit analysis of gas infrastructure projects” (hereinafter referred to as “draft 2<sup>nd</sup> CBA Methodology”), together with the responses to the public consultation and an accompanying letter.
- (8) Taking into account that the current CBA Methodology did not include the necessary adaptations to define the project-specific CBAs to be carried out in the context of investment requests pursuant to Article 12 of Regulation (EU) No 347/2013, the Agency issued its Recommendation No 05/2015<sup>5</sup> on 18 December 2015, providing specific suggestions for the project-specific CBA in the context of investment requests. As that Recommendation already covers the topic of CBA for investment requests, the Agency does not provide in this opinion recommendations regarding the application of the ENTSOG CBA methodology specifically for the purpose of investment requests, but expects that ENTSOG will indicate in the adapted CBA Methodology that project promoters are encouraged directly to follow the Agency’s Recommendation.
- (9) Pursuant to Article 11(2) of Regulation (EU) No 347/2013, within three months of the day of receipt of the methodologies, the Agency shall provide an opinion to Member States and the European Commission on the methodologies and publish it,

## **HAS ADOPTED THIS OPINION:**

### **1. Scope and Structure**

In preparing this Opinion, the Agency evaluated ENTSOG’s submission of the draft 2<sup>nd</sup> CBA Methodology, covering the following main elements:

- views on the consistency of the draft 2<sup>nd</sup> CBA Methodology with the applicable legal requirements (Section 2);

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<sup>4</sup> [https://www.entsog.eu/public/uploads/files/publications/CBA/2015/INV0175-150213\\_Adapted\\_ESW-CBA\\_Methodology.pdf](https://www.entsog.eu/public/uploads/files/publications/CBA/2015/INV0175-150213_Adapted_ESW-CBA_Methodology.pdf).

<sup>5</sup> Agency’s Recommendation No 05/2015 regarding good practices for the treatment of investment requests including cross-border cost allocation (CBCA) requests.  
[http://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Recommendations/ACER%20Recommendation%2005-2015.pdf](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Recommendations/ACER%20Recommendation%2005-2015.pdf).



- the development processes of the draft 2<sup>nd</sup> CBA Methodology (Section 3);
- the content of the draft 2<sup>nd</sup> CBA Methodology, covering improvements in line with previous guidance issued by the Agency, and areas where further adaptations and improvements are recommendable (Section 4); and
- recommendations on the way forward for further work leading to the adoption of a robust 2<sup>nd</sup> CBA methodology (Section 5).

## **2. Views of the Agency on the consistency with applicable legal requirements**

The Agency has doubts that the requirement of Article 11(1) of Regulation (EU) No 347/2013 for an extensive consultation process has been adequately fulfilled, especially because:

- the content (text) of the draft 2<sup>nd</sup> CBA Methodology has not been consulted with stakeholders;
- no documents are available regarding ENTSOG's evaluation of feedbacks received during the consultation on principles for updating the CBA methodology.

The Agency has no evidence that the requirement of Article 11(1) of Regulation (EU) No 347/2013 for a CBA methodology<sup>6</sup>, including on network modelling, has been entirely fulfilled, as only a zonal representation (i.e., a simplified market model) is presented in the draft 2<sup>nd</sup> CBA Methodology.

Regarding the proposed indicators and their relationship to the indicators specified in Annex IV to Regulation (EU) No 347/2013, the Agency recalls its view expressed in its Position on Potential Improvements to the Energy Infrastructure Package<sup>7</sup>, namely that Annex IV indicators may be over-prescriptive.

The Agency finds that the draft 2<sup>nd</sup> CBA Methodology is to a large extent consistent with the principles in Annex V to Regulation (EU) No 347/2013, despite the fact that some requirements of Annex V(3) related to the development and use of network and market models and modelling are not fully met.

The Agency reaffirms its recommendation to ENTSOG to include a proper network modelling in the CBA methodology, at the time of the inclusion of the interlinked electricity and gas market and network model in the CBA methodology, as indicated in the Agency's Opinion No 07/2017<sup>8</sup>.

<sup>6</sup> Article 11(1) of Regulation (EU) No 347/2013 states that "by 16 November 2013, the European Network of Transmission System Operators (ENTSO) for Electricity and the ENTSO for Gas shall publish and submit to Member States, the Commission and the Agency their respective methodologies, including on network and market modelling, for a harmonised energy system-wide cost-benefit analysis at Union level for projects of common interest falling under the categories set out in Annex II.1(a) to (d) and Annex II.2".

<sup>7</sup> Position of the Agency on Potential Improvements to the Energy Infrastructure Package, 31 May 2017. ([http://www.acer.europa.eu/Official\\_documents/Position\\_Papers/Position%20papers/ACER%20Position%20on%20Potential%20Improvements%20to%20the%20EIP.PDF](http://www.acer.europa.eu/Official_documents/Position_Papers/Position%20papers/ACER%20Position%20on%20Potential%20Improvements%20to%20the%20EIP.PDF)).

<sup>8</sup> Pursuant to Article 11(8) of Regulation (EU) No 347/2013, "By 31 December 2016, the ENTSO for Electricity and the ENTSO for Gas shall jointly submit to the Commission and the Agency a consistent and interlinked electricity and gas market and network model including both electricity and gas transmission infrastructure as well as storage and LNG

### 3. The development process of the draft 2<sup>nd</sup> CBA Methodology

The main preparatory activities of ENTSOG for updating the CBA Methodology included:

- In January and February 2017, ENTSOG set up a “Prime Movers” group in order to get early feedback and identify the most needed improvements for updating the CBA methodology. It gathered energy trader associations (EFET), industry associations (European Power to Gas Platform, European Biogas Association), consultancies, experts, European institutions (European Commission, Energy Community), the Agency and organisations representing gas infrastructures operators (GSE - Gas Storage Europe, GLE – Gas LNG Europe).
- From 19 May to 23 June 2017, ENTSOG launched a web-based public consultation on “principles” for updating the gas CBA methodology ahead of the preparation of a draft methodology. In addition to asking for feedback on different options under consideration by ENTSOG for improving the CBA methodology, ENTSOG asked stakeholders to submit concrete proposals as regards possible evolutions of its CBA methodology. On 31 May 2017, ENTSOG organised a public stakeholder webinar on the update of the CBA methodology.
- On 25 July 2017, ENTSOG published the draft 2<sup>nd</sup> CBA Methodology<sup>9</sup>, as submitted to the Agency and to the European Commission for their opinions.

The Agency notes ENTSOG’s willingness to collect early feedback from stakeholders under the Prime Movers meetings setting. However, it also notes that the conclusions of the meetings were not fully transparent as they were not published.

The Agency also notes that ENTSOG does not clearly indicate the main changes and improvements in the draft 2<sup>nd</sup> CBA Methodology in comparison to the current CBA methodology, and that no documents accompanied the submission that could serve this purpose.

The Agency notes that the process for updating the electricity CBA methodology, which is subject to the same procedure under Article 11 of Regulation (EU) No 347/2013, was initiated by ENTSO-E significantly earlier and included a public consultation on a complete draft CBA Methodology for electricity, in contrast to the public consultation run by ENTSOG, which was limited to the “principles” for an update of the gas CBA methodology.

The Agency notes that responses to the Public Consultation on the principles for an update of the CBA methodology were published by ENTSOG, but that ENTSOG has not published an evaluation of the responses. It remains unclear how the responses were considered in the draft 2<sup>nd</sup> CBA Methodology.

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facilities, covering the energy infrastructure priority corridors and areas and drawn up in line with the principles laid down in Annex V. After approval of this model by the Commission according to the procedure set out in paragraphs 2 to 4, it shall be included in the methodologies.” The Agency provided Opinion No 07/2017 on the submitted interlinked electricity and gas market and network model, but for the time being the model is not included in the CBA Methodologies.

