Project Sheet

Pannonian Corridor

Project type	transmission
Project id	1074
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ENTSOE

Key Information

Cross Border Project
AC transmission line
New

Under Consideration

Description

The new 400 kV line connecting Serbian and Hungarian transmission systems, initially considered to connect SS Subotica 3 (RS) and SS Sándorfalva (HU). This is, however, not definitely decided, as the bilaterally developed Pre-Feasibility Study is expected to be done in 2021. This Study will provide much clearer insight into the situation in the area of interest and suggest the optimal substations that should be connected by the new line. Also, this project includes strengthening the North-to-South transmission corridor in Serbian system, by building two new 400 kV lines: SS Sombor 3 – SS Srbobran and SS Srbobran – SS Sremska Mitrovica 2. This is also deemed necessary, as numerous calculations have indicated that the new tie-line may not affect the NTC value enough if it is not accompanied by the two mentioned internal lines. The project can, alongside covering the needs seen in IoSN report, also be seen as a response to the ever-higher requests for integration of renewable sources in the Bačka region, while simultaneously strongly enhancing the security of supply and reliability of the transmission systems' operation in the included countries.

Project promoters

EMS

Countries

Hungary
Serbia

National development plan(s)

Additional information on the project

Project sheet backlog

6 Nov. 2020 - Publication as part of the draft TYNDP 2020 package for consultation

Project Description & Context

Project Investments

Main investment(s): New 400 kV interconnection OHL between SS Subotica (RS) and SS Sándorfalva (HU). This is the main investment of the project and a part of the new North-South corridor for energy transmission.

Type of element	Total route length (km)	From substation 1	To substation 2	Present status	Commissioning year	Progress of the investment	Explanation in case of delay or reclustering
AC transmission line	50.6	SS Subotica 3	SS Sándorfalva	Under Consideration	2036	New Investment	

Other investments

Description	Type of element	Total route length (km)	From substation 1	To substation 2	Present status	Commissioning year	Progress of the investment	Explanation in case of delay or reclustering
New 400 kV OHL from existing substation Sombor 3 to existing substation Srbobran (both in Serbia).	AC transmission line	80	SS Sombor 3	SS Srbobran	Under Consideration	2036	New Investment	
New 400 kV OHL from existing substation Srbobran to existing substation Sremska Mitrovica 2 (both in Serbia).	AC transmission line	90	SS Srbobran	SS Sremska Mitrovica 2	Under Consideration	2036	New Investment	

Reason for investment clustering

Each of these investments represents a segment of the new corridor for energy transmission, spanning across Serbian-Hungarian border, simultaneously increasing the NTC on it (which is a need stated in IoSN report) and facilitating the renewable sources integration in the Bačka region (area in the close proximity of the mentioned border).

Is the project in the reference grid?

No

System Needs addressed by the project

Project promoter(s) selected up to 4 system needs that are addressed by their project in a predefined list. Available needs ranged from reduction of price differentials between countries, improvement of system flexibility and stability, enabling cost-efficient connection of high volumes of RES, improvement of voltage stability...
As part of the TYNDP 2020, ENTSO-E released a study investigating cross-border system needs in the 2030 and 2040 horizons.

