Project Sheet

Black Sea Corridor

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Key Information

Internal Project
AC transmission line
Mostly New

PCI number 3.8 (4th list, 31 Oct. 2019)
In Permitting

Description

The project consists of one 400kV double circuit OHL Cernavoda-Stalpu with in/out connection of one circuit in Gura Ialomitei, one 400 kV double circuit OHL Smardan-Gutinas in Romania and also the new 400 kV OHL Dobrujda-Burgas in Bulgaria. This project allows transfer of generation from Western cost of the Black Sea towards consumption and storage centers in Central Europe and South-Eastern Europe.

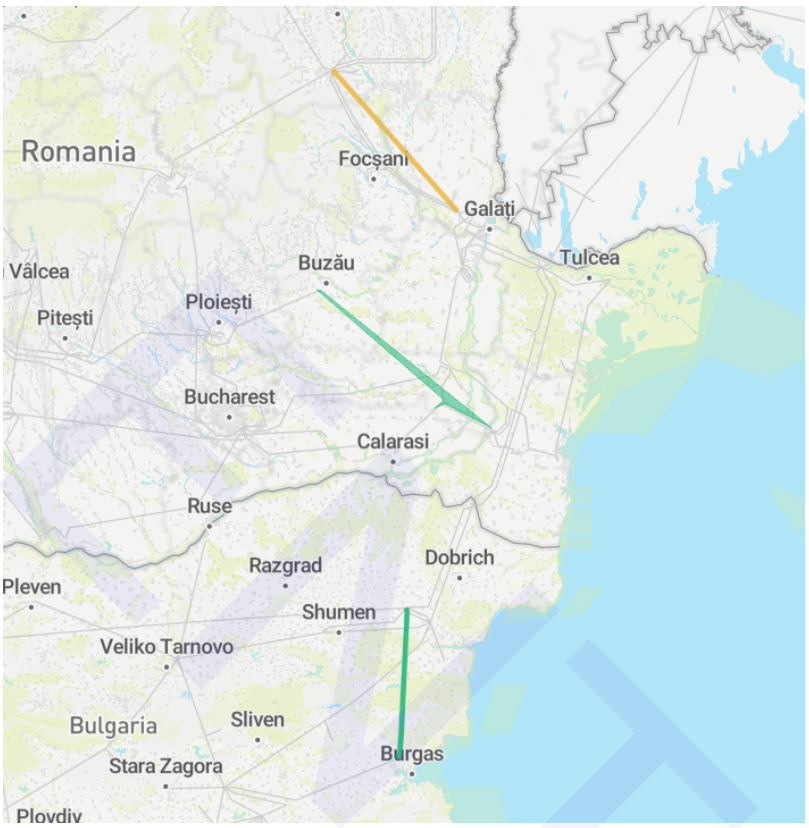
Project promoters

ESO

TRANSELECTRICA

Countries

Bulgaria
Romania



National development plan(s)

Planul de dezvoltare a RET perioada 2020-2029 - draft version- was submitted in October 2020 for approval to the Romanian NRA -page 15,
https://web.transelectrica.ro/noutati/noutati/55_2020.08.17_14-30-42.pdf
;
http://www.eso.bg/fileObj.php?oid=1179
, Bulgaria,NDP2017,page 19

Additional information on the project

In the forth PCI list are included the following investments:

3.8.1 Internal line between Dobrudja and Burgas (BG)

3.8.4 Internal line between Cernavoda and Stalpu(RO)

3.8.5 Internal line between Gutinas and Smardan(RO)

http://www.transelectrica.ro/web/tel/proiecte-de-interes-comun

Romanian National Development Plan (only in Romanian):
https://www.transelectrica.ro/web/tel/plan-perspectiva

Project sheet backlog

6 Jan. 2021 - Update commissioning year of investment 400 kV OHL Smardan-Gutinas and of the project to 2024, for consistency with the most recent version of the NDP

5 Jan. 2021 - Update of the reference to the last available Romanian NDP released in draft form

in October 2020. To align with the recently released draft NDP, update of the CAPEX and OPEX of the project and update of the field 'Explanation in case of delay' for investments '400 kV OHL Smardan-Gutinas' and '220kV Stalpu substation upgrade to 400 kV'.

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

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Project Description & Context

Project Investments

Main investment(s): Reinforcement of the cross-section between the Western coast of the Black Sea (Dobrogea area) and the rest of the system. New 400kV double circuit OHL (one circuit wired) between existing substations. Line length 140km.

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	140	Smardan (RO)	Gutinas (RO)	In Permitting	2024	Delayed	Delay in issuing the government decision for expropriation.

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
Reinforcement of the cross-section between the Western coast of the Black Sea (Eastern Romania) and the rest of the system. A new 400 kV AC OHL double circuit of 159 km shall be built between the 400 kV substation Cernavoda and the existing 220/110 kV	AC transmission line	159	Cernavoda (RO)	Stalpu (RO)	Under Construction	2023	Delayed	Delays related to land acquisition, obtaining approvals and modificatons to the public procurement legislation.

