Project Sheet

Transbalkan Corridor

Project type	transmission
Project id	227
Created by	
Created on	Feb 9, 2021 10:00:42 AM

Index

Key Information 3
Description 3
Project Description & Context 5
Project Investments 5
System Needs addressed by the project 7
Interconnection targets 8
Project Assessment 12
Transfer capacity increase (National Trends 2025) 12
CBA results 12
Central scenario: National Trends 12
Scenarios: Distributed Energy & Global Ambition 14
Non scenario-dependent indicator(s) 16
Sensitivity Study: Current Trends 16
Residual impact 17
Project Costs 17

ENTSOE

Key Information

Cross Border Project
AC transmission line
Mostly New

In Permitting

Description

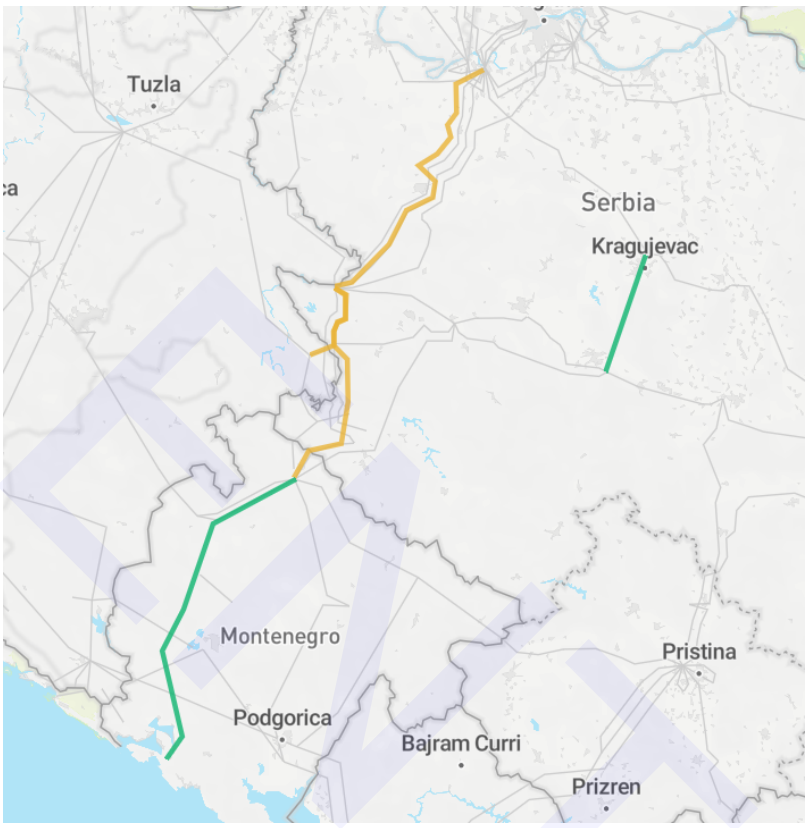
This project contains seven investments, with the new corridor spanning from Central (SS Kragujevac 2 and SS Kraljevo 3) and Western Serbia (SS Obrenovac and SS Bajina Basta) all the way to SS Visegrad in Bosnia and Herzegovina and SS Lastva (across SS Pljevlja 2) in Montenegro. As can be seen from the brief list of the investments, the project aims to increase both the transmission capacity within Serbian transmission system and the transfer capacities on the borders between the mentioned countries. Thus, it is expected that it will largely facilitate the energy exchange between the north-east and south-west parts of Europe, setting a foundation for the enhanced market integration and leveling of the marginal energy costs and guaranteeing the security of supply throughout the region. This project is tightly connected to the projects 28 (Italy - Montenegro) and 342 (Central Balkan Corridor).

Project promoters

EMS
NOS-BIH
CGES

Countries

Bosnia and Herzegovina
Italy
Montenegro
Serbia



National development plan(s)

Plan razvoja prenosnog sistema Republike Srbije za period 2019 - 2028 (Serbian national TYNDP 2019-2028), p205, https://www.aers.rs/FILES/JavnaKonsultacija/2019-02-13_Plan%20razvoja%20prenosnog%20sistema%20Republike%20Srbije%202019-2028.pdf

Additional information on the project

Related projects

TYNDP 2020 - project 342

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):

Description of broader context - New double circuit 400kV OHL connecting existing substation Pljevlja (ME) and substation Bajina Basta (RS) and new double circuit 400kV OHL connecting existing substation Visegrad (BA) and substation Bajina Basta (RS). In the first phase one 400 kV circuit would be equiped. In the second phase New SS Bistrica (RS) would be connected to the exisitng double circuit 400 kV OHL between SS Bajina Basta (RS), SS Visegrad (BA) and SS Pljevlja (ME). Part of regional transmission corridor northeast-southwest.

Description of broader context - New double circuit 400kV OHL (105km RS + 16km ME) connecting existing substation Pljevlja (ME) and substation Bajina Basta (RS) and new double circuit 400kV OHL connecting existing substation Visegrad (BA) and substation Bajina Basta (RS). In the first phase one 400 kV circuit would be equiped. In the second phase New SS Bistrica (RS) would be connected to the exisitng double circuit 400 kV OHL between SS Bajina Basta (RS), SS Visegrad (BA) and SS Pljevlja (ME). Part of regional transmission corridor northeast-southwest.

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	45.2	Bajina Basta (RS)	Visegrad (BA)	In Permitting	2026	Delayed	Due to phasing of the project HVDC ME-IT cable and its infuluence on project Transbalkan corridor, there is a need for a new Study with economic and financial CBA analyses.
AC transmission line	100	Bajina Basta (RS)	Pljevlja (ME)	In Permitting	2026	Delayed	Due to phasing of the project HVDC ME-IT cable and its infuluence on project Transbalkan corridor, there is a need for a new Study with economic and financial CBA analyses.