<sup>9</sup> <https://entsog.eu/publications/cba-methodology#2ND-CBA-METHODOLOGY>.



The Agency notes that the European Commission has commissioned a study on “Recommendable updates for and improvements of the energy system-wide CBA for gas”, which is expected to be finalised soon. The Agency welcomes the draft recommendations presented in the gas CBA methodology consultation document<sup>10</sup>.

The Agency also recommends ENTSOG to take into account the recommendations contained in the executive summary of the 2014 study commissioned by the European Commission on gas CBA<sup>11</sup> and implement those which have not been yet implemented<sup>12</sup>.

A limited number of responses (nine) to the web-based Public Consultation were received by ENTSOG, which included the responses of European associations (EFET, Eurogas, Food & Water Europe), a network user (ENGIE / Global Energy Management), and other stakeholders (Edison SpA, and organisations and respondents who requested confidentiality and/or anonymity of their responses).

Some respondents suggested to adopt a Multi-Criteria Analysis (MCA) approach or even not to perform any CBA. The Agency observes that, even though some parties may have a private interest in avoiding the requirement to perform a CBA for projects as set out by Regulations (EC) No 715/2009 and (EU) No 347/2013, such CBA is in the public interest as it reveals important socio-economic impacts of a project. It draws the attention of all stakeholders to take this aspect into due account when deciding on CBA methodology and CBA applications.

The Agency considers that quantitative project assessments outside the frame of cost and monetised benefits could complement a CBA analysis. Such quantitative assessments<sup>13</sup> may also be a fall-back to a proper CBA, but only if the bulk of the expected benefits stand outside market integration, security of supply and sustainability effects which should be monetised, and provided that double counting of costs and benefits is avoided.

Furthermore, the Agency recommends ENTSOG to devote utmost attention to the following proposals by stakeholders:

- On simplification of the CBA methodology document: there is a need to streamline and align with the ENTSO-E CBA Methodology. Outputs should be more manageable both for stakeholders and project promoters, and procedures and information requirements should be clarified.

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<sup>10</sup> The consultation document of March 2017 is downloadable from <http://fsr.eui.eu/gas-cba-consultation/>. In the view of the Agency, the five key recommendations are: R1A: Classify the indicators according to the value and capacity to monetise them; R1C: Improve the monetisation of security of supply and disrupted demand; R2A: Reduce the number of indicators; R2B: Highlight the relevant future cases; and R4B: Correct how commercial constraints and transportation costs impact flow setting.

<sup>11</sup> Report prepared for the European Commission by Frontier Economics.

<https://ec.europa.eu/energy/sites/ener/files/documents/Study%20to%20support%20the%20definition%20of%20a%20CBA%20methodology%20for%20gas.pdf>.

<sup>12</sup> Such as the ability of the CBA to derive benefits per Member State, amend the modelling approach and treatment of transportation costs, monetise the cost of disruption, include guidance on the economic lifetime of projects, avoid double counting of sustainability benefits, take into account other environmental issues, and acknowledge that ENTSOG's modelling is not able to capture benefits related to a potential reduction of market power.

<sup>13</sup> E.g. if market power is not possible to be monetised.

- On indicators with limited additional value for CBA and the use of Multi-Criteria Analysis (MCA): modelling-based indicators could be simplified.
- On the use of a CBA Project Fiche template: its use is positively noted but, as currently defined, the fiche is functional for the 3<sup>rd</sup> PCI selection process rather than for a general application of the CBA methodology. Besides, the fiche could be improved by including capital and operational cost (CAPEX, OPEX), information on competing projects, and more monetised benefits.
- On the monetisation of the Value of Lost Load (VoLL) and Security of Supply (SoS): in terms of methodological approach and data sources, ENTSOG's calculation of the VoLL, as performed in the TYNDP 2017, is seen by most stakeholders as irrelevant and not serving the purpose. The main reason is that the VoLL must be assessed at the margin and be representative of the cost of failure to avoid a disruption in gas supply per Member State and per group of gas users.
- On market modelling: stakeholders demonstrate general support for the introduction of infrastructure tariffs in the modelling.
- On treatment of LNG supply diversification in the modelling: stakeholders' prevailing views are to account for the diversity of LNG supply in the modelling, by making sure that the modelling supports a multi-source LNG supply approach, i.e. an approach which considers LNG supply as coming from more than one source.
- On the use of CBA for the purpose of preparing investment requests and performing cross-border cost allocation (CBCA): the CBA methodology should adequately cover the cost dimension as needed for taking CBCA decisions (especially CAPEX and OPEX), and in this sense be aligned with ENTSO-E's CBA methodology and with the Agency's Recommendation No 05/2015 on CBCA.

The Agency recommends ENTSOG to increase stakeholder involvement and transparency during the adaptation process of the draft 2<sup>nd</sup> CBA Methodology by opening a public consultation on the complete methodology and by organising a public workshop after receipt of all Opinions (from the Agency, the European Commission and possibly Member States) on the draft 2<sup>nd</sup> CBA Methodology.

Later, ENTSOG should provide evidence on how such Opinions and the feedback from stakeholders to the proposed methodology were duly taken into account, by clearly indicating amendments with respect to the draft 2<sup>nd</sup> CBA Methodology and explaining the reasons for taking or not taking suggestions on board.

#### **4. Content of the draft 2<sup>nd</sup> CBA Methodology**

This section of the Opinion covers improvements contained in the draft 2<sup>nd</sup> CBA Methodology in comparison to the current CBA Methodology and elaborates on areas where the Agency recommends



adaptations to the draft 2<sup>nd</sup> CBA Methodology or subsequent improvements<sup>14</sup>, in particular regarding the inappropriate identification of planning steps before the CBA application<sup>15</sup>, the presence of numerous and mostly non-monetised indicators, and the market model and modelling assumptions.

The Agency notes that five elements of the submission are incomplete, as ENTSOG explicitly states that further work is needed for them:

- treatment of social cost of carbon emissions (externality cost);
- treatment of value of lost load (avoided cost of gas supply disruption);
- treatment of LNG supply as coming from one source or from several sources (basins);
- additional market assumptions including transmission tariffs; and
- CBA indicators for use in TYNDP.

#### **4.1. Improvements included in the draft 2<sup>nd</sup> CBA Methodology**

The Agency acknowledges that the draft 2<sup>nd</sup> CBA Methodology introduces a number of improvements in comparison to the current CBA Methodology, notably the following:

- The removal of the concepts of energy-system-wide CBA and project-specific CBA and the integration of both into a single CBA Methodology;
- The inclusion of guidance on the grouping of projects for the purpose of carrying out CBA, considering a “functionality” criterion<sup>16</sup>;
- The inclusion of a Project Fiche template intended to facilitate the presentation of the CBA results in a structured manner;
- The improved consideration of project cost information<sup>17</sup>, by stating that project costs are one of the main components of any CBA analysis, which are to be provided in line with Annex V to Regulation (EU) No 347/2013;

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<sup>14</sup> In this Opinion, the terms “adaptations” and “short-term adaptations” refer to ENTSOG’s actions needed before the adapted version of the 2<sup>nd</sup> CBA methodology is submitted to the European Commission for approval. The terms “improvements” and “mid-term improvements” refer to the regular updates and improvements of the CBA methodology pursuant to Article 11(6) of Regulation (EU) No 347/2013, unless feasible to implement such updates and improvements earlier.

<sup>15</sup> The electricity CBA methodology clearly differentiates and recommends the classical planning steps, as follows: i) scenario development, ii) identification of infrastructure needs, iii) project definition and iv) cost-benefit assessment. *Cf.* ENTSO-E draft CBA methodology 2.0, Figure 1, version December 2016.

