Project Sheet

Redipuglia (IT) - Vrtojba (SI) interconnection

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Key Information

Cross Border Project
AC transmission line
New

In Permitting

Description

The Redipuglia (IT) - Vrtojba (SI) interconnection is a third party cross-border electrical line promoted by Adria Link Srl, E 3, ENERGETIKA, EKOLOGIJA, EKONOMIJA, d.o.o. and Holding slovenske elektrarne d.o.o.. The project concerns an underground cable 110kV a.c. merchant line, 150 MW from Redipuglia (IT) substation to Vrtojba (SI) substation, including a 110/135 kV Phase Shifter Trasformer."

Project promoters

HSE d.o.o. (Holding Slovenske Elektrarne, d.o.o.)
E3 d.o.o. (ENERGETIKA, EKOLOGIJA, EKONOMIJA, d.o.o)
Adria Link Srl

Countries

Italy
Slovenia

National development plan(s)

The Italian TSO "Terna" declared in its NDP 2019 that it includes only merchant line projects exempted and with a connection agreement signed. The Redipuglia (IT) – Vrtojba (SI) interconnection project has a connection agreement signed but it has not yet obtained the exemption under the Reg. (CE) 714/2009. For this reason these projects are not included in its NDP. Terna mentions the project in the table n. 165 at page 162 of the NDP 2019 (https://download.terna.it/terna/0000/1188/36.PDF)

Additional information on the project

Project sheet backlog

13 Jan. 2021 - Correction of project promoters

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

Project Description & Context

Project Investments

Main investment(s): "The Redipuglia (IT) - Vrtojba (SI) interconnection is a third party cross-border electrical line promoted by Adria Link Srl, E3 d.o.o. and HSE d.o.o.. The project concerns an underground cable 110kV a.c. merchant line, 150 MW from Redipuglia (IT) substation to Vrtojba (SI) substation, including a 110/135 kV Phase Shifter Transformer."

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	22.5	REDIPUGLIA	VRTOJBA	In Permitting	2023	Delayed	The promoter asked the respective NRA for the NTC recalculation not subject to conditions (eg third party network reinforcements), which will be guaranteed for the exemption period and from the entry into the new commercial operation date (COD) of the interconnector.

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	The Project will enhance the interconnection capacity between the interconnected Countries and will allow a progressive alignment of the Italian border price differentials also in

Need		How the project addresses each need (explanation provided by the project promoter(s))
		line with the interconnection target recommendations (Nov 2017) by EC Expert Group.
	Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power failures.	The project will enhance the adequacy of the interconnected systems in the mid/long-term scenarios. In particular, it improves the share of the renewable energy sources and new flexible thermal generation in the electricity systems.
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 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%.	The Project contributes to increase the Italian cross-border capacity in the medium-long term objectives (2030) as also reported in the Italian Implementation Plan for the requirements set in article 20 of Regulation 2019/943 of 5th June 2019 on the Internal Electricity Market (IEM).
	Infrastructure designed to offer more supply options to isolated areas	Considering that the Italian Peninsula is one of the most European isolated area, the Project will increase the Italian cross-transfer capacity contributing to reduce the gap with the other European Countries.

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)

The net transfer capacity increases considered by ENTSO-E to assess this project are indicated below. TSOs Terna and ELES have performed detailed simulations, using a model including also the subtransmission (110 kV) grid, leading to the following values: SI-IT +10 MW, IT-SI +10 MW. Under the assumption of a grid with all planned reinforcements completed (beyond 2025) the NTC values are: SI-IT +70 MW, IT-SI +10 MW.

	Border	A B	B A
Transfer capacity increase (in MW)	Italy - Slovenia	20	120

Boundary capacity diagram

Network boundary the projects helps mitigate

Italian Peninsula integration

Boundary capacity diagram

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	3 2 1	7 5 1	<	<	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	1 -1 -3	-2 -7 -11	>	<	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min	1 0 0	0 0 0	<	>	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	95	780	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-2	-14	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	175	1053	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-1	134	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	4	42	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-6	67	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	121 37 -24	376 260 69	< 	< 	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 -3 -6	-8 -19 -42	>> >> >>	>> >> >>	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	46	5	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	-2 -4 -8	0 0 -1	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)		max average min	13 3 0	4 2 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	69	26	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ /		average	4	1	n/a	n/a	ENTSO-E assessment

year)					

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		53	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	0.53	>	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	5	5	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	2	-9	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	0	2	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market	average	-34	257	ENTSO-E assessment

simulation (ktonnes / year)				
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 5	-6 -17 -40	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	3	32	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	
Redipuglia (IT) - Vrtojba (SI) Interconnection (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€ /	average	2	ENTSO-E assessment

year)			
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	1	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-9	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 1	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

Comments on the CBA results by the project promoter(s)

Regarding NTC increases:

1. The values indicated by the TSOs Terna and Eles in the “Transfer Capacity Increase” fields do not respect the methodology and calculations of the TYNDP 2020 CBA - ENTSO-E Guidelines. The TSO calculation considers its own studies (different methodology), with different network, load, generation and network scenarios (different database than ENTSO-E);

2. The values indicated by the TSOs Terna and Eles in the “Transfer Capacity Increase” fields are not consistent with the purpose of the project sheet. The paragraph expressly refers to the National Trend scenario in 2025, while the evaluation of the TSOs is based not only on different scenarios, but also on different time horizons (network scenario, generation and load in 2019 specifically). Furthermore, the 2025 evaluation carried out by the TSOs is based on a partial update of the 2019 network model. In particular the NTC value at 2025 is evaluated as the minimum value calculated by Eles with reference scenario at 2025 and Terna with reference scenario at 2019.

Adria Link Srl, taking into account the assumption indicated above, expresses concerns about the correctness of the note reported by the TSOs and about its coherence with the overall project sheets.

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

Residual social impact

Investment	Investment status	Distance (km)	Type of sensitivity

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1482. Redipuglia (IT) - Vrtojba (SI) Interconnection	24.3	7%	0.4
Total	24.3		0.4

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

1482