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

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
Double circuit 400 kV OHL between upgraded substation Bajina Basta and substation Obrenovac. Part of larger regional transmission corridor northeast-southwest.	AC transmission line	109	SS Bajina Basta (RS)	SS Obrenovac (RS)	In Permitting	2024	Delayed	Due to phasing of the project HVDC ME-IT cable and its infuluence on project Transbalkan corridor, there is a need for a new Study with economic and financial CBA analyses.
Upgrade of existing 220/110 kV substation in Bajina Basta to 400/220/110 kV substation as part of overall western Serbia system upgrade to 400 kV voltage level. Part of larger regional transmission corridor northeast-southwest.	Onshore substation		Bajina Basta (RS)	Bajina Basta (RS)	In Permitting	2024	Delayed	Due to phasing of the project HVDC ME-IT cable and its infuluence on project Transbalkan corridor, there is a need for a new Study with economic and financial CBA analyses.
400 kV OHL Lastva - Pljevlja	AC transmission line	151	SS Lastva	SS Pljevlja	Under Construction	2019	Delayed	Due to the delay of B. Basta - Obrenovac and B. Basta - Pljevlja investments
400 kV OHL	AC	60	SS	SS	Under	2020	Invest	

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
Kragujevac-Kraljevo	transmission line		Kragujevac	Kraljevo	Construction		ment on time	
Upgrade of SS Kraljevo	Onshore substation		SS Kraljevo	SS Kraljevo	Under Construction	2020	Investment on time	

Reason for investment clustering

These investments will form new HV AC and DC corridor from Serbia, through Montenegro to Italy, enhancing energy exchange and further market integration in SEE region

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 Tranbalkan Corridor encompasses the infrastructure needed for the energy transfer across the Balkan Peninsula and towards Italy, it is envisaged as an invaluable tool for the market integration and consequential reduction of price differentials between Italy and the countries in Continental Southeast Europe region.
	Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power failures.	As the grid in Western Serbia is rather old, which might put its reliability in question, one of the aspects that will also be affected by this project's commissioning is the increase of security of supply by replacing the numerous old power lines with the new ones.
	Infrastructure to improve system flexibility and stability e.g. improve system or local ramp rate, improve transient	As the systems in this region are envisaged to heavily rely on the variable renewable sources in the not-so-distant future, the importance of new interconnections, such as those included in this

Need		How the project addresses each need (explanation provided by the project promoter(s))
	stability or RoCoF to meet system Needs.	project, for providing the additional system flexibility cannot be overstated.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	Even though the importance of this project for the RES integration might not be obvious, Drina river, located near the route of the lines enveloped by the project, offers huge potential for the future environmentally friendly Hydro Power Plants, amplifying the significance of Transbalkan Corridor for this system need.

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.

ENTSOE

ENTSOE

ENTSOE

Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Montenegro - Serbia	20	500
Transfer capacity increase (in MW)	Bosnia and Herzegovina - Serbia	850	700

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.

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	10 2 0	4 2 0	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	2 0 -4	0 -1 -2	>	>	ENTSO-E assessment
B1_RES Annual	max	1	1			ENTSO-E

Socio-Economic Welfare increase resulting from RES integration	average min	0 0	0 0	>	>	assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	-5	-20	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	0	-1	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	-22	-20	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-7	113	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	1	-2	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-8	115	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min	157 9 -105	75 19 -6	< 	< 	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 -1 -2	-1 -1 -3	>> >> >>	>> >> >>	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)	average	-21	-26	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation	CO2 price 60€/ ton	1 2	1 2	n/a	n/a	ENTSO-E assessment

resulting from CO2 variation from network simulation monetised (M € / year)	100€/ ton 189€/ ton	3	4			

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	17 4 0	35 11 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	-29	-24	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-1	-1	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	9	4	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	3	1	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	5	1	ENTSO-E assessment
Reduction of CO2 and GHG emissions				
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-52	-24	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 2 7	1 2 4	ENTSO-E assessment
Integration of renewable energy sources				
B3 Annual avoided curtailment (RES integration) (GWh / year)	average	86	19	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	
400kV interconnection RS-BA (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.
400kV OHL B.Basta-Obrenovac (New AC line)	++	++	0	
400kV interconnection RS-ME (New AC line)	++	++	0	
400 kV OHL Lastva - Pljevlja (New AC line)	++	++	0	
400 kV OHL Kragujevac-Kraljevo (New AC line)	++	++	0	

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	1	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	1	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	1	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-47	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	2 3 8	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	28	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).

Residual environmental impact

Investment	Investment status	Distance (km)	Type of sensitivity
400kV interconnection RS-ME	In Permitting	27.8	Other nature protection areas under national law

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
627. 400kV interconnection RS-BA	19.6	5%	0.24
628. 400kV OHL B.Basta-Obrenovac	55	5%	0.66
630. 400kV interconnection RS-ME	44.4	5%	0.53
631. 400kV SS B.Basta upgrade	11	5%	0.13
1526. 400 kV OHL Lastva - Pljevlja	67.5	5%	1.35
1527. 400 kV OHL Kragujevac-Kraljevo	17	5%	0.2

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1528. Upgrade of SS Kraljevo	10.5	5%	0.13
Total	225		3.24

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

627	Uncertainty of prices of necessary materials.
628	Uncertainty of prices of necessary materials.
630	Uncertainty of prices of necessary materials.
631	Uncertainty of prices of necessary materials.
1526	Uncertainty of prices of necessary materials.
1527	Uncertainty of prices of necessary materials.
1528	Uncertainty of prices of necessary materials.