<sup>16</sup> To the extent possible, and as long as the functionality criteria is respected, the Agency finds it positive to base the grouping on previous PCI lists, in order to facilitate monitoring of projects appearing in several PCI lists.

<sup>17</sup> *Cf.* Section B.2.2. of the draft 2<sup>nd</sup> CBA methodology.

- The identification of three categories of monetised benefits, which fit well three of the four specific criteria for PCI selection and can thus be seen as a useful starting point for further adaptations: i) reduced cost of supply (change in socio-economic welfare); ii) improvement in security of supply; and iii) substitution effects (fuel switching and change in CO<sub>2</sub> emissions<sup>18</sup>); and
- The use of a common social discount rate and its recommended value (4%)<sup>19</sup>.

## **4.2. Short term adaptations and mid-term improvements of the draft 2<sup>nd</sup> CBA methodology**

### **4.2.1. Usability and relevance**

The Agency proposes the following measures in order to improve the usability of the CBA methodology by project promoters and project evaluators<sup>20</sup>:

- Simplifying and streamlining the CBA methodology documentation and outputs, in particular by using fewer, uncorrelated, well-defined and comprehensive indicators that serve the purpose of monetisation of benefits (see sections 4.2.3 and 4.2.4 of this Opinion for specific recommendations on indicators). The Agency recommends to streamline the CBA methodology documentation by merging overlapping sections, such as the current sections B. and C., and clearly making the methodology applicable for all its intended purposes, rather than focusing on individual application cases such as the TYNDP and the PCI selection.
- Focusing on the CBA itself and therefore reducing the elements in the draft 2<sup>nd</sup> CBA methodology which are out of scope, as they would belong to instances of the application of the methodology. Examples of these are the elements related to scenario development (called “assessment framework”), i.e. Section B.1 and Section C.1, and to the “identification of infrastructure gaps”, i.e. Section C.4 and Section D.1 (related to applying CBA guidelines in PCI selection) and D.4 (financial assessment of investment requests). The Agency recommends ENTSOG to delete or reduce to the very minimum: Sections B.1 and C.1 “assessment framework”, as they belong to TYNDP scenario-related documents; and Section C.4 “identification of infrastructure gaps” and Annex V “indicators”, as they belong rather to a TYNDP needs-related document. At the same time, acknowledging that the identification of needs is of critical importance to evaluate future infrastructure developments, the Agency recommends to strengthen this step (see section 4.2.4 of this Opinion).
- Deleting the text of the CBA methodology related to performing CBA for the purpose of investment requests (including for CBCA). The Agency notes that the draft 2<sup>nd</sup> CBA Methodology contains a chapter<sup>21</sup> elaborating on the use of CBA results in the context of investment requests and CBCA, which is not aligned with the information requirements and guidelines on the preparation and treatment of investment requests defined under the Agency

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<sup>18</sup> Cf. Section B.4.6.2. of the draft 2<sup>nd</sup> CBA methodology.

<sup>19</sup> Cf. Section B.4.4. of the draft 2<sup>nd</sup> CBA methodology.

<sup>20</sup> Representatives of Member States, the European Commission, NRAs, and the Agency, among others.

<sup>21</sup> Cf. Chapter D. 2. CBA Methodology in investment requests and CBCA, p. 54.



Recommendation No 05/2015<sup>22</sup>. The Agency recommends to delete section D.2 and invites ENTSOG to make sure that the application modality of the CBA methodology in the context of investment requests and CBCA is fully aligned with the Agency's Recommendation.

- Introducing a glossary with general and specific definitions of terms used in the CBA Methodology<sup>23</sup>.

#### 4.2.2. Consideration of cost information in the CBA Methodology

Regarding the availability of cost information, the Agency reiterates its earlier position that cost estimates for TYNDP projects and for PCI candidates<sup>24</sup> constitute an essential part of the project attributes, also given the requirement to demonstrate that a candidate PCI's benefits, including negative ones, where applicable, exceed its costs<sup>25</sup>, as well as the need for consistent information between TYNDP and PCI.

The Agency notes that the draft 2<sup>nd</sup> CBA Methodology<sup>26</sup> would allow promoters to indicate whether cost information is confidential and thus should not be published as part of the CBA results in the accompanying "Project Fiche". The Agency acknowledges the importance of carefully considering confidentiality concerns expressed by project promoters. The desire of some promoters to keep project cost information confidential should be respected, but should not be used as an excuse for withholding cost information for the purpose of performing a CBA and for assessing the CBA results, in confidence where needed.

The Agency reiterates that carrying out and presenting the results of any kind of CBA without cost information is a *contradictio in terminis* and is not in line with the essentials defined in Regulation (EC) No 715/2009<sup>27</sup>.

The Agency deems that in the context of the economic sector of regulated gas infrastructure, which operates as a natural monopoly in many instances, and where infrastructure costs are paid for by end-users via regulated tariffs, there is always public interest in the disclosure of cost estimates. Such disclosure contributes to increasing transparency, accountability, greater public awareness, and to stimulating more effective and informed public participation in the infrastructure planning processes.

The draft 2<sup>nd</sup> CBA Methodology proposes to consider CAPEX, residual value and OPEX.

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<sup>22</sup> In particular, Annex IV (p. 26) of the said Recommendation contains a summary of the data relevant for investment requests.

[http://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Recommendations/ACER%20Recommendation%2005-2015.pdf](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Recommendations/ACER%20Recommendation%2005-2015.pdf).

<sup>23</sup> See, for example, the draft Electricity CBA 2.0 (p. 3) and the current 2015 gas CBA Methodologies (Section 10, p. 67).

<sup>24</sup> Including both the total investment costs up to the commissioning of the project and the entire lifetime costs.

<sup>25</sup> Cf. Article 4(1)(b) of Regulation (EU) No 347/2013 "the potential overall benefits of the project, assessed according to the respective specific criteria in paragraph 2, outweigh its costs, including in the longer term".

<sup>26</sup> Cf. draft 2<sup>nd</sup> CBA Methodology, section C.5.3, p.52.

<sup>27</sup> Article 8(10)(a), as amended by Article 22 of Regulation (EU) No 347/2013: "[...]; it shall be the subject to a cost-benefit analysis using the methodology established as set out in Article 11 of that Regulation".

The Agency observes that residual value is not indicated in Annex V(5) to Regulation (EU) No 347/2013. It reaffirms its position (see Annex II.1 to the Agency's Opinion No 04/2014 and Agency's Recommendation No 05/2015, Annex II, costs) that residual value should not be counted. In principle, the societal net value of a project after the economic lifetime (if relevant<sup>28</sup>) should account for benefits and costs in these years and not for a rough proxy related to depreciation effects. The no-residual-value approach allows for a conservative estimate of the project's benefits and costs balance.

The Agency considers that the provision of cost data at individual project level for the purpose of performing the CBA should be a requirement in the adapted version of the 2<sup>nd</sup> CBA Methodology, rather than a recommendation to project promoters.

The Agency recommends that ENTSOG and promoters complement the investment cost estimates by a cost calculation using the Unit Investment Costs indicators as published by the Agency<sup>29</sup>, and that differences between the two estimates (if any) should be explained by project promoters.

The Agency recommends that ENTSOG delete references to any use of the residual value when adapting the draft 2<sup>nd</sup> CBA methodology.

The Agency recommends that ENTSOG provide general guidance in the CBA methodology regarding the identification, monetisation and – in instances where monetisation is not possible – quantification of negative project externalities, to be considered as “negative benefits”.

#### 4.2.3. Improved monetisation of benefits

The monetisation of economic benefits is the cornerstone of any CBA methodology, as stated for example in the general guidelines for CBA released by the European Commission in 2014<sup>30</sup>.

