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# Cost Benefit Analysis for Electricity Balancing – general methodology

Final report

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Prepared by Frontier Economics and Consentec

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## 2. Introduction

### Context and scope of report

The draft Network Code on Electricity Balancing (NC EB)<sup>1</sup> requires a cost benefit analysis (CBA) be undertaken in support of various decisions:

- **European Integration Model** (Articles 14(3), 16(4), 18(4), 20(3)): CBAs to support TSOs' proposal to modify the European integration model (Replacement Reserves (RR), Frequency Restoration Reserves with manual activation (FRR-m), Frequency Restoration Reserves with automatic activation (FRR-a), and the imbalance netting process);
- **Application of a TSO-BSP model** (Article 38): CBA to indicate the implications of the application of a TSO-BSP model for the exchange of balancing capacity or the exchange of balancing energy (RR and FRR) for at least the responsibility area or scheduling area when appropriate for the contracting TSO and the connecting TSO; and
- **Harmonisation of Imbalance Settlement Period** (Articles 21(2) and 21(5)): CBA on harmonisation of the imbalance settlement period (ISP) within and between synchronous areas. This CBA shall be submitted by TSOs to NRAs no later than 2 years after entry into force of the NC EB. After a decision is taken by NRAs about harmonisation of ISPs, specific CBAs might be performed by TSOs that have a proposal which deviates from the decision taken.

ENTSO-E has asked Frontier to develop a general methodology for TSOs in relation to the completion of the CBAs envisaged in the NC EB, and a specific methodology for the completion of the CBA for ISP harmonisation:

- **General methodology for performing CBAs** – this task covers the development of a general framework for performing a CBA in the context of the NC EB.
- **Specific methodology for the CBA for ISP harmonisation** – this task covers the development of a specific methodology for performing the CBA for ISP harmonisation. This methodology should be consistent with the design of the general methodology for performing CBAs.

In this report we deal with the first task with regard to the **guidance on the general methodology for performing CBAs**. We deal with the second task in a separate report.

### Organisation of report

The report is organised as follows:

- **Section 3** describes the structure and content of the general methodology for the CBA. In addition, the section provides an overview of the process for undertaking the CBA, including the timeframe for the preparing the CBA. We suggest questions for consultation related to each relevant issue.
- **Section 4** summarises the questions for consultation.

## 3. General methodology for CBA

In this section we discuss the general methodology for the CBAs to be performed under the NC EB.

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<sup>1</sup> ENTSO-E Network Code on Electricity Balancing Version 3.0, 06 August 2014.

In developing the general methodology we have been guided by ENTSO-E's broad design objectives for the CBA and by design choices made for CBAs used elsewhere in the European energy sector.

ENTSO-E places high importance on the fact that the CBA:

- can cope with complexity while allowing ENTSO-E (and others) to undertake the CBA in due time and using a reasonable level of resources; and
- provides ENTSO-E and TSOs with a transparent and objective assessment of different options (“planning cases”).

The use of a CBA is not restricted to the NC EB. CBAs are used elsewhere in the context of the development of the European electricity market and transmission networks. With regard to the latter the European Commission issued the regulation on guidelines for trans-European energy infrastructure (Regulation (EU) No. 347/2013) which includes in Annex V the scope of the energy system-wide cost-benefit analysis used to assess Projects of Common Interest (PCI) and support the ten year network development plan (TYNDP) process. There was an extensive consultation process with regard to the design of the CBA in the context of Regulation 347/2013.

We have taken into account the results from this consultation process in considering the general design of CBAs performed under the NC EB. This allows us to:

- use methodological decisions, modelling, and data collection already undertaken in the context of the PCI and TYNDP CBA. This may include reusing data, modelling and scenarios if appropriate or reusing design choices for the CBA; and
- avoid unjustified inconsistencies between the CBAs developed for the NC EB and the CBA developed for PCIs and the TYNDP.

## Overall evaluation approach

The NC EB foresees the CBA as a tool to assess:

- whether changing the business as usual by implementing a certain option (“planning case”) is beneficial; and/or
- which option (“planning case”) is more beneficial as compared to the business as usual case and the other options, in the case of more than one option.

Hence, the result of the CBA should allow the decision maker to decide upon one option (or to retain business as usual) based on transparent and objective criteria. This has implications for the choice of approach to the overall evaluation.

### Three potential methodologies for CBA

In our view three potential overall evaluation methodologies for a CBA could be used:

- **Standard Cost Benefit Analysis:** Under this approach only those benefits and costs for which a monetary quantification can be made are included in the analysis. For proposals where a significant element of either the benefits or costs may be difficult either to quantify or monetise (e.g. some types of environmental protection, social equality etc.) this approach may be overly restrictive and may cause factors that have a material impact on the viability of a proposal to be excluded from the assessment.
- **Augmented CBA:** An augmented CBA seeks to overcome the challenge with the standard cost benefit analysis by allowing the assessment of quantified monetary benefits and costs to be augmented with an assessment of non-quantifiable benefits and costs. Typically, this is done relatively informally, where a qualitative description of the non-monetised benefits and costs is provided and the policy-maker

takes a subjective view of the weight to put on these benefits relative to the monetised CBA. So, for example, if a CBA suggested a proposal might have a small net cost, the policy-maker might still go ahead with the proposal if they arrived at the view that the non-monetised benefits were likely to substantially outweigh the monetised net cost.

- **Multi-Criteria Assessment:** A multi-criteria assessment (MCA) seeks to place a more formal structure on the augmented CBA. Under this approach, the policy-maker explicitly recognises that the policy may be addressing multiple objectives, devises a set of assessment criteria to reflect those objectives, and establishes a set of weights and a scoring system that allows formal account to be taken of the full set of costs and benefits. The output of the monetised CBA would be one of the criteria, so the monetary value of net benefits (costs) would need to be converted into a score, and combined with the scores in relation to each of the other criteria.

A review of the NC EB suggests that the CBA must take into consideration a very wide range of objectives, which may have an implication for the chosen CBA approach. One may argue that the pure CBA may take too narrow a focus in terms of assessment given the wide range of objectives, and the possible challenges associated with monetising them. Hence, there are arguments that the overall approach should be based on a relatively informal augmented CBA or an MCA based on a formalised scoring matrix.

However, when deciding upon the right approach to the overall evaluation methodology it is necessary to keep in mind the main advantage of a pure CBA in relation to objectivity, which ENTSO-E has defined as one priority for the CBA. The pure CBA helps to avoid the problem of:

- double counting, i.e. meaning that a benefit is measured in monetary terms and again in qualitative terms, entering the final assessment twice; and
- scoring benefits/costs with different metrics.

Therefore, as a **first principle** we would propose to **monetise as much as possible the benefits and costs** in the general CBA approach so as to maximise the objectivity of the analysis. Monetisation means putting a € (or other currency) value and a date (i.e. the years in which the benefits and costs occur) on the benefit and costs. Each relevant benefit and cost in the respective CBA must be assessed to decide whether it can be monetised. A decision to monetise a cost or benefit should be sufficiently substantiated by the availability of reliable data and a robust (non-biased) approach to processing the data. The principle to monetise as much as possible the benefits and costs should not result in non-monetary costs and/or benefits being ignored or given a lower level of importance. Costs and benefits (both ones that can be monetised and those that cannot) should be listed prior to any evaluation. The assessment should follow the subsequent steps:

- define a full list of benefits and costs;
- identify conceptually how the benefit or cost can be monetised;
- if the calculation is theoretically possible identify a practical modelling approach for this and identify the necessary underlying assumptions. The assumptions should be agreed (ideally by all stakeholders) and be transparent;
- if practical modelling is possible assess the time needed for the calculation and the expected additional information provided by the calculation. This includes defining required data and identifying data sources. The required data and its sources should be agreed and be transparent;
- if practical modelling is possible, in addition, assess the uncertainty associated with the derived results. This includes identifying whether monetary results are likely to fall within an adequate interval of confidence. If measures to deal with these uncertainties (e.g. scenarios and sensitivity analysis) are not

appropriate then monetisation may disguise ambiguities and should be used with caution or not be undertaken;

- if monetisation is not possible due to theoretical and/or practical reasons, alternative options for quantifying the benefit (e.g. non-monetary metrics, traffic light system etc.) must be identified.

### Decision process for defining general CBA approach

The decision as to the appropriate general CBA approach depends on various factors:

- the scale of unquantifiable benefits (if these are small, relying on a monetised CBA and qualitative assessment of other benefits may be more appropriate);
- the extent to which an appropriate and commonly accepted set of weights can be devised and agreed upon (this is a subjective exercise and securing consensus on it has the potential to create delay); and
- the extent to which one can devise a scoring matrix that can objectively and transparently differentiate alternative planning cases in terms of likely benefits or costs (conversion of a monetary amount to a score is subjective and can be difficult to justify to regulatory authorities).

The scale of unquantifiable benefits is likely to vary according to each of the CBAs required in the context of the NC EB. To identify the scale of unquantifiable benefits we first classify the range of objectives set out in the NC EB into various categories. Grouping the objectives also allows the complexity of the analysis to be reduced. Secondly, we consider the ability to monetise those objectives that are measurable.

### Grouping objectives

We group objectives under the NC EB into the following categories:

- **Pass/fail condition** – defined by specific characteristics required of a design option (which would be expected to be contained in the definition of the option) or an absolute standard that a design option must fulfil. A design option that “better” fulfilled the pass/fail condition may or may not receive a higher score in the CBA than another option that only just met the pass/fail condition, depending on whether better fulfilment was valued. We note that the pass/fail condition defines a minimum standard.
- **Benefits (scoring)** – used to score or rank different options, i.e. Option A is better than Option B or Option A scores 8 out of 10 and Option B scores 5 out of 10. Objectives related to social welfare fall under this category.
- **Costs (scoring)** – used to score or rank different options, as per benefits.

In **Table 1** we categorise each of the objectives for the NC EB. We have taken the objectives from Article 10(1) and Article 69(2), and modified them only so as to unbundle objectives that were combined into a single clause and to avoid repetition. Some criteria fall into two categories, e.g. where there is a minimum requirement (pass/fail condition) and a benefit from exceeding the minimum (scoring). The main purpose of this classification is to serve as the preliminary step for the more detailed list of benefits and costs for each the different CBAs set out in the NC EB. Defining the detailed list for each CBA is not the content of this report, which deals with the general methodology.

