ENTSO-E slides for the climate adaptation workshop

19 October 2023

entsoe

Reliable Sustainable Connected

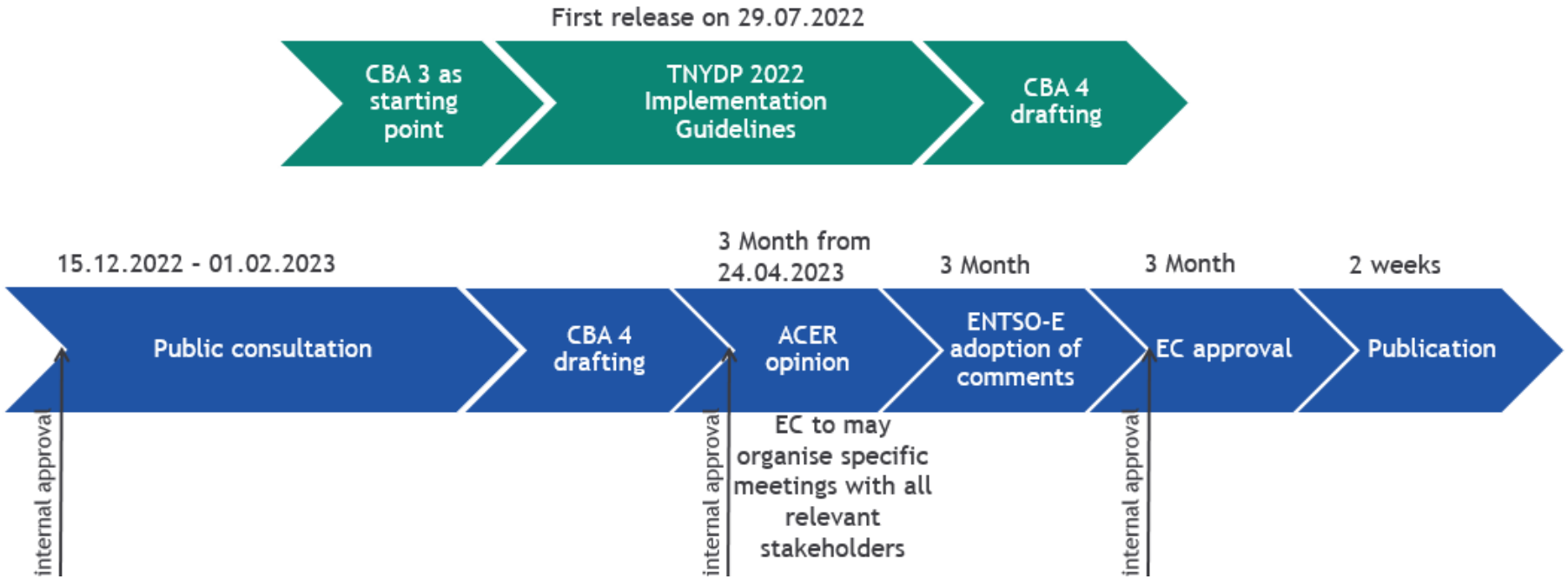
Introduction to the 4th ENTSO-E Guideline for Cost Benefit Analysis of Grid Development Projects

CBA 4: development overview

Prepared based on the requirements from Regulation (EU) 2022/869

4th version is the result of

- Constant development from previous version
- Consulstaion feedback from the public
- Direct feedback from ACER
- Direct feedback from EC
- Discussions for alignemnt with ENTSOG



