Project Sheet

Offshore wind integration

Project type	transmission
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Key Information

Internal Project
AC transmission line
New

Under Consideration

Description

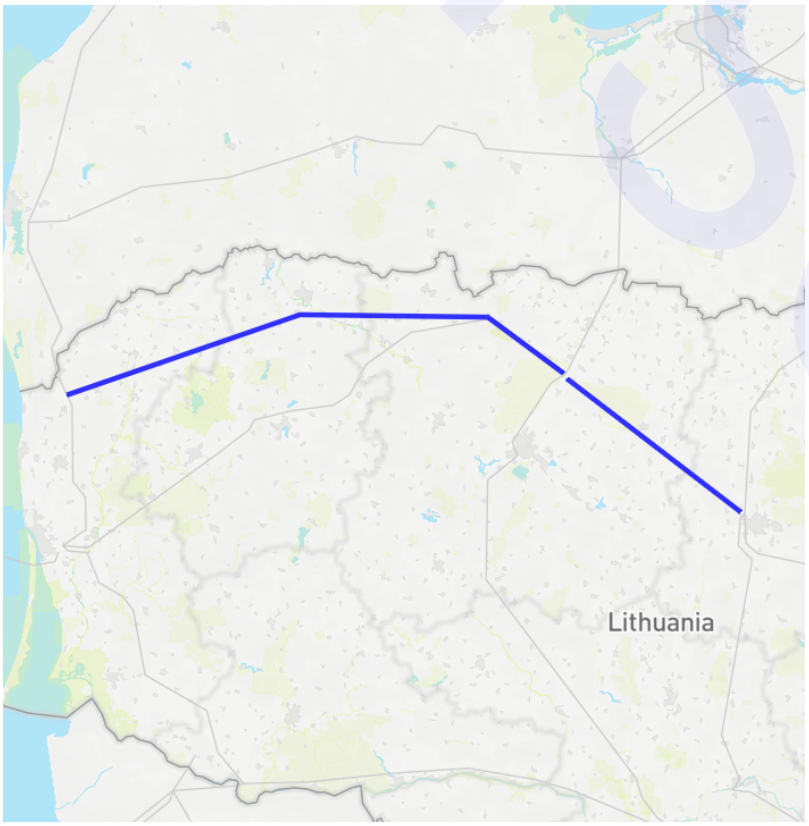
Integration of 700 MW off-shore wind farms in Baltic Sea near Lithuania coast. To connect offshore wind farms it will be necessary to strenghten western part of 330 kV network in Lithuania, build offshore platform in Baltic Sea and connect platform via 60-80 km AC or DC cable to planned Darbenai substation.

Project promoters

LITGRID AB

Countries

Lithuania



National development plan(s)

"'Development of the Lithuanian electric power system and transmission grids. 2017-2026" (https://www.litgrid.eu/uploads/files/dir417/dir20/dir1/12_0.php

), page 23.

Additional information on the project

Project sheet backlog

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

ENTSO-E

Project Description & Context

Project Investments

Main investment(s): New 330 kV OHL Darbenai-Musa

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	170	Darbnai	Muša	Under Consideration	2030	Delayed	Investment depends on plans to build offshore wind farms

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
New 330 kV OHL Panevežys-Muša	AC transmission line	72	Panevežys	Muša	Under Consideration	2030	Delayed	Investment depends on plans to build offshore wind farms

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.

