Project Sheet

New AC 400 kV interconnection line Greece - Turkey

Project type	transmission
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ENTSO-E

Key Information

Cross Border Project
AC transmission line
New

Under Consideration

Description

The project concerns the construction of a new AC 400kV interconnection Greece - Turkey. The proposed interconnection line with a total length 130 km will connect Nea Santa SS in Greece and Babaeski SS in Turkey. This project, together with the project for a new interconnection between Bulgaria and Turkey, compose the project “East Balkan Corridor” that will contribute to the increase of the cross-border transfer capacities between ENTSO-E countries and Turkey and address a system need, identified in ENTSO-E's System Needs study. The construction of the two interconnections will also improve the stability of the connection of a large electricity system such as the Turkish one to the unified electricity system of the countries of continental Europe. Furthermore the project will allow integration of more renewables to the grids, support the convergence of market price between the neighboring countries and thus will help the realization of clean energy package targets.

Project promoters

Admie

Countries

Greece
Turkey

National development plan(s)

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): New AC 400 kV Overhead line Greece - Turkey

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	130	Nea Santa (GR)	Babaeski (TR)	Under Consideration	2036	New Investment	

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.

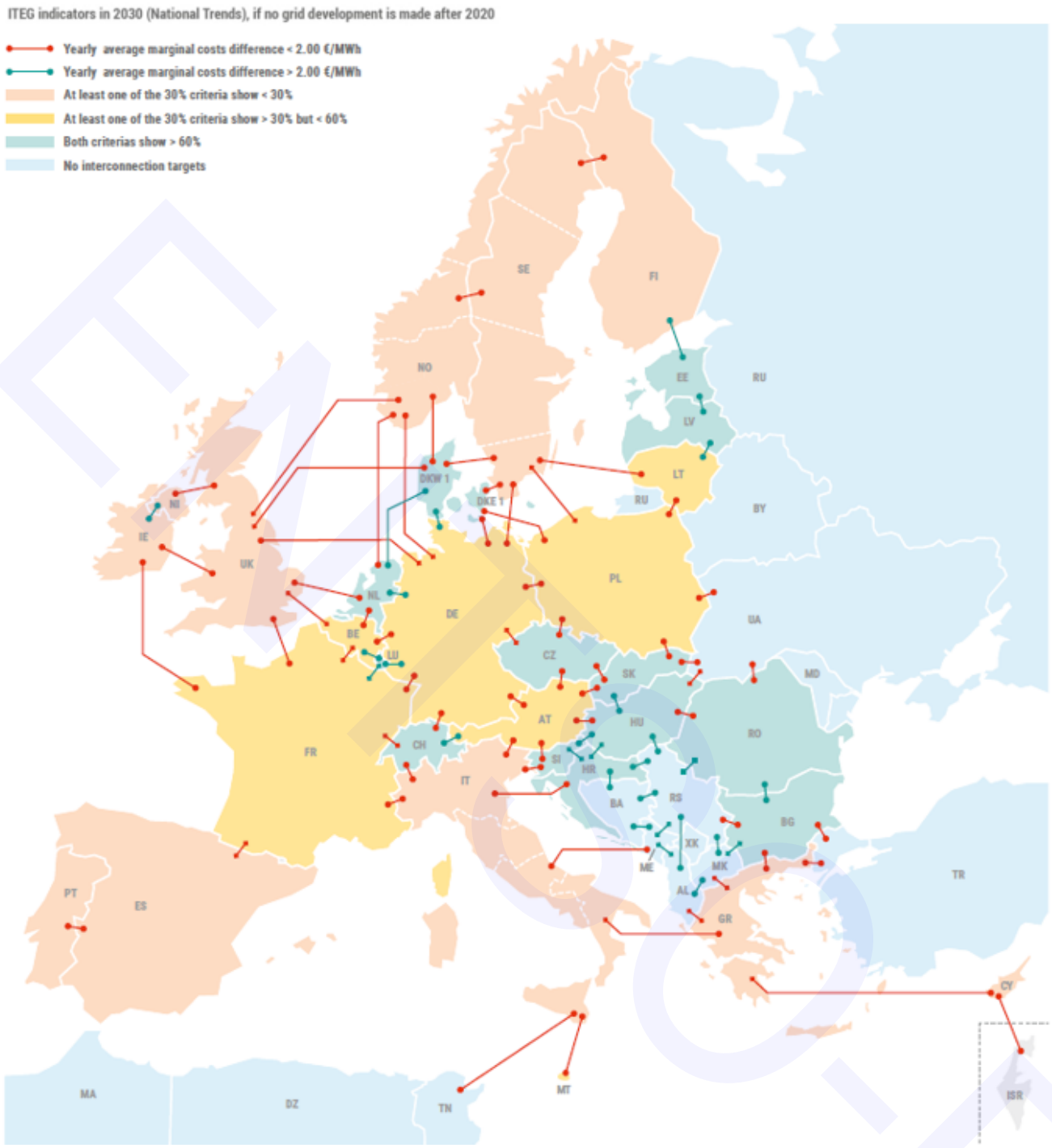
Need		How the project addresses each need (explanation provided by the project promoter(s))
€	Infrastructure to reduce price differentials between EU and/or non-EU countries	The project contributes in reducing high price differentials indicated between Turkey and Greece in the future due to the generation shift, enabling lower and more balanced wholesale prices.
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%.	Project implementation will enhance transmission capacity between Greece and Turkey and thus will contribute to a further improvement of the 2nd ITEG indicator pushing ratio between nominal transmission capacity and installed RES capacity past 30%.