CBA 4: assessment process

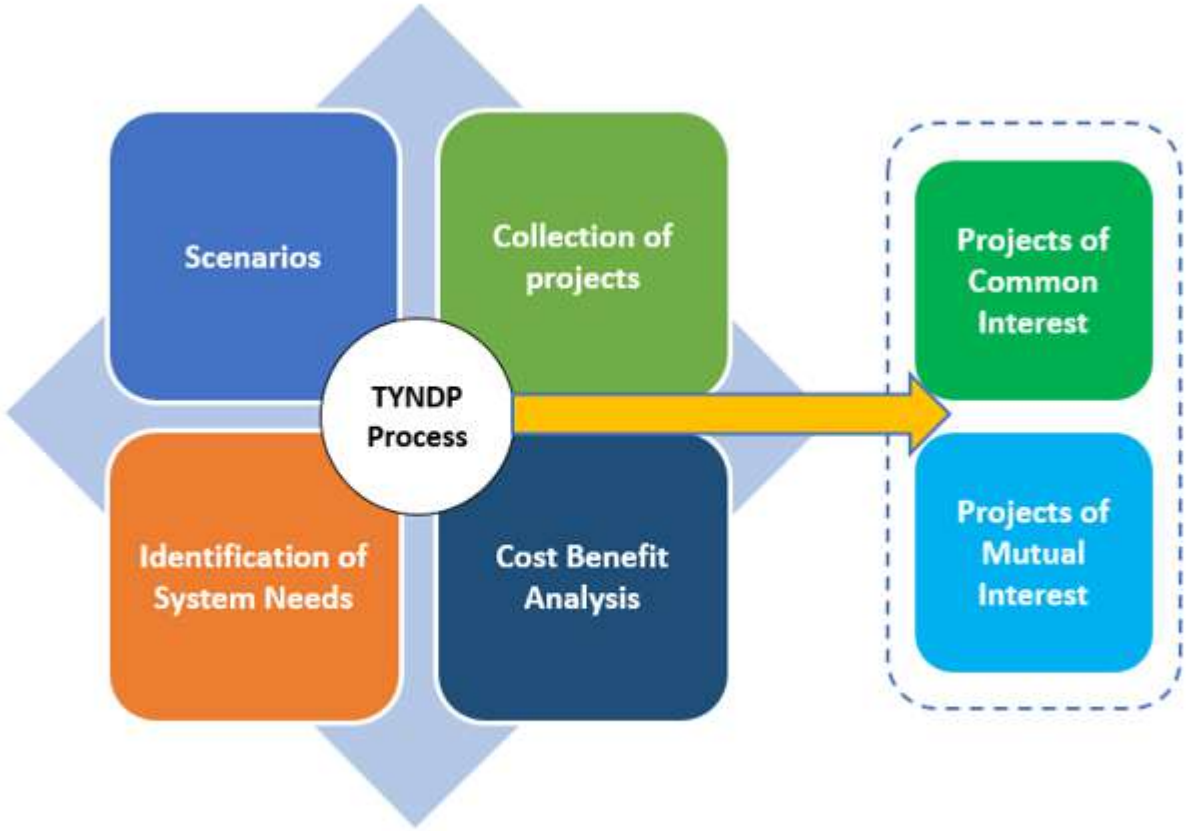


Figure 1: Overview of the assessment process inside the TYNDP and for identifying PCIs and PMIs

