Project Sheet

New 400 kV interconnection line between Serbia and Croatia

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Key Information

Cross Border Project
AC transmission line
New

Under Consideration

Description

Construction of new 400 kV interconnection line Sombor (RS) - Ernestinovo (HR), expected to provide a significant asset in terms of increasing the NTC between Serbia and Croatia, hence allowing the more prominent energy flow in the East-West direction across the CSE region, improving the market integration among the beneficiary countries and further ensuring the security of supply primarily in Serbia and Croatia, but, under certain circumstances, contributing to the reliable functioning of the systems in the rest of the countries in the region as well. Alongside that, it should be mentioned that the project will have a rather positive impact related to the possibility of integration of renewable energy sources in the Backa region.

Project promoters

EMS
HOPS

Countries

Croatia
Serbia

National development plan(s)

Plan razvoja prenosnog sistema Republike Srbije za period 2019 - 2028, page 157 (Serbian national TYNDP 2019-2028)

Additional information on the project

http://www.ems.rs/media/uploads/Plan_razvoja_prenosnog_sistema_R.pdf

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): The project necessity stems for the need to increase the transfer capacity between RS and HR in order to accommodate connection of RES and improve market integration, according to the results based on TYNDP2018 CBA.

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	70	Ernestinovo	Sombor	Under Consideration	2035	Investment on time	

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	Since this interconnection means the increase of NTC between Croatia (EU country) and Serbia (non-EU country), it is seen as a mean of reaching the market integration goals and reducing the price differentials in the Continental Southeast Europe region.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	As the future scenarios, taken into account in the scope of TYNDP, predict rather high energy flow across the borders in the CSE region, each of the new interconnections in that area can be seen as an additional step towards guaranteeing the timely reaching of the set goal.
	Infrastructure and/or market	In the conditions of ever higher needs for the

Need		How the project addresses each need (explanation provided by the project promoter(s))
	design to provide balancing flexibility (e.g. international pooling / sharing of reserves, coordinated development of reserve capacity)	intensive cooperation between the neighboring TSOs, every new interconnection, such as the one included in this project, can be seen as the asset regarding the improvement of systems' flexibility and reliability of operation.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	According to the currently available information, the Bačka region in Northern Serbia is predicted to host several wind power plants of sustainable installed capacity, with the line between SS Sombor 3 and SS Ernestinovo ensuring the uninterrupted and secure evacuation of the produced energy.

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.

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Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Croatia - Serbia	600	600

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 its planned commissioning date is in 2035 or later, 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	9 9 9	11 7 5	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	-4 -4 -4	-3 -6 -9	>	<	ENTSO-E assessment

B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min	0 0 0	0 0 0	>	>	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	N/A	189	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	N/A	-17	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	N/A	132	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	N/A	1194	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	N/A	13	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	N/A	1157	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	183 183 183	323 198 107	<	>	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	-7 -14 -30	-6 -14 -32	>> >> >>	< < <<	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	0	0	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost	CO2 price	60€/ ton	0 0	0 0	n/a	n/a	ENTSO-E assessment

variation resulting from CO2 variation from network simulation monetised (M € / year)	100€/ ton 189€/ ton	0	0			

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	0 0 0	3 1 0	>	>	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	0	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	N/A	0	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	ENTSO-E assessment

Scenarios: Distributed Energy & Global Ambition

DE and GA are two scenarios created in line with the COP21 targets to understand the impact on

infrastructure needs agains different pathways reducing EU-28 emissions to net-zero by 2050. For these two scenarios, projects were assessed with a subset of CBA parameters.

		DE2030	GA2030	
Increase in socio-economic welfare				
B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year)	average	15	13	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	-3	-24	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	6	4	ENTSO-E assessment
Reduction of CO2 and GHG emissions				
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	64	678	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	0 -3 -9	-17 -44 -104	ENTSO-E assessment
Integration of renewable energy sources				
B3 Annual avoided curtailment (RES integration) (GWh / year)	average	119	86	ENTSO-E assessment
B3a Connected RES (MW)	-			ENTSO-E assessment

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
New 400 kV overhead line Sombor (RS) - Ernestinovo (HR) (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.

Sensitivity Study: Current Trends

'Current Trends' describes a future where the energy transition is slower than planned.

		CT2030	
Increase in socio-economic welfare			
B1 Annual Socio-Economic Welfare (SEW) increase (M€ / year)	average	8	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	0	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	0	ENTSO-E assessment
Reduction of CO2 and GHG emissions			
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	2	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from	CO2 price 60€/ton 100€/	0 0 0	ENTSO-E assessment

CO2 variation from market simulation monetised (M€ / year)	ton 189€/ ton		

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	8	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

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
1269. New 400 kV overhead line Sombor (RS) - Ernestinovo (HR)	19.04	5%	0.0245
Total	19.04		0.0245

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

1269 Uncertainty of prices of necessary materials. Difference between the estimated capex cost for the investment and the standard costs of investments is caused by fact that the ACER report considers only 14 EU member countries, in which the unit price for this type of project is higher than price for corresponding projects in Serbia.