Before discussing the classification of the different objectives we first clarify what is meant by social welfare in the context of NC EB. It is possible to apply a social welfare standard whereby consumer welfare and producer welfare are given different weights or where different consumers are given different weights (e.g. consumers with lower incomes are given higher weights than consumers with higher incomes). Although the NC EB provides no guidance as to weightings, we assume that the intention is to weight all welfare equally. We note that this is also in line with the approach applied in the CBA for PCIs/TYNDP.

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There is an economic rationale for not placing different weights on different consumers or on consumers and producers, in aggregate. Using different weights for the CBA would imply that the NC EB is a tool for redistribution within society. However, the NC EB is likely to be a sub-optimal mechanism for redistribution and other tools designed specifically with redistribution in mind would be more appropriate in this role.

**Table 1. List of objectives and initial thinking on their classification**

Objective	Category	Discussion	Conclusion
<b>Enhancing pan-European Social Welfare</b>	Benefit (scoring)	<p>The NC EB states that the option should “enhance” social welfare<sup>2</sup>, meaning that options have to be compared to each other (either by ranking them or scoring them) and compared to business as usual.</p> <p>We note that in theory the impact of an option on European social welfare can be monetised. This is done by estimating the change in the net present value of producer and consumer surplus for each of the options compared to the business as usual.</p> <p>However, there may be practical issues in monetising welfare effects, e.g. in cases for which market data or markets do not exist. In this case non-monetary indicators would need to be used, which will have an impact on the overall CBA approach.</p>	We suggest treating “Enhancing pan-European Social Welfare” as a <b>“benefit (scoring)”</b>
<b>Ensuring Operational Security</b>	Pass/fail criterion Benefit (scoring)	<p>The NC EB states that the option should “ensure operational security”. “Ensuring” can be interpreted in such a way that the option has to fulfil an absolute standard with regard to operational security, which would classify this objective as a pass/fail condition.</p> <p>However, where there is value in one option “better” ensuring operational security it would make sense to treat this objective as a benefit (scoring). In this case, indicators (monetised and/or non-monetised) would be necessary to compare different options.</p>	We suggest primarily treating “Ensuring Operational Security” as a <b>“pass/fail criterion”</b> , and to treat the objective as a <b>“benefit (scoring)”</b> only to the extent a ‘better’ level of security has value
<b>Contributing to the efficient long-term operation and development of the European electricity transmission system and electricity sector</b>	Benefit (scoring)	<p>This as a general objective stating the overall aim of an integrated European electricity market. We interpret this objective as describing a desire to achieve efficient sector outcomes.</p> <p>To the extent that contributing to this objective means that power markets operate more efficiently there would be a contribution to social welfare, which would be captured a measurable benefit (scoring).</p> <p>We note that special attention has to be taken in order to avoid double counting in particular with respect to “Enhancing pan-European Social Welfare.”</p>	We suggest treating this as a <b>“benefit (scoring)”</b> captured by the social welfare objective

<sup>2</sup> The possible effect on the retail market is currently not explicitly included as an objective in the NC EB. However, we note that to the extent retail market effects fell within other objectives, in particular maximising social welfare, the effects would be captured in the CBA.



<p><b>Fostering competition in Balancing Markets</b></p>	<p>Benefit (scoring)</p>	<p>Competition <i>per se</i> is not normally an objective in its own right since it is not in itself beneficial. Rather, the benefit of competition can be measured as the avoided welfare loss due to market outcomes not being aligned with perfectly competitive market outcomes. Hence, the positive effect of competition is covered by the objective “Enhancing pan-European Social Welfare”.</p> <p>However, in cases where it is not practical to monetise the social welfare effect of a change to the strength of competition, non-monetary indicators could be used as a proxy to the effect on social welfare, e.g. the Herfindahl-Hirschmann Index (HHI). In this case it is important to avoid double counting a social welfare effect and it is important to give the proxy indicators an appropriate weight in the CBA.</p> <p>This means that to the extent the competitive effects on social welfare can be monetised this objective is captured within the objective of “Enhancing pan-European Social Welfare”.</p>	<p>We suggest treating this as a “<b>benefit (scoring)</b>” but to keep in mind the potential problem of double counting in relation to “Enhancing pan-European Welfare”</p>
<p><b>Fostering non-discrimination and transparency in Balancing Markets</b></p>	<p>Pass/fail criterion Benefit (scoring)</p>	<p>Non-discrimination and transparency describe specifics characteristics the option must fulfil, e.g. procedures that significantly discriminate between market participants would not be acceptable as possible options. Hence, we suggest this objective be treated as a pass/fail criterion.</p> <p>We note that it may be permissible to have justified discrimination between participants, e.g. where different charges imposed on different users reflect costs. Non-discrimination and transparency are attributes of efficient markets and therefore we propose to capture any measurable effects in meeting this criterion within the objective of social welfare.</p>	<p>We suggest treating “Fostering non-discrimination and transparency in Balancing Markets” as a “<b>pass/fail criterion</b>” and to capture additional effects as a “<b>benefit (scoring)</b>” within social welfare</p>
<p><b>Facilitating the efficient functioning and preventing undue distortion of other electricity markets in timeframes different from the Balancing Markets</b></p>	<p>Benefit (scoring)</p>	<p>We note that in theory the estimate of the effect on social welfare due to the balancing market design should take into account the effect on other electricity markets, in particular the day-ahead and intraday markets. Hence, this objective should already be covered by “Enhancing pan-European Social Welfare”.</p> <p>However, in the case that the modelling of the balancing market does not allow the effects on other electricity markets to be included in the analysis or modelling of the balancing market is not possible at all, indicators or conceptual arguments can be used to describe this objective. These indicators would be used as a proxy for social welfare effects.</p> <p>In addition, we note that this objective is very much related to other market issues like “fostering competition in balancing markets”, “fostering non-discrimination and transparency” and “fostering liquidity”.</p>	<p>We suggest treating this as a “<b>benefit (scoring)</b>” but to keep in mind the potential problem of double counting in relation to “Enhancing pan-European Welfare”</p>
<p><b>Ensuring that the procurement of Balancing Services is fair, objective, transparent and market-based</b></p>	<p>Pass/fail criterion Benefit (scoring)</p>	<p>This describes specific characteristics the option must fulfil, e.g. procedures which are not-fair or not-market based would not be acceptable as possible options. Hence, we suggest this objective be treated as a pass/fail criterion.</p> <p>An option may provide greater levels of fairness, objective, transparent and market based procurement than required as a minimum. These attributes are subjective and may not have a value in their own right. However, they are important features of efficient markets. To the extent different levels of these attributes affect the efficiency of markets this would be captured through the general objective of social welfare.</p>	<p>We suggest treating this as “<b>pass/fail criterion</b>” and to capture additional effects as a “<b>benefit (scoring)</b>” within social welfare</p>

<b>Avoids undue barriers to entry for new entrants</b>	Pass/fail criterion	This describes specific characteristics the option must fulfil, e.g. the definition of balancing products which can only be provided by certain market participants would not be allowed <sup>3</sup> . Hence, we suggest this objective be treated as a pass/fail criterion.	We suggest treating this as “ <b>pass/fail criterion</b> ”
<b>Fosters the liquidity of Balancing Markets while preventing undue distortions from within the internal market in electricity</b>	Benefit (scoring)	<p>Liquidity is important for the functioning of markets. For example, it:</p> <ul style="list-style-type: none"> <li>• reduces the ability of market participants to engage in market manipulation;</li> <li>• increases confidence in traded prices; and</li> <li>• provides a wider range of counterparties for participants to hedge their risk exposure.</li> </ul> <p>Hence, higher market liquidity reduces the ability to exercise market power. As discussed in the context of the objective of “fostering competition” liquidity is not in itself beneficial and it brings benefits to social welfare through enhanced competition.</p> <p>However, we note that monetising the welfare effect from higher liquidity is difficult. This means that the effect of a change to liquidity is likely to be assessed based on proxy indicators or qualitative reasoning.</p> <p>Liquidity is often described by the number of market participants, depth of the market and/or bid-offer spreads. However, these indicators may not always be appropriate for the balancing market, e.g. bid-offer spreads may not be relevant.</p>	We suggest treating this as a “ <b>benefit (scoring)</b> ” but to keep in mind the potential problem of double counting in relation to “Enhancing pan-European Welfare”
<b>Promoting the exchange of Balancing Services</b>	Benefit (scoring)	<p>This is a general objective stating the overall aim of the NC EB, which is to create a European-wide balancing market.</p> <p>However, promoting the exchange of balancing services <i>per se</i> does not bring a benefit. If the exchange of balancing services was done efficiently using market based principles this would bring benefits in the form of more efficient market outcomes, and potentially additional benefits in terms of security of supply. To the extent that contributing to this objective means that power markets operate more efficiently there would be a contribution to social welfare, which would be captured a measurable benefit (scoring).</p>	We suggest treating this as a “ <b>benefit (scoring)</b> ” within the objective of enhancing social welfare
<b>Facilitating the participation of Demand Side Response including aggregation facilities and energy storage</b>	Pass/fail condition Benefit (scoring)	<p>We propose to classify this objective as a pass/fail condition, which means that the options should be designed to support the participation of demand side response.</p> <p>We note that classification of facilitating demand side response as a benefit may result in possible double counting. The participation of demand side response will increase the number of suppliers in the balancing market, having a positive effect on “Enhancing pan-European Social Welfare”, “liquidity” and/or “competition”.</p>	We suggest treating this as a “ <b>pass/fail condition</b> ” and that any effect on efficient markets be captured as a <b>benefit (scoring)</b> within social welfare