CBA 4: modelling environment

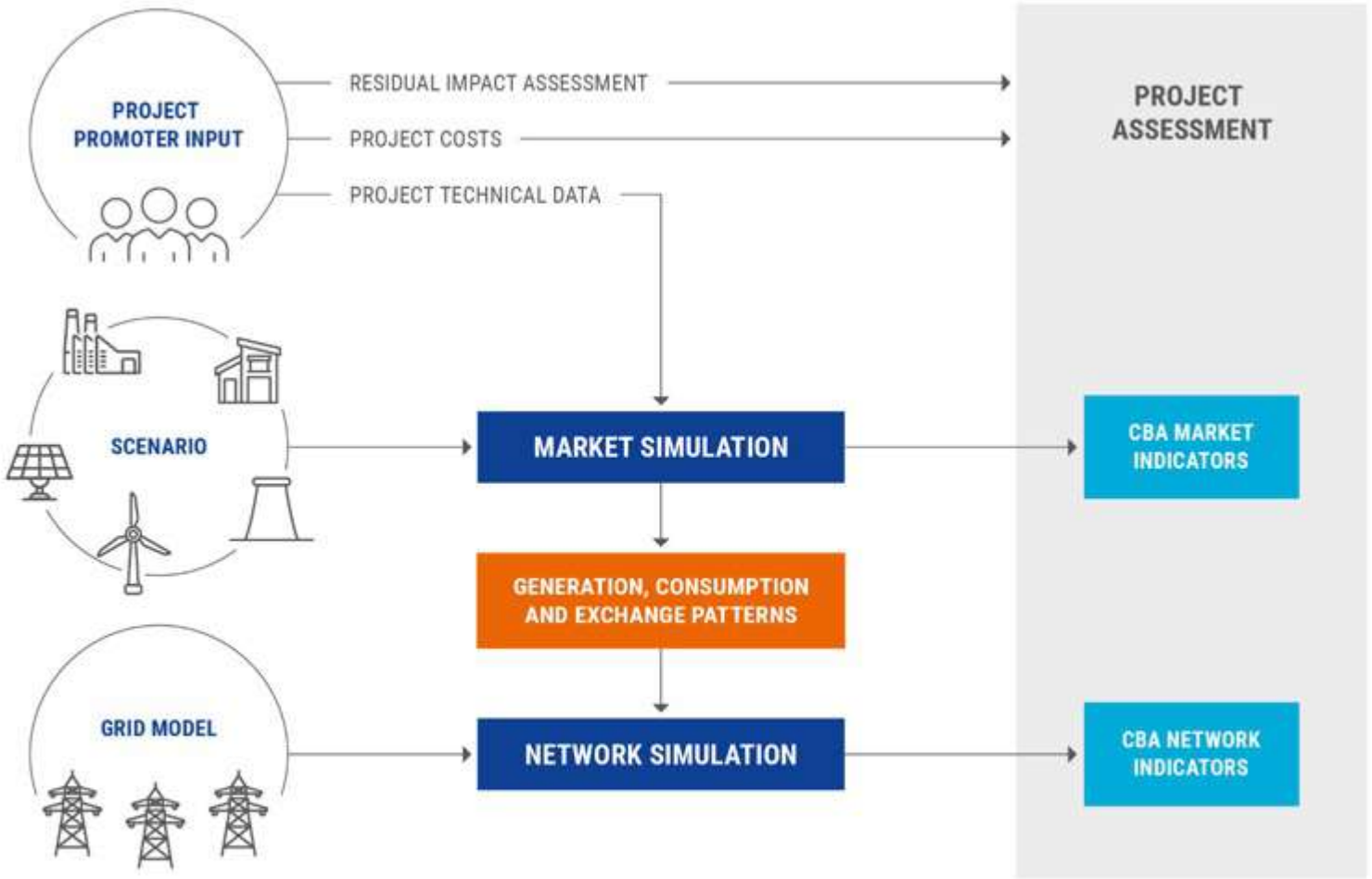