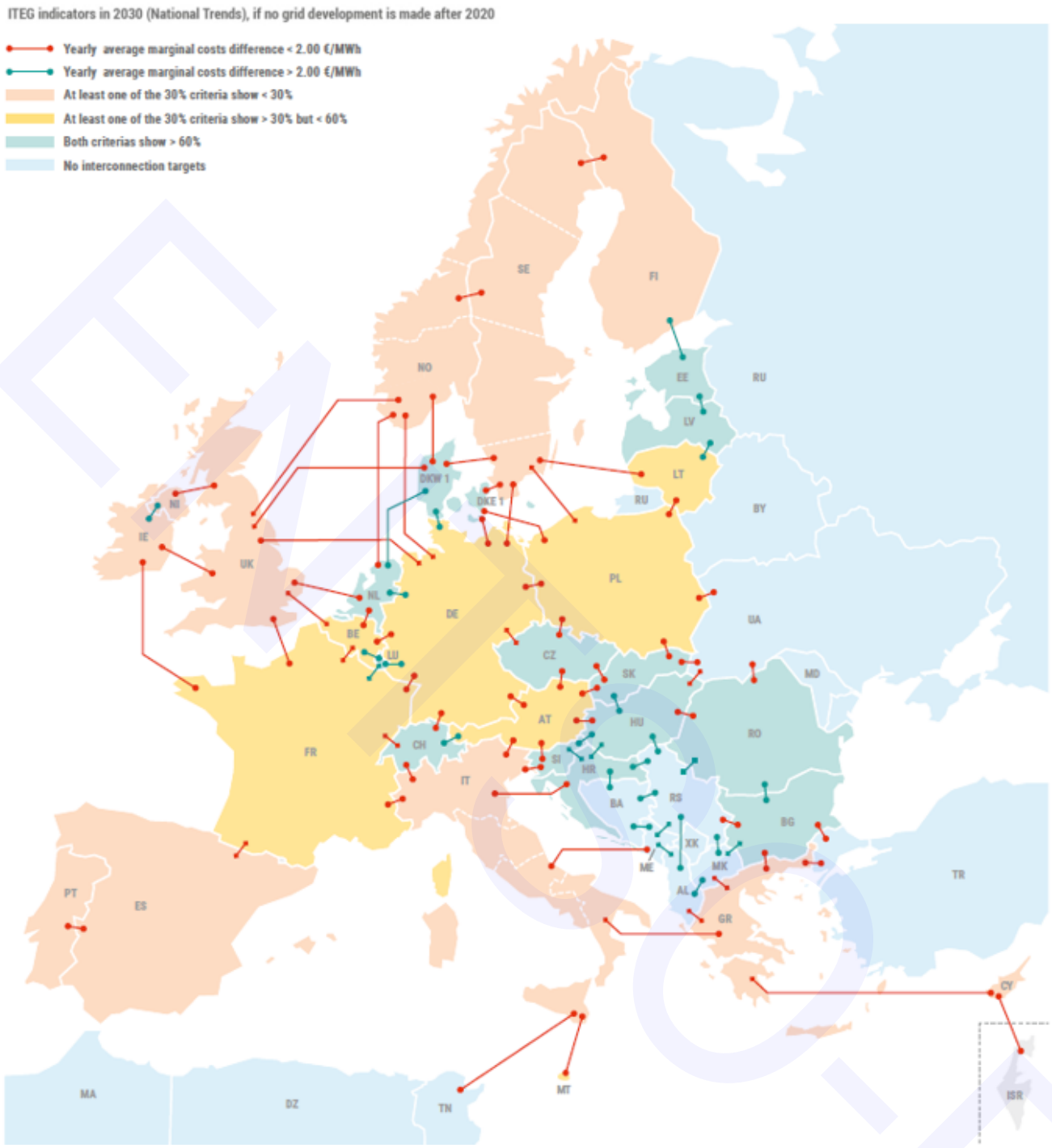
Need		How the project addresses each need (explanation provided by the project promoter(s))
	Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power failures.	Connection of 700 MW offshore wind farms is supporting national strategy targets in Lithuania to significally increase generation from renewables.

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.	Connecting 700 MW offshore wind farms will accommodate future scenarios, by helping to reach decarbonisation targets and increase generation from renewable energy sources.