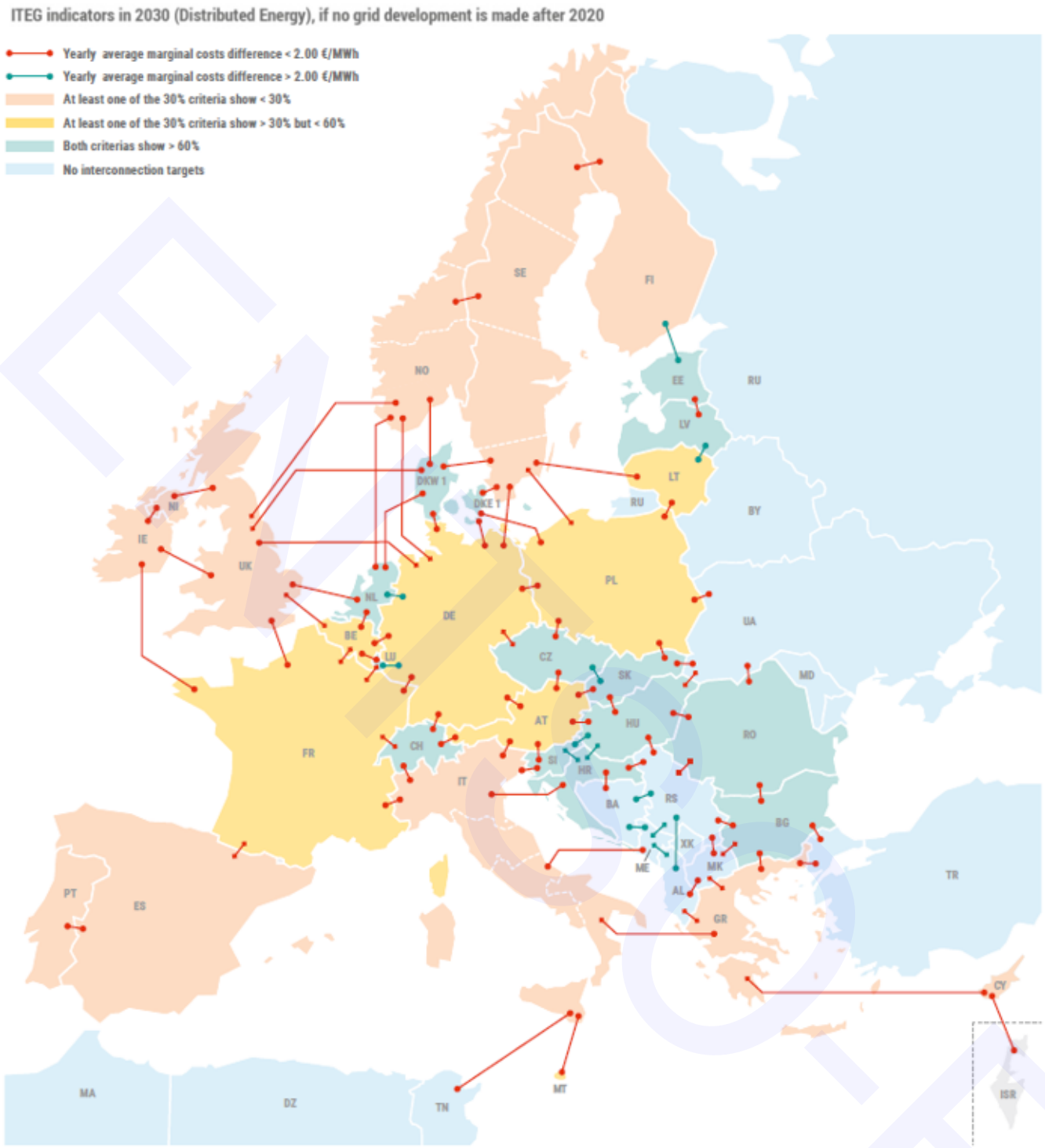
Need		How the project addresses each need (explanation provided by the project promoter(s))
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	Constrains (e.g. congestions) occur in future scenarios where high flows are exchanged between Greece and Turkey with the current grid. The project contributes in transfer capacity increase, thus minimizing congestions at the GR – TR border.