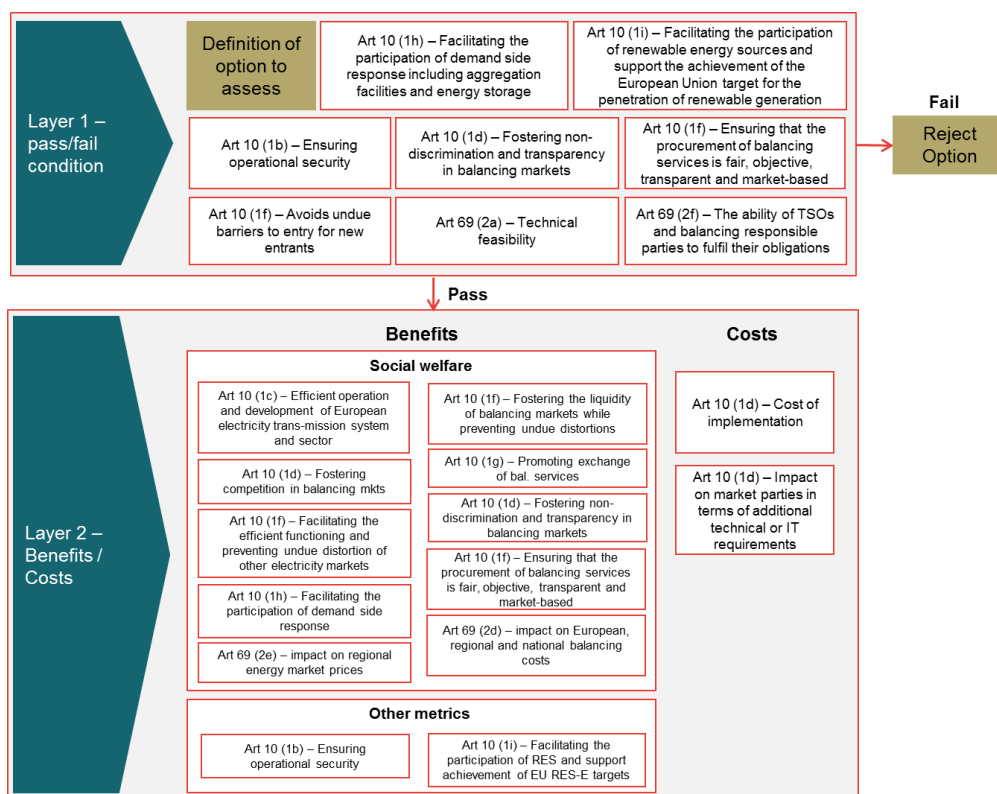
<sup>3</sup> However, there is a caveat. In principle the product design should achieve maximum social welfare. As a result, more ‘ambitious’ products could be designed to achieve this objective. It is up to market participants to find innovative solutions to offer such products. Such design would not lead to entry barriers but could incentivise new entry of market participants. If product design is from the beginning limited to capabilities already available in the market, the risk is that new market participants are not incentivized to enter the market, and existing participants are not encouraged to adapt and innovate.

<b>Facilitating the participation of renewable energy sources and support the achievement of the European Union target for the penetration of renewable generation</b>	Pass/fail condition Benefit (scoring)	We propose to classify this objective as a pass/fail condition, which means that the options should be designed to support the participation of renewable energy sources.  Renewable energy is an EU objective in its own right. Therefore to the extent a measurable effect could be observed, it would make sense to also measure the extent to which an option contributed to renewable energy development.	We suggest treating this as a “ <b>pass/fail condition</b> ” and also as a “ <b>benefit (scoring)</b> ”
<b>Technical feasibility</b>	Pass/fail condition	Any changes to business as usual should take into account the technical capabilities of current (and future) providers of balancing services and of the TSOs that procure those services. A design that is highly beneficial from an economic perspective would be considered to be technically infeasible if technical requirements (e.g. maximum time constants for power infeed changes, IT interfaces for control purposes and data recording, etc.) cannot be fulfilled by service providers or the TSO.  In the case that changes to business as usual are such that technical requirements can be in principle be fulfilled because the best available technology has been considered in the design change but a significant number of current balancing service providers (or TSOs) would be unable to meet the new technical requirements (or could only meet them at an inappropriately high cost) and would therefore not be able to continue to participate in the market, the respective design would also be rejected with respect to the “technical feasibility” objective.  We propose to classify “technical feasibility” as a pass/fail condition. However, we note that by definition a technically infeasible option is unlikely to be included in the set of possible design options.	We suggest treating “technical feasibility” this as a “ <b>pass/fail condition</b> ”
<b>Cost of implementation</b>	Cost	Cost by definition.	“ <b>Cost</b> ”
<b>The impact on European, regional and national balancing costs</b>	Benefit (scoring)	We note that the impact on balancing costs feeds into the calculation of “Enhancing Pan-European social welfare” and hence, is already covered by this objective.	We suggest including this as a “ <b>benefit (scoring)</b> ” within “Enhancing Pan-European social welfare” and not to treat it as separate objective
<b>The potential impact on regional energy market prices</b>	Benefit (scoring)	We note that the impact on energy market prices feeds into the calculation of “Enhancing Pan-European social welfare” and/or “Facilitating the efficient functioning of other electricity markets” and, hence, is already covered by these objectives.	We suggest including this as a “ <b>benefit (scoring)</b> ” within “Enhancing Pan-European social welfare” and not to treat it as separate objective
<b>The ability of TSOs and Balancing Responsible Parties to fulfil their obligations</b>	Pass/fail condition	If an option does not allow TSOs and BRPs to fulfil their obligations then by definition this option has to be excluded. We propose to classify this as a pass/fail condition.	We suggest treating this as a “ <b>pass/fail criterion</b> ”
<b>Impact on market parties in terms of additional technical or IT requirement</b>	Cost	This impact causes monetary costs (investment and ongoing operating costs) on market participants and should therefore be classified as a cost.	We suggest treating this as a “ <b>cost</b> ”

Source: Frontier Economics

The classification of the objectives allows the scope of the CBA to be structured in line with the requirements set out in the NC EB and the complexity of the analysis required for the CBA to be reduced. Based on our classification of objectives (**Table 1**) the structure for assessing the objectives in the CBA shown in **Figure 1** emerges.

**Figure 1. Structure for assessing objectives in the CBA**



Source: Frontier Economics

**Layer 1 – pass/fail condition** should be regarded as a checklist including all listed conditions. The conditions set minimum standards which have to be fulfilled before proceeding to **Layer 2 – Benefits /Costs** where costs and benefits are measured. We note that it may be possible that one option better fulfils the conditions (exceeds the minimum standard) than another. This information may be used in measuring costs and benefits in layer 2. However, we note that the CBA for an option would stop in the case that the option does not pass any of these minimum standards.

Some aspects of **Figure 1** are worth noting:

- “Ensuring Operational Security” is classified as a pass/fail condition and enters the analysis *before* assessing benefits and costs of the respective options. It then enters again as a possible benefit, only to the extent that value is placed on the additional security above the minimum threshold. This means that the comparison of benefits and costs in Layer 2 relates mainly to social welfare and costs but includes metrics related to security, where required.
- Several objectives set out in Art. 10 are related to “Enhancing pan-European Social Welfare”. This includes, for example, fostering competition, facilitating efficient functioning of other electricity markets, and fostering liquidity of balancing markets. This has an important consequence for the assessment. If the impact on all relevant aspects of social welfare from Art. 10 (1a) can be measured (in € values) the other objectives related to social welfare must only be used for information purposes.

If the other objectives are also used for the assessment of the option, this will result in double counting of benefits.

On the other hand, if social welfare cannot or can only partially be measured, indicators from the other objectives related to social welfare can be used as a proxy for the total impact on social welfare. However, generally it will be difficult to derive indicators in € terms for these objectives, e.g. the HHI indicator to assess the impact on competition is stated as a number, the indicator for liquidity of the balancing market may be the number of market participants or the volume of trade relative to physical demand. This has implications for the appropriate CBA evaluation approach.

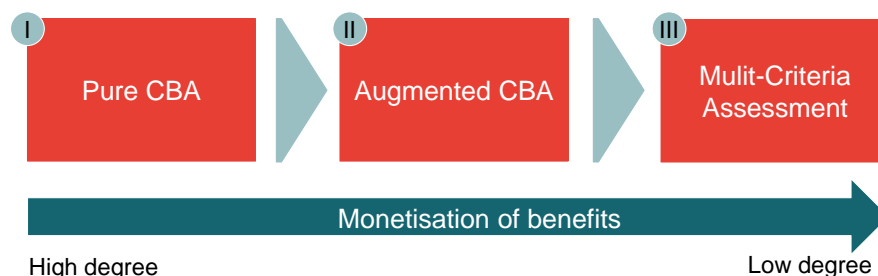
In addition, the CBA should avoid any double counting of benefits with regard to the benefits related to “Enhancing pan-European Social Welfare”.

- Facilitating the participation of renewable energy sources is a separate benefit in its own right and therefore has been given a separate metric in Layer 2.

European regions or countries may be affected differently by the options that are analysed. However, it should be noted that the overall European social welfare is the relevant objective of the NC EB. Nevertheless, the CBAs under the NC EB shall report on regional and country effects for information purposes but should not take account of these effects in the overall CBA assessment. Reporting on regional and country effects shall include the monetised objectives and where appropriate the non-monetised objectives.

In addition, Layer 2 in **Figure 1** largely determines the appropriate CBA evaluation approach, which is mainly driven by the ability to monetise all relevant aspects of “Enhancing pan-European Social Welfare”.

**Figure 2. Range of CBA evaluation approaches**



Source: Frontier Economics

As shown in **Figure 2**, the fewer the benefits that can be monetised the more appropriate the use of an MCA and, conversely, the greater the benefits that can be monetised the more appropriate the use of a pure CBA:

- **Pure CBA** – in the case that “Enhancing pan-European Social Welfare” can be fully monetised along with all relevant costs, a pure CBA comparing monetised benefits with monetised costs will be the most appropriate approach. In addition, indicators for the other objectives such as those related to competition and liquidity could be disclosed solely for information purposes.
- **Augmented CBA** – in the case that “Enhancing pan-European Social Welfare” can only be partly monetised the other related objectives are needed to give a full picture as to the impact on social welfare from each option. Quantitative indicators for the objectives should allow a scoring of the options in addition to the scoring by the monetised social welfare and costs. For example, Option A increasing the number of balancing market participants from 10 to 20 can be scored higher by this

measure than Option B increasing them from 10 to 15. Hence, the degree of subjectivity could still be kept low, with some exceptions.

We note that a challenge arises in cases whereby partly monetised benefits are lower than the monetised costs, where there are multiple options for the design change with partly monetised benefits and partly qualitative benefits, and where there are multiple qualitative benefits whose rankings vary by option.

For example, the case whereby partly monetised benefits are lower than the monetised costs still allows a relatively objective comparison between the different options, i.e. the options can be ranked according to the level of the negative net-benefit and the other quantified indicators. However, the comparison between the design options and the business as usual case<sup>4</sup> (counterfactual) becomes more difficult because the assessment requires the positive impact on non-monetary objectives to be compared to the negative monetary net benefit.

