Project Sheet

LaSGo Link

Project type	transmission
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Key Information

Cross Border Project
Offshore DC transmission cable
New

Under Consideration

Description

LaSGo Link is a new multi terminal HVDC sub-sea interconnector project linking Sweden, the Island of Gotland and Latvia. The project consists of two sections: a 700MW internal grid reinforcement between the Swedish mainland and the island of Gotland and a 500MW cross border connection between the island of Gotland and Latvia.

LaSGo Link is being developed to increase grid capacity to Gotland and increase the level of cross border capacity in the Baltic Sea region. This will meet the current challenge of security of supply experienced in this region and therefore support industry and the further growth of wind power in the Gotland region. The cross border element of the project will provide further routes to market for generation thereby reducing internal grid congestion in Sweden and providing socio-economic benefit to both Sweden, Latvia and the interconnected markets in the Baltic Sea region.

Project promoters

Transmission Investment

Countries

Latvia
Sweden

National development plan(s)

Additional information on the project

Beyond the the economic benefits of 500MW of cross border capacity between Sweden and Latvia, the mid-terminal located on the island of Gotland will replace the aging existing HVDC cable connection between the Swedish mainland and Gotland which is expected to come to end of life between 2030 and 2035. This internal grid reinforcement will support the connection of significantly more offshore wind expected to be greater than 1GW in the seas around the island. Furthermore, the project will mitigate current security of supply issues limiting the industrial expansion on the island with a decarbonised energy approach. One example of such is a cement factory that could, with an increase of clean energy supply, reduce their emmissions (that is today 5% of Sweden's total emmissions) towards zero.

By improving the economic viability and expansion of local industry and creating further job

opportunities on the project itself the project will secure and increase the number of jobs on Gotland, which is critical for the local development.

The project will be designed using Voltage Sourced Converter (VSC) technology which will provide further security of supply benefits in the form of frequency/voltage control and stability to the three areas in which it will connect.

As part of the early stage development of the project, key participants and stakeholders will be established.

Project sheet backlog

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): New monopolar HVDC VSC monopole sub-sea cable running from a new substation in Gotland (TBC) to Grobina in Latvia (or Ventspils or a possible a new substation inbetween Grobina and Ventspils) (TBC). This investment consists of two VSC HVDC converter stations connected via two 320kV HVDC XLPE cables.

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
Offshore DC transmission cable	195	New substation on Gotland (TBC)	Grobina (TBC)	Under Consideration	2036	New Investment	

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 monopolar HVDC VSC monopole sub-sea cable running from the vicinity of Oskarshamn in mainland Sweden (TBC) to a new substation in Gotland (TBC). This investment consists of one HVDC VSC converter station	Offshore DC transmission cable	125	Oskarshamn (TBC)	New substation on Gotland (TBC)	Under Consideration	2036	New Investment	

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
connected via two 320kV HVDC XLPE cables to a Converter Station being built as part of the LaSGo Link Gotland to Latvia investment.								

Reason for investment clustering

The LaSGo Link project is a multi-terminal HVDC link with converter stations sited in Sweden, the island of Gotland and Latvia. The Sweden to island of Gotland section is an internal Swedish grid reinforcement project but is required to support the connection of the cross border element between the island of Gotland and Latvia. Equally the sizing of the Sweden to Gotland section is based on the requirement of the cross border section. These two sections are therefore mutually inclusive and must be realised as a single project to maximise the capital efficiency and socio-economic welfare of the project.

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.

