Project Sheet

HVDC SuedOstLink Wolmirstedt to area Isar

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Key Information

Internal Project
DC transmission line
New

PCI number 3.12 (4th list, 31 Oct. 2019)
In Permitting

Description

2 GW HVDC-connection from North-East Germany (Area of Wolmirstedt), an area with high installed capacities of RES, to the South of Bavaria (area of Isar), an area with high consumption and connections to storage capabilities. A Capacity extension to 4 GW is under investigation.

Project promoters

50HERTZ
TenneT DE

Countries

Germany

National development plan(s)

NEP2030 version 2019, page 374

Additional information on the project

Permitting status in the TYNDP reflects the fact, that the necessity of the project is approved by the NRA and is German Law (so called Bundesbedarfsplangesetz, listed as project No. 5). Therefore the realization is mandatory. In addition, according to German law, the permitting process has already started.

http://www.gesetze-im-internet.de/bbplg/BBPlG.pdf
(Page 4, Project Nr. 5)

https://www.netzausbau.de/leitungsvorhaben/de.html?cms_map=2

German grid development plan:

http://www.netzentwicklungsplan.de/en

Project Homepage:

http://www.50hertz.com/en/Grid-Extension/Projects/SuedOstLink

https://www.tennet.eu/de/unser-netz/onshore-projekte-deutschland/suedostlink/

3rd PCI-list:

https://ec.europa.eu/energy/sites/ener/files/documents/annex_to_pci_list_final_2017_en.pdf

4th PCI-list:

https://ec.europa.eu/energy/sites/ener/files/c_2019_7772_1_annex.pdf

Project sheet backlog

25 Jan. 2021 - Addition of results for indicator B10 for scenarios DE2030 and GA2030

5 Jan. 2021 - Correction of CBA results for DE2030

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

Project Description & Context

Project Investments

Main investment(s): New DC-line to integrate new wind generation from control area 50Hertz especially Mecklenburg-Vorpommern, Brandenburg and Sachsen-Anhalt towards Central/south Europe for consumption and storage.

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	540	Wolmirstedt (DE)	Isar (DE)	In Permitting	2025	Investment on time	

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 improve system flexibility and stability e.g. improve system or local ramp rate, improve transient stability or RoCoF to meet system Needs.	Infrastructure improves system flexibility and stability. Controllable HVDC connections stabilize the increasingly stressed German system. DC power lines can provide better controllability in the power grid and support especially voltage stability in the system, as the converters can provide both capacitive and inductive reactive power.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	In situations with high wind infeed or high pan-European market driven flows, unscheduled load flows from North of Germany over Poland and Czech Republic to Bavaria or Austria can occur. The project will reduce unintended load flows significantly and will relieve the transmission grids of neighboring countries.

Need		How the project addresses each need (explanation provided by the project promoter(s))
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	The project will connect the North-East of Germany, a region with a high amont of renewables covering the annual total energy consumption of the area, with Bavaria, a region with high consumption and structural import need as well as access to large hydro storage capabilities in Alps.

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 - Poland	400	400
Transfer capacity increase (in MW)	Czechia - Germany	150	150
Transfer capacity increase (in MW)	Austria - Germany	100	100
Transfer capacity increase (in MW)	Internal (Germany)	2000	2000

Boundary capacity diagram

Network boundary the projects helps mitigate

Central East 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.

This project is assessed with the internal redispatch methodology. Because this project was assessed with only one tool for the NT scenario, there is no variation between min, max and average values.

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	49 49 49	160 160 160	>	<	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	-1 -1 -1	16 16 16	>	<	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min	16 16 16	79 79 79	>	<	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	366416	-411635	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-28505	-85085	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	739333	664013	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	26498	-58515	n/a	n/a	ENTSO-E assessment
B4