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
Stalpu substation, which shall be replaced with a 400/110 kV substation (onshore). One of the two circuits shall be connected in-out to the 400 kV substation Gura Ialomitei, situated in the vicinity of the new line.								
To reinforce the cross-section between the Black Sea coast wind generation in Romania and Bulgaria and the consumption and storage centers to the West, the 220 kV OHL Stalpu-Teleajen-Brazi is upgraded to 400 kV, as a continuation of the 400 kV d.c. OHL Cernavoda-Stalpu. The 220/110 kV substation Stalpu is upgraded to	Onshore substation		Stalpu (RO)	Stalpu (RO)	Under Construction	2023	Delayed	Delays due to the amendment of the public procurement legislation and resumption of auction due to non-compliant offers.

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
400/110kV (1x250MVA).								
New 86 km single circuit 400kV OHL in parallel to the existing one.	AC transmission line	86	Varna(BG)	Burgas (BG)	Under Construction	2021	Investment on time	

Reason for investment clustering

These investments are completely dependent on each other as the main enhancements in Romania and Bulgaria which remove bottlenecks and integrate RES to the network. Clustering of investments had the purpose to identify investments contributing to the increase of transfer capacity on the same corridor. Proposed Project supports market development in South East Europe which is less developed. Based on upper mentioned information it is crucial to cluster all these investment together, to fully utilize the possible benefits.

Is the project in the reference grid?

Yes

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	Increased cross-border capacities allow European countries to exchange more energy and this will have an impact on reducing the marginal costs. The project contributes to the increase of the transfer capacity across the border between Bulgaria and Romania.
ITEG	Infrastructure to tackle a Need identified by one of the European ITEG indicators referring to the 15% interconnection target for 2030:1. Reduce	The project contributes to reach the 15% interconnection target for 2030 and also will help to reduce the

Need		How the project addresses each need (explanation provided by the project promoter(s))
	the price differential between EU countries to below 2EUR/MWh.2. Contribute to pushing ratio between nominal transmission capacity and installed RES capacity past 30%.3. Contribute to pushing ratio between nominal transmission capacity and peak load past 30%.	price differentials between the countries.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	Increase of transfer capacity in the predominant North-South direction at the boundary between Romania and Bulgaria, will support the large scale integration of new RES in the area of Black Sea coast, in both countries and especially Romania.

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)	Bulgaria - Romania	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.

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	8 5 3	19 14 11	>	<	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	0 -3 -6	1 -4 -8	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	3 1	9 3	>	<	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	440	346	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-11	-32	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	656	557	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	41	300	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	19	11	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	7	257	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	249 119 12	273 160 -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	-4 -9 -20	-5 -12 -26	>> >> >>	>> >> >>	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	3	-12	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	0 0 0	0 1 2	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	63 20 0	248 68 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	4	29	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	0	2	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		11	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	0	>	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	17	6	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	6	3	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	10	3	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-111	-79	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 5 15	2 5 12	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	194	72	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 OHL Cernavoda-Stalpu (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 Smardan-Gutinas (New AC line)	++	++	0	
400 kV OHL Varna-Burgas (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	5	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	0	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	50	ENTSO-E assessment
B2a_€ Annual		-2	ENTSO-E assessment

Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year)	CO2 price 60€/ ton 100€/ ton 189€/ ton	-4 -8	

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	3	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 OHL Cernavoda-Stalpu	Under Construction	1	Habitats Directive (92/43/EEC)
400 kV OHL Smardan-Gutinas	In Permitting	3	Habitats Directive (92/43/EEC)
400 kV OHL Varna-Burgas	Under Construction	7	Habitats Directive (92/43/EEC)
220kV Stalpu substation upgrade to 400 kV	Under Construction	0	

Additional information by the project promoter(s)

The data was provided based in the environmental agreements obtained.

Residual social impact

Investment	Investment status	Distance (km)	Type of sensitivity
400kV OHL Cernavoda-Stalpu	Under Construction	0	
400 kV OHL Smardan-Gutinas	In Permitting	0	

220kV Stalpu substation upgrade to 400 kV	Under Construction	0	

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
273. 400kV OHL Cernavoda-Stalpu	65	-5%, +5%	0.36
275. 400 kV OHL Smardan-Gutinas	53	-5%, +5%	0.26
715. 220kV Stalpu substation upgrade to 400 kV	15	-5%, +5%	0.15
800. 400 kV OHL Varna-Burgas	63	+10%, -10%	0.8
Total	196		1.57

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

273	Cost represents the currently expected total project investment cost. Uncertainty range related to procurement/construction cost uncertainties.
275	Cost represents the currently expected total project investment cost. Uncertainty range related to procurement/construction cost uncertainties.
715	Cost represents the currently expected total project investment cost. Uncertainty range related to procurement/construction cost uncertainties.
800	Procurement/construction cost uncertainties