Interconnection targets

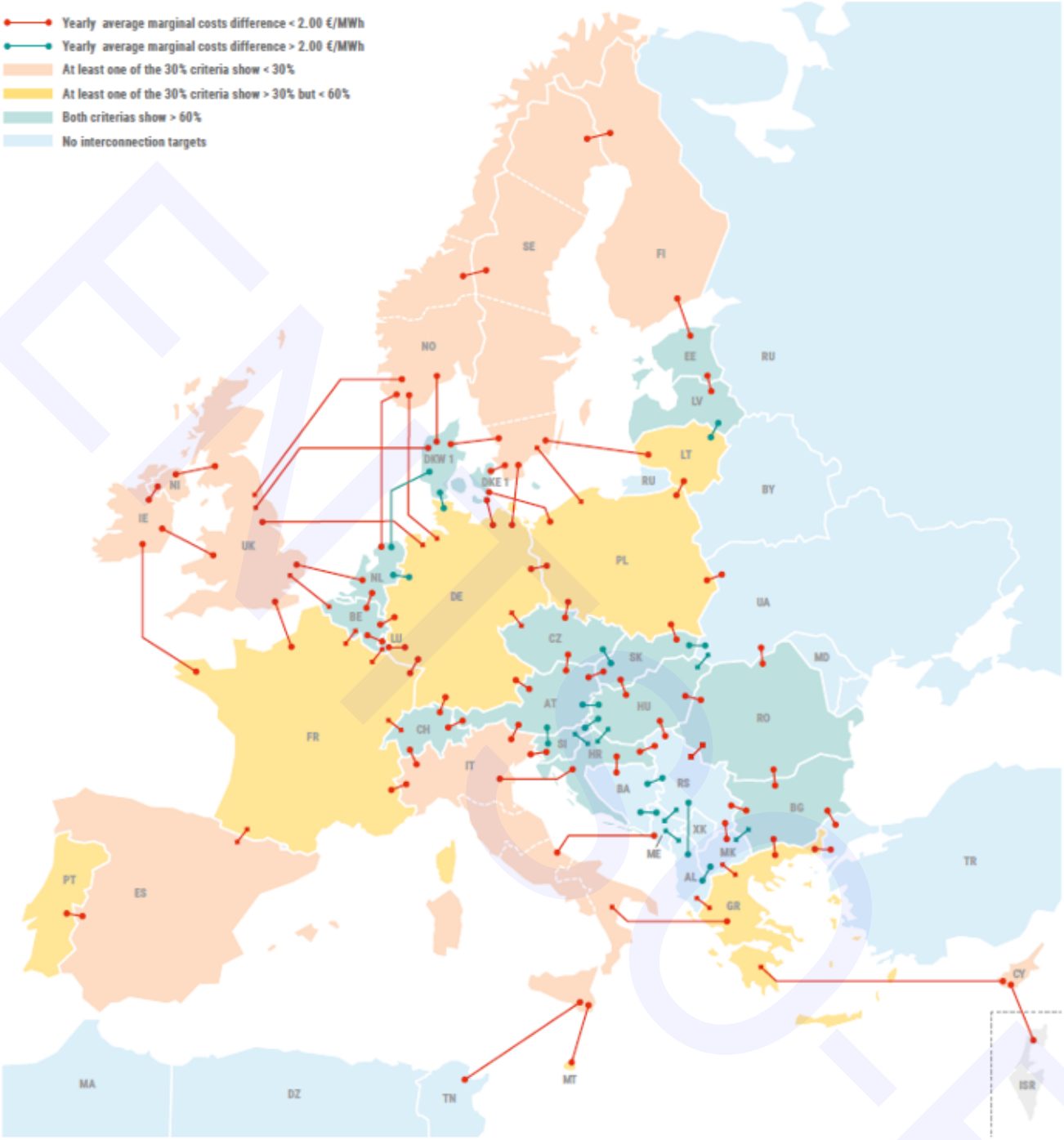
In 2017, the Interconnection Target Expert Group proposed alternative indicators to the 15% interconnection criteria for every country and electrified island with a new methodology developed collaboratively between the European Commission, ENTSO-E, ENTSOG, industry, universities and other experts. The 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.