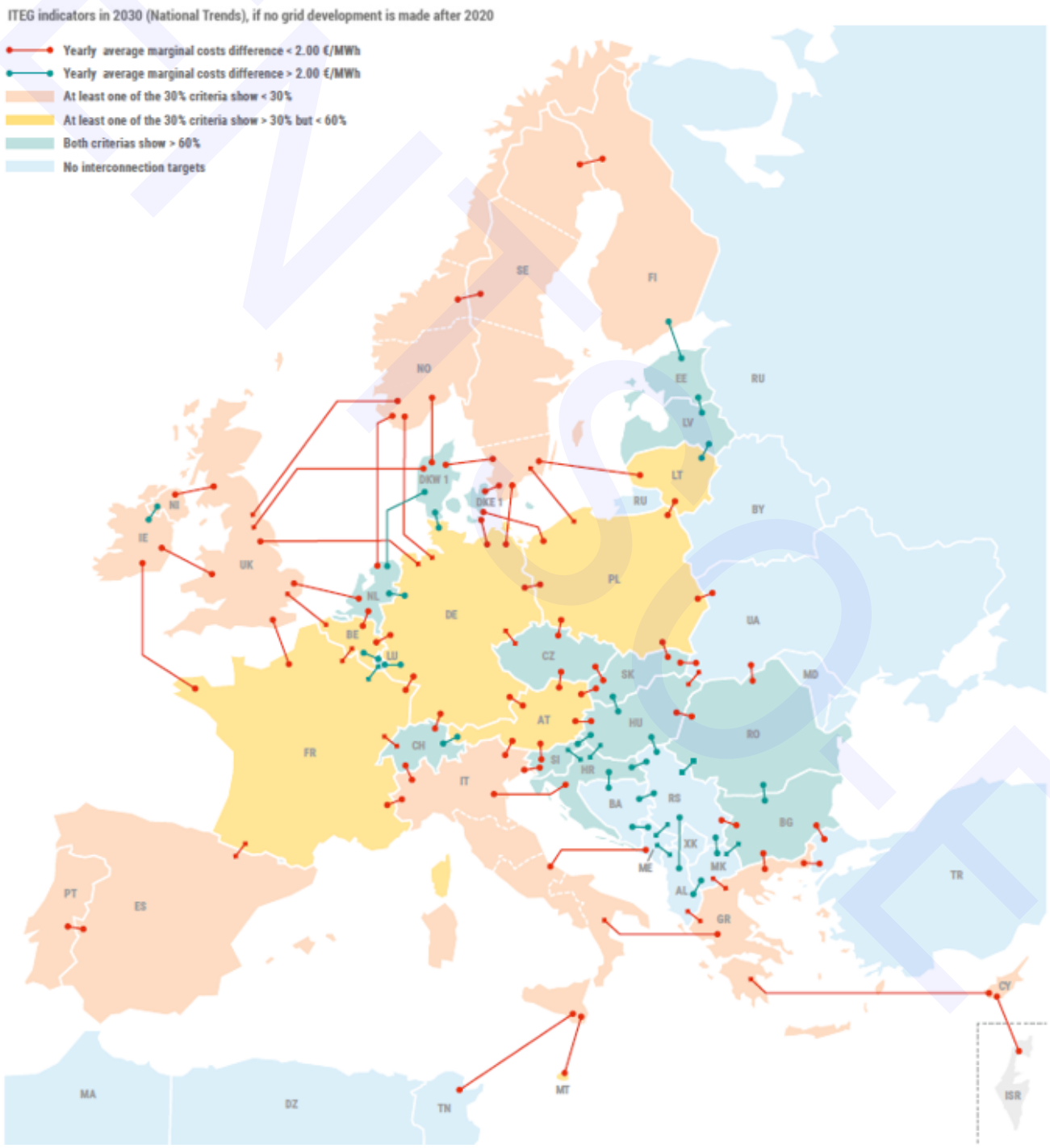
Need		How the project addresses each need (explanation provided by the project promoter(s))
	Infrastructure to reduce price differentials between EU and/or non-EU countries	As the foreseen scope of the project envisages the new interconnection between Serbia and Hungary, it can be seen as another step towards the fully integrated energy market of the CSE region, leading to the noteworthy reduction of the price differentials between the EU and non-EU countries.
	Infrastructure to improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	The additional NTC, vouched for by the commissioning of this project, is expected to be a major asset in the field of system flexibility and stability, especially if the massive capacities of variable RES, predicted along the routes of its investments, are taken into consideration.
	Infrastructure and/or market design to provide balancing flexibility (e.g. international pooling / sharing of reserves, coordinated development of reserve capacity)	As the fully integrated market represents one of the main goals set before the system development plans, the new interconnection enveloped by this project will certainly lead the systems of interest in the desired direction, characterized, among other facets, by the substantial balancing flexibility.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	Since the Bačka region, in the vicinity of the border between Serbia and Hungary, becomes more and more attractive for the investors in the wind plants each day, this project represents a guarantee that the energy evacuation from the newly built sources will happen reliably and safely.

Interconnection targets

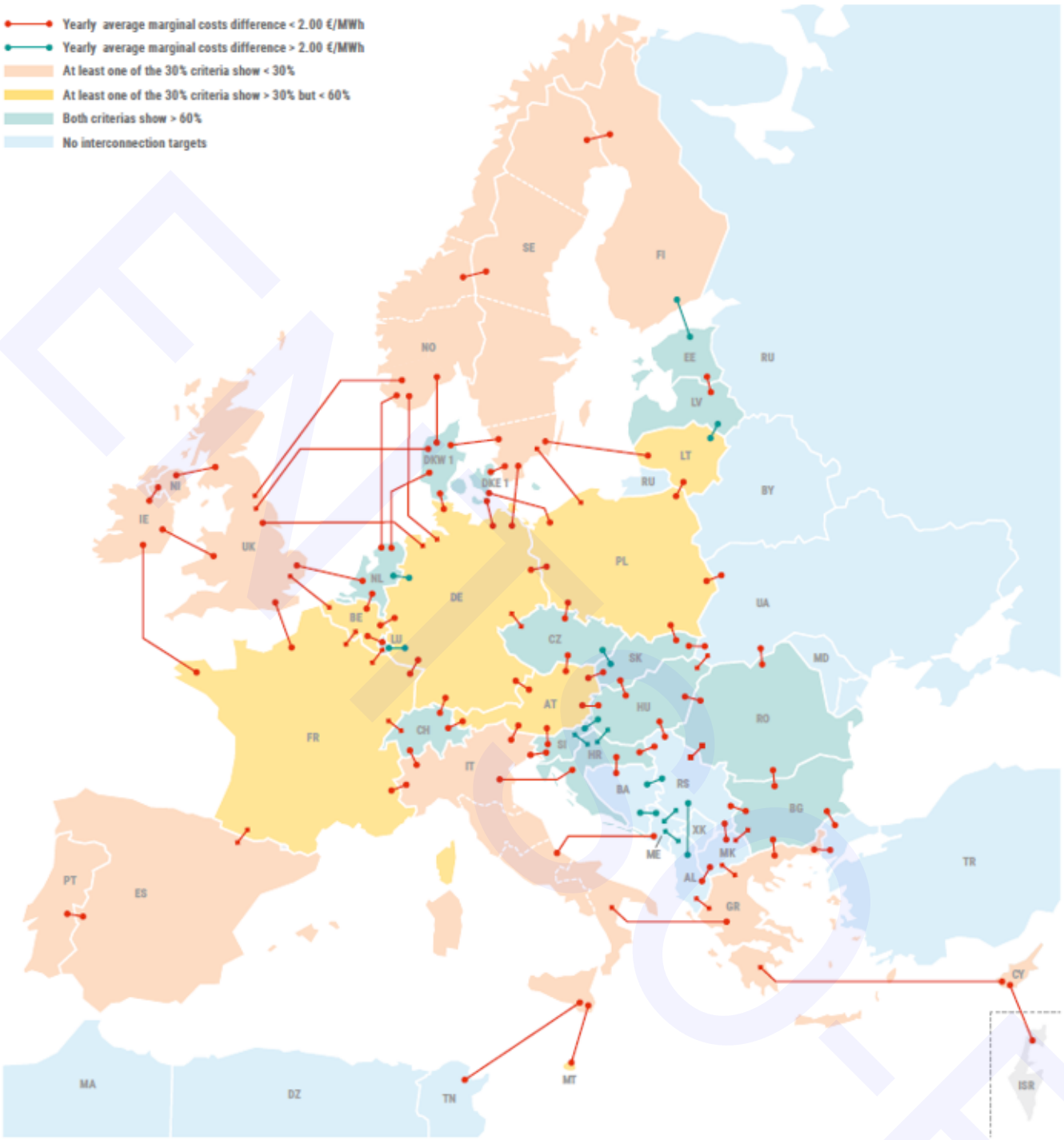
In 2017, the Interconnection Target Expert Group proposed alternative indicators to the 15%

interconnection criteria for every country and electrified island with a new methodology developed collaboratively between the European Commission, ENTSO-E, ENTSOG, industry, universities and other experts. The methodology is based on three indicators:
1. Price differential between EU countries, with an objective to reduce it below 2 EUR/MWh
2. Ratio between nominal transmission capacity and installed RES capacity, with a target of past 30%
3. Ratio between nominal transmission capacity and peak load, with a target of past 30%

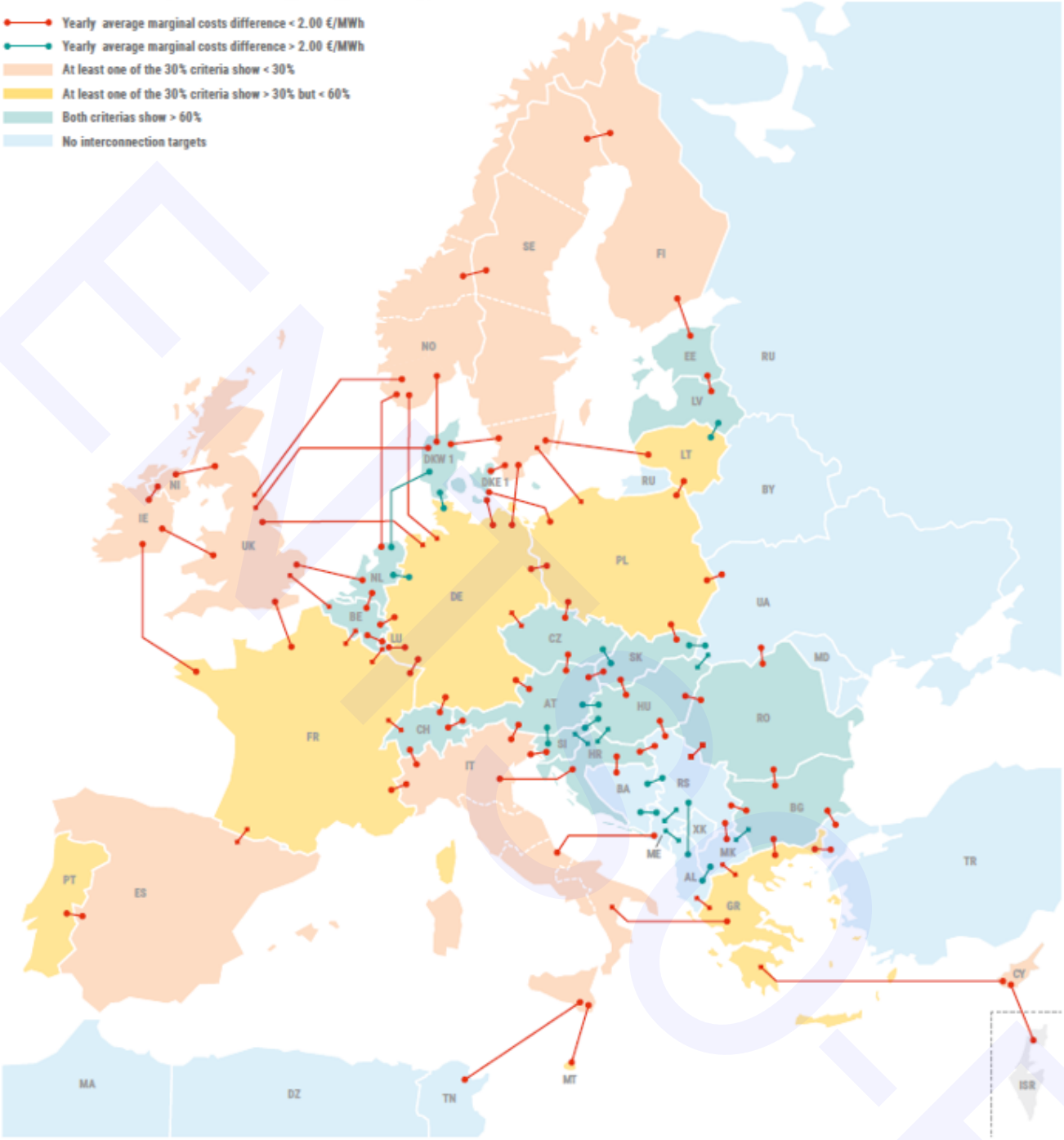
The following maps show the ITEG methodology applied to the TYNDP 2030 scenarios, with the 2020 grid.



ITEG indicators in 2030 (Distributed Energy), if no grid development is made after 2020



ITEG indicators in 2030 (Global Ambition), if no grid development is made after 2020



Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Hungary-Serbia	500	500

CBA results

ENTSO-E has assessed the benefits delivered by each project in 2025 (scenario National Trends 2025) and in 2030 (three scenarios: National Trends, Distributed Energy and Global Ambition). Indicators B1 to B6 were computed by ENTSO-E, while promoters had the possibility to compute and submit so-called project-level benefits (B7 to B10). The benefits must be understood as benefits for Europe as a whole, not for the promoters of the project.
Results are presented per scenario.

Because it is a Future project, addressing system needs and with a planned commissioning date after 2025, this project has only been assessed in the 2030 scenarios and based on a subset of CBA indicators.

Central scenario: National Trends

National Trends is the central policy scenario of the TYNDP2020, designed to reflect EU member state's National Energy and Climate Plans (NECP), in line with the requirement to meet current European 2030 energy strategy targets.

			Comparison of the COP21 scenarios with NT2030 average result		
	NT2025	**NT2030**	**DE2030 is < or > than NT2030**	**GA2030 is < or > than NT2030**	

Increase in socio-economic welfare

B1 Annual Socio-Economic Welfare (SEW) increase (M € / year)	max average min		11 8 6	n/a	n/a	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2	max average min		-4 -5 -6	n/a	n/a	ENTSO-E assessment

emissions reduction					
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration max average min		3 1 0	n/a	n/a	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides average		247	n/a	n/a	ENTSO-E assessment
B4b Ammonia average		-16	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide average		249	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5 average		1124	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10 average		16	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds average		1085	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year) max average min		211 170 134	n/a	n/a	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M € / year) CO2 price 60€/ ton 100€/ ton 189€/ ton		-5 -12 -27	n/a n/a n/a	n/a n/a n/a	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year) average		N/A	n/a	n/a	ENTSO-E assessment

B2b_€ Annual Societal cost variation resulting from CO2 variation from network simulation monetised (M € / year)	CO2 price 60€/ ton 100€/ ton 189€/ ton		N/A N/A N/A	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min		71 26 0	n/a	n/a	ENTSO-E assessment
B3a Connected RES (MW)	-			n/a	n/a	ENTSO-E assessment

Impact on grid losses

B5 Variation of network losses (GWh / year)	average		N/A	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average		N/A	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		N/A	n/a	n/a	ENTSO-E assessment
B6_€ Annual Socio-Economic Welfare increase resulting from reduction in Energy Not Served monetised (M€ / year)	average	n/a	N/A	n/a	n/a	ENTSO-E assessment

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
400 kV OHL SS Subotica 3 – SS Sándorfalva (New AC line)	++	++	0	Qualitative assessment by ENTSO-E based on information on the project technology provided by the project promoter(s). This indicator is not dependent on scenarios or time horizons.
400 kV OHL SS Sombor 3 – SS Srbobran (New AC line)	++	++	0	
400 kV OHL SS Srbobran – SS Sremska Mitrovica 2 (New AC line)	++	++	0	

Residual impact

Information on the residual impact of the project was provided by the project promoter(s).

Project Costs

The project costs were provided by the project promoter(s).

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1742. 400 kV OHL SS Subotica 3 – SS Sándorfalva	24.1	10	0.4
1743. 400 kV OHL SS Sombor 3 – SS Srbobran	19.5	5	0.26
1744. 400 kV OHL SS Srbobran – SS Sremska Mitrovica 2	21.2	5	0.272
Total	64.8		0.932

Explanation provided by the project promoter on the CAPEX uncertainty range:

1742	Uncertainty of prices of necessary materials and potential modifications that could stem from the Pre-feasibility Study.
1743	Uncertainty of prices of necessary materials.
1744	Uncertainty of prices of necessary materials.