ENTSO-E Cost-Benefit analysis methodology for Electricity projects

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ENTSO-E Regional Group Baltic Sea Stakeholder workshop

March 18th 2014, Stockholm

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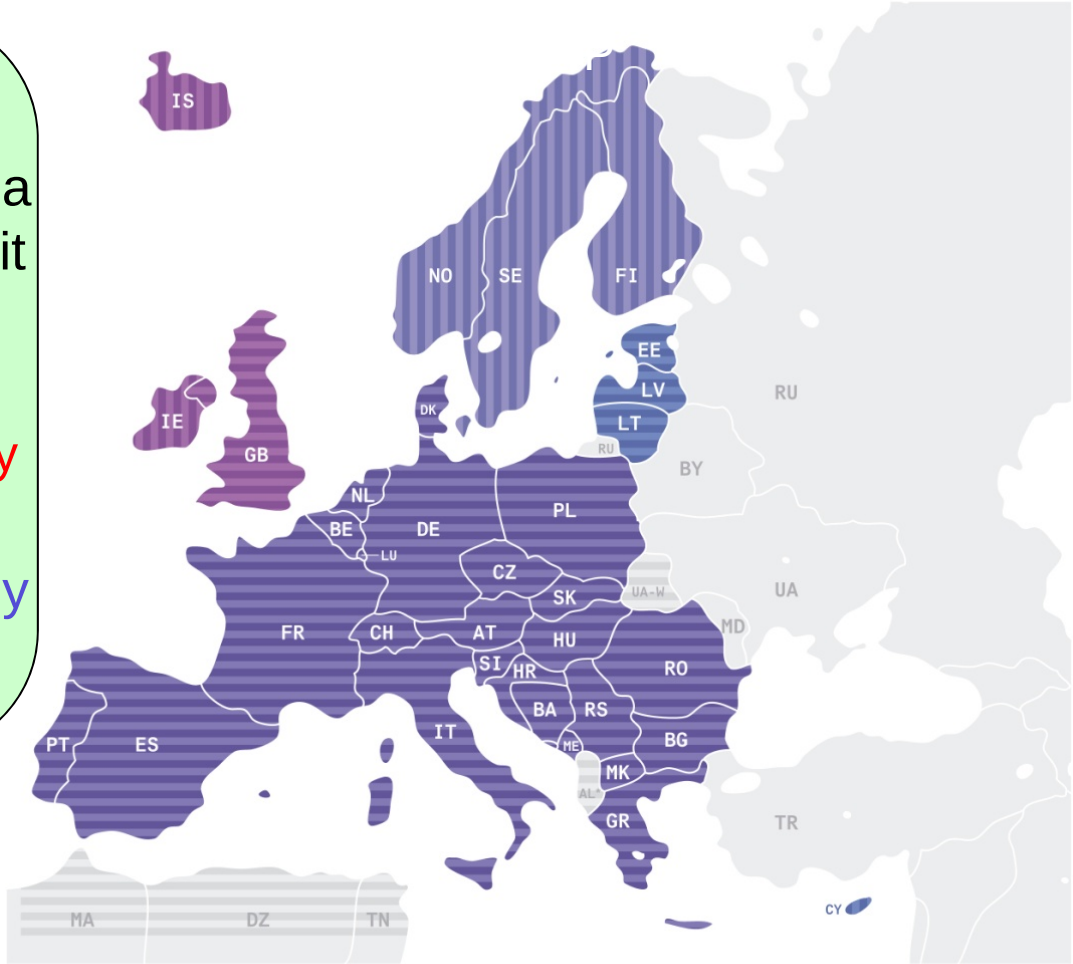
European power system

Objectives of EU networks :

- ensuring the development of a single European grid to permit the 20-20-20 objectives
- guaranteeing security of supply
- completing the internal energy market



Regulatory Framework

Regulation 347/2013 mandates ENTSO-E to:

- Deliver a methodology for a **harmonised energy system-wide cost-benefit analysis at Union level** for projects of common interest, including on network and market modelling
- Make ENTSO-E **TYNDP sole basis** for selection of electricity projects of common interest (PCI)
- Deliver a consistent and interlinked **electricity and gas market and network models**, jointly with ENTSO-G, including both electricity and gas transmission infrastructures covering the energy infrastructure priority corridors

Mandatory for TYNDP 2016

Objectives of a system wide CBA methodology

Giving Transparency on TYNDP projects assessment

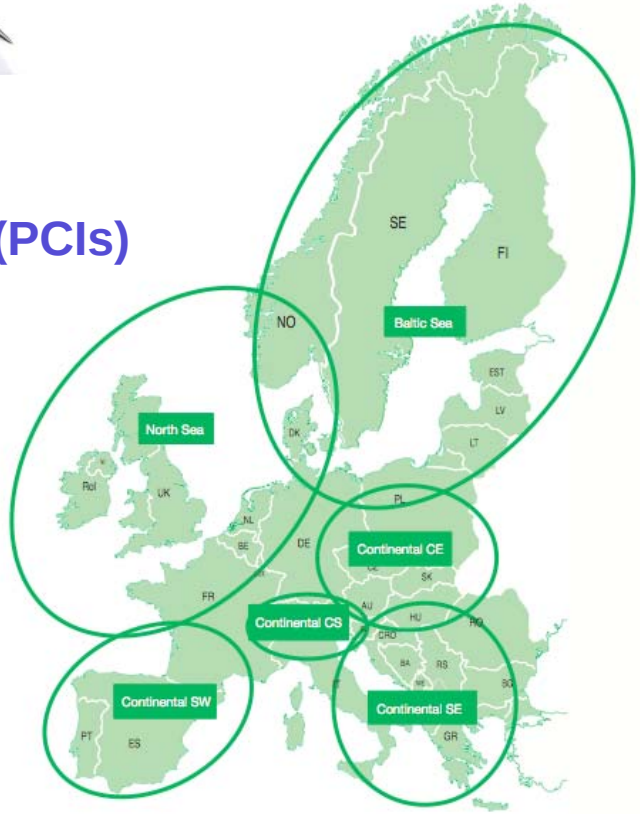
- Harmonized EU energy system-wide CBA
- Demonstrate overall costs and benefits from a Pan-European system perspective

Supporting Selection Projects of common interest (PCIs)

- PCI Selection process will take into account ENTSO-E CBA results in TYNDP

CBA as possible input to decision-making process

- CBA results as one of possible input for Cross Border Cost Allocation (CBCA)