ITEG indicators in 2030 (National Trends), if no grid development is made after 2020
Yearly average marginal costs difference < 2.00 €/MWh
Yearly average marginal costs difference > 2.00 €/MWh
At least one of the 30% criteria show < 30%
At least one of the 30% criteria show > 30% but < 60%
Both criterias show > 60%
No interconnection targets
SE
FI
NO
EE
RU
LV
LT
DKW 1
DKE 1
RU
BY
NI
IE
UK
PL
NL
DE
UA
BE
LU
CZ
SK
MD
AT
HU
RO
FR
CH
SI
HR
IT
BA
RS
BG
XK
ME
MK
AL
TR
PT
ES
GR
CY
MA
DZ
TN
MT
ISR


ITEG indicators in 2030 (Distributed Energy), if no grid development is made after 2020
Yearly average marginal costs difference < 2.00 €/MWh
Yearly average marginal costs difference > 2.00 €/MWh
At least one of the 30% criteria show < 30%
At least one of the 30% criteria show > 30% but < 60%
Both criterias show > 60%
No interconnection targets
SE
FI
NO
EE
RU
LV
LT
DKW 1
DKE 1
RU
BY
NI
IE
UK
PL
NL
DE
UA
BE
LU
CZ
SK
MD
AT
HU
RO
FR
CH
SI
HR
IT
BA
RS
BG
XK
ME
MK
AL
TR
PT
ES
GR
CY
MA
DZ
TN
MT
ISR

ITEG indicators in 2030 (Global Ambition), if no grid development is made after 2020



Project Assessment

Transfer capacity increase (National Trends 2025)