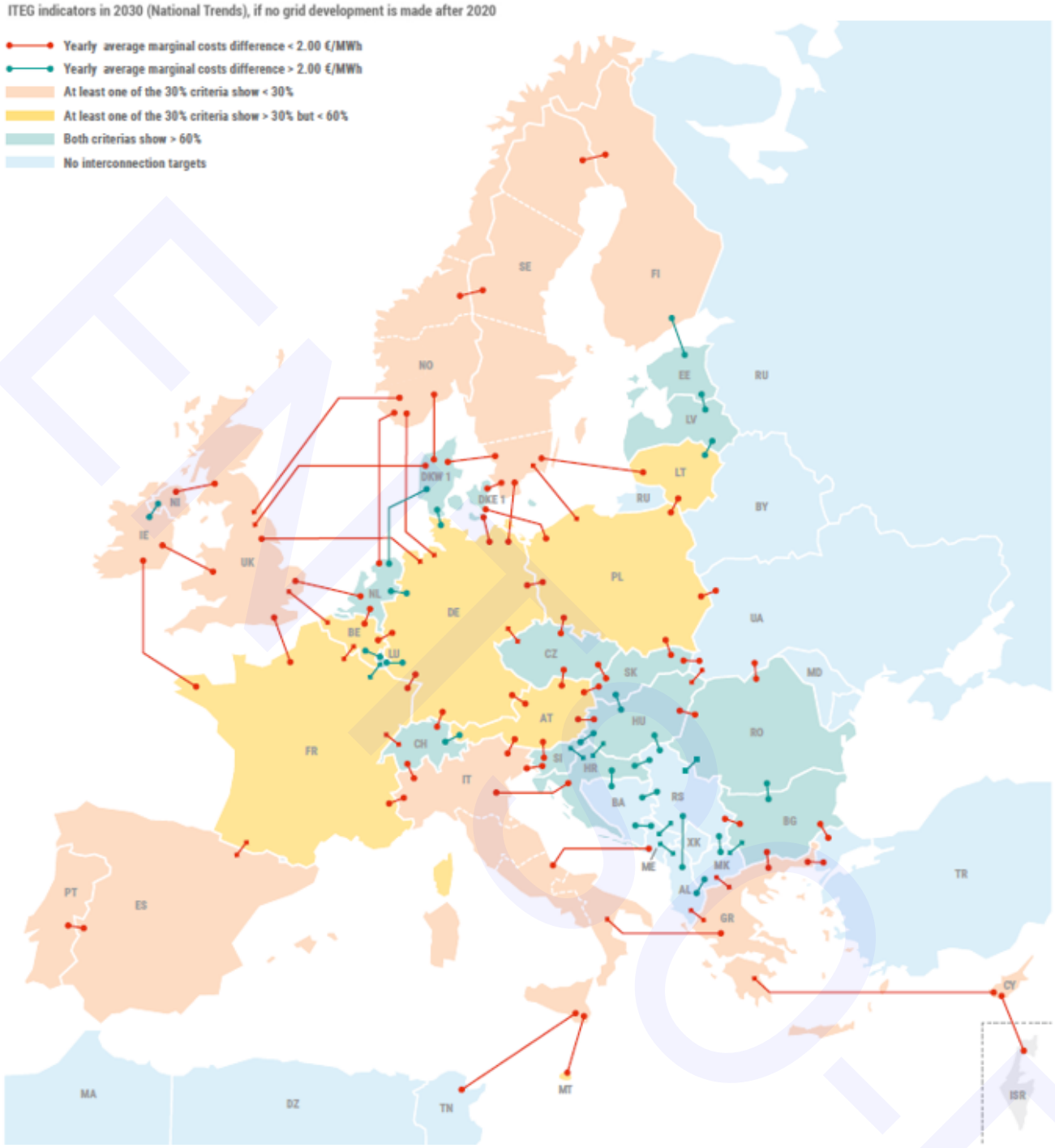
Need		How the project addresses each need (explanation provided by the project promoter(s))
€	Infrastructure to reduce price differentials between EU and/or non-EU countries	The new cross border capacity will give lower cost generators in Sweden access to wider markets, reducing the cost of power in Latvia and converging prices in the region.
	Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power	LaSGo Link will mitigate current grid deficiencies and support the

Need		How the project addresses each need (explanation provided by the project promoter(s))
	failures.	connection of offshore wind in the seas around the island of Gotland. Furthermore, the project will reduce current security of supply issues that are limiting industrial expansion on the island with increased access to decarbonised energy.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	The multi-terminal design of LaSGo Link improves the capital efficiency and operational security of connecting future offshore wind around the island of Gotland directly to the markets of Sweden and Latvia.
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 will support reducing price differentials in the Baltic region and support the expansion of wind generation around the island of Gotland contributing to the 30% RES capacity target.

