Project Sheet

Interconnector DE-LUX

Project type	transmission
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Key Information

Cross Border Project
AC transmission line
Mostly New

Planned But Not Yet Permitting

Description

The project comprises the construction of two new 380/220-kV-substations in Germany (Aach) and Luxemburg (Bofferdange). The new substations will be connected via a new AC-link to allow a higher cross border capacity between Germany and Luxembourg.

Project promoters

AMPRION
CREOS

Countries

Germany
Luxembourg

National development plan(s)

NDP1; Germany, Netzentwicklungsplan 2030 Version 2019, Project 406, p. 662;

Additional information on the project

The project was part of the previous TYNDP 2018, Link to the Website:
https://tyndp.entsoe.eu/tyndp2018/projects/projects/328

In line with Scenario report 2040
http://www.creos-net.lu/actualites/actualites/article/scenario-report-2040-public-consultation.html

The existing 220-kV-line between Heisdorf/Blooren - Niederstedem/Quint will be partially dismantled after commissioning of this 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 Overhead Line between Germany and Luxembourg

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	40	Aach (DE)	Bofferdange (LU)	Planned But Not Yet Permitting	2026	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
New 400/220-kV-substation	Onshore substation		N/A	N/A	Planned But Not Yet Permitting	2025	Investment on time	
New 400/220/110 kV substation including transformer 400/220 kV to be commissioned in Bofferdange (LU)	Onshore substation		N/A	N/A	Planned But Not Yet Permitting	2025	Investment on time	

Reason for investment clustering

The new AC double circuit overhead 400 kV line between Germany and Luxembourg is clustered with substation Aach (DE) and Bofferdange (LU) to secure the needed capacity and distribute the energy into lower voltage levels. The existing 220 kV OH-lines Trier-Blooren and Quint-Heisdorf will be decommissioned after the 400 kV OH lines and substations will be put in operation.

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.	
	Infrastructure to improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	

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)	Germany - Luxembourg	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.

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

Welfare increase resulting from RES integration	min	0	0			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	-9	-3	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	0	-1	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	-21	2	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-7	-2	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	0	-1	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-7	-2	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	3 -2 -8	2 -3 -11	>	>	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 0	0 0 0	< < <	< < <	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	-15	-19	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	1 1 2	1 1 3	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	0 0 0	8 3 0	>	>	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	-28	-37	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-1	-1	n/a	n/a	ENTSO-E assessment

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		159	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	1.59	>	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	1	0	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	0	0	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	1	0	ENTSO-E assessment

Reduction of CO2 and GHG emissions

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

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	12	9	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	
AC Overhead Line Aach-Bofferdange (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.

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	1	ENTSO-E assessment
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	0	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from CO2 variation from market	CO2 price 60€/ton 100€/ton 189€/	0 0 0	ENTSO-E assessment

simulation monetised (M€ / year)	ton		

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	6	ENTSO-E assessment
B3a Connected RES (MW)	-		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
1620. Substation Aach	40	10%	0.32
1629. Substation Bofferdange	42	10%	0.34
1630. AC Overhead Line Aach-Bofferdange	83.5	10%	0.67
Total	165.5		1.33

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

1620 Uncertainty range is needed due to uncertainties in material costs, permitting issues and unknown final routing in case of projects in early planning status.

1629	Uncertainty range is needed due to uncertainties in material costs, permitting issues and unknown final routing in case of projects in early planning status.

1630

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