Monetisation of benefits which are not reflected in market prices (externalities) may not be trivial, but it is particularly relevant for any CBA application. A harmonised comparison of projects costs and benefits requires benefits to be presented in the same unit as costs, i.e. in monetary value.

The draft 2<sup>nd</sup> CBA Methodology provides ways to monetise three types of social benefits related to changes of social welfare potentially induced by projects, which fall under the following criteria:

- Market integration: savings in the gas supply bill of the whole market and not only for those who will effectively use the new project resulting from changes in the gas supply pattern (projects may bring additional gas volumes by way of connecting the Union to new gas

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<sup>28</sup> The longer the economic lifetime is, the smaller the discounted value of residual costs and benefits would be, due to the discounting effects.

<sup>29</sup> [http://www.acer.europa.eu/official\\_documents/acts\\_of\\_the\\_agency/publication/uic%20report%20-%20gas%20infrastructure.pdf](http://www.acer.europa.eu/official_documents/acts_of_the_agency/publication/uic%20report%20-%20gas%20infrastructure.pdf).

<sup>30</sup> Guide to CBA of Investment Projects, Economic appraisal tool for Cohesion Policy 2014-2020, DG-REGIO of the European Commission, December 2014, p. 5 and 15 “CBA - that is about measuring in “money terms” all the benefits and costs of the project to society - should become a real management tool for national and regional authorities [...]”, “Calculation of economic performance indicators expressed in monetary terms. CBA is based on a set of predetermined project objectives, giving a monetary value to all the positive (benefits) and negative (costs) welfare effects of the intervention. These values are discounted and then totalled in order to calculate a net total benefit”.



sources or new national gas production, interconnecting previously not connected Member States, or lifting the isolation of markets not connected to the single European market);

- Security of supply: savings related to mitigation of the risk of overall demand curtailment and avoiding the cost of such curtailment; and
- Sustainability: savings related to gas substitution effects vs. other fuels, measured in terms of lower fuel price and/or reduced CO<sub>2</sub> emissions.

The Agency proposes that ENTSOG adapt the draft 2<sup>nd</sup> CBA Methodology as follows:

*Reduced cost of supply (change in socio-economic welfare)*

The Agency acknowledges that social welfare is accounted for in Annex II to the draft 2<sup>nd</sup> CBA methodology, but asks ENTSOG to provide more details about the specific application of the consumer and producer surplus approach to natural gas infrastructure, as well as guidance on how to produce a more detailed graphical representation of the consumer and producer surplus.

As the draft 2<sup>nd</sup> CBA Methodology indicates (p. 41) that the modelled topology accounts for cross-border capacities between countries, for intra-country capacities between balancing zones and, where relevant, for meaningful intra-balancing zone constraints, the Agency suggests to differentiate in the Project Fiche the presentation of the social welfare benefits related to cross-border constraints and those related to intra-balancing zone constraints, in pursuit of clearer distinction between benefits associated with cross-border needs and those associated with a particular Member State.

*The benefit of improved security of supply*

The Agency shares ENTSOG's view that projects may provide benefits by mitigating possible demand curtailment, and that once volumes of gas supply potentially saved from disruption due to investments are quantified (e.g. in MWh), it is possible to monetise such overall benefits by multiplying those volumes by a unit of value (Euro/MWh), for example by using the VoLL or, even better for the gas sector, the "Cost of Disruption of Gas" (CoDG)<sup>31</sup>.

However, the presentation of the benefit should be:

- improved by distinguishing the disrupted demand under normal conditions and the one under supply stress (as introduced in the current CBA methodology<sup>32</sup>), because the probability of occurrence is significantly different between the two instances;
- simplified by directly presenting the positive benefit of "avoided disrupted demand"<sup>33</sup>; and

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<sup>31</sup> For the sake of avoiding cross-feed with the issue of SoS in electricity, the term "Cost of Disruption of Gas Supply" is used here, as opposed to "Value of Lost Load", a term more appropriate for the electricity sector.

<sup>32</sup> The term "route disruption" is mentioned in the draft 2<sup>nd</sup> CBA methodology, without explanations. Its meaning should be clarified, as well as whether it corresponds to the former "supply stress" term, and if yes, then exactly in what way.

<sup>33</sup> Currently, the formula monetises the effects of a "disruption", i.e. its cost, which has the opposite sign of a benefit.

- improved by presenting, for information, the probability of occurrence of disruptions (e.g. in hours per year) and the amount of avoided disrupted gas demand (in energy units).

The Agency recommends ENTSG to define the CoDG based on country and categories of consumers and to take into account available studies and studies which may become available during the adaptation period of the CBA methodology.

*Substitution effects (fuel switching and CO<sub>2</sub> impacts)*

The draft 2<sup>nd</sup> CBA Methodology seems to account both for savings of fuels due to substitution and for CO<sub>2</sub> emission effects under this proposed benefits category. Savings of fuels take into account the switched fuel quantities (e.g., coal to gas, in MWh) and the price of fuels (in Euro/MWh). The CO<sub>2</sub> emission effects take into account the switched quantities of fuels (e.g., in MWh), the specific emission factors (in tCO<sub>2</sub>/MWh), and a valuation coefficient (in Euro/tCO<sub>2</sub>).

The Agency deems the proposed approach as suitable. However, the Agency notes that CO<sub>2</sub> monetisation can only be accurately done if the net impact of a project on CO<sub>2</sub> emissions (i.e., increase or reduction of the volume of CO<sub>2</sub> emissions) is properly estimated. The Agency notes that the draft 2<sup>nd</sup> CBA Methodology does not provide guidelines on how to calculate the impact of a project on the volume of CO<sub>2</sub> emissions. The Agency recommends ENTSG to consult and add such guidance to the methodology during adaptation<sup>34</sup> of the 2<sup>nd</sup> CBA Methodology, and invites ENTSG:

- clearly to specify the effects related to fuel substitution (e.g., fuel switching and CO<sub>2</sub> impacts associated with such switching);
- to treat the fuel substitution effects (mainly gas vs. coal) related to changes in power generation (which can be calculated by using an electricity market model, as described in the ENTSG-E CBA methodology) separately from the fuel substitution effects related to gasification of new areas (gas vs. oil/coal), excluding power generation effects; and
- to display in any CBA application, for information, the quantities of switched fuels.

The monetisation of the reduction of CO<sub>2</sub> emissions in the draft 2<sup>nd</sup> CBA Methodology seems based on expected CO<sub>2</sub> market prices (p. 12, “CO<sub>2</sub> market prices appear to be more accurate”). In the Agency’s view, this approach is acceptable, but it could be complemented by an evaluation of the societal benefits which are not internalised to market participants and thus not captured by the expected CO<sub>2</sub> market price. For example, such a benefit is labelled as “B3” in the latest draft of the electricity CBA methodology<sup>35</sup>. A similar approach is recommended for the assessment of gas infrastructure.

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<sup>34</sup> See e.g. the spreadsheet descriptions of estimated volumes of replacement fuel in the report by European Investment Bank “The Economic Appraisal of Investment Projects at the EIB”, p. 125.

<sup>35</sup> C.f. p. 33 “this societal cost of CO<sub>2</sub> should be viewed separately from the cost that is imposed on carbon-based electricity production, which may take the form of carbon taxes and/or the obligation to purchase CO<sub>2</sub> emission rights under the Emissions Trading Scheme (ETS). The Variation in CO<sub>2</sub> emissions indicator (B3) can be used for further analysis of the societal effects of CO<sub>2</sub> emissions, if these deviate from the CO<sub>2</sub> emission costs”.



The draft 2<sup>nd</sup> CBA Methodology states (p. 12) that “The difficulty stems from lack of clear indications in the literature on how to value” the social cost of carbon. The Agency suggests that ENTSG, in cooperation with ENTSG-E and in consultation with stakeholders, propose valuation metrics in the adapted gas CBA methodology.