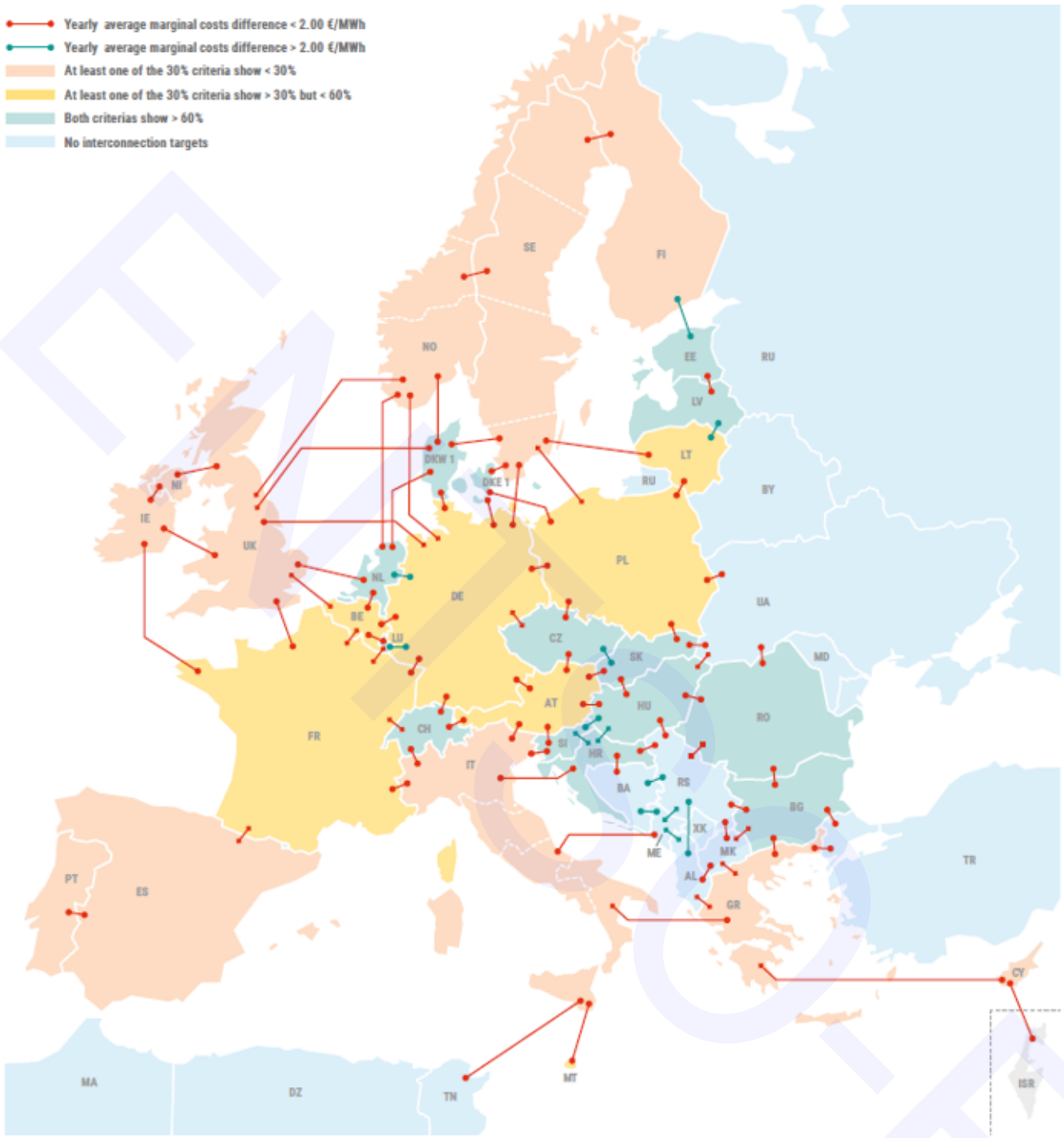
Interconnection targets

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%