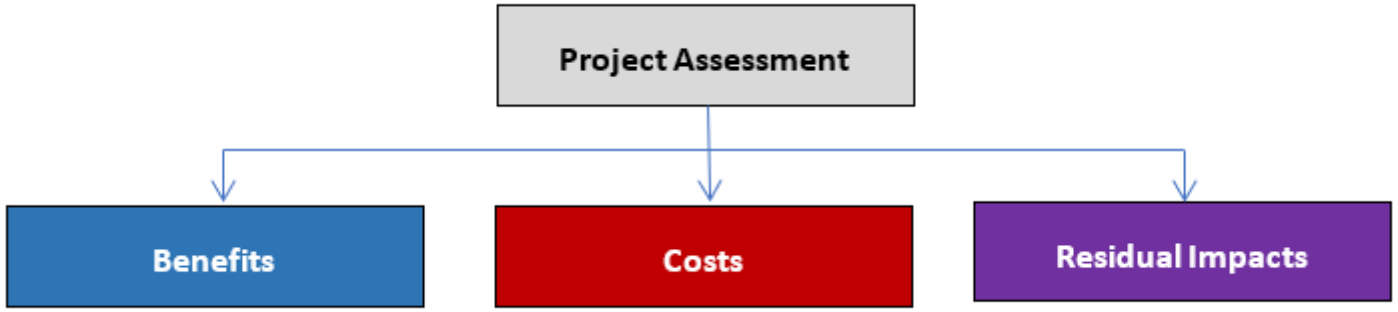
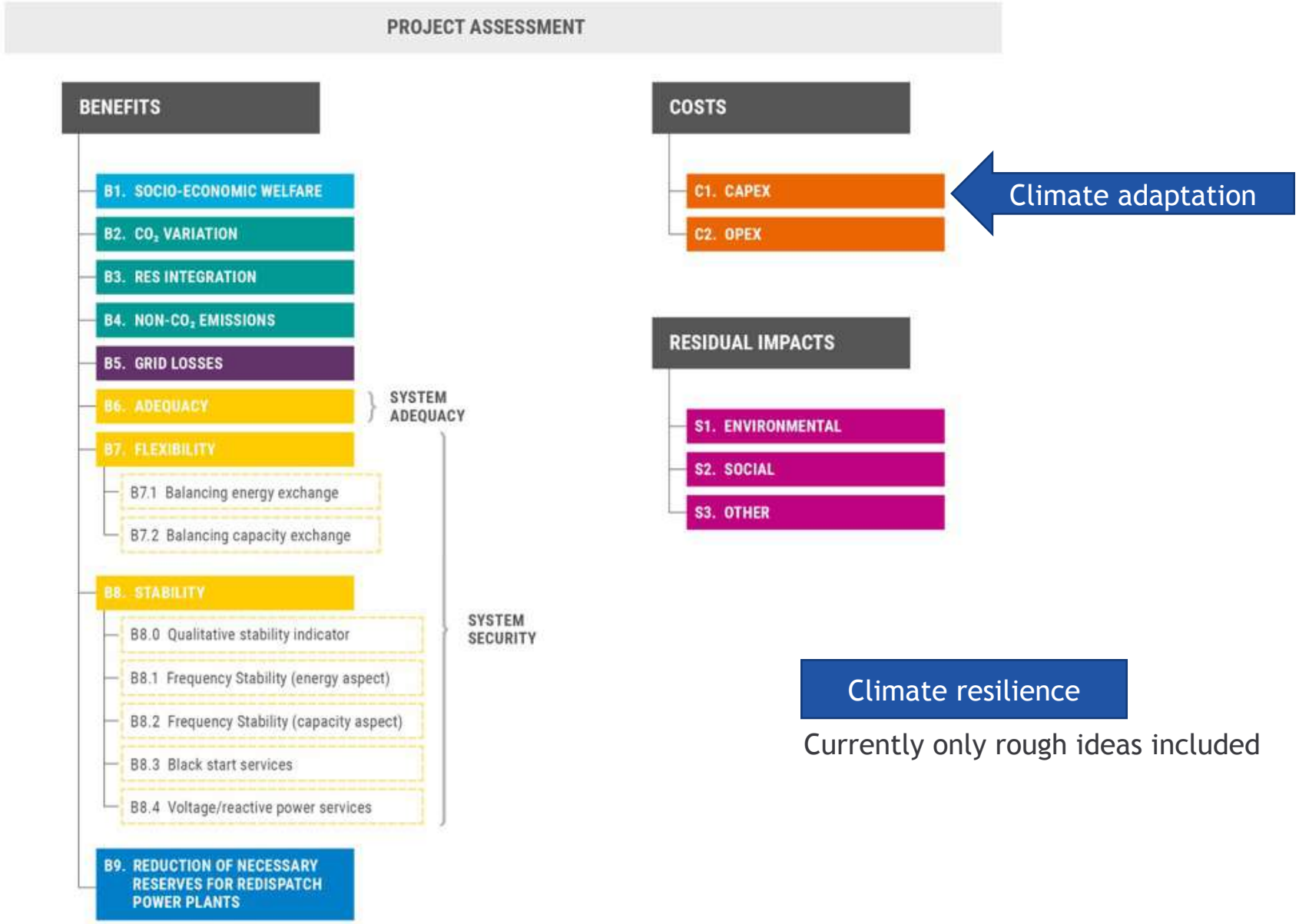