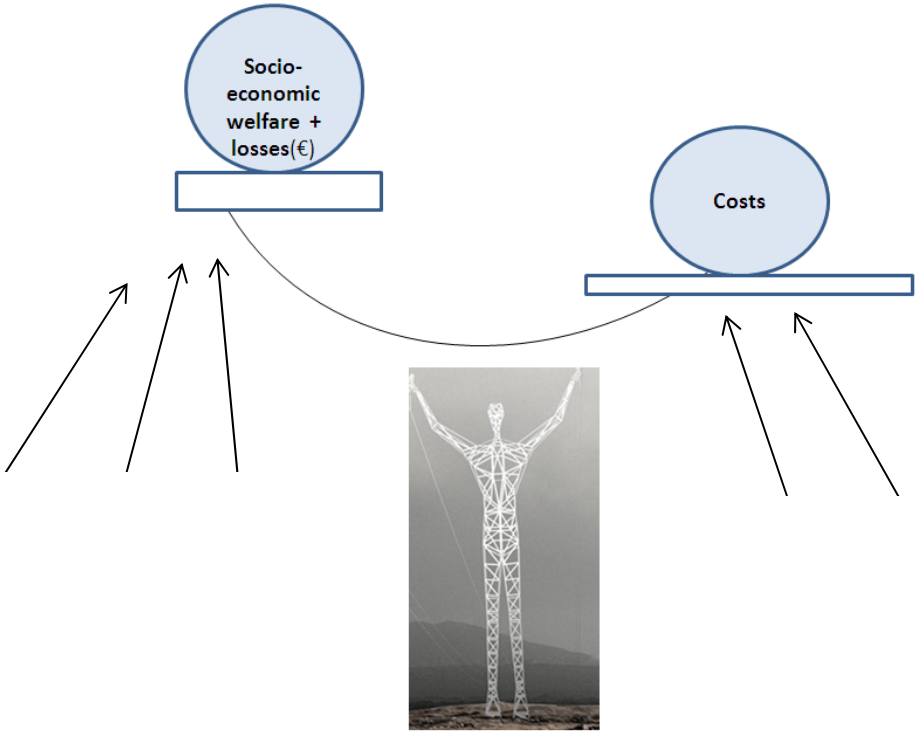


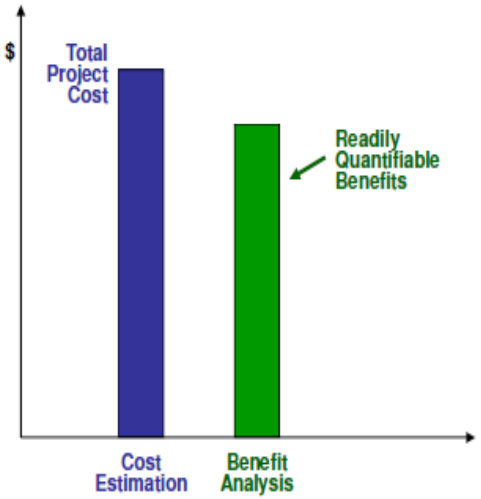
Tool to assess all Pan-EU development projects

General approach to CBA: get the balance right

Project Assessment

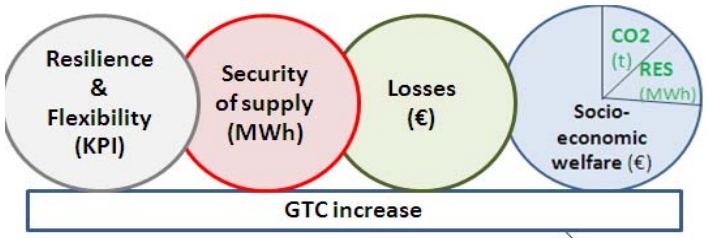
Balancing exercise

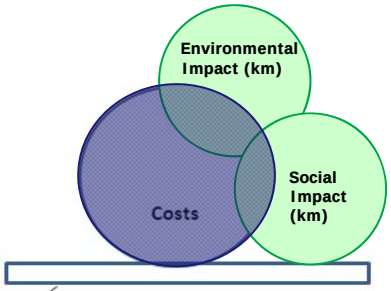




How to ensure that benefits outweigh costs ?

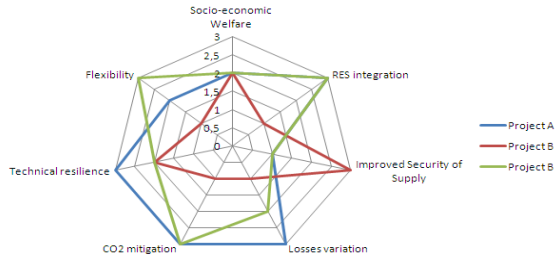
Benefits/Costs Computation





Results Presentation

Criteria	Grid Transfer Capability Increase	Socio-economic Welfare	RES integration	Improved Security of Supply	Losses variation	CO2 mitigation	Technical resilience	Flexibility	Social and environmental Impact	Project costs
	MW	M€/year	MWh/year	MWh/year	M€	Mt				M€
Project A	1000	90-150	500-550			0,5-0,6	+++	++		650-700
Project B	500	30-50		3000	20-30		++			25
Project C	800	225-30	3000-3500		10-20	1-1,5	++	+++		150