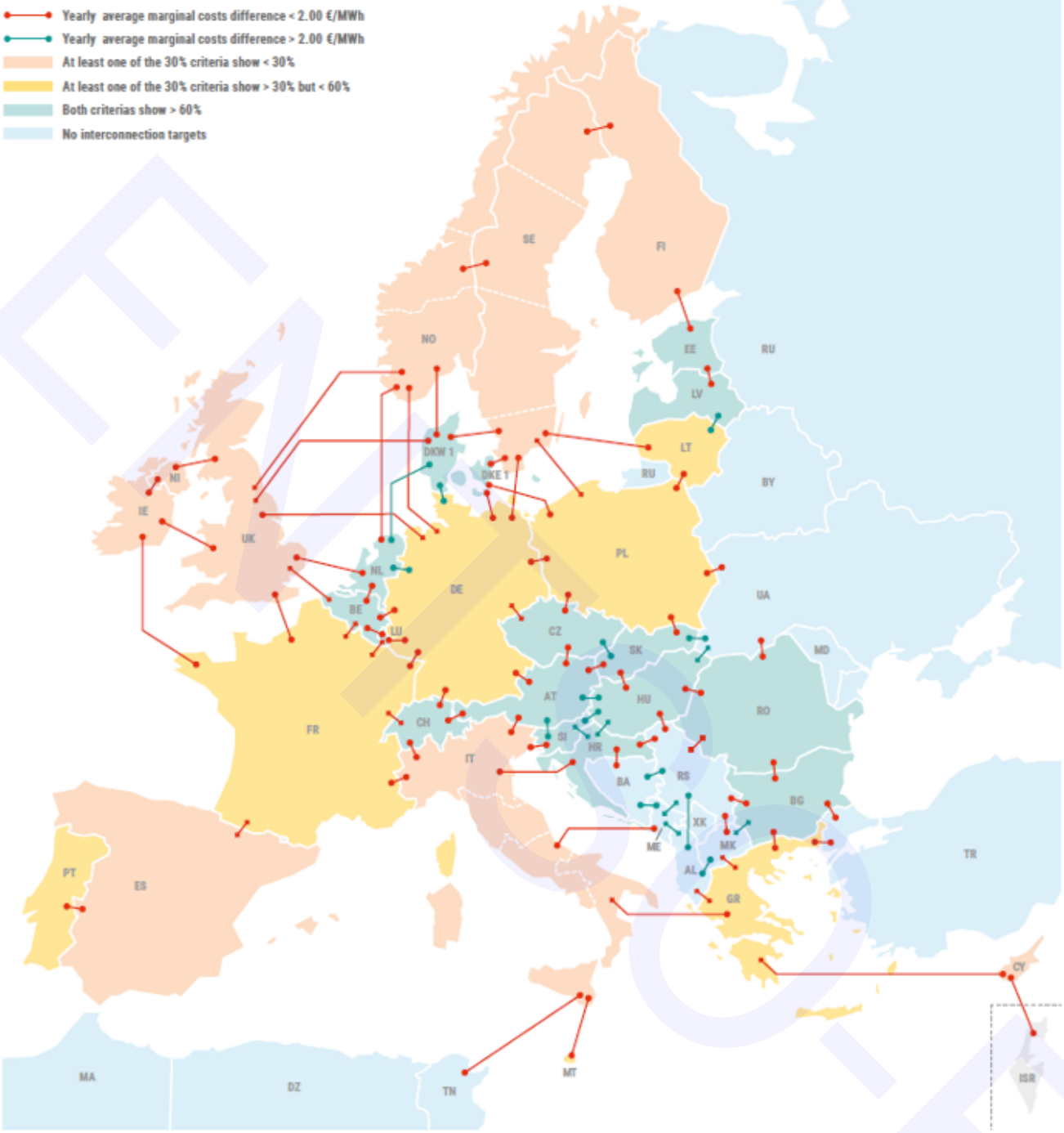
The following maps show the ITEG methodology applied to the TYNDP 2030 scenarios, with the 2020 grid.