- **Multi-Criteria Assessment** – in the case that the effects of “Enhancing pan-European Social Welfare” that cannot be monetised are important relative to the effects that can be monetised, an MCA is necessary. In this case the monetary evaluation of benefits and costs is given a score that can be combined with the scores for the non-monetised effects to give a ranking of the options. Hence, a scoring matrix is required whereby weights are given to monetised and non-monetised effects and a scoring system developed. The choice of weights and scoring system should reflect the perception of the relative value of the different metrics. This is important to avoid perverse outcomes whereby, for example, an option with extremely high costs relative to monetised benefits is chosen as the preferred option because insufficient weight was placed on monetary values or the scoring system allowed insufficient variation between options.<sup>5</sup>

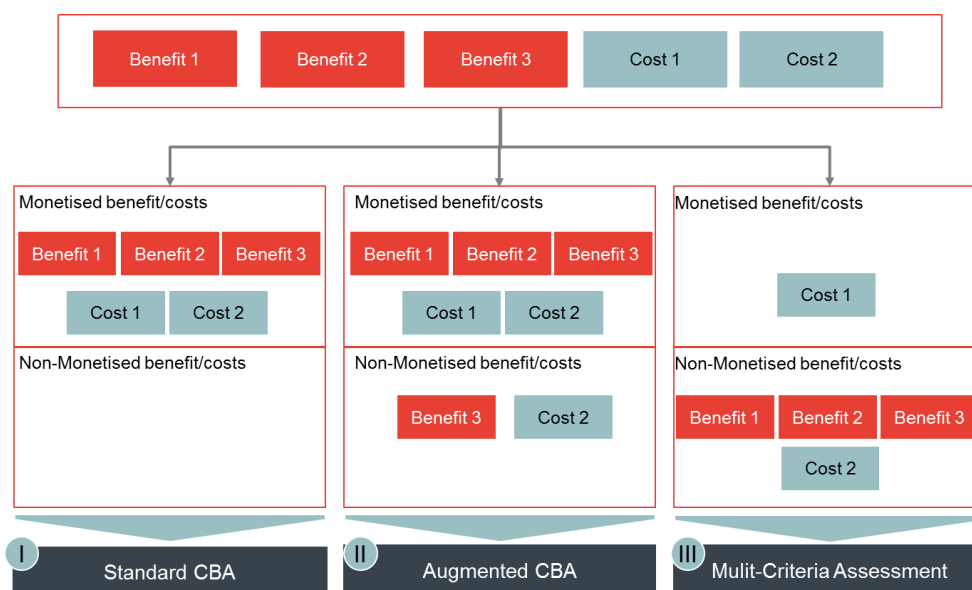
We conclude that there is no single “correct” CBA evaluation approach for all cases where a CBA is used in the NC EB. Rather, there is a **“correct” process to assess the CBA evaluation approach that fits the particular case where the CBA is used in the NC EB**. The “correct” CBA evaluation approach will emerge when assessing the extent to which benefits and costs can be monetised and the importance of non-monetised benefits and costs during the stakeholder consultation process.

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<sup>4</sup> The business as usual case may not necessarily be the current status quo state of the power system. This is because even under the business as usual case the power system may change from today.

<sup>5</sup> While careful selection of weights and the scoring system is the most effective way to ensure the ‘correct’ option is chosen, an alternative approach to safeguard against the perverse outcome described as an example is to place a pass/fail upper bound on costs. Care would need to be taken as to the choice of the upper bound since an option with high costs could also have high benefits.

**Figure 3. Process for CBA approach selection**



Source: Frontier Economics

**Figure 3** illustrates the process for the CBA approach selection by way of a stylised example. We assume three types of benefits and two types of costs:

- **Standard CBA** – in the case that all benefits and costs can be monetised into a € value then the Standard CBA applies.
- **Augmented CBA** – assume that not all benefits and costs can be measured in € values. Benefit 3 and Cost 2 can only be reported in non-monetary terms, e.g. Benefit 3 may be the impact of a design option on liquidity, quantified by the increase in the number of market participants. On the other hand a substantial amount of benefits and costs (or the most important ones) can be monetised. In this case the Augmented CBA applies. The benefits and costs that can be monetised are monetised and indicators based e.g. on a traffic light system, are used for costs benefits and costs that cannot be monetised.
- **Multi-Criteria Assessment** – assume that only Cost 1 can be measured in € values. All other benefits and costs can only be reported in non-monetary values. In order to translate all the benefits and costs into a final number which can be used to compare different options a scoring and weighting of the benefits and costs is necessary. This applies to the monetised Cost 1 and to the non-monetised (but somehow quantified) other benefits and costs.

## CBA content

The second key issue to consider is the scope of the guidance regarding the CBA methodology to be deployed. There is a common structure for any CBA:

- **Counterfactual and factual:** The cost-benefit analysis has to be carried out by determining the impacts with (factual) and without (counterfactual) the option on the business as usual case. The business as usual case is not necessarily the state of the power system at the time when the analysis is



undertaken (status quo) but rather the state of the power system that would exist were it not for the introduction of the design option.

- **Geographic scope:** The geographic scope of the CBA must be defined so as to capture the relevant cost and benefits.
- **Time horizon and discount rate:** If the costs include long-term investments and/or options may differ with regard to the time horizon, decisions have to be made about the time horizon of the analysis and the discount rate that is used to draw all of the costs and benefits together into a single comparable value at a given point in time.
- **Scenarios:** Depending on the time horizon of the analysis it may be *reasonable to define different scenarios for the future to understand the effect of uncertainty* on the CBA result. Scenario analysis is a common procedure used when assessing long-term investments and is applied in the TYNDP and PCI process. As a further method to deal with uncertainty it would be possible to use sensitivity analysis.
- **Benefit and cost identification:** The cost-benefit analysis has to identify all the relevant benefits and costs from an option and measure them.
- **Evaluation of benefits and costs:** The cost-benefit analysis needs to specify the evaluation criterion to assess if an option is preferable to the business as usual case or other assessed options. In principle this is done by calculating the difference between benefits and costs either in monetary terms or by applying other approaches (e.g. a scoring matrix).
- **Data collection and analysis:** Here, the methodology should outline the type of data required to support the CBA. This would, for example, cover use of existing market data, market participant questionnaires and cost estimates, and any scenario analysis, other analysis or modelling that the TSOs might be required to undertake to support the CBA.

In the following we address some of the topics listed above.

### **Factual and counterfactual**

Both the factual and the counterfactual require a projection as to how the electricity market will develop over time.

The counterfactual describes how the electricity market would develop if the option were not implemented. Under the counterfactual, is no option implemented or would the market evolve and implement an alternative, perhaps, less optimal option at some stage in future?

The factual describes how the electricity market would develop if the option being considered (the planning case) were implemented. To ensure the CBA captures only those effects of the option, it is important to consider only those changes to the way the electricity market would develop as compared to the factual that are caused by the introduction of the option.

In the case of the NC EB, the CBAs need to consider the effect of options that are implemented across multiple countries, with the design or choice of the option varying by country. This complicates the definition of the option or planning case to be assessed, as the following example demonstrates. Assume that there are two options, A and B, which are assessed against the business as usual case for two countries, 1 and 2. Assume also that the electricity markets of the two countries interact such that the effect of option A in country 1 depends on whether country 2 continues with business as usual, implements option A or implements option B.

To fully assess options A and B for country 1 and 2 requires eight different planning cases to be assessed (in addition to the business as usual case) and compared to each other, as shown in **Table 2**.

**Table 2. Explosion of planning cases**

Planning case	Country 1	Country 2
Counterfactual	Business as usual	Business as usual
Factual 1	Option A	Business as usual
Factual 2	Option B	Business as usual
Factual 3	Business as usual	Option A
Factual 4	Business as usual	Option B
Factual 5	Option A	Option A
Factual 6	Option A	Option B
Factual 7	Option B	Option A
Factual 8	Option B	Option B

Source: Frontier Economics

It is theoretically possible to assess all combinations of countries and options. However, there are limitations (e.g. resource and time constraints) as to what reasonably can be done in practice. This particularly holds if the scope of the CBA includes many countries. In addition, there may be little incremental information provided by adding further planning cases to the analysis.

A pragmatic solution to the dilemma of the choice of planning cases is to assume that the factual and counterfactual are the same for all countries. Based on the example above the assessment would reduce to comparing the business as usual (counterfactual) with two planning cases:

- Factual 1: option A implemented in country 1 and 2; and
- Factual 2: option B implemented in country 1 and 2.

An exception to this rule could be allowed where the specific design of a planning case is chosen to test a theory about the key drivers of costs or of benefits. The CBA required for imbalance settlement period (ISP) harmonisation provides an example. Suppose one holds the theory that the key driver of benefits in changing ISP duration is harmonisation of ISP duration between countries and that the key driver of costs is a change to ISP duration. One might therefore design a planning case that minimised the change to ISP duration while maximising harmonisation. Such a planning case may therefore require the choice of design option to vary by country.

A second exception to the rule may be where one thought the preferred design option will differ by country. In the example above, suppose option A is expected to be preferred in country 1 and option B in country 2. Again, if the benefit of the design option in one country is affected by the choice of design option in other countries, a country specific choice of design option may be necessary.

### **Geographic scope for the CBA**

The geographic scope of the CBA must be defined so as to capture all of the relevant cost and benefits. In principle the CBA should extend to the entire EU. However, in practice only those countries materially affected by the introduction of the option need to be included in the analysis.

This suggests excluding those costs and benefits that fall on countries outside the EU. However, the question arises if the NC EB is of EEA relevance (i.e. Iceland, Liechtenstein and Norway) and of relevance for countries not in the EEA but in the single market (i.e. Switzerland). Hence, we propose that at least Liechtenstein, Norway and Switzerland be included in the analysis.

### **Time horizon for CBA**

If the costs include long-term investments and/or the benefits only emerge over time, a decision has to be made about the time horizon of the analysis. Generally the time horizon for the analysis is determined by the economic lifetime of investments required to implement the relevant option. Regulatory depreciation periods tend to be used as a first cut indicator of the economic lifetime of an asset.

For example, in the case that an investment in IT systems is necessary the regulatory depreciation period for IT systems of around 5 to 10 years can be used as the default time horizon. Additional analysis may then be undertaken to assess whether a shorter or longer economic lifetime for the investment could be assumed.