Best&most complete information for stakeholders and decision-makers

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Project Assessment methodology

TOOT – Take Out One at a Time:

- Project assessment in most plausible future
- Conservative approach
- Reference network: «all-projects-in» considering needs on each border

Clustering: basic rules

- Project assessment in most plausible future
- Conservative approach

Maybe some needs for adaptations:

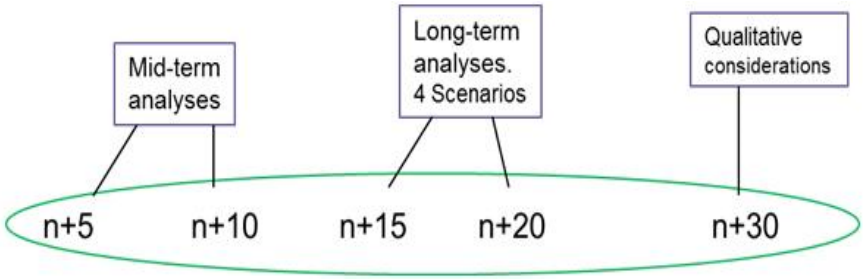
- In case of non-mature projects
- Accordance to Scenarios

Full developed European Transmission grid

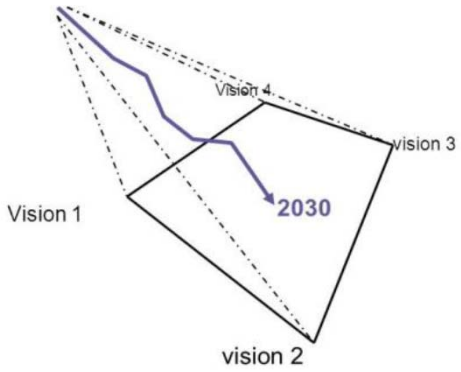
Equal treatment assured for both TSOs and third Party Projects