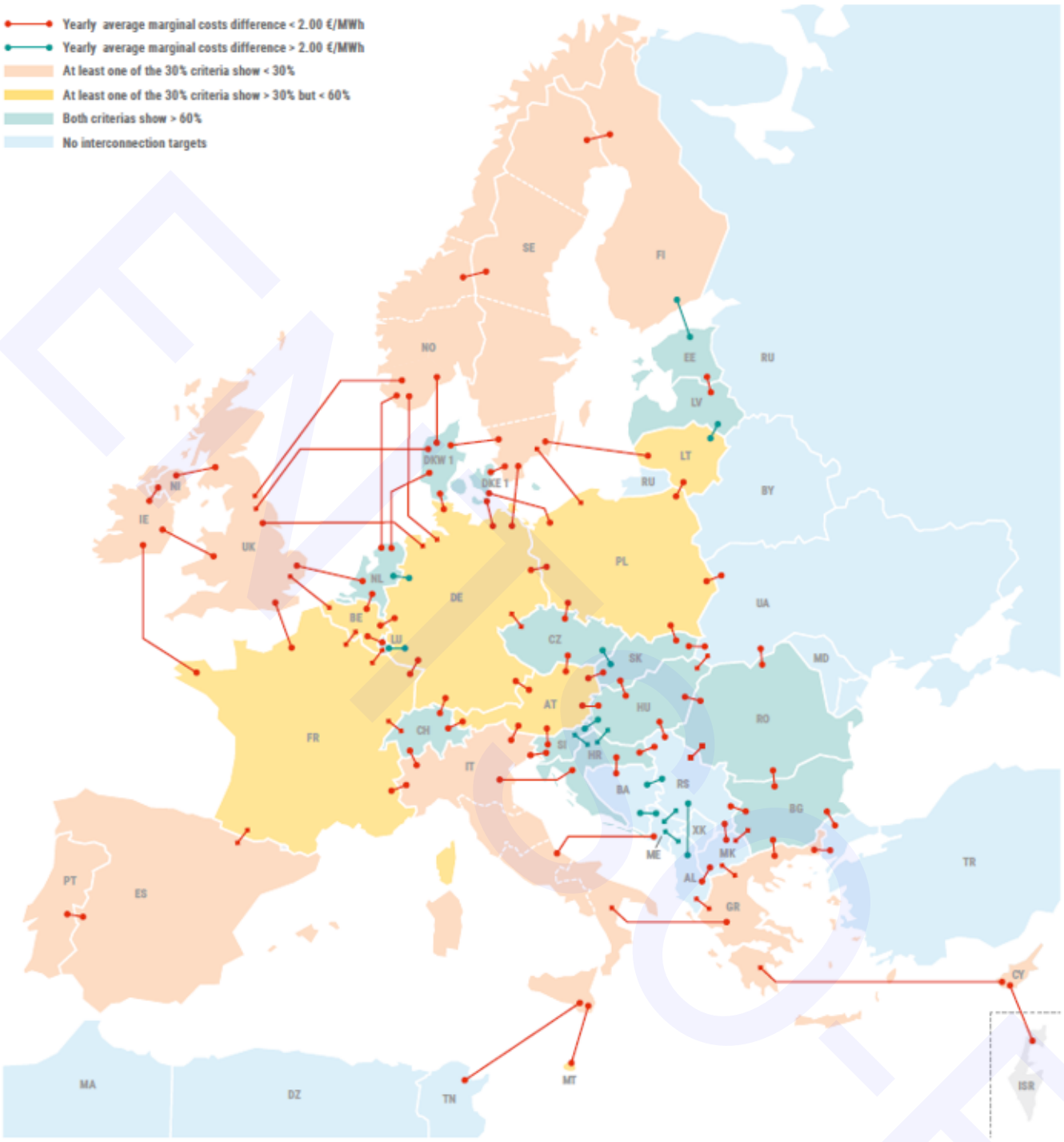
Interconnection targets

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%

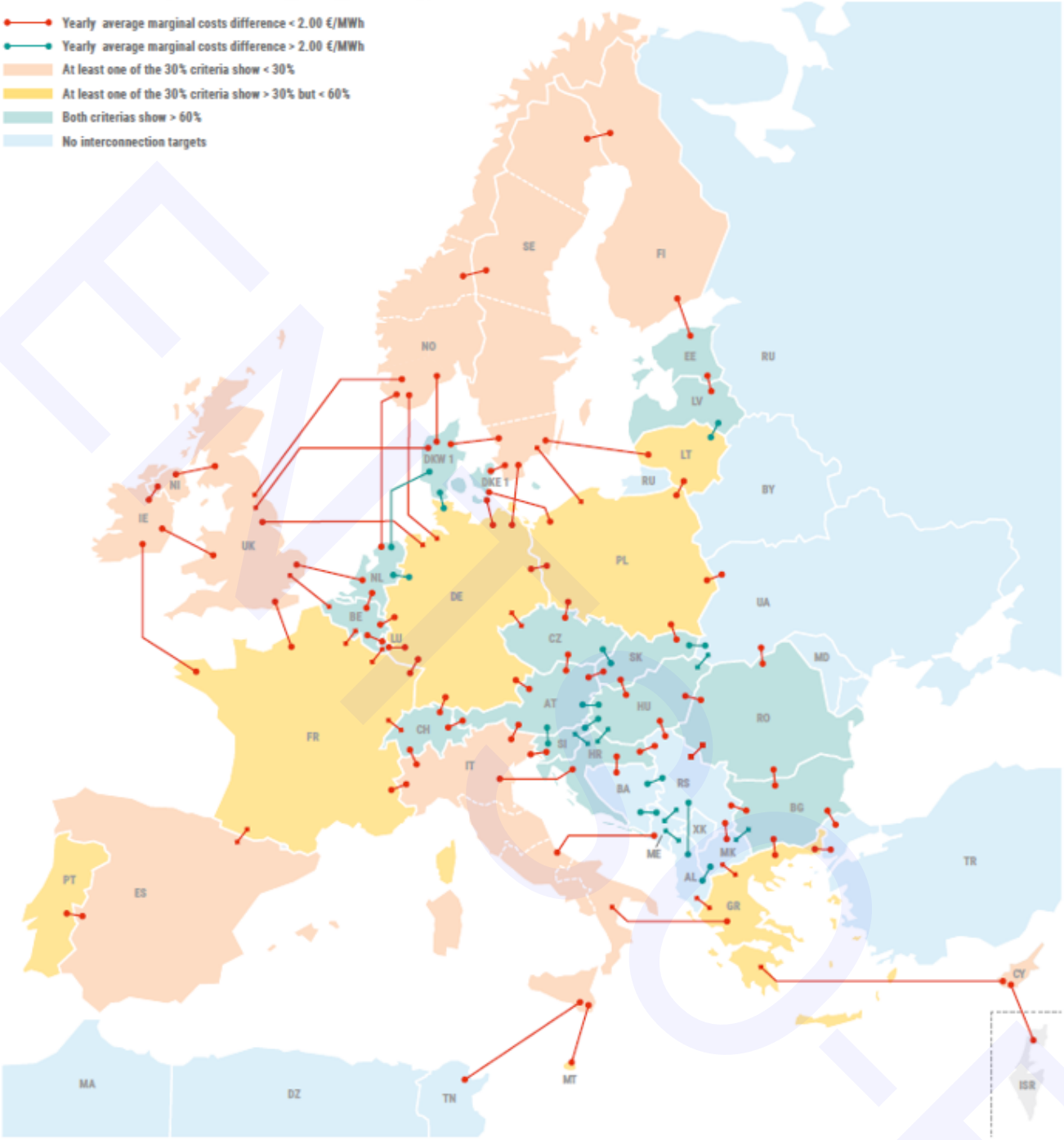
The following maps show the ITEG methodology applied to the TYNDP 2030 scenarios, with the 2020 grid.


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



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)	Internal (Lithuania)	700	700

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	107 99 91	82 79 75	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	25 23 22	25 22 19	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	112 110	122 114	>	>	ENTSO-E assessment

Welfare increase resulting from RES integration	min	109	107			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	805	768	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	45	99	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	1555	1090	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-840	-12341	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	100	101	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-860	-12339	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	-935 -986 -1083	-693 -782 -901	<	>	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	36 76 164	25 56 126	< < >	< < <	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	-38	-58	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	2 2 6	2 4 9	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	2222 2217 2207	2744 2739 2734	<	<	ENTSO-E assessment
B3a Connected RES (MW)	-	700	700	n/a	n/a	ENTSO-E assessment

Impact on grid losses

B5 Variation of network losses (GWh / year)	average	-36	-70	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-2	-5	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	142	91	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	54	27	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	139	123	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-1018	-764	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	7 48 138	19 50 118	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	2615	2639	ENTSO-E assessment
B3a Connected RES (MW)	-	700	700	ENTSO-E assessment

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
New 330 kV OHL Darbenai-Musa (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.
New 330 kV OHL Panevezys-Musa (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	114	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	25	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	125	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-910	ENTSO-E assessment
B2a_€ Annual Societal cost variation	CO2 price 60€/ton 100€/	29 66 147	ENTSO-E assessment

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

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	2231	ENTSO-E assessment
B3a Connected RES (MW)	-	600	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

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

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
1694. New 330 kV OHL Darbenai-Musa	66	+5%, - 5%	0.143
1695. New 330 kV OHL Panevezys-Musa	21.6	+5%, - 5%	0.047
Total	87.6		0.19

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

ENTSO-E