### **Choice of years to analyse**

If costs and benefits are evaluated over more than one year, e.g. 10 years, it is necessary to define annual benefits and costs. There are various options to derive these annual figures:

- *Option 1 “Keep benefits constant over the years”* – the benefit is calculated using one snapshot year and then kept constant. This is an appropriate approach if no changes in the benefits over time are expected and/or the evaluation period is relatively short.
- *Option 2 “Define periodical snapshot years and interpolate benefits between the years”* – this approach takes into account that benefits may change over time. Hence, the benefits are calculated for certain snapshot years and the benefits for the years between the snapshot years are interpolated. This corresponds to the approach set out in Regulation No 347/2013 for the energy system wide cost-benefit analysis, where snapshot years (n+5, n+10, n+15, and n+20, where n is the year in which the analysis is performed) are defined.
- *Option 3 “Calculate benefits for all years separately”* – this is the most complex and precise approach. However, there may be some arguments against an annual calculation, in particular in comparison to the snapshot approach. On the one hand the complexity of the calculation and the effort required to gather data increases. On the other hand the information about the level of benefits increases with the increased frequency of analysis. However, the incremental benefit of the information is likely to be small, at least relative to analysis using snapshot years.

Hence, we would propose to use Option 2 “*Define periodical snapshot years and interpolate benefits between the years*” as the default for the analysis. This is in line with the CBA in Regulation No 347/2013. This consistency also has a practical advantage – the CBA set out in NC EB can in principle draw on the TYNDP database as the starting point. However, we note that additional data collected independently from the TYNDP database may be necessary depending on the final data requirements for the respective NC EB CBA. In addition, we note that the choice of snapshot years should ensure that relevant external events having an impact on benefits and/or costs are reflected with sufficient accuracy.

A different set of snapshot years may be required for short time horizons. For example, if the time horizon of the analysis is only 5 years using the single snapshot year n+5 might not be appropriate as a proxy for the prior years. However, in this specific case it is necessary to assess beforehand if the additional complexity and effort of data gathering outweighs the possible benefit from additional snapshot years within the 5 year period.

### **Dealing with uncertainty – scenarios and sensitivity analysis**

The longer the time horizon, the more the uncertainty as to how the electricity market will develop during the time horizon. To the extent this uncertainty could affect the outcomes of the CBA it would make sense to take into account the uncertainty as part of the analysis. To take account of the uncertainty, different outcomes of the future (“scenarios”) can be defined. However, this introduces complexity into the CBA.

Scenarios are often used for CBAs. For example, ENTSO-E uses scenarios in the TYNDP process and the CBA for PCIs.<sup>6</sup> ENTSO-G uses scenarios in the development of the TYNDP and the CBA for PCIs.<sup>7</sup> In addition, sensitivity analysis can supplement scenarios to further analyse the sensitivity of the results from single scenarios with regard to individual input parameters.

The decision process with regard to scenarios in the CBA can be described using the following key questions:

- When should scenarios be used and how many should be used?
- How are scenarios defined?
- How to use CBA results from different scenarios?

#### **When should scenarios be used and how many?**

The use of scenarios is a technique to deal with uncertainty as to the future development of the electricity market. Uncertainty tends to increase as one looks further into the future. Hence, the need for scenarios will increase with the time horizon of the analysis. ENTSO-E (2013)<sup>8</sup> can be used to define different time horizons with some implications for the need of scenarios:

- Short-term horizon (typically 0 to 5 years) – generally, we would propose to use only one scenario for the short-term horizon, because uncertainty is relatively limited over a 5 year period. In addition, sensitivity analysis on certain key drivers, e.g. fuel prices or CO2 prices, may be used to include some uncertainty within the scope of the analysis.
- Medium-term horizon (typically 5 to 10 years) – uncertainty is greater over this time horizon. For example, the expansion of intermittent and volatile renewable generation capacity has a substantial impact on the balancing market. However, there is uncertainty as to what national and European renewable policies will be in 10 years time, affecting the development of renewable generation. Therefore, there are good arguments for using a “grey” or “green” scenario to assess the effect of changes to the balancing market. However, to reduce the complexity of the CBA we would propose using only one scenario as default, supplemented by sensitivity analysis.

In addition, we propose that an initial evaluation be undertaken at the start of each CBA under the NC EB to assess whether one scenario is likely to be sufficient.

- Long-term horizon (typically 10 to 20 years) – over this time horizon there is significant uncertainty as to how the electricity market will develop. ENTSO-E (2013) foresees for the long-term horizon using four different scenarios. In principle, we agree that for an analysis over 20 years one scenario may be insufficient to take account of the future uncertainty. However, in order to reduce the complexity of the analysis one may argue that two scenarios should be used as the default rather than the four used by ENTSO-E (2013).

<sup>6</sup> ENTSO-E, Scenario outlook and adequacy forecast 2014-2030, June 2014.

<sup>7</sup> ENTSO-G (2013), Cost-Benefit Analysis Methodology – Energy System Wide CBA Methodology, November 2013; ENTSO-G (2013), Cost-Benefit Analysis Methodology – Project Specific CBA Methodology, November 2013.

<sup>8</sup> ENTSO-E, ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects, Nov 2013. See page 9.

Again, we propose that an initial evaluation be undertaken at the start of each NC EB CBA to consider whether one scenario is sufficient.

#### **How are scenarios defined?**

Scenarios represent future developments of the energy system and represent a coherent, comprehensive and internally consistent description of a plausible future (generally including a description of the path from today to the end of the planning horizon) built on the imagined interaction of key economic parameters (including economic growth, fuel prices, CO<sub>2</sub> prices, etc.). Hence, it is necessary to define over time and for each relevant country:

- policy developments such as the design of the power market and RES subsidy regimes. For example, the choice of bidding zones and liquidity in the intra-day market may affect the benefits of design options under the NC EB. Other things may be important such as the roll out of smart meters or electric vehicles or demand side response;
- development of electricity demand, peak demand, and the shape of demand, e.g. demand side management may change the shape of demand;
- development of generation capacities for different generation technologies, i.e. plant investment and closure;
- development of network infrastructure; and
- development of fuel prices and CO<sub>2</sub> prices.

The key characteristic of scenarios is that all or most of the components listed above must substantially differ from each other in order for analysis under each scenario to provide meaningful additional information. For example, if scenarios A and B only differ with regard to the CO<sub>2</sub> price, then we are not in the world of scenarios but of sensitivity analysis.

The definition of scenarios is a time-intensive process as the involvement and at best acceptance of the scenario definition by all relevant stakeholders is necessary. However, we note that ENTSO-E already has established consensus on scenarios as part of the TYNDP process although the TYNDP does not assign any particular status to the scenarios e.g. none is described as the expected case or reference case.

We propose that the:

- scenarios for the CBAs under the NC EB draw on the scenarios from the TYNDP; and
- ENTSO-E consults with stakeholders regarding:
  - which single TYNDP scenario to use as the reference scenario in the case that the time horizon of the CBA is 10 years; and
  - which two TYNDP scenarios to use in the case that the time horizon of the CBA exceeds 10 years.

#### **How to use CBA results from different scenarios?**

Using more than one scenario may lead to conflicting results when assessing an option. For example, option A has a positive net benefit in scenario 1 and a negative one in scenario 2. The issue is that if results differ between scenarios guidance is necessary as to how to interpret them. There are various possible ways to do this:

- reject (accept) the option if the net benefit is negative (positive) in one scenario; or
- reject (accept) the option if the weighted total net benefit of the scenarios is negative (positive).

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The advantage of the first approach is that it appears easy to implement and is objective. The decision maker has only to decide *a priori* if (s)he wants to reject (or accept) the option in the case that only for one scenario the net benefit is negative (or positive).

However, the main drawback of this approach is that it neglects information from the scenario that is not used as part of the decision. For example, assume that option A has a net benefit under different scenarios as follows:

- Scenario 1: +100 million €; and
- Scenario 2: -1 million €.

Further suppose that the decision rule is to reject option A in the case of a negative net benefit in any one of the scenarios. The decision maker will reject option A due to the small negative net benefit in scenario 2 despite the large positive effect in scenario 1.

The second approach takes into account information from both scenarios by using a weighted sum of the net benefits across all scenarios. Generally, scenarios are meant to provide different states of the world in the future but not to provide information as to the probability that they will occur. This means that putting an equal weight on the scenarios, e.g. 50% in case of 2 scenarios, seems to be a reasonable starting point as it avoids a value judgement about which scenario is more likely. Hence, we propose to use equal weights as the default.

However, we note that it may also be possible to include in the consultation on the relevant TYNDP scenarios for the NC EB CBAs a question to the stakeholder on the probabilities they would place on the scenarios. This information can then be used to set the relevant weights if there were a broad agreement as to the different probabilities to apply to scenarios.

### **Discount rate**

Cost-benefit analysis involves comparing projects with different flows of financial or economic costs and benefits occurring in different time periods. Discounting recognises that money has a time value, since a euro today is worth more than a euro in five years.

The time value of money means that cash inflows and outflows occurring in different time periods cannot simply be added together to determine the overall net cost or net benefit of a project. It is necessary to remove the effect of the time value of money to enable all values to be compared equally (e.g. to convert all values to the present value before summing them).

There is a huge literature on how to set the discount rate for cost benefit analysis. However, there is little consistency in the literature. In principle the discount rate should reflect the systematic risk underlying different cash-flows. However, the key issue is how to define the differences in systematic risks especially if various stakeholders and regions, e.g. network companies, generators, consumers in different member states, are affected by the options (planning cases) being assessed under the CBA.

Hence, different options may be available to set the discount rate:<sup>9</sup>

- discount all costs and benefits at the social discount rate;
- discount some costs and/or benefits at a weighted average cost of capital (WACC), and discount some at the social discount rate, depending on their likely systematic risk;

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<sup>9</sup> See for example: Discounting for CBAs involving private investment, but public benefit, Consultation paper by the Joint Regulators Group (JRG), London, 2011. The discussion paper also shows that the UK regulators use different approaches for the discount rates in their cost-benefit analysis.

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- discount all costs (including financing costs as calculated based on a WACC) and benefits at the social discount rate;
  - discount all costs and benefits at a WACC; and
  - use a single discount rate, regional discount rate, or discount rate per member state.

In its recent guidelines for CBA for smart grids<sup>10</sup> the European Commission mentions that at the European level social discount rates have been suggested. However, different levels may be proposed and justified based on specific Member State's macroeconomic conditions or capital constraints. The European Commission concludes that “in any case, a clear and motivated explanation for the choice made should be provided”.

