Project Sheet

Central Northern Italy

Project type	transmission
Project id	33
Created by	
Created on	Feb 8, 2021 2:38:40 PM

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ENTSOE

Key Information

Internal Project
AC transmission line
Upgrade

Planned But Not Yet Permitting

Description

The project consists in the strengthening of interconnection between the northern and the central part of Italy. It will involve the upgrading of existing 220 kV over-head line to 400 kV between Colunga and Calenzano substations as well as the removing of limitations on the existing 220 kV network in Central Italy

Project promoters

TERNA

Countries

Italy

National development plan(s)

Avanzamento Piani di Sviluppo precedenti 2015/Pag.223-233, Italy

Additional information on the project

"Link to the last release of the Italian National Development Plan

http://www.terna.it/en-gb/sistemaelettrico/pianodisviluppodellarete.aspx
"

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): Voltage upgrade of the existing 80km Calenzano-Colunga 220kV OHL to 400kV, providing in and out connection to the existing 220/150kV substation of S. Benedetto del Querceto (which already complies with 400kV standards).

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	80	Calenzano (IT)	Colunga (IT)	In Permitting	2023	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
Removing limitations on existing 220 kV grid between Villanova e S.Barbara	AC transmission line	350	Villanova (IT)	S. Barbara (IT)	Planned But Not Yet Permitting	2026	Investment on time	

Reason for investment clustering

The two investments will closely contribute to reduce congestions and guarantee a major market integration between Italy-North and Italy Center

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 improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	In case of failure of the OHL along the Adriatic or Thyrrenic coast the upgraded lines will improve transient stability.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	The new line will allow congestion reduction on the North Center-Northern border, in order to transport the foreign import to the local loads and to integrate the southern renewable production.

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)	Internal (Italy)	400	400

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	1 1 0	3 2 0	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	0 0 -1	1 0 0	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	1 0	9 5	<	<	ENTSO-E assessment

Welfare increase resulting from RES integration	min	0	2			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	18	-71	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	0	-4	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	37	-95	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-74	-1175	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	2	-7	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-76	-1171	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	36 10 -9	-3 -12 -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 -1 -2	0 1 2	< < >	< < >	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	-2	3	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	0 0 0	0 0 0	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	27 9 1	239 137 43	<	<	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	-3	13	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	0	0	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		2	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	0.02	>	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	3	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	1	1	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	4	2	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-20	-19	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 3	0 1 3	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	77	54	ENTSO-E assessment
B3a Connected RES (MW)	-			ENTSO-E assessment

Benefits submitted by promoters based on scenarios other than

the TYNDP2020 scenarios

	2025	2030	
B7 System Flexibility – Balancing Energy Exchange	+	+	Qualitative assessment by ENTSO-E, based on the study and values provided by the project promoter(s). ENTSO-E confirms the consistency of the proposed indicator with the CBA Guideline 3.0. About the computation of this indicator by the project promoter(s)

This indicator was computed based on Piano Nazionale Integrato Energia e Clima (PNIEC) and Piano Nazionale Integrato Energia e Clima (PNIEC), in a study performed by TERNA in 2020. The promoter(s) stated that the submitted value was computed in accordance with the CBA Guideline and explained it as follows:

The indicator B7, adopted in Italian NDP, defines the cost variation for dispatching services, with reference to reduction of internal congestion and ancillary services

The promoter(s) certified that the values submitted and assessed in the study relate to countries located within the ENTSO-E perimeter only.

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
90 (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.
Rem. lim. in Central Italy (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 average	2	ENTSO-E assessment

(SEW) increase (M€ / 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	0	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-10	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	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	0	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

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

About B6 - Annual Socio-Economic Welfare increase resulting from reduction in Energy Not Served monetised):

In Italy a different parameter is used for the monetization of the Expected Energy Not Served (EENS) variation due to this project, because the current parameter used by ENTSOE in this project sheet (10 k€/MWh) is not compliant with National regulations in force in Italy n°627/2016

("Minimum Requirements for the preparation of the Ten Year Development Plan of the National Transmission Network" according to which benefits related to reduction of EENS is monetized through a Value of Lost Load (VOLL) in a range between 20 k€/MWh and 40 k€/MWh.

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
90	In Permitting	27	-
Rem. lim. in Central Italy	Planned But Not Yet Permitting	34	-

Note based on CBA Guideline 3.0: Given that the actual route of the project might not be defined due to the low degree of maturity of its investment(s), an environmental assessment is not yet available.

Residual social impact

Investment	Investment status	Distance (km)	Type of sensitivity
90	In Permitting	3	
Rem. lim. in Central Italy	Planned But Not Yet Permitting	6	-

Note based on CBA Guideline 3.0: Given that the actual route of the project might not be defined yet because of the low degree of maturity of its investment(s), a residual social impact assessment is not yet available.

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
90. 90	188		1.36
1041. Rem. lim. in Central Italy	71		0.92
Total	259		2.2800000000000002

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

90	Uncertainty regarding extra costs due to safety, environmental or legal requirements imposed during permit grating process.
1041	Uncertainty regarding extra costs due to safety, environmental or legal requirements imposed during permit grating process.