How to address uncertainties: scenarios & time horizons

Time horizon



Scenarios



TYNDP 2014:
4 Scenarios for one time horizon

TYNDP 2016:
Scenarios and at least two time horizons

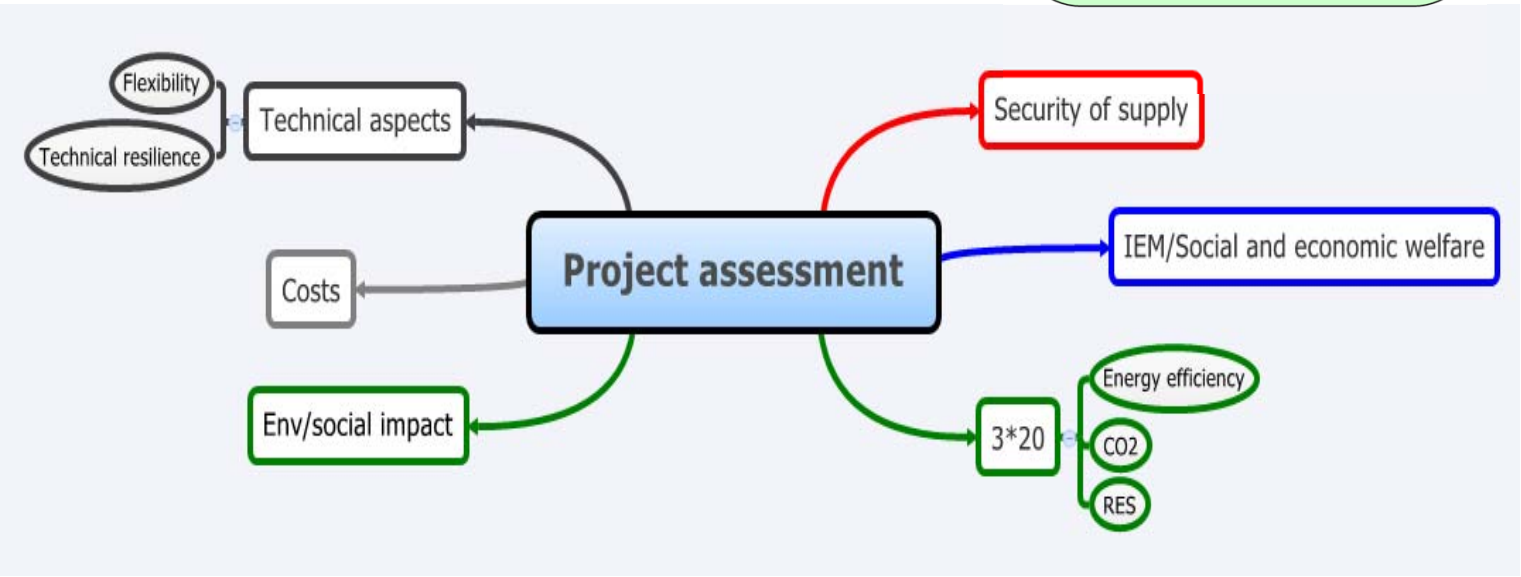