*Benefits related to competition and market power and to other effects*

The draft 2<sup>nd</sup> CBA Methodology assumes a perfect market functioning and that “the CBA assessment should therefore always consider a perfect market functioning hypothesis”, obviating the fact that this is merely a theoretical optimum which will not be reached in practice, and which is far from being reached in some regions of the European Union.

Finally, the Agency underlines that the draft 2<sup>nd</sup> CBA Methodology does not allow for the monetisation of the fourth type of benefits foreseen by Regulation (EU) No 347/2013, namely benefits related to competition. The Agency recommends ENTSG to continue investigating ways to improve this issue and to draw from existing best practice, as this benefit may be relevant especially for some specific projects. At the same time, recognising its difficulty, the Agency considers that the evaluation of this type of benefits may require in the short term to resort to non-monetised indicators.

Lastly, the Agency positively acknowledges the statement that “Indirect effects (or secondary market effects), such as projects impact on employment, should be excluded by the assessment in order to avoid double counting or evaluating benefits by default difficult to estimate though reliable techniques”. This is a reasonable approach, also in line with the electricity CBA methodology.

The Agency suggests that ENTSG defines and implements in the adapted CBA methodology the benefit categories listed in Annex I to this Opinion. The details of the indicators and valuations corresponding to each benefit should be implemented by ENTSG in the course of the adaptation process of the CBA Methodology.

4.2.4. Non-monetary quantitative indicators used for multi-criteria analysis (MCA) and qualitative assessments

*Regarding the use of MCA and qualitative assessments*

The draft 2<sup>nd</sup> CBA Methodology foresees for the evaluation of the impacts of a project a combination of monetised benefits, multi-criteria analysis (MCA) based on information provided by numerous (10) non-monetised quantitative indicators, and also qualitative assessments<sup>36</sup>.

The Agency recommends the adapted CBA methodology to be focussed on additional quantitative indicators *only* if monetisation is not feasible. The Agency recommends that the monetised benefits and the non-monetised quantified indicators are presented separately in the “Project Fiche”. In any case, the indicators used in the MCA should only cover those types of benefits which cannot be

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<sup>36</sup> Cf. 2014 general CBA guidelines of the European Commission, Annex IX. Other appraisal tools, p. 329-331. “Qualitative elements can be added by the project promoter in order to comment the results from the monetised and non-monetised indicators, provide possible additional information regarding the project, justify potential additional benefits of the project that may not have been sufficiently captured by the analysis”.

evaluated by using monetary values in the CBA methodology, otherwise there would be a significant risk of double-counting benefits (as monetised and as non-monetised).

The Agency also recommends ENTSOG further to clarify the use of qualitative assessments, so that the analytical outputs (monetised benefits as part of CBA, quantified but not monetised benefits as part of MCA, and non-quantified “qualitative” benefits) are clearly distinguished and one and the same benefit is not assessed by more than one indicator, regardless of whether monetised or not.

*Regarding the set of non-monetised indicators for MCA*

The Agency notes that the proposed set of indicators in the draft 2<sup>nd</sup> CBA Methodology has undergone a limited evolution compared to the one present in the current CBA methodology. The experience from the last PCI selection process showed that some of the indicators have a very limited field of application under the current methodology for project assessment.

This set of indicators is the following: Import Route Diversification (IRD); N-1 for ESW-CBA (N-1); Remaining Flexibility (RF); Disrupted Demand (DD) and Disrupted Rate (DR); Uncooperative Supply Source Dependence (USSD); Cooperative Supply Source Dependence (CSSD); Supply Source Price Diversification (SSPD<sub>i</sub>); Supply Source Price Dependence (SSPD<sub>e</sub>); Marginal Price and Import Price Spread Configuration.

The Agency draws the attention of ENTSOG to the importance of using fewer indicators which are uncorrelated, well-defined, comprehensive and as much as possible directly covering the criteria of Regulation (EU) No 347/2013.

The Agency considers that the **Import Route Diversification** at capacity level can be seen as a proxy to measure the benefit of increased market competition as well as security of supply (as long as the project will connect a market to a new gas supply source), and therefore recognises its added value in the methodology. At the same time, keeping in mind the objective of simplifying and streamlining the evaluation of projects, the Agency recommends further studies leading to its monetisation.

The Agency recommends ENTSOG to consider adding one or more **new indicators about the environmental impact of gas infrastructures**<sup>37</sup>. Gas infrastructure development may have negative environmental impacts, such as CO<sub>2</sub> and methane emissions associated with the construction and operation of gas infrastructure, noise generated by the operation of compressor stations, impact on marine ecosystems by LNG terminals, etc. While these environmental effects could partially be internalised in the CAPEX of a project, e.g. via the payments for the right of land use or compensation payments for negative social and environmental effects of the type of land use, any non-internalised effects should be considered and could be captured by quantitative indicators or, at a minimum, should be qualitatively described. The CBA methodology should provide guidance regarding the typical environmental impacts of gas infrastructure and suggest methods for their consideration in terms of costs and benefits.

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<sup>37</sup> For example, consider the practice of the electricity CBA uses certain indicators (S1, S2 and S3), suitable for the electricity sector.



In particular, taking into account the provision of Annex V(13) to Regulation (EU) No 347/2013 about “greenhouse gas and conventional air pollutant emissions”, the recent European Commission approach in the 3<sup>rd</sup> PCI selection process (for electricity<sup>38</sup>) and EIB and JASPERS practices<sup>39</sup>, an additional benefit category related to the quantified impacts of a project on non-GHG emissions should be considered by ENTSOG. Taking into account the currently limited discussion and experience on the valuation metrics for such a benefit, its monetisation is suggested as a medium-term improvement after related work is carried out jointly by ENTSO-E and ENTSOG.

The Agency recommends ENTSOG to abandon in the CBA methodology the following indicators which overlap with other indicators (i.e. result in double counting) and, in some instances, provide limited added value for the assessments:

- **Disrupted Demand and Disrupted Rate:** these indicators would be redundant if the benefit of improved security of supply were adequately monetised. In such a case, using this indicator would lead to double counting.
- The four **Supply Source Price Diversification/Dependence indicators:** the calculation and interpretation of these indicators is too complex and would imply double counting with either the monetised security of supply benefit or the monetised social welfare benefit, which puts its added value under a cloud of doubt. The issue of supply diversification should be addressed by fewer and simpler indicators – see below.
- **Remaining Flexibility:** improvements in the remaining flexibility resulting from a project would already be reflected via the monetised security of supply benefit. Besides, this indicator, rather than being a benefit itself, seems to measure the reduction in the “risk level” of occurrence of gas supply disruption.
- **Import Price Spread Configuration:** its role and intended use overlaps (at least) with the Import Route Diversification.

The Agency is of the view that the following indicators are informative for the purpose of analysing the “needs of infrastructure”, rather than for assessing benefits in the context of the CBA:

- **N-1:** the benefits of an improved “N-1” would already be accounted via a monetised security of supply benefit. However, it is a relevant indicator mentioned in Annex IV(3) to Regulation (EU) No 347/2013 and could be informative for assessing security of supply needs (at country / region level);

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<sup>38</sup> European Commission DG Energy, “Cross-Regional Group Meeting Electricity”, 27-28 June 2017. Presentation downloadable at: <https://circabc.europa.eu/sd/a/1f6c4d6c-34a4-4ace-9373-b57e5ac0de45/General%20Presentation%20CR%20meeting.pdf>.

<sup>39</sup> F. Angelini, “Economic Analysis of Gas Pipeline Projects” JASPERS Knowledge Economy, Energy and Waste Division Staff Working Papers.  
[http://www.jaspersnetwork.org/download/attachments/4948004/Economic\\_Analysis\\_of\\_Gas\\_Pipeline\\_Projects\\_Final.pdf](http://www.jaspersnetwork.org/download/attachments/4948004/Economic_Analysis_of_Gas_Pipeline_Projects_Final.pdf).