EIB (2013: pages 44-52)<sup>11</sup> states that the social discount rate shall be derived from the social-time-preference rate (STPR). The STPR ( $= a + b * g$ ) has two components:  $a$  and the product of  $b$  and  $g$ , where:

- $a$  measures the pure time preference rate. This reflects the hypothesis that society prefers today's consumption over tomorrow's purely because of its precedence in time. All other things being equal, the social time preference rate (STPR) is the higher, the higher the pure time preference rate;
- The second reason why society prefers having things sooner rather than later is captured by  $b * g$ , which reflects a combination of two things. Firstly, the hypothesis that consumption possibilities grow over time at the rate  $g$  (expected per capita consumption growth) and, secondly, that the additional welfare that society derives from an increase in consumption declines – an effect captured by  $b$  (marginal welfare of consumption). All other things being equal, the higher  $b * g$ , the higher the STPR.

All three parameters can be derived from empirical analysis. The main reason for variations in the social discount rate across countries is differences in the expected per capita consumption growth rate.

For the CBA for PCIs, we understand that ENTSO-E<sup>12</sup> proposed that for all the projects, a uniform discount rate shall be used. ENTSO-E proposed to use 4% (real) as the discount rate. ACER confirmed the use of a uniform rate and also the level of the rate.

We note that for pragmatic reasons the different CBA methodologies undertaken by ENTSO-E should use the same discount rate. In addition, ENTSO-E should consider regularly updating the social discount rate using the approach described above. This may result in different social discount rates per country.

Hence, we propose to:

- use a uniform discount rate for all the NC EB CBAs;
- align this discount rate with the rates used in the TYNDP and PCI selection process, i.e. as potentially updated from time to time; and
- regularly update the discount rate.

### Benefits

All of the net benefits of moving from the counterfactual (business as usual) to the world with the design option must be identified. However, only those benefits caused by the move to the option (“planning case”) are relevant. Benefits that would happen in any case due to decisions that are unaffected by the choice between the business as usual case and the planning case are not relevant.

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<sup>10</sup> European Commission, Guidelines for conducting a cost-benefit analysis of Smart Grid projects, JRC reference reports, 2012.

<sup>11</sup> European Investment Bank, The Economic Appraisal of Investment Projects at the EIB, 2013.

<sup>12</sup> ENTSO-G follows this line and proposes to use a uniform discount rate, as well.

Benefits are derived by comparing the planning case to business as usual. However, it is important that only economic benefits are considered and not, for example, transfers. As an example, suppose a change to the balancing rules led to a reduction in the costs incurred by the TSO in procuring balancing services. This apparent benefit may in fact be entirely a transfer of welfare from producers to the TSO, e.g. in the case where the TSO cost saving was solely due to a price reduction and the quantity of balancing services procured was unchanged. In this case, the benefit to the TSO comes at the expense of a reduction in the benefit to producers, with a zero net benefit for the system. An example, of a real economic benefit is where a change to balancing rules allows the TSO to hold less reserve capacity, reducing out of merit running and thereby allowing the system to meet demand at lower fuel cost and CO2 emission cost. The reduction in fuel and CO2 emission costs is an economic benefit.

### Costs

All of the costs affected by moving from the counterfactual (business as usual) to the world with the design option must be identified. Only those costs caused by the move to the option (“planning case”) are relevant.

Costs related to investments that would have been undertaken irrespective of the move from business as usual to the option should not be included in the CBA. This raises two points:

- Investments due to decisions already taken should not be considered. For example, if for a certain option smart meters were necessary but politics have decided that smart-meters must be rolled out anyway, these costs are not relevant.
- Only incremental investment costs in the context of replacement are relevant. For example, suppose that a TSO has to replace its IT system because it is very old and the replacement of the old system costs 100 million €. One then undertakes a CBA for planning case A. The IT relevant investment costs. Suppose that the investment cost for replacement is 100 million € for an IT system. For implementing planning case A is 110 million € is necessary. Hence, the relevant cost of the IT system for assessing planning case A is the incremental cost due to that planning case, i.e. 10 million €.

Similar issues apply to operating costs that would have been incurred irrespective of the introduction of the planning case.

Only economic costs are relevant for the CBA, not accounting costs. For example, this means that when an investment is undertaken, the cash flow in procuring the asset is relevant for the CBA, not annual depreciation.

As noted above, the CBA must identify those costs that change in moving from business as usual to the planning case being considered. Where the planning case avoids the need for investment under business as usual, there are two ways in which the investment (and potentially also operating) cost saving may be taken into account in the analysis. The costs could be attributed to the business as usual case or the avoided costs (i.e. negative costs or positive benefit) could be attributed to the planning case. Either approach can be used. However, it is important to be clear as to the attribution of costs and avoided costs to ensure that all cost changes are correctly assessed.

Different types of relevant costs include the following:

- Investment costs, e.g. if there is a need for an upfront investment.
- Operating costs over the planning horizon, e.g. for the ongoing operation of IT systems.
- Decommissioning costs, e.g. for the removal of equipment at the end of their technical lives.
- Transactions costs, e.g. for the renegotiation and redrafting of contracts, etc.



- Indirect costs such as fuel costs and environmental costs, e.g. the costs of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub> and other emissions.

Indirect costs are not a direct cost of implementing the planning case. However, these costs are relevant because they may be affected by the planning case and therefore they must be taken into account in the CBA. We suggest that these indirect costs be considered as part of the net benefit of a planning case by comparing the level of these costs under the planning case to the level of these costs under business as usual.

In addition to the types of costs, all of the different entities whose costs may change must be considered. The scope of the CBA includes all stakeholders and therefore costs that are incurred by all stakeholders are relevant, including:

- Costs incurred centrally by TSOs; and
- Costs incurred de-centrally by power exchanges, traders, generators and loads.

We note that it may be difficult to assess and verify the costs incurred de-centrally. However, these costs are likely to form a substantial part of the costs of the change from business as usual to the planning case and therefore should not be ignored.

Besides defining categories of costs it is also necessary to at least define a process for how to define the absolute level of costs. With regard to the benefits we note that the definition of scenarios and the modelling based on these scenarios will result in agreed input data to be used in monetising benefits. We would propose that a similar stakeholder (including National Regulatory Authorities) engagement process be applied with regards to deciding upon costs:

- define categories of investments, e.g. meter devices, IT systems, in a questionnaire;
- ask stakeholders, in particular TSOs, on the operating and capital costs they use/estimate for these categories of investments; and
- use this information to define ranges (averages) for these investment costs, which must be used in the CBA.

### **Evaluation of benefits and costs**

The evaluation of benefits and costs depends on the chosen CBA evaluation approach. However, as discussed above the evaluation criteria for any of the three CBA approaches can be differentiated into:

- a monetary criterion; and
- a combination of monetary and non-monetary criterion.

For example, if the analysis allows all benefits to be monetised, only the monetary criterion is relevant. If augmented CBA or MCA is necessary, the combination of monetary and non-monetary evaluation criteria applies.

### **Monetary evaluation criterion**

There are various economic performance indicators (EPI) available to assess monetised benefits and costs:

- *Net Present Value (NPV)* – calculated by the aggregated discounted value of all monetary cash flows generated by the option considering monetised social welfare and costs. The unit of the NPV is € as at the date to which values are discounted;
- *Internal Rate of Return (IRR)* – calculated by the discount rate that produces a zero NPV. The unit of the IRR is %; and

- *Benefit / Cost ratio (B/C)* – calculated by the present value of economic benefits divided by the present value of economic costs. The B/C is a ratio.

We note that different EPIs may result in different “rankings” of options. In the case of two options, A and B, it is possible that:

- NPV:  $A > B$ ; and
- IRR:  $A < B$ .

Hence, in order to assess the options based on the economic performance indicators some further thought on the interpretation of the indicators is necessary.

The European Commission<sup>13</sup> (2008: page 211ff) states the following with regard to the relation between the three EPIs:

- “The **Internal Rate of Return** is an indicator of the relative efficiency of an investment, and should be **used with caution** ... If the sign of the net benefits, benefits minus costs, changes in the different years of the project’s lifespan there may be multiple IRRs for a single project. In these cases the IRR decision rule is impossible to implement. Examples of this type of project are mines and nuclear power plants, where there is usually a **large cash outflow at the end of the project because of decommissioning costs.**” (emphasis added)
- “There are many reasons in favour of the NPV decision rule. The **IRR contains no useful information** about the **overall economic value** of a project. ... **Welfare depends on NPV** not IRR.” (emphasis added)
- “Being a ratio, the indicator (**benefit-cost ratio, BCR**) does **not consider the total amount of net benefits** and therefore the ranking can reward more projects that contribute less to the overall increase in public welfare. The **appropriate case for using the BCR is under capital budget constraints.**” (emphasis added)

Hence, if social welfare matters then the NPV should be the relevant indicator. Therefore special attention should be placed on the NPV as the economic performance indicator (as opposed to IRR and B/C). Instead of the NPV, which is calculated over a certain time period, a simpler metric, the difference between the annual benefit and annuitized costs, could be used as a relevant economic performance indicator.

On the other hand, the IRR or the B/C ratio provide information as to the relative merits of the project which may be important when management time is limited, not just when there is a budget constraint. When management time is limited it may be better to spend that time on a small project with a high benefit to cost ratio than a large project with a small ratio.

Therefore, we suggest using the NPV or difference between annual benefits and annuitized costs as the primary economic performance indicator and turn to other metrics such as B/C ratio and IRR only if the primary measures do not sufficiently differentiate between options.

In addition, we note that the economic performance indicators (EPI) may also provide information as to the extent the benefits exceed the costs in order to assess the robustness of the results with regard to small variations in benefits and costs. The B/C ratio may be one option for this, e.g. a B/C ratio of 110% means that benefits exceed costs by 10%. Including total investment costs in addition to the NPV provides information about the relationship between the net benefit and the related investment costs, and could therefore be a second option. In addition, including results from sensitivity analysis adds further information about the robustness of the results.

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<sup>13</sup> European Commission, Guide to the cost-benefit analysis of investment projects – Structural Funds, Cohesion Fund and Instrument for Pre-Accession, 2008.

We note that this proposal may deviate from the ENTSO-E<sup>14</sup> guideline for the CBA for grid development projects, which does not explicitly include the NPV. The multi-criteria analysis for TYNDP/PCI projects discloses monetary socio-economic welfare and project costs separately, without calculating an economic performance indicator from benefits and costs.

