Project Sheet

2nd interconnector Belgium - Germany

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Key Information

Cross Border Project
DC transmission line
New

Under Consideration

Description

This project considers the possibility of a second ~1GW HVDC interconnection between Belgium and Germany at the earliest by 2035 (indicative timing). The timing as well as location, routing, capacity are subject to further studies.

Project motivation:

Preliminary studies have indicated potential for further regional welfare increase by further increasing the interconnection capacity between Belgium and Germany. The possibility of higher market exchanges between these two bidding zones leads to a higher price convergence in more hours of the year and reduces therefore the price differentials.

This interconnector project is designed as a HVDC-link. The full controllability of the HVDC link facilitates the balancing of active and reactive power in the Belgian and German grid.

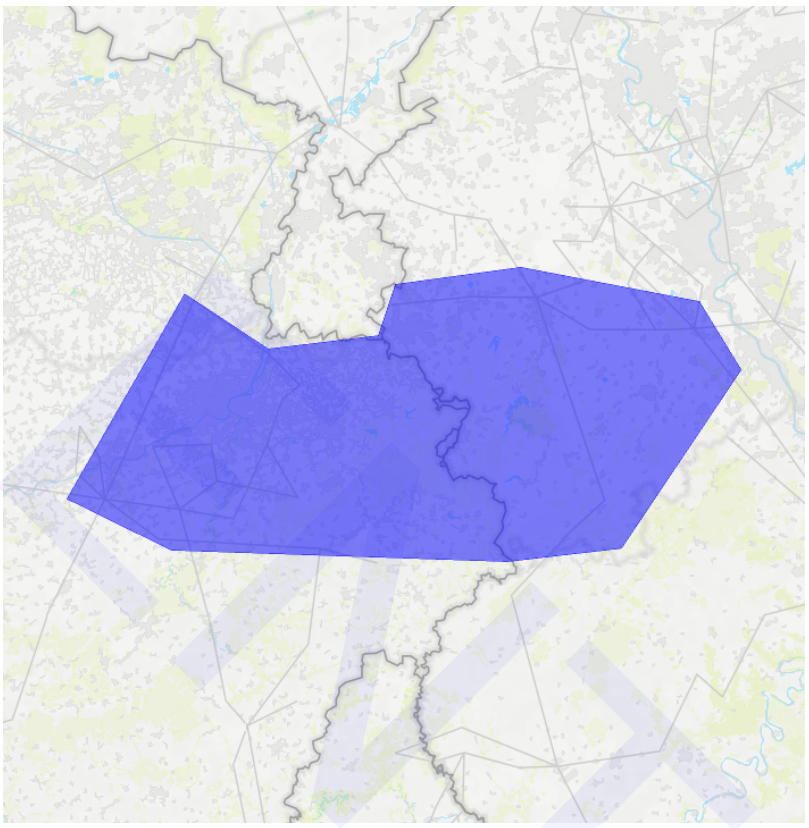
Belgium and Germany face decreasing figures of installed conventionals due to bad market conditions. The interconnector contributes to meet adecacy not only in both countries but also in the entire CWE-region. Due to the future RES increase in whole CWE the RES spillage will rise significantly especially beyond 2030. This interconnector project allows a better integration of RES in the entire region.

Project promoters

AMPRION
ELIA

Countries

Belgium
Germany



National development plan(s)

NDP1, Belgium, 2020-2030, §4.2.3.4; NDP2, Germany, Netzentwicklungsplan 2030 Version 2019, Project 313, p. 563

Additional information on the project

More information about the project can be found following this link:

- National Development Plan:
https://www.elia.be/-/media/project/elia/elia-site/infra-and-projects/investment-plans/federal-development-plan-2020-2030/nl/20190516_federaal-ontwikkelingsplan_nl.pdf?la=en

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): This investment item envisions the possibility of a second 1 GW HVDC interconnection between Belgium and Germany. Subject to further studies.

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
DC transmission line	150	Gramme (BE)	Dahlem (DE)	Under Consideration	2035	Delayed	The recently adopted Clean Energy Package will have a significant impact on the future market design. These developments are likely to have a major impact on the project of a second interconnector between Belgium and Germany. However, as a lot of these regulatory changes are still about to enter into force, the exact impact on this project cannot be established today.

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	This project increases the degree of interconnectivity between the Belgian and German bidding zones. The possibility of higher market exchanges between these two bidding zones leads to a higher price convergence in more hours of the

Need		How the project addresses each need (explanation provided by the project promoter(s))
		year and reduces therefore the price differentials.
	Infrastructure to address system adequacy deficiencies and/or mitigate the risk of power failures.	Belgium and Germany face decreasing figures of installed conventionals due to bad market conditions. The interconnector contributes to meet adequacy not only in both countries but also in the entire CWE-region.
	Infrastructure to improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	This interconnector project between Belgium and Germany is designed as a HVDC-link. The full controllability of the HVDC link facilitates the balancing of active and reactive power in the Belgian and German grid.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	Due to the future RES increase in whole CWE the RES spillage will rise significantly especially beyond 2030. This interconnector project allows a better integration of RES in the entire region.

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)	Belgium - Germany	1000	1000

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 its planned commissioning date is in 2035 or later, 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	7 7 7	28 23 21	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	1 0 0	6 5 4	>	>	ENTSO-E assessment

B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min	11 11 11	25 25 25	<	<	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	N/A	10	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	N/A	-4	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	N/A	147	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	N/A	-3980	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	N/A	4	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	N/A	-3978	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min	14 -6 -26	-137 -194 -225	<	<	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 0 1	6 14 31	< > >	>> >>	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)	average	0	0	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost	CO2 price 60€/ ton	0 0	0 0	n/a	n/a	ENTSO-E assessment

variation resulting from CO2 variation from network simulation monetised (M € / year)	100€/ ton 189€/ ton	0	0			

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	237 230 223	688 663 630	<	<	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	0	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	N/A	0	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		1590	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	16	>	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	27	25	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	21	14	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	17	12	ENTSO-E assessment
Reduction of CO2 and GHG emissions				
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-404	-386	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	3 19 55	10 25 59	ENTSO-E assessment
Integration of renewable energy sources				
B3 Annual avoided curtailment (RES integration) (GWh / year)	average	345	279	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	
2nd interconnecter between Belgium and Germany (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.

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	11	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	2	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	15	ENTSO-E assessment
Reduction of CO2 and GHG emissions			
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-81	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from	CO2 price 60€/ton 100€/	3 6 13	ENTSO-E assessment

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	288	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

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

For indicator B6 – Security of supply, in the NT2030 scenario the following subsequent information was calculated by the project promoter in line with CBA 3.0 method with the Antares market modelling tool: annual reduction in energy not served = 1,590MWh/year and a corresponding annual socio-economic welfare increase resulting from the energy not served (monetized) of 15.90 M€/yr.

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1107. 2nd interconnecter between Belgium and Germany	600	20%	4.8
Total	600		4.8

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

1107 Uncertainty range is needed due to uncertainties in material costs and permitting issues and unknown final routing in case of projects in early planning status.

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