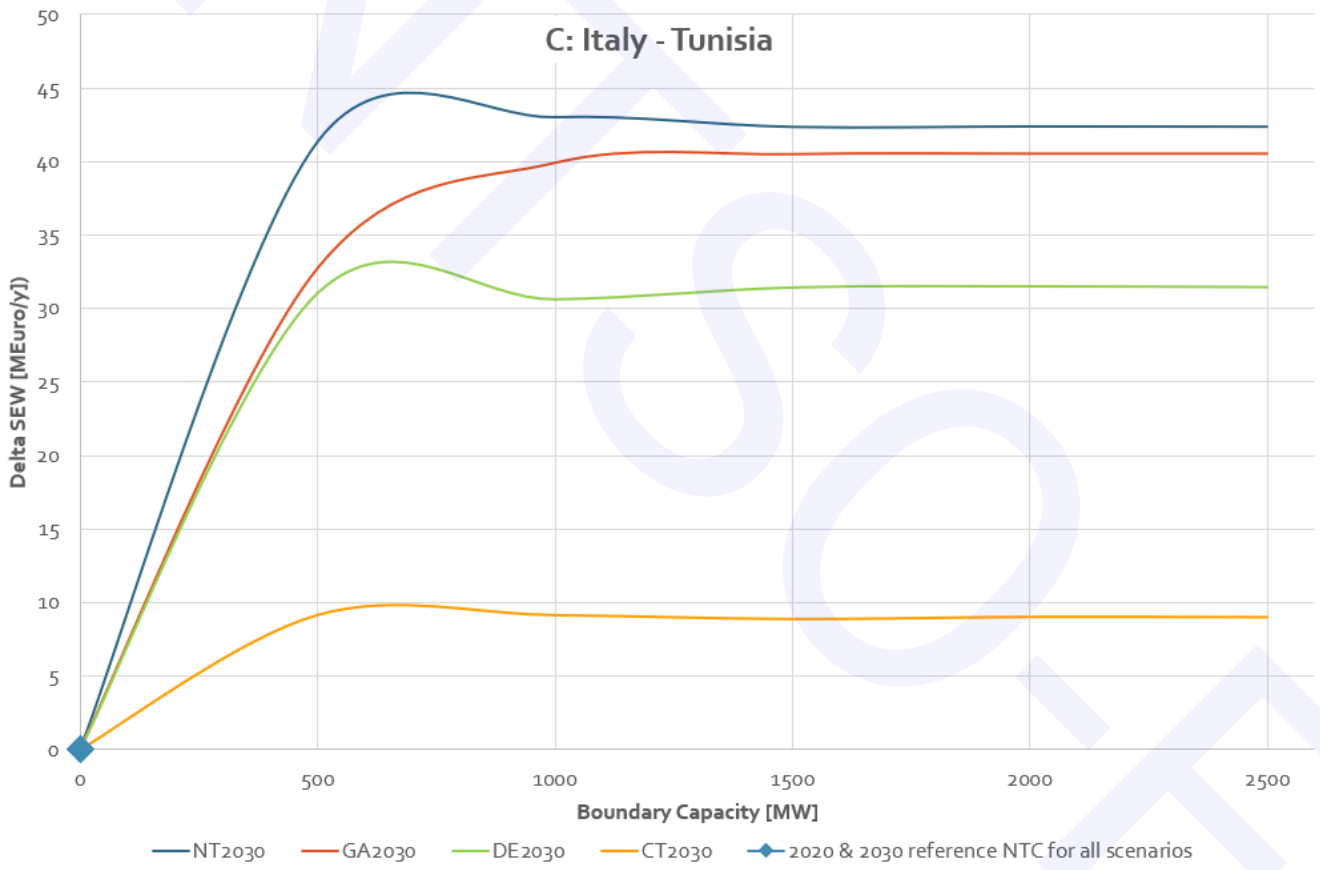
	Border	A B	B A
Transfer capacity increase (in MW)	Greece-Turkey	600	600

Boundary capacity diagram

Network boundary the projects helps mitigate

Turkey – South Balkan

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.

Because it is a Future project, addressing system needs and with a planned commissioning date after 2025, this project has only been assessed in the 2030 scenarios and based on a subset of CBA indicators.

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		135 128 124	n/a	n/a	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min		-7 -9 -13	n/a	n/a	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min		0 0 0	n/a	n/a	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average		1077	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average		-104	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average		85	n/a	n/a	ENTSO-E assessment

B4d Particular matter 5	average		1420	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average		196	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average		1074	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min		469 320 237	n/a	n/a	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		-10 -23 -52	n/a n/a n/a	n/a n/a n/a	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)	average		N/A	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		N/A N/A N/A	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min		9 4 0	n/a	n/a	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		N/A	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average		N/A	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	n/a	ENTSO-E assessment

Residual impact

Information on the residual impact of the project was provided by the project promoter(s).

Project Costs

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1738. New AC 400 kV interconnection line Greece - Turkey	32.55	± 10%	0.64
Total	32.55		0.64

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

1738