- **Marginal Price:** the benefits brought by changes in marginal prices would be already accounted via the changes in the social welfare (savings in the gas supply bill). However, marginal prices, as direct output of the modelling, can provide useful information, provided that assumptions on gas prices (e.g., supply curve) are reasonable and transparent, and may thus be used for assessing market integration infrastructure needs;
- **Access to number of gas supply sources** (new proposed indicator from ACER Market Monitoring Report 2015<sup>40</sup>, not included in the draft 2<sup>nd</sup> CBA Methodology). It is seen as a comprehensive indicator of the level of competition and gas supply diversification per country, which also allows to account for the diversification of gas supply sources that LNG provides. The Agency proposes that the three abovementioned indicators are removed from the adapted CBA methodology and shifted to the documents and activities related to identification of needs of infrastructure.

The Agency stands ready further to discuss with the European Commission and ENTSOG proposals to simplify as much as possible the use of non-monetised indicators.

#### 4.2.5. Improving the network and market model and modelling

The Agency notes that ENTSOG acknowledged the need to improve the market modelling and asked stakeholders for input and possible solutions. In the view of the Agency, the main areas for improvement, apart from those already expressed in its Opinion No 07/2017 on the interlinked electricity and gas market and network model<sup>41</sup>, are the following:

##### Gas demand modelling

The Agency notes that ENTSOG's gas demand scenarios (story lines) used in simulations rely on the models used by TSOs for estimating gas demand, and are the aggregation at EU level of the TSOs gas demand estimates. The gas market assumption in the CBA Methodology treats gas demand as an exogenous parameter which is inelastic to prices, an analytical approach which does not sit well with the reality of gas demand market fundamentals. In fact, gas demand reacts to changes of the gas price itself (own gas price elasticity) and to changes in the price of fuels which could be substitute for gas and vice versa (cross-elasticity of gas demand). The Agency recommends ENTSOG to work in the medium-term towards the use of price-responsive gas demand functions. The fact that other gas models already used at European level incorporate gas demand price elasticity<sup>42</sup> shows that a better model of gas demand is a feasible improvement of the CBA methodology.

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<sup>40</sup> Cf. p. 14, figure 7, "Estimated number and diversity of supply sources in 2015 in terms of the geographical origin of the gas".

[http://www.acer.europa.eu/Official\\_documents/Acts\\_of\\_the\\_Agency/Publication/ACER%20Market%20Monitoring%20Report%202015%20-%20GAS.pdf](http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER%20Market%20Monitoring%20Report%202015%20-%20GAS.pdf).

<sup>41</sup> The Agency regrets to note that the draft 2<sup>nd</sup> CBA methodology does not show evidence, with the exception of a succinct description and reference to joint scenario development process with ENTSO from TYNDP 2018 onwards, on the presence of an interlinked market and network model that should become part of the methodology and be used for CBA.

<sup>42</sup> European Gas Market Model (EGMM) from Regional Centre for Energy Policy Research (REKK), Corvinus University of Budapest, May 14, 2016. p. 5 [http://rekk.hu/research\\_paper/56/a\\_top-down\\_approach\\_to\\_evaluating\\_cross-border\\_natural\\_gas\\_infrastructure\\_projects\\_in\\_europe](http://rekk.hu/research_paper/56/a_top-down_approach_to_evaluating_cross-border_natural_gas_infrastructure_projects_in_europe).



*Infrastructure tariffs and long-term contracts in the market model*

The Agency concurs with the prevailing views of stakeholders about the need to incorporate **gas infrastructure tariffs**<sup>43</sup> in the model, and generally in the CBA methodology, since tariffs impact physical flows of gas and, by adding infrastructure tariffs to the cost of gas supply, affect the modelled decisions of gas producers and traders and the utilisation rate of infrastructure. In considering tariffs within the market model used for the CBA methodology, ENTSOG should look for synergies with the tariff transparency obligations under the Tariff Network Code (TAR NC)<sup>44</sup>, under which TSOs and ENTSOG shall publish standardised level of transmission tariffs at cross-border Interconnection Points (IPs).

The Agency acknowledges the complexity of the interdependencies between capacity bookings and tariffs, especially regarding short-term bookings, which influence the setting of an “average” value of infrastructure tariffs. However, the Agency also recalls that other gas market models used for CBA<sup>45</sup> of projects in gas networks include existing tariffs as a “proxy”, and that existing tariffs are also accounted for by the Agency for the purpose of its annual Market Monitoring Report. Therefore, the Agency deems that the consideration of **tariffs for existing infrastructure** within the CBA methodology in the context of the gas market is feasible, indispensable, and should be implemented without delay. The Agency considers that tariffs for use of all types of gas infrastructure (transmission, LNG and storage) should be considered in the modelling. For practical reasons, the Agency recommends ENTSOG to start the work by incorporating existing transmission tariffs at cross-border IPs.

As regards **tariffs effects for new infrastructure**, the Agency, while acknowledging the complexity of the task, sees that at least three options are possible:

- assuming the tariff level of existing infrastructure in the same arc of the modelled system;
- deriving the tariff level by using reference unit costs (accounting for both CAPEX and OPEX);
- deriving the tariff level from promoters’ cost estimates for each project.

Taking into account the drawbacks and advantages of each solution (including simplicity, data availability, potential difficulties in dealing with less advanced projects, risk of gaming and unintended project promoter bias), the Agency recommends ENTSOG to explore the use of reference values and consult proposals with stakeholders.

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Other gas market models, such as GASTALE (<https://www.ecn.nl/publications/PdfFetch.aspx?nr=ECN-R--03-001>), also consider elasticity of gas demand to price.

<sup>43</sup> Include Transmission system operators - TSO, LNG-SO, and Underground-SO tariffs.

<sup>44</sup> Article 31 of Commission Regulation (EU) 2017/460 <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0460&from=EN>.

<sup>45</sup> C.f. REKK and TIGER model from Institute of Energy Economics at the University of Cologne (EWI) (<http://kups.ub.uni-koeln.de/4601/>, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/09/European-gas-grid-through-the-eye-of-the-TIGER-Investigating-Bottlenecks-in-Pipeline-Flows-by-Modelling-History-NG-112.pdf>) but also others. C.f. EGMM used by REKK, presentation “Tariffs used in EGMM”, 26 July 2017. [http://rekk.hu/downloads/events/3\\_tariffs\\_K%C3%A1csor.pdf](http://rekk.hu/downloads/events/3_tariffs_K%C3%A1csor.pdf).

The Agency also points out that new infrastructure which does not bring additional gas flows may still impact the utilisation rate of existing gas infrastructure systems and, consequently, push up the level of transmission tariffs, an effect which should be carefully compared with the potential benefits from a project.

The Agency considers that even a simplified treatment of existing tariffs within the market model used in the CBA methodology is preferable to the proposed approach and urges ENTSOG to adapt the CBA methodology in this direction.

The Agency notes the importance of being transparent in the methodology regarding the way in which assumptions are made for tariffs and other factors that would significantly affect the results of the CBA, and of providing guidance to the users of the CBA methodology on how to deal with the inherent uncertainties of this type of analysis.

The Agency notes that **long-term gas supply contracts** still play an important role in European gas markets. The Agency is concerned by the fact that long-term contracts are not considered in the model described by ENTSOG in the draft 2<sup>nd</sup> CBA Methodology documentation. The Agency deems the consideration of long-term supply contracts a feasible improvement, and notes that long-term contract information is publicly available<sup>46</sup> or accessible by subscription<sup>47</sup>, and is already used in other European gas market models<sup>48</sup>.