Sensitivity analysis
- Range of values

CBA quality depends mainly on quality of input assumptions !

CBA-Assessment Summary

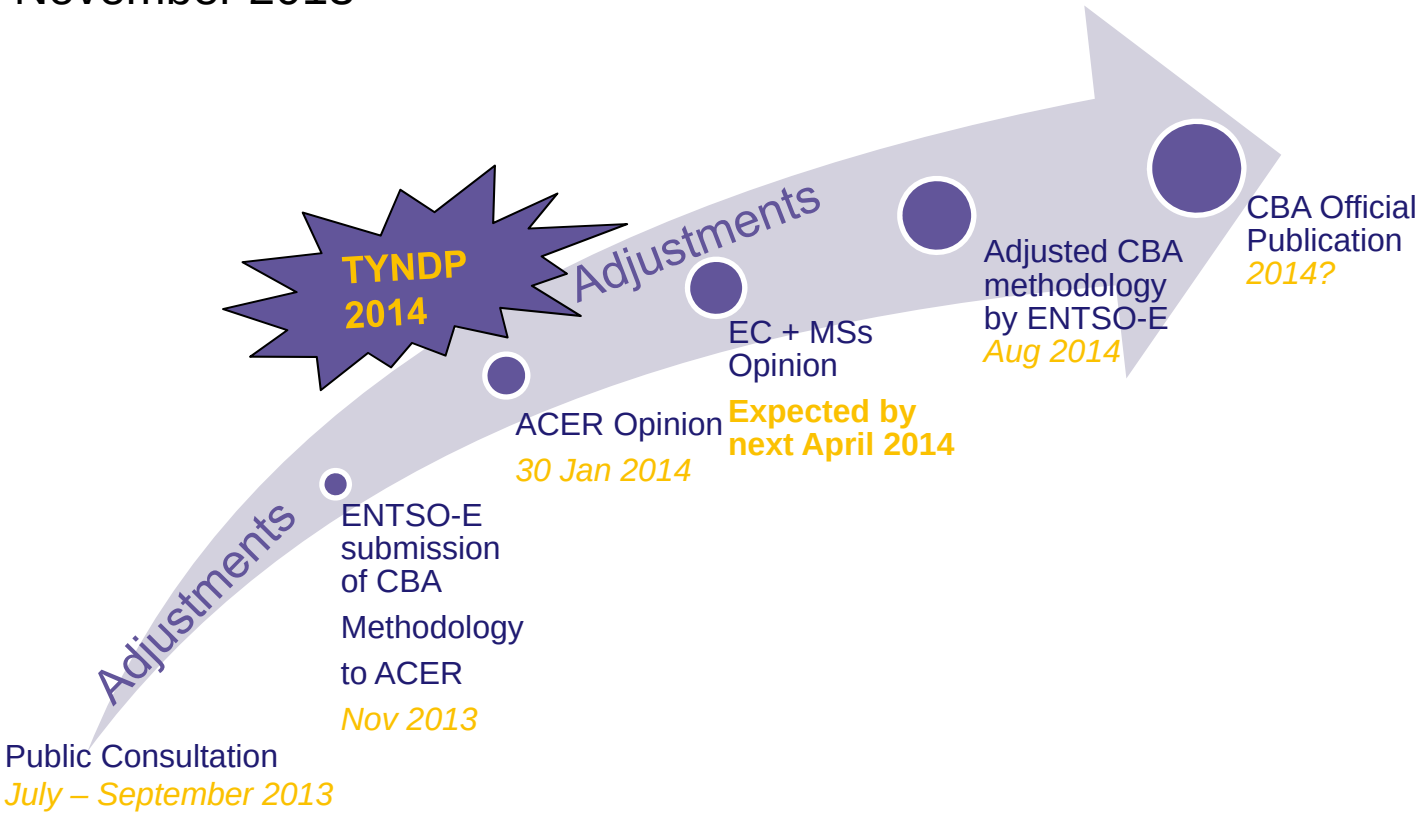
Objectives of EU networks:

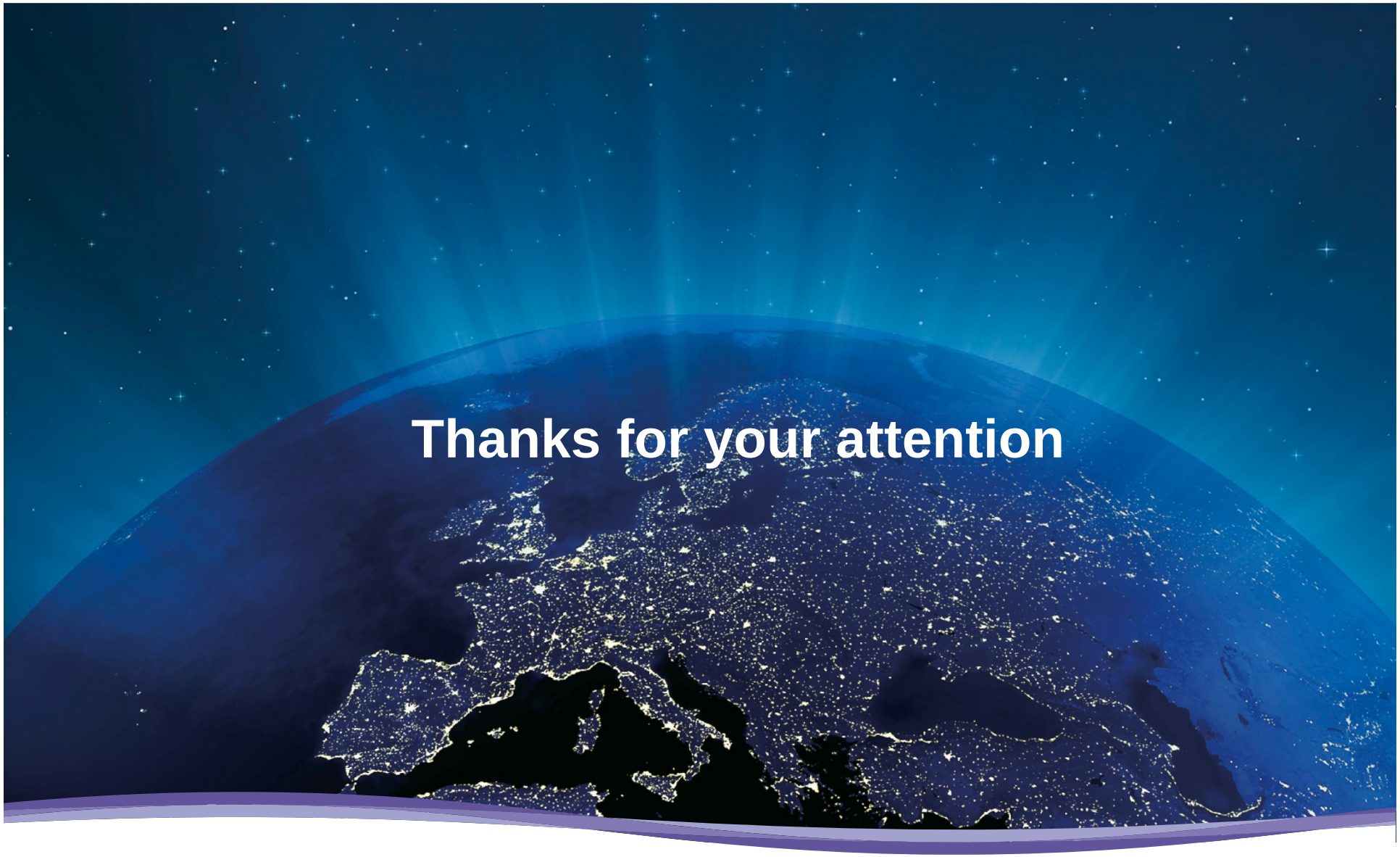
- 20-20-20 objectives
- security of supply
- internal energy market