Figure 3: Schematic project assessment process. Whereas 'CBA market indicators' and 'CBA network indicators' are the direct outcome of market and network studies, respectively, 'project costs' (see 5.10 and 511) and 'residual impacts' (see 5.13, 5.14 and 5.15) are obtained without the use of simulations.

CBA 4: main indicators



CBA 4: multi-criteria approach



Climate resilience

Currently only rough ideas included

CBA 4: climate adaptation measures

Current information from CBA 4 (5.12) and the TYNDP 2024 Implementation Guidelines (7.3):

- Consideration percentage of the CAPEX
- Project promoters will be asked to provide respective information
- Based on pre-defined table:

Hazards	Explaination of adaptation	Climate adaptation cost (% of CAPEX)	Benefit/resilience
Ocean PH	foundation is protected against corrosion and structural failure		prevent/reduce damage
Wild fire	forest management to reduce impact on OHL, stronger tower foundations, higher towers, protection of equipment against exposure to fire		prevent/reduce damage
Storms, including storm surge	extra-sturdy power lines that can withstand strong winds, designing the line to fail at controlled points		prevent/reduce damage and recovering transmission system
Flooding/Sea level rise	underwater drainage, extra-sturdy power lines that can withstand flooding, entire SS may need to be strategically elevated, flood barriers, pumping stations, flood storage reservoirs, flood monitoring devices		prevent/reduce damage and transition to climate resilient society
Soil/costal erosion	retaining wall, maintaining the natural vegetation and taking up plantation near tower foundations, type of foundation structure that is used in ground improvement and stabilization		prevent/reduce damage
Ground instability/landslides/avalanches	modifying slopes geometry, using chemical agents to reinforce slope material, inspection system for remotely identify high-risk towers		prevent/reduce damage and transition to climate resilient society
Ice jam	usage of materials and structures with low ice adhesion deicing properties		Prevent/reduce damage

CBA 4: climate resilience

From CBA 4:

6.5 Climate resilience based on climate adaptation measures

Climate resilience based on climate adaptation measures provide better ability to anticipate and respond to climate hazards changing in practices and structures to moderate potential damages associated with climate change.

Climate resilience consists of following capabilities:

- Preventing damage;
- Dealing with extreme weather conditions and reduce damage during such conditions;
- Recovering transmission system back to a state equal to before the extreme event;
- Implementing interventions for transition to a climate-resilient society.

Discussion about the definition of climate adaptation and resilience measures

Definitions:

Adapted based on feedback received

- According to Regulation 2022/869, “climate adaptation means a process that ensures that resilience to the potential adverse impact of climate change of energy infrastructures is achieved through a climate vulnerability and risk assessment, including through adaptations measures.”

- In the context of the energy transition, and specifically infrastructure planning, climate adaptation is any action (progressive or ultimate) taken in order to make infrastructure assets and the whole energy system less vulnerable to the intensity and prevalence of the direct and indirect climate change impacts, including both extreme weather events (high-impact low-probability events) and alteration of weather patterns. Common primary climate change impacts are changes in temperature, precipitation, sea level, wind speed, humidity, solar radiation. In terms of the CBA framework, climate adaptation measures are to be assessed as quantitative information.

- Integrating climate adaptation measures in energy system planning aims at reducing the system vulnerability and enhancing its resilience to climate change, by better anticipating, mitigating, absorbing, accommodating and recovering from the effects of potentially hazardous events related to climate change. Therefore, resilience measures are all measures that help improving the security of supply and sustainability in the system. In terms of the CBA framework, climate resilience measures have to be given as quantitative indication.

Definitions:

Feedbacks considered in revised Common Definition
Consider primary climate drivers (temperature, precipitation, sea-level, humidity, solar radiation)
Adaptation considers physical risks of climate change, both direct and indirect impact (e.g., community impacts)
Asset level resilience vs System level resilience: both should be included, with adequate assessment factors, considering local/regional climate conditions and risks, allowing for cross-border collaboration, for: - network generation mix (weather-dependant RES and distributed generation), including storage and flexibility options; - demand (weather-dependent profiles and active end-users).
Broad range of resilience measures (bigger/redundant, stronger, smarter) that cover the infrastructure planning, building, operation, maintenance, emergency, and recovery phase
Resilience assessment factor (e.g., monetary cost of grid maintenance and recovery)

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.