#### LNG diversification

LNG is treated as “one gas source” with “one single gas price” in ENTSOG’s gas market model used in the draft 2<sup>nd</sup> CBA Methodology, despite the diversification of gas supply that LNG provides, and despite the fact that the prices of LNG from different sources may differ.

The Agency recalls the suggestions made by stakeholders during the consultation process regarding the incorporation of the diversity of LNG supply in the indicators used for CBA. The Agency is of the view that a more realistic approach would entail assessing the actual number of competitively available sources of LNG imports for the LNG terminals located in various countries and regions of the EU and for the proposed locations of new LNG terminal projects.

The Agency invites ENTSOG to investigate in the market model used in the CBA methodology treating LNG as originating from multiple sources of supply and being delivered at different prices.

#### 4.2.6. Economic lifetime for the purpose of CBA

The draft 2<sup>nd</sup> CBA methodology does not clearly recommend the economic lifetime of assets to be used when applying the CBA Methodology.

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<sup>46</sup> Cf. Long-Term Contracts in the Natural Gas Industry – Literature Survey and Data on 426 Contracts (1965-2014), DIW Berlin, 2015 [https://www.diw.de/sixcms/detail.php?id=diw\\_01.c.498213.de](https://www.diw.de/sixcms/detail.php?id=diw_01.c.498213.de).

<sup>47</sup> <http://www.cedigaz.org/products/gas-supply-contracts.aspx>.

<sup>48</sup> Cf. TIGER and REKK model (see presentation “Introduction of the EGMM, main concept, usage and assumptions”, 26 July 2017, slides 12, 13 and 20: [http://rekk.hu/downloads/events/2\\_EGMM\\_and\\_ref\\_Kotek.pdf](http://rekk.hu/downloads/events/2_EGMM_and_ref_Kotek.pdf)).



For the sake of clarity, the Agency notes that the “economic lifetime” is not the “regulatory lifetime” of assets (i.e., the regulatory depreciation period), the latter used for setting allowed revenues and may differ between Member States.

In order to conduct the socio-economic analysis (CBA) of projects on an equal footing, the Agency recommends ENTSOG to foresee in the CBA Methodology the use of default economic lifetimes. The economic lifetimes used by the European Investment Bank<sup>49</sup> in their economic appraisal of investment projects could be recommended as the default ones: 25 years of operation for gas networks (including pipelines and compressor stations)<sup>50</sup> and 20 years of operation for LNG/UGS facilities.

The Agency notes that these parameters were also recommended by a study commissioned by the European Commission in 2014<sup>51</sup> and, in the Agency’s view, should be publicly consulted before adapting the 2<sup>nd</sup> CBA methodology (see Section 3).

#### 4.2.7. Project Fiche

The Agency considers that, in order to ensure fair treatment of promoters and to increase the transparency and the consistency of CBA in the TYNDP and the quality of the TYNDP itself, the CBA methodology should require the carrying out of CBA and the publication of its results for each TYNDP project, rather than only for those projects intending to apply for PCI status.

The Agency is of the view that the content and the presentation of the Project Fiche should be amended as indicated in Annex I of this Opinion.

#### 4.2.8. Transparency and replicability of the results of the application of the CBA methodology

The Agency considers that the transparency of the CBA results and the possibility to verify or to replicate them are fundamental for a sound and trusted CBA methodology.

For this purpose, the Agency already provided recommendations regarding the transparency of the TYNDP input data and scenario development process and (indirectly) of the CBA methodology in its Opinion No 07/2017.

In addition, the Agency recommends ENTSOG that the adapted version of the 2<sup>nd</sup> CBA methodology includes guidelines on transparency and replicability requirements, by accompanying the CBA results with information about the implementation of the CBA methodology. This set of information should include, as a minimum:

- The name, type and basic specifications (including a list of the variables) of the gas market model(s) used to derive benefits related to market integration and security of supply;
- The solver solutions and optimisation techniques used in the gas market model;

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<sup>49</sup> Cf. The Economic Appraisal of Investment Projects at the EIB, 30 April 2013, p.120.

<sup>50</sup> For instance, for a project to be commissioned in 2027, the benefits and the operational costs would be counted from 2028 to 2052.

<sup>51</sup> Study to support the definition of a CBA methodology for gas, Frontiers Economics, year 2014, p. 41-42.

- The description of main features related to topology (zones, arcs, LNG sources, etc.) used in the gas market model;
- The description of the main modelling assumptions (e.g. elastic vs. inelastic gas demand, treatment of transmission tariffs, treatment of LNG);
- The name and main features of the network modelling tool(s), and the description of the way in which key input parameters, such as definition of zones and intra-zonal capacities, was handled by the tool(s);
- The way in which the gas market model and the network modelling tool interacts with the electricity market modelling tool(s) used to derive benefits related to fuel substitution in the power generation sector, if applicable, and the name(s) of the electricity market modelling tool(s);
- The high-level description of the model implementing approach (e.g. spreadsheets) used to derive benefits related to fuel substitution in new areas, if applicable;
- The way in which the definition of the main assumptions (e.g. fuel and CO<sub>2</sub> prices) should be arrived at and used.

## **5. Way forward for adapting the draft 2<sup>nd</sup> CBA Methodology**

The Agency welcomes ENTSOG's intention to work closely with the Agency and the European Commission before the submission of an adapted CBA methodology to the European Commission for its approval.

In line with Article 11(4) of Regulation (EU) No 347/2013, the Agency calls on ENTSOG duly to take into account the views expressed by the Agency in this Opinion and adapt the draft 2<sup>nd</sup> CBA Methodology before submitting it to the European Commission for approval.

### *Adapting the 2<sup>nd</sup> CBA Methodology for TYNDP 2018*

The Agency considers feasible the implementation of the following “short-term adaptations” of the draft 2<sup>nd</sup> CBA Methodology:

- Better monetisation of benefits, in particular sustainability, including CO<sub>2</sub> emissions, by using the electricity sector approach for determining an additional value of CO<sub>2</sub>, derived as the difference between the social cost of carbon and the future CO<sub>2</sub> market price which is already proposed for monetisation;
- Improvement of indicators, notably by limiting to the indispensable minimum the number of non-monetised indicators;
- Improvement of the content and presentation of the CBA Project Fiche, by presenting separately the monetised results, the non-monetised quantitative indicators, and the qualitative assessments, as described in Annex I to this Opinion;



- Better consideration of costs, by requiring the provision of cost estimates from project promoters for use in the CBA and for the CBA outputs, and using UIC indicators and reference values for cost comparisons;
- Improvements of the market model and modelling assumptions as applicable in the CBA methodology, in particular by incorporating infrastructure tariffs (starting with transmission tariffs) and the diversity of LNG supply in the market model;
- Focusing on the CBA in the methodology, and removing elements which are not strictly in scope, i.e. scenario development, financial assessment of investment requests, and application of the CBA methodology to investment requests and CBCA for which the Agency's Recommendation No 05/2015 already provides guidelines; and
- Taking into account detailed technical comments provided in Annex II to this Opinion.

The Agency calls on ENTSOG to go beyond these short-term improvements during the adaptation process of the CBA methodology whenever possible. The Agency notes that some of the requested improvements are already incorporated in other available gas market models at European level.

The Agency stands ready constructively to work with ENTSOG and the European Commission to discuss open issues and seek solutions leading to the implementation of the suggested “short-term adaptations” during the process of re-drafting the CBA Methodology leading the submission of an adapted methodology by ENTSOG to the European Commission by spring 2018.

*Updating and improving the 2<sup>nd</sup> CBA Methodology beyond TYNDP 2018*

The Agency recommends ENTSOG to design a comprehensive medium-term “Action Plan”, with measurable objectives, milestones, schedules, responsibilities and concrete steps leading to the implementation of the missing elements of the CBA methodology, and to periodically report on and discuss with the Agency and the European Commission the implementation of the “Action Plan”.

