ACER
Agency for the Cooperation of Energy Regulators

'COST-BENEFIT ANALYSIS METHODOLOGIES FOR ELECTRICITY TRANSMISSION INFRASTRUCTURE AND SCENARIOS FOR ENERGY AND POWER SYSTEM PLANNING'

WORKSHOP ON SCENARIOS AND COST-BENEFIT ANALYSIS METHODOLOGY FOR ASSESSING ELECTRICITY INFRASTRUCTURE PROJECTS

Part A: Scenarios Development Methodology

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Formulation of visions – Governance of process

Issues

- Selection of basic parameters (e.g. climate targets and strength of European Governance) difficult to justify, especially without considering an integrated assessment of the whole energy sector
- Other activities for the development of scenarios for the future EU energy outlook entailing integrated assessment of the whole energy sector
- Strong energy policy dimension in determining scenario parameters and targets, including the interaction of energy sectors (e.g. climate, gas – electricity, etc.)

Recommendations

- Closer collaboration with bodies oriented more closely to policy development / assessment (e.g. IEA, EC, etc.) – especially for the longer term period
- More active role of EC and Member States, potentially undertaking the definition of scenarios, with ACER/NRAs having a major consultative role

Formulation of visions – Number of visions

Issues

- Extensive debate on the “envelope” of future power system states formed by the adopted 4 scenarios / visions
- Difficulty in assessing the probability of each vision / scenario

Recommendations

- Considering a “Best – Estimate” scenario, based on assessment of a “most – likely” development of key scenario parameters over the studied period and
  - assessing a value range for the key parameters of the Best Estimate scenario
  - Performing sensitivity analysis on the basis of the value range of the key parameters

Definition of scenario parameters

Issues

- Only high level information on scenario parameters provided in “TYNDP 2016 Scenario development report”
- Lack of quantitative information on several scenario parameters – parameters presented in qualitative terms (e.g. Economic conditions: Least / Less / More favourable, Focus on R&D: National / European, etc.)
- Unclear definition and quantification of certain scenario parameters (e.g. Demand response / smart grids: As of today 0% / partially used 5% / Fully used 20%, etc.)

Recommendations

- More comprehensive reporting on the scenario assumptions definition and quantification

Methodological Aspects: Bottom up / Top Down Scenarios

Issues

- Unclear process of formulation of bottom up scenarios at the TSO level e.g.:
  - Assumptions adopted at the TSO level
  - Compatibility of assumptions among TSOs
  - Level of harmonization with national policies
- Overall top-down approach steps well defined and justified
- Some unclear points on data / specific methodologies used for implementing certain steps of the top down methodology, e.g.:
  - Interconnection capacities assumed in top down scenarios
  - Future Locational Marginal Costs of Production (LMP): No information on calculation methodology, lack of LMP assessment data (critical for new RES allocation)

Recommendations

- Development of guidelines for bottom up scenario formulation by the TSOs
- More comprehensive reporting on the methodology used for the implementation of each step of the top-down approach

Time Frame of Scenarios

Issues

- Assessment of scenarios only for 2020, 2030
- Use of interpolation for the in between years seems questionable given the long time period
- Scenario assessment for additional time points shall also contribute towards more comprehensive CBA results

Recommendations

- Consideration of 2025 (at least) in scenario assessment

Assessment of electricity / gas (and other fuels) interaction

Issues

- Assessment of electricity demand does not seem to take into account the dynamics of electricity / gas and other fuels sub-sectors interaction
- Separate development of gas and electricity scenarios on alternating years does not allow for an integrated assessment of electricity / gas interaction
- Difficult to assess the consistency of gas / electricity scenarios
- Lack of consideration of Energy / economy interaction (e.g. demand elasticity, fuel competition, etc.)

Recommendations

- Joint development of scenarios with ENTSO-G
- Consideration of overall electricity (and other fuels) demand assessment on the basis of an energy / economy modeling approach

Consistency with National Views and EC expectations

Issues

- Scenarios are developed utilizing a multitude of sources, including data provided by TSOs
- A single comparison with regard to the total electricity demand against the 2030 snapshot of EU trends to 2050 and the IEA WEO 2014, is reported
- Need to cross check consistency of scenario results with:
  - Relevant national plans
  - EC adopted scenarios for the future EU energy outlook

Recommendations

- Comprehensive comparative assessment at least with the EC adopted scenarios should be performed

Smart Grids / Demand Response:

Issues

- Smart Grids / Demand Response shall be a necessary prerequisite for the integration of a high share of RES
- DSOs are going to have an upgraded role in the coming years
- Current consideration of smart grids / demand response in 2016 scenarios is unclear (defined only as 5-20% in the scenario assumptions)

Recommendations

- More information, methodological approaches to be applied, etc. should be developed / provided
- Involvement of DSOs in an issue that should be assessed

Scenario Results Reporting

Issues

- 2016 Scenario Development Report provides scenario results with regard to 2020/2030 electricity demand, installed capacities per technology and electricity generation per technology
- Additional information would increase transparency and value of the Scenario Report to stakeholders

Recommendations

- Provide more comprehensive scenario results, e.g.:
  - Imports / exports between MS
  - Peak loads
  - Equivalent operating hours of thermal power plants
  - Results of demand side measures, etc.

Streamlining of Stakeholder involvement

Issues

- In general, the overall level of consultations carried out for the 2016 Scenarios development seems adequate
- It is unclear though which inputs from the 2030 Visions questionnaire and the 2030 Visions data consultation have been taken into account

Recommendations

- An explanatory document could be issued (at the beginning of the process) addressing issues, such as:
  - Methodology for consideration of stakeholders' input, including treatment of 'inconsistencies' in forecasts provided
  - Decision making process in each step of the scenario building
  - Details / Explanations on data to be or not be shared with stakeholders, etc.

Concluding overview of scenario development recommendations

Shorter term

- Stronger co-ordination with ENTSOG on scenario development
- Streamlining the consultation process
- Harmonisation of bottom up process at the level of TSOs
- Clarifications / improvements on top-down methodology

Longer term

- Use of a Best estimate scenario with variation range combined with sensitivity analysis
- Active involvement of EC and MS, with consultative role of ACER / NRAs
- Development of scenario(s) on the basis of an integrated energy/economy modelling approach, considering at least 5-yearly time points, for the whole of the energy sector, as basic input for further assessment by ENTSO-E(G) for TYNDP purposes

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Part B: CBA Methodology

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Assessment Process: TOOT / PINT

Issues

- Adopted TOOT (Take one out at the time) approach implies a stronger network, thus it tends to downsize the impact of a project to the system
- PINT (Put in one at the time) approach, implies a weaker network and thus it tends to oversize the impacts
- TOOT seems more appropriate for longer term commissioned projects, while PINT for the shorter term

Recommendations

- For selected projects commissioned in the short term, assessment using both methodologies is recommended as it could provide useful insight on the relative scale of their impact
- In case that a TOOT is used, this could be done using the closest to the commissioning time available reference network

Assessment Process: Clustered projects

Issues

- Current quantitative rules for clustering seem arbitrary
- As clustering typically contributes to enhancement of the resulting benefit of the project, clustering approach should be more elaborate

Recommendations

- Clustering rules should provide a motivation for promoters to align the relevant projects. A tighter time gap between projects should be considered. However, the promoters should be allowed to provide justification in case of not fulfilling this condition for ENTSO-E to decide whether this is acceptable

Assessment Process: Time horizon and CBA assessment

Issues

- CBA typically entails the assessment of a time series of benefits and costs over the time period analysed. TYNDP 2014, provides CBA indicators only for 2030.
- Extrapolation of CBA indicators on the basis of 2030 values does not seem adequate, in order to assess PV benefits and costs

Recommendations

- Additional time points for assessment of scenario and CBA results should be considered
- Calculation of Present Value should be considered for applicable CBA indicators
- Potential for an assessment of qualitative CBA indicators, representative of the whole period of analysis should be investigated

Assessment Process: Network Studies

Issues

- Significant number of network studies is performed for assessing indicators B4-Variation in losses and B6 – Technical Resilience
- Calculations proposed with regard to B6, e.g. distance to voltage collapse calculations require great effort, while the uncertainties on the assumptions which are used, makes results highly debatable.
- Overall, assessment of B6, given the time distance to the year of analysis (2030), seems of limited relevance with regard to the purposes of TYNDP, disproportional to the effort spent, and of low importance for the overall CBA

Recommendations

- Purposefulness of B6 should be reconsidered

Assessment Process: Market Studies

Issues

- Market studies provide main inputs for the calculation of CBA indicators, however the relevant methodology is not discussed in CBA Methodology document
- Several different S/W tools are reported being used by Regional Groups for the performance of market studies, thus creating risks for inconsistencies of results, and imposing additional work load for their alignment
- Market studies are performed based on regional data only

Recommendations

- ENTSO-E proposes a common methodology and, preferably a common S/W tool to be used by the Regional Groups for the performance of market studies