Finalization of ENTSO-E CBA Methodology

In compliance with Regulation 347/2013, ENTSO-E submitted its CBA Methodology to Member States, the Commission and ACER for their relevant opinion on 15 November 2013





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Benefit Indicators

B1. Security of supply is the ability of a power system to provide an adequate and secure supply of electricity in normal conditions.

B2. Social and economic benefit on electricity markets is characterised by the ability of a power system to reduce congestions and thus provide an adequate grid transfer capability.

B3. RES integration. Support to RES integration is defined as the ability of the system to allow the connection of new RES plants and unlock existing “green” generation, while minimising curtailments.

B4. Variation of losses (energy efficiency) is the ability to minimise thermal losses in the power system.

B5. CO2 emissions is a result of B2 and B3 (unlock of carbon-free generation), as well as B4.

B6. Technical resilience/system safety is the ability of the system to withstand increasingly extreme system conditions (exceptional contingencies).

B7. Flexibility is the ability of the proposed reinforcement to serve in different possible future development paths or scenarios.

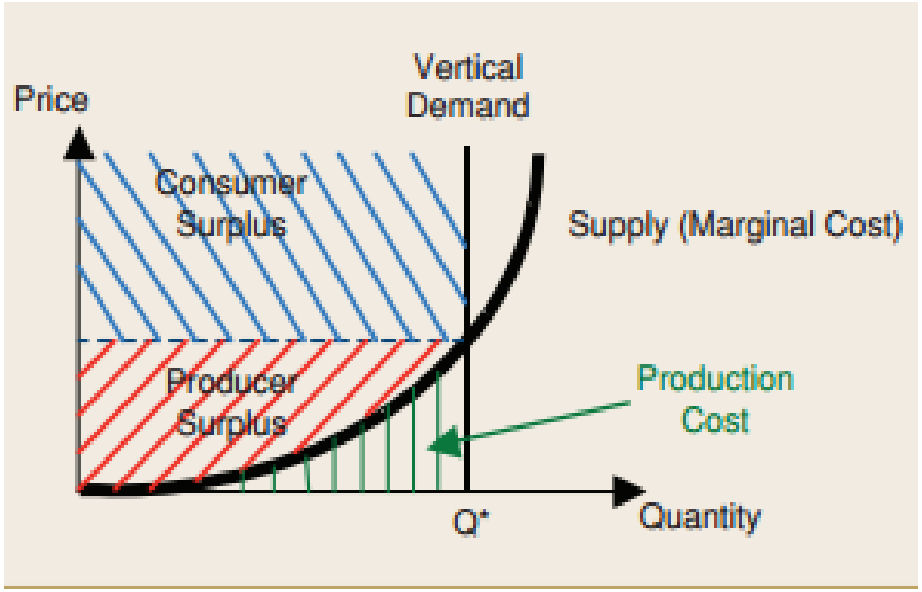
Thresholds : benefit indicators

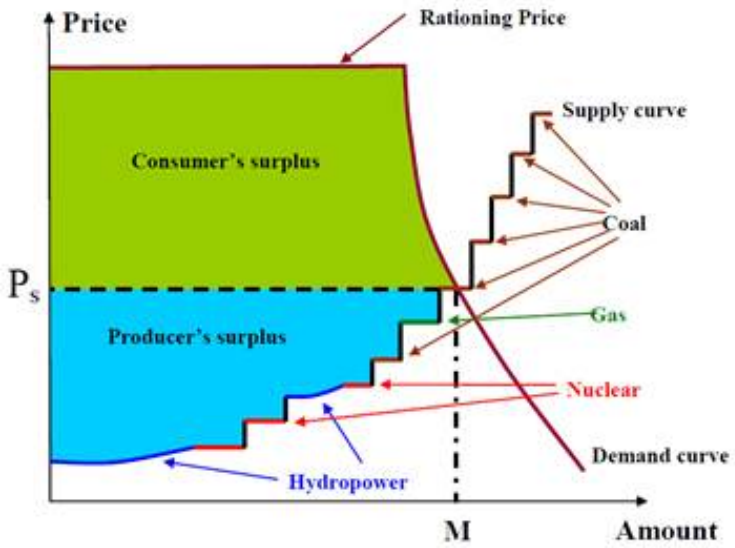
- Socio economic benefit

Light green : the project has an annual benefit < € 30 million

Green: the project has an annual benefit between€ 30 and € 100 million

Dark green: the project has an annual benefit > or = to € 100 million





Thresholds : benefit indicators

- Socio economic benefit

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Green: the project has an annual benefit between€ 30 and € 100 million

Dark green: the project has an annual benefit > or = to € 100 million

- RES integration

White: the project has a neutral effect on the capability of integrating RES, i.e. allows less than 100 MW of direct RES connection or increases RES generation by less than 50 GWh

Light green: the project allows direct connection of RES production between 100 and 500 MW or permits an increase in RES generation between 50 GWh and 300 GWh

Dark green: the project allows direct connection of RES production greater than 500 MW or increases RES generation by more than 300 GWh

- Security of Supply

Light green: the project has no measurable impact on security of supply;

Green: the project increases the security of supply for an area of annual energy demand greater than 3 TWh by more than 0.001% of annual consumption[41];

Dark green: the project increases the security of supply for an area of annual energy demand greater than 3 TWh by more than 0.01% of annual consumption[42].

Thresholds : benefit indicators

- CO2 variations

Indicative colours are assigned as follows:

White: the project has no positive effect on CO2 emissions

Green: the total of projects reduces CO2 emissions by < 500 kt/year

Dark green: the total of projects reduces CO2 emissions by > 500 kt/year

- Variations in losses

Red: the project contributes to increase the volume of losses on the grid

White: the project may help decreasing losses in some situations and increasing them in others

Light green: the project the project contributes to decrease the volume of losses on the grid

- Technical resilience/system safety
- Robustness/flexibility

Indicative colours are assigned as follows:

White: the score of KPI's is 0

Green: the score of KPI's is < or = 3+

Dark green: the score of KPI's is > 3 +

Thresholds : impact indicators

- Investment costs

Light green: Higher than 1000 M€

Green: Between 300 M€ and 1000 M€

Dark green: lower than 300 M€

- Environmental and social impact

Light green: desk-top studies indicate that sensibility is low (no protected or dense urban area is affected, the visual impact is perceived as low).

Amber: desk-top studies indicate that sensibility is medium (protected or urban area may be affected in a limited way, visual impact is perceived as moderate).

Red: desk-top studies indicate that sensibility is high (visual impact is high, protected or urban area may be affected).