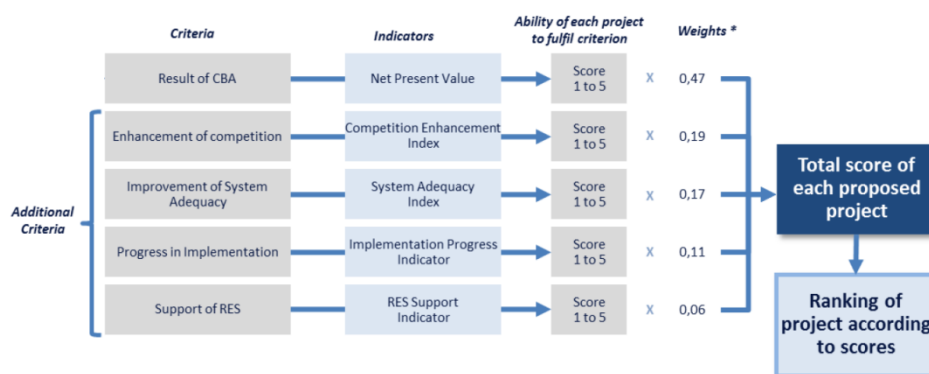
**Combination of Monetary and Non-monetary criterion**

The economic performance indicator can be combined with the non-monetary criterion in two different ways:

- **Combination without calculation of a final score** – this can be interpreted as a development of the current multi-criteria assessment for TYNDP/PCI-projects. Here the NPV for the monetised benefits and costs would be calculated and disclosed. Non-monetised benefits will still be assessed qualitatively, e.g. by a traffic light system. Although no final score consisting of monetary and non-monetary criterion is calculated a final assessment between different options is in principle be feasible. However, in the case of a negative NPV the comparison with business as usual is challenging and in the case of multiple options the choice between options is challenging.
- **Combination with calculation of a final score** – in order to combine monetary and non-monetary evaluation criteria (or indicators) into one final score it is necessary to:
  - define weights for the criteria (or indicators); and
  - transform the criteria (or indicators) into a uniform metric.

This can be illustrated by the approach from the Energy Community<sup>15</sup> in relation to the identification of Projects of Energy Community Interest.

**Figure 4. Multi-criteria assessment Energy Community**



Source: Energy Community

**Figure 4** includes one monetary indicator (Net Present Value) and four non-monetary indicators. These indicators are transformed into one common metric by assigning a score of 1-5 to the indicators. As a first decision the realisation of the indicators has to be allocated to the different scores. As a

<sup>14</sup> ENTSO-E, *ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects*, Nov 2013.

<sup>15</sup> DNV KEMA/REKK/EIHP, *Development and Application of a Methodology to Identify Projects of Energy Community Interest*, Report for Energy Community, 2013.

second decision weights have to be assigned to each indicator.<sup>16</sup> The score for each indicator multiplied by the respective weight result in the total score for the proposed options and can be used to rank the options.

We note that the MCA has its merits in particular:

- when a substantial part of the relevant criteria cannot be monetised; and
- objectivity of the evaluation results should be ensured at least by an objective formal approach to scoring.

However, the two decisions on the relevant scores and weights need to be based on a common understanding of all relevant stakeholders. In the above example, the impact on social welfare (measured by the net present value) is more than twice as important as the criterion “enhancement of competition” (0.47 vs. 0.19).

There are different possible approaches to determine the “weights” for the different indicators necessary to derive the final total score. Energy Community (2013)<sup>17</sup> used the Analytic Hierarchy Process (AHP)<sup>18</sup> to determine weights. The AHP allows subjective assessments of the relative importance of different indicators to be converted into a set of overall weights, using a pairwise comparison of all possible pairs of indicators. The fundamental input to the AHP is the decision maker’s answers to a series of questions of the general form, ‘How important is criterion A relative to criterion B?’.

In the first step, for each pair of criteria, the decision-maker is required to respond to a pairwise comparison question asking the relative importance of the two. Responses are gathered in verbal form and subsequently codified on a nine-point intensity scale (**Table 3**).

**Table 3. Analytic Hierarchy Process – preference ranking**

How important is A relative to B?	Preference index assigned
Equally important	1
Moderately more important	3
Strongly more important	5
Very strongly more important	7
Overwhelmingly more important	9

Source: Frontier Economics

If the judgement is that B is more important than A, then the reciprocal of the relevant preference index value is assigned to A. For example, if B is felt to be strongly more important as a criterion for the decision

<sup>16</sup> We describe these as sequential decisions. In reality, the choice of the approach to scoring each criteria and the weights given to each criteria may be related, e.g. to adequately capture the value of the likely variation between options regarding a criterion.

<sup>17</sup> See footnote 15.

<sup>18</sup> AHP is an accepted approach. Nevertheless, we note that some concerns have been raised about this approach (see for example: Department for Communities and Local Government, *Multi-criteria analysis: a manual*, page 129-130, 2009).

than A, then the value 1/5 would be assigned to A relative to B. For B relative to A the value 5 will be assigned.

In the second step a matrix including all pairwise comparisons is defined. This matrix is used to calculate the set of weights (two in the above example, one for A and one for B). This may be done in a number of ways. The basic method to identify the value of the weights is to use matrix algebra and calculate the weights as the elements in the eigenvector associated with the maximum eigenvalue of the matrix.<sup>19</sup>

Hence, the main task in the AHP is to determine the preference ranking of the different indicators (e.g. NPV, indicator for competition, indicator for technical impact). This preference ranking should be based on a consensual agreement of all relevant stakeholders. This should be done by asking the stakeholder for their preference ranking and then aggregating the rankings into weights.

Besides defining the weights it is also necessary to define the scores and to make transparent the criteria for assigning realisations of indicators to different values of the scores, e.g. an NPV between 0-1 million € gets a score 1, between 1-2 million € gets a score of 2, etc. Or, the score is equal to the monetary value for an option (including the counterfactual as an option) divided by the monetary value for the least cost option, etc.

### **Sensitivity analysis – dealing with uncertainty**

We discussed above that scenarios should be used to deal with uncertainty. In order to deal with uncertainty a sensitivity analysis is a useful component of the CBA.

As discussed further above, scenarios for the CBA are based on forecasts and estimates of a set of quantifiable variables. While these forecasts are considered to be the most probable, they may deviate from the actually realised values in particular if a long time horizon is used for the analysis. The variation of key quantifiable variables within a scenario allows evaluation of the impact on the net benefits of the option and the robustness of the results in relation to specific variables. This is particularly important if only one scenario is used for the CBA.

A second reason is uncertainty about costs. The result of the CBA depends on the costs, as well as the benefits. If a large upfront investment is necessary, evaluating the effect of variation in the investment costs provides valuable information about the robustness of the CBA results with respect to cost changes.

A further reason is uncertainty in other parameters used for the CBA. The time horizon and the discount rate used are further candidates for a sensitivity analysis. For example, extending the time horizon used to assess an option allows up front investment costs to be recovered via benefits over a longer or shorter period of time.<sup>20</sup> As a second example, changing the discount rate places more or less importance on up front costs relative to benefits that accrue further into the future.

To sum up, the goal of the sensitivity analysis is to find the range of variables that lead to a positive outcome of a CBA in order to understand the robustness of the analysis. If it is considered very unlikely that a variable would take on a value leading to a negative outcome for the CBA confidence can be gained that the conclusions drawn from the CBA are robust. This requires an understanding of the values at which critical variables would change the result of the analysis from being acceptable to unacceptable.

With regard to the pure CBA and the augmented CBA (monetised part) we propose that a sensitivity analysis be undertaken for the following parameters/variables capturing assumptions with high uncertainty, e.g. CO2 prices, and generic parameters, e.g. discount rate:

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<sup>19</sup> There is also an alternative approach consisting of three steps: (i) calculate the geometric mean of each row in the matrix; (ii) total the geometric means; and (iii) normalise each of the geometric means by dividing by the total. The weights estimated by the two different methods are not identical, but are typically very close.

<sup>20</sup> The effect of changing the time horizon by a year diminishes as the time horizon increases due to discounting. This limits the usefulness of extending the time horizon a very long way into the future.

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- discount rate;
  - time horizon;
  - investment costs and operating expenditures; and
  - key drivers of benefits, e.g. CO2 prices or fuel prices.

When it comes to the multi-criteria assessment an additional sensitivity analysis is necessary. In the sensitivity analysis the weights and scores assigned to the benefits/scores can be varied to understand how the preference ranking between options is affected by these factors. The following steps are undertaken to assess the sensitivity of the appraisal conclusions (i.e. total weighted scores) to the scores assigned to options. For each option:

- determine the agreed range of scores for each criterion;
- alter the score of the first criterion within its agreed range;
- repeat the analysis for scores of each of the other criteria; and
- note the implications for the total weighted benefit score when all scores for the option are at a maximum and when they are at a minimum.

However, we note that sensitivity analysis in the context of the MCA can become complex if sensitivities to changes to scores and weights are combined with sensitivities to parameters (discount rate, fuel prices etc.) that affect individual benefits and costs.

### Data collection

The data collection process can vary depending on which CBA it concerns. Nevertheless, there are some principles that each data collection process should follow:

- **Clearly define data collection process** – the data collection process should be defined in terms of the responsibility for data definition, data collection, data validation, running the consultation and determining the final data set. The process should also define timescales and interaction with stakeholders. We expect ENTSO-E would have a central role in defining the data collection process and its members a central role in applying the process.
- **Data definition** – it is essential to have a common definition of the data which need to be collected. This ensures the comparability of results. For example, ISP harmonisation may result in certain one off cash costs in scheduling and settlement systems. Hence, a standardised definition for “scheduling and settlement systems” is necessary.
- **Data sources** – it is important that the data are collected from a widely accepted source. When it comes to cost data, e.g. for scheduling and settlement systems, this source may be TSOs and other balancing responsible parties. When it comes to market data, e.g. on demand, generation capacity, etc., the TYNDP dataset may be the most appropriate source. In addition, public institutions, e.g. Eurostat, and/or private institutions, e.g. IEA, may be used.
- **Transparency in data collection** – the data collection process should be transparent and the collected data and data sources should be disclosed to all relevant stakeholders.
- **Data validation** – special emphasis should be put on the data validation process. The party collecting the data should undertake the validation. In the case that cost data from TSOs and/or BSPs are

collected, this would include *inter alia* validating whether reported data followed the data definition, whether there are data outliers and identifying the reason for the outliers. Validation should also include reporting cost ranges. Ranges could also be reported if different data sources are used e.g. for market data. The data validation process should end with a draft disclosed data set that is open for consultation.