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)

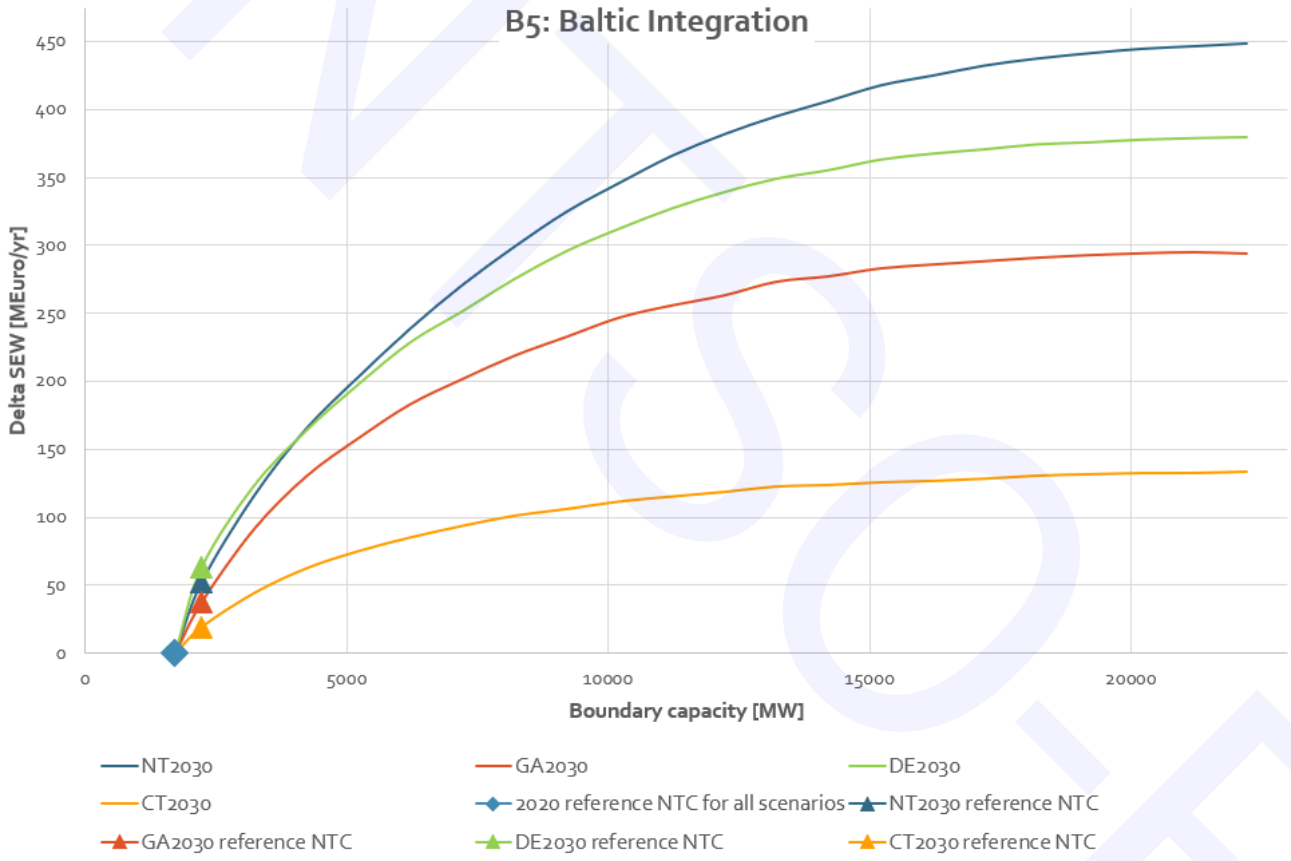
	Border	A B	B A

Boundary capacity diagram

Network boundary the projects helps mitigate

Baltic 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.

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		55 54 52	n/a	n/a	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min		17 16 15	n/a	n/a	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min		15 15 14	n/a	n/a	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min		-525 -562 -598	n/a	n/a	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from	CO2 price 60€/ ton 100€/		18 40 90	n/a n/a n/a	n/a n/a n/a	ENTSO-E assessment

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

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average		-589	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average		-20	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average		-739	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average		3635	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average		-26	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average		3663	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min		429 406 384	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

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
LaSGo Link - Gotland to Latvia (New HVDC)	++	++	+ (between sync areas)	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.
LaSGo Link - Sweden to Gotland (New HVDC)	++	++	+ (between sync areas)	

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1740. LaSGo Link - Gotland to Latvia	511.5	+/-15%	8
1741. LaSGo Link - Sweden to Gotland	287.5	+/-15%	4
Total	799		12

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

1740

1741