Done at Ljubljana on 24 October 2017.

For the Agency:



Alberto Pototschnig  
Director

## Annex I – Specific proposals for adaptation of the draft 2<sup>nd</sup> CBA methodology

Proposal of content for a simplified CBA Project Fiche for gas infrastructure projects, focused on CBA results:

Project identification	TYNDP Code / PCI Code / Name of project / project's visualisation (i.e. extract from TYNDP map)
Intention to apply for the next PCI list	
Description of the project	Short description of the project and of the problems it may address
Rationale of the project	Description of how it addresses infrastructure needs
Hosting countries and code in National Development Plan (NDP)	Name of Country 1: code / Name of Country 2: code justification if a project is not included in a NDP
Impacted countries not hosting the project	
Projects forming a cluster with the project	
Competing projects	
Complementary projects	
Main technical parameters	Technical and capacity data at all the IPs directly involved (existing and new) (different for transmission, LNG and UGS)

### Cost information

C1. CAPEX - total and per hosting country	(million Euro)
C2. OPEX <sup>52</sup> - total and per hosting country	(thousand Euro per year)
Cost estimation range	+ x / - y %

### Cost information related for tariff calculations for transmission projects:

At least for advanced projects, i.e. projects with FID<sup>53</sup> taken or in advanced non-FID status, the estimated (mean value) annual cost is to be included into the regulatory regime (in million Euro per year), per hosting country, and, where possible, with a breakdown by potentially affected Interconnection Points (IPs) and flow directions.

<sup>52</sup> Under normal operation of a project. Includes maintenance and operational costs, understood as all costs that have to be incurred for the purpose of operating the infrastructure (e.g., costs for operating the compressor stations and costs of gas losses, including the cost of gas itself).

<sup>53</sup> Final Investment Decision.



*Monetised Benefits (\*)*

	Year X	Year X+5 scenario A	Year X+5 scenario B	Year X+5 scenario C
B1 European SW (MEur/y)				
B2 Local SW (MEur/y)				
B3 DD-Normal (MEur/y)				
B4 DD-Stress (MEur/y)				
B5 New gas Subst fuel (MEur/y)				
B6 Power Subst fuel (MEur/y)				
TOTAL <sup>54</sup> (MEur/y)				

*\*SW=Social Welfare; DD= Disrupted Demand; B5 and B6 are related to savings in fuel costs and CO<sub>2</sub> emissions due to substitutional effects related to gasification of new areas (excluding power generation), or to switch from other fuels to gas in power generation. The CBA related to substitutional effects should account for all costs associated with gas switching in the course of the gasification of new areas, including those related to distribution and connections to the gas transmission networks.*

*Note 1: A new indicator B7 Market Power should be considered in the longer term: e.g. a new project may open to competition a previously isolated market or a market dominated by a single supplier, affecting the pricing strategy of the incumbent suppliers. It is acknowledged that such B7 Market Power benefits may not yet be monetised and should be considered in the frame of updating and improving the 2<sup>nd</sup> CBA methodology.<sup>55</sup>*

*Note 2: A new indicator capturing the net environmental effects, other than those related to the ones included in the table above, should be considered in the frame of updating and improving the 2<sup>nd</sup> CBA methodology.*

Furthermore, when the monetised values are obtained by multiplying a physical quantity [e.g. volume] by an economic multiplier [Euro/volume], the relevant quantities should be provided. This would ensure transparency and would allow potentially different assessments in the decision-making process. We suggest to consider the following quantities:

- For cost C2 OPEX: consumption of energy by compressor stations (GWh);
- For benefit B3 and B4: variation of disrupted demand (GWh);
- For benefit B5 and B6: amount of energy switched from other fuels to gas (GWh); and
- For benefit B5 and B6: related variation of CO<sub>2</sub> emissions (tCO<sub>2</sub>).

<sup>54</sup> The avoidance of double counting should be performed before providing the figures.

<sup>55</sup> See p.10 on Modelling market behaviour, Frontiers Economic “study to support the definition of a CBA methodology for gas” commissioned by the European Commission, year 2014.

*Economic performance indicators (comparing costs and monetised benefits)*

ERR - Economic rate of return	In %
ENPV - Economic net present value	In M€, discounted
NPVC - Net present value of costs	In M€, discounted
NPVB - Net present value of benefits	In M€, discounted
B/C – Benefits to cost ratio	ratio

*Quantified but non-monetised indicators*

- Import Route Diversification
- Negative environmental externalities<sup>56</sup>

In the longer term, other or alternative measures (or proxies) for benefits related to competition should be considered in the frame of updating and improving the 2<sup>nd</sup> CBA Methodology, if it were not possible to monetise them already during the adaptation of the draft 2<sup>nd</sup> CBA Methodology.

*Qualitative benefits*

Short narrative description of project externalities not monetised or not quantified due to data unavailability or their non-quantifiable nature.

Description of environmental or social impacts beyond those captured by other indicators of the CBA methodology<sup>57</sup>.

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<sup>56</sup> See Section 4.2.4 of this Opinion and Note 2 to the Table of Monetised Benefits in this Annex.

<sup>57</sup> In this regard, the electricity CBA methodology includes an indicator “S3 Other Residual Impacts” (qualitative). In gas, the qualitative information may address, for instance, the impact of a LNG terminal on the coastal and marine environment.



## **Annex II – Detailed technical comments on the draft 2<sup>nd</sup> CBA Methodology**

On pp. 9-17, Section B1, the title ("assessment framework") does not seem to reflect the content. A more appropriate title could be "scenario development activity", and it should be part of the "scenario development reports".

On pp. 5, 43, 26-28, 44-48 and 73-80, there seems to be a confusion between the processes of infrastructure gap identification (and related indicators) and the application of the CBA methodology. ENTSOG could consider the description used in the electricity CBA methodology, which clearly differentiates (i) scenarios (ii) identification of needs (iii) project data collection and identification and (iv) CBA assessment.

The Agency suggests to delete the following statements, as the CBA methodology should be applicable irrespective of the nature of the identified infrastructure needs and their metrics and thresholds:

- p. 5: "Where infrastructure gaps are identified, the CBA methodology provides guidelines to support the assessment of projects able to fulfil these gaps."
- p. 43: "The CBA indicators should be used for both those roles of performing the assessment of the gas infrastructure at Union-wide level and performing project-specific assessment."
- p. 47: "in cases where TYNDP identifies that gas infrastructure is already sufficiently developed to prevent the apparition of an infrastructure gap, there is no need for related project-specific assessment."

In order to streamline the CBA methodology documentation, the following elements should be deleted and transferred to an ENTSOG document which identifies needs: Section B.4.6.1 indicators (to identify infrastructure gaps) and Section C4 (identification of infrastructure gaps).

On p. 31, section B4.6.3 lacks a clear indication on the economic lifetime for project analysis (it rather refers to the concept of "time horizon", which is rather linked to the time horizon for the input data. Later, section C3 states that "Economic Performance Indicator shall be calculated on a 20-year time horizon" while, according to the ENPV formula in p. 57, the years are equal to the number of years with capital expenditures before project operation +20 years of project operation. The Agency recommends the use of time horizons as suggested in this Opinion.

On p. 57, ENPV formula needs to be corrected. Where it says " $R_t$ " it should say "B", since CBA refers to economic "benefits" rather than revenues.

On p. 59, the treatment of multi-phased groups of projects is too positive, as it is assumed that all benefits arrive in the first year of operation of a project in the group. It should rather be the opposite, i.e. the year when the last project in a group comes into operation, given that until all projects forming a group of interdependent projects become operational, not all benefits will reasonably materialise.