- **Data consultation** – all relevant stakeholders should have the opportunity to cross-check and comment on the draft data set. Hence, stakeholders may provide opposing data sets, their own sources and arguments as to why their opposing data set is preferable. However, the question arises as to who should participate in the data consultation process. For example, should stakeholders from region A be able to validate data used for the CBA in region B? If the CBA in region B has an impact on region A then stakeholders from region A should be part of the consultation process.
- **Data determination** – after evaluating the submissions made as part of the data consultation process, the party collecting the data should disclose the final data set and report how the submissions were taken into account (or the reasons why they were not taken into account).

### Results of CBA

There are various issues that arise regarding the reporting and interpretation of the final results from the CBA, which we discuss below.

When interpreting the outcome of the CBA one has to make a distinction between two types of measures:

- **Primary measures for decision making** – these measures are relevant for choosing the “best” option from among the analysed options (including the option of doing nothing). This includes, for example, the total net present value in the case of the Pure CBA and Augmented CBA, the final score from an MCA or the results from sensitivity analysis.
- **Measures for informative purpose** – these measures give further detailed information which may be of interest for stakeholders, but should not have a direct impact on decision making. This shall at least include reporting on the distributional effects on regions, countries and optionally on producers, consumers, etc., of each of the options analysed.

As the main objective of the NC EB is enhancing total pan-European welfare we propose to use the net present value as the primary measure for the monetary economic performance indicator for decision making. Hence, we propose to turn to other metrics such as benefit/cost ratio and IRR only if the primary measures do not sufficiently differentiate between options. We note that these other measures include additional information on the extent to which the benefits exceed the costs, e.g. benefit/cost ratio. However, the robustness of the results, which is determined by how far the benefits exceed the costs, can also be illustrated by other means, in particular, sensitivity analysis.

Using more than one scenario may result in different outcomes for the primary measures. This is an issue if the outcome for one scenario reports a positive welfare effect and for the other scenario a negative welfare effect. This is also an issue if the choice of scenario changes the ranking of options, in the case of multiple options. As discussed further above, we propose to use the weighted sum of net benefits from different scenarios to evaluate the option, and to use equal weights for the scenarios. In addition, the results for the two scenarios and the different planning cases should be reported separately.

In order to assess the robustness of the results we propose to apply sensitivity analysis. The sensitivity analysis may show that:

- The change in net benefit of all options with regard to changing one input parameter shows the same pattern. Hence, if option 1 ranks better than option 2 in the base case, the ranking does not change after the sensitivity analysis. The ranking is therefore robust to a change to the input parameter.

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- The change in net benefit of with regard to changing one input parameter shows different patterns for different options. For example, option 1 may be more sensitive to changing the discount rate because the cost and revenue stream occurs later than for option 2. This may have the consequence that option 1 ranks better than option 2 in the base case but behind option 2 with a change to the input parameter. In this case understanding the expected outcomes may be appropriate. By this we don't mean setting the input parameter to its expected level and seeing the result. Rather we mean applying the sensitivity analysis to the input parameter and obtaining the range of results, and from this understand the expected result.<sup>21</sup> We note that this adds complexity to the analysis as explicit or implicit understanding of probability distributions for parameters used in the sensitivity analysis will be necessary.
  - The net benefit of an option changes from positive to negative (or vice versa) when one input parameter is changed. For example, the positive welfare effect of option 1 is small and becomes negative with a small change to one input parameter. In this case expected measures (or confidence intervals) may be appropriate.
  - The net benefit of an option changes remains positive (or negative) when one input parameter is changed. In this case the option is robust to changes in the input parameter.

It is outside the scope of the CBA methodology to provide guidance as to how informative measures should be used, e.g. for the design of compensation payments between countries or stakeholders.

## Define process of CBA

Structuring the process of the CBA includes two main tasks:

- defining objectives of stakeholder involvement; and
- defining the various steps of the CBA and the interaction with stakeholders.

We note that it is necessary to define an approach for dealing with the different views that may be expressed in the consultation process. The principle rule here should be that all decisions and the rationale for the decisions should be communicated in a transparent way. This means that a stakeholder with a dissenting opinion can understand the reasoning for the decision even if they don't agree with it.

### Defining objective of stakeholder involvement

Stakeholder involvement can begin at different stages of the process:

- **At the end of the CBA process** – in this case stakeholders would be asked whether they agree with the results. The main objective here is to get agreement on the overall result without interacting with stakeholders as to how this result was reached.
- **At each step of the CBA process** – the main objective here is to get input from stakeholders on various issues related to the CBA, so that stakeholders can help to define the CBA by involvement throughout the process. The involvement throughout should increase stakeholders' understanding, buy-in and trust in the final results of the analysis.

We note that as a positive CBA will have a substantial impact on all relevant stakeholders an early involvement has its merits, so that all stakeholders buy-in to the process and the result. In particular, in the case that the default evaluation approach is an MCA the early involvement of stakeholders is necessary to

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<sup>21</sup> In the case of a non-linear process the output when the expected (average) input is applied may differ from the expected (average) output when the full range of inputs is applied.



get agreement on the scores and weights applied to certain benefits and costs. The same holds for the definition of scenarios.

However, stakeholder involvement also comes at a cost as it may delay the decision making process itself. In addition, dealing with very specific questions, e.g. setting up modelling tools, can be very complex and time consuming. Hence, stakeholder involvement must not interfere overly in the day-to-day business of stakeholders. A balance has to be found between involving and bothering stakeholders.

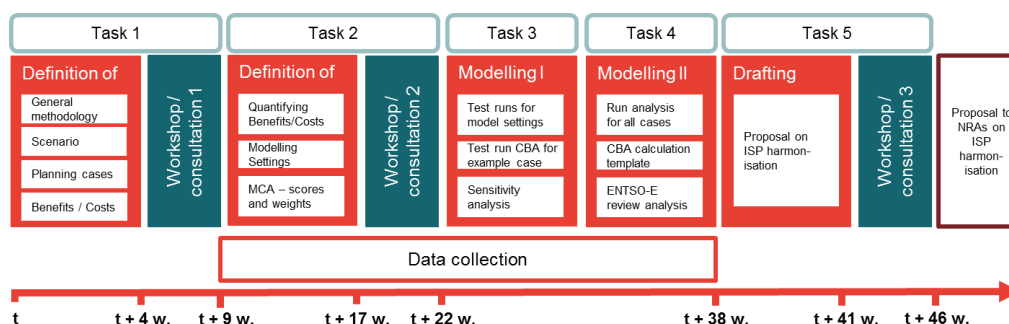
This means that the general principle should be to start stakeholder involvement and/or consultation if there is something to consult on. If the consultation causes delays, project management should have an appropriate amount of flexibility to shift work tasks without jeopardising the overall process.

### Defining steps of the CBA and the interaction with stakeholders

In the following we describe the process for a CBA, using the CBA for ISP harmonisation for illustrative purposes (**Figure 5**). We note that various CBA processes have already been established by ENTSO-E, e.g. TYNDP, and PCI.

The time schedule illustrated in **Figure 5** is relatively ambitious and hinges on various assumptions, e.g. with regard to the ease of scenario definition and availability of modelling tools. To illustrate the entire process, the timeline begins with the definition of the CBA methodology and planning cases. In the case of the CBA for ISP harmonisation, the CBA methodology and definition of planning cases will already have been established prior to beginning the CBA, i.e. the timeline would begin from task 2.

**Figure 5. CBA Process and time schedule**



Source: Frontier

- **Task 1:** includes defining the general CBA methodology, scenarios, planning cases and benefits and costs. The definition of benefits and costs mainly focuses on conceptual assessments, e.g. scoping of benefits (costs) and identifying how they may be quantified. Task 1 ends with a consultation and a workshop. In **Figure 5** we allow 9 weeks for this task. 4 weeks are allowed for work on the content of the methodology and 5 weeks for the consultation. We note that the time required for this task depends largely on the assumption that stakeholders agree on using scenario definitions that already exist, e.g. from the TYNDP process. If this is not the case a substantial extension of the time required for this task is likely.
- **Task 2:** is the starting point for data collection with regard to benefits, costs and scenarios. In addition this task includes the definition of the model setting necessary to monetise benefits. With regard to model setting ENTSO-E should assess whether existing models can be used for the CBAs under the NC EB, for example, whether modelling tools used for TYNDP calculations are applicable. We note that defining scores and weights for a MCA is a complex task, which should be started in task 2 after the benefits and costs have been defined. Task 2 ends with a stakeholder consultation and a closing

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workshop. In **Figure 5** we allow 13 weeks for this task. 8 weeks are allowed for work on the content of the methodology and 5 weeks for the consultation.

- **Task 3 – Modelling I:** includes setting up the preliminary model and undertaking test runs of the model and analysis. Test runs are necessary to evaluate the soundness of the model, analytical approach and data. In order to assess how the model works in practice selected case studies may be defined for a preliminary CBA. This should also include sensitivity analysis. Depending on the progress of this task a stakeholder workshop presenting preliminary modelling and CBA results could be organised. We would suggest this phase allows some flexibility over whether to hold this workshop, as it only makes sense if preliminary and reliable results can be presented. In **Figure 5** we allow 16 weeks for Task 3 and 4. We note that this time schedule depends on the assumption that existing modelling tools of ENTSO-E and/or TSOs are used for the analysis. If the development of a modelling tool is necessary, a substantial extension of the time schedule would be necessary.

- **Task 4 – Modelling II:** includes applying the final modelling tool or analytical approach, data and CBA template. There are in principle two options for this:
  - open access to the ENTSO-E modelling tool and analytical process and data which all market participants can use for their own analysis; or
  - calculation by ENTSO-E on behalf of market participants.

ENTSO-E does not need to decide the approach to accessing the model at the start of the CBA process – it could decide this at the beginning of task 4.

- **Task 5 – Drafting proposal:** includes drafting the decision proposal to NRAs. We allow 3 weeks for this task, plus a 5 week consultation period on the draft CBA report. Following the consultation period a further 2-3 weeks should be allowed to revise the report and the decision proposal to NRAs.