Assessment Process: Grid Transmission Capacity (GTC)

Issues

- GTC is a core element in CBA, as it used in several calculations / assessments performed for the purposes of CBA
- The calculation of GTC is described very briefly in CBA methodology, and the implementation of the calculation proposed is quite unclear

Recommendations

- More information is provided on GTC calculation
- Relationship of GTC and NTC is explained
- Utilization of harmonized “flow-based” methodologies is proposed at least for the calculation of the GTCs

Assessment Process: Storage Projects

Issues

- Storage projects will be of high and increasing importance as RES penetration increases
- It is understood that in TYNDP 2014 ENTSO-E has used the same cost and benefit indicators for assessing both transmission projects and storage projects, which is a reasonable approach
- CBA methodology however, does not seem able to capture the capacity / ancillary / flexibility benefits of storage or at least it does not provide any relevant information

Recommendations

- ENTSO-E proposes a general methodology on the modelling and simulation of storage projects in the market studies

CBA Indicators: B7: Flexibility

Issues

- CBA methodology states that indicator B7 assesses the ability of a project to be adequate in different possible future development paths or scenarios, including trade of balancing service, through 3 KPIs
- B7 indicator seems to attempt to capture a diverse range of quite complex aspects
- The relevant methodology for the assessment of B7 as presented in the CBA methodology document is unclear and seems to rely on the expert judjment of TSOs

Recommendations

- Indicator B7 is repassed in order to become more focused
- The impact of a project on ancillary services is a quite complex issue and should be dealt through a new indicator, under a methodology that should be developed
- B7 could be reassigned to assess the adaptability of a project into future system conditions, i.e. the various scenarios
- Such assessment could be based on the calculation of the variation of the assessed benefits of the project across all scenarios considered, the lowest value representing higher adaptability

CBA Indicators: B1: Security of Supply (SOS)

Issues

- SoS indicator is not monetized, and will be when the relevant CEER methodology is applied by MS
- Quantification of SoS indicator at the project level is a difficult task, while the relevant results are usually negligible for new projects added to a well meshed networks, as is the case for the majority of the TYNDP projects. This is probably the reason of zero value of SoS indicator reported for a lot of projects in TYNDP-2014.
- However, it is not certain that the impact on security of supply of the whole TYNDP is also negligible, and this could be a useful information for the TYNDP

Recommendations

- Gradual monetization of SoS can be accomplished by using an EU-Wide or regional VOLL, until national VOLL become available
- Limitation of SoS Indicator calculation to individual projects which severely affect the network structure, e.g. radial new connections or new connections to weakly connected areas. A methodology for case selection could be defined by ENTSO-E
- SoS is calculated for the whole of the TYNDP, and is used by comparing the LOLE in the target network to the LOLE with regard to the network of today

CBA Indicators: Assessment of Environmental Benefit

Issues

- Environmental Benefit is currently based on the basis of the avoided CO2 costs from avoided thermal generation (which are integrated in the calculation of Social Welfare – B2 indicator)
- The environmental benefit of avoided thermal generation should be rather based on the external cost of thermal electricity that includes which is not properly captured by CO2 cost
- Subsequently, it is considered that the environmental benefit is underestimated by the current methodology

Recommendations

- Calculation of environmental benefit taking into account the external cost of avoided thermal generation

Availability of CBA data

Issues

- Access of stakeholders to background data used for CBA calculations is very important for reasons of transparency of results
- CBA results is also a main criterion in the PCI selection process, thus increasing the need for transparency
- Transparency is also required as TYNDP includes as well projects promoted by 3rd parties (i.e. TSO which are not ENTSO-E members, or entities that do not hold a transmission license, e.g. merchant lines, promoters of storage projects, etc.)

Recommendations

- ENTSO-E establishes a roadmap for making publically available all the necessary data for the CBA, considering the potential confidentiality issues

Concluding overview of CBA methodology recommendations

Shorter term

- Revised Rules for clustering
- Clear definition of GTC and its calculation methodology
- Reassessing the purposefulness of B6-Technical Resilience indicator
- Reconsideration of definition / content of B7-Flexibility indicator
- Monetisation of B1-SoS indicator
- Use of external cost of thermal electricity as basis of the environmental benefit

Longer term

- Making CBA background data publicly available
- Assessing CBA indicators for more time points in analysis period and assessing PV on indicators applicable
- Adopting a common S/W tool / methodology for market studies
- Developing methodology and adopting a relevant indicator for assessing impact on ancillary services
- Storage projects assessment methodology

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