Project Sheet

Upgrading of existing 220 kV lines between HR and BA to 400 kV lines

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Key Information

Cross Border Project
Onshore substation
Mostly Upgrade

Under Consideration

Description

Upgrading of existing 220 kV lines between SS Dakovo (HR) and SS Tuzla/Gradacac (BA) to 400 kV lines.

The project 241, has been proposed assessed in the TYNDP 2016, based on the results of common planning studies performed in the CSE Region during preparation of Regional investment plan 2015. The project assumes upgrade of existing 220 kV lines between SS Dakovo (HR) and SS Tuzla (BH) and SS Gradacac (BH) to 400 kV, with additional internal new double 400 kV line connecting SS Dakovo to existing 400 kV line Žerjavinec - Ernestinovo. This project is under consideration and there is a need for pre-feasibility study.

Project promoters

HOPS
NOS-BIH

Countries

Bosnia and Herzegovina
Croatia

National development plan(s)

Desetogodišnji plan razvoja hrvatske prijenosne mreže 2019.-2028. s detaljnom razradom za početno trogodišnje i jednogodišnje razdoblje, Croatia, 2019, Page 74

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): Upgrading existing 220 kV SS Dakovo to 400 kV enables connection between SS Dakovo (HR) and TPP Tuzla/Gradacac (BA) by 400 kV lines.

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
Onshore substation		Dakovo	Dakovo	Under Consideration	2033	Investment on time	

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
The project necessity stems for the need to increase the target transfer capacity between HR and BA in order to accommodate market integration and exploitation of RES, according to the results by the Common Planning Studies based on TYNDP2014	AC transmission line	91	Dakovo	Tuzla	Under Consideration	2033	Investment on time	

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
Vision 4.								
The project necessity stems for the need to increase the target transfer capacity between HR and BA in order to accommodate market integration and exploitation of RES, according to the results by the Common Planning Studies based on TYNDP2014 Vision 4.	AC transmission line	46.2	Dakovo	Gradacac	Under Consideration	2033	Investment on time	
New double 400 kV line between SS Dakovo and location Razbojiste enables connection of planned 400 kV SS Dakovo to existing 400 kV line Zerjavinec - Ernestinovo	AC transmission line	25	Dakovo	Razbojiste	Under Consideration	2033	Investment on time	
Upgrading of existing 220 kV line between SS Gradacac (BA)	AC transmission line	47.8	SS Gradacac (BA)	TPP Tuzla (BA)	Under Consideration	2032	Investment on time	

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
and TPP Tuzla (BA) to 400 kV line								
Upgrading existing 220 kV SS Gradacac (BA) to 400 kV	Onshore substation		SS Gradacac (BA)	SS Gradacac (BA)	Under Consideration	2032	Investment on time	

Reason for investment clustering

The Project implies upgrading of existing 220 kV substations and transmission lines between HR and BA to 400 kV lines, which will enable further connection to the existing 400 kV network in HR and BA and increase security of supply of broader 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.

The project promoter did not select any 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.

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Project Assessment

Transfer capacity increase (National Trends 2025)

	Border	A B	B A
Transfer capacity increase (in MW)	Bosnia and Herzegovina - Croatia	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.

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	13 8 6	6 5 4	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	3 -3 -6	-2 -4 -7	>	<	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	1 1	0 0	>	>	ENTSO-E assessment

Welfare increase resulting from RES integration	min	0	0			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	400	150	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-13	-15	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	351	110	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	63	817	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	38	10	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-4	786	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	271 124 -118	246 149 89	 <	 >	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 -10 -21	-5 -11 -24	>> >> >>	< < <<	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	47	22	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	-2 -4 -8	-1 -2 -4	n/a	n/a	ENTSO-E assessment

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

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	30 11 0	12 4 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	81	26	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	4	2	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	11	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	-1	-29	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	10	833	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 0 -1	-21 -54 -128	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	96	25	ENTSO-E assessment
B3a Connected RES (MW)	-			ENTSO-E assessment

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	4	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	-18	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	1 1 3	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	15	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
1276. Upgrading of existing 220 kV line between SS Dakovo (HR) and TPP Tuzla (BA) to 400 kV line	26		0.033
1277. Upgrading of existing 220 kV line between SS Dakovo (HR) and Gradacac (BA) to 400 kV line	14.07		0.018
1278. Upgrading existing 220 kV SS Dakovo to 400 kV	11		0.0141
1279. New double 400 kV line between SS Dakovo and location Razbojiste	10.375		0.0133
1530. Upgrading of existing 220 kV line between SS Gradacac (BA) and TPP Tuzla (BA) to 400 kV line	13.7		0.0176
1531. Upgrading existing 220 kV SS Gradacac (BA) to 400 kV	7.9		0.01
Total	83.045		0.106

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

1276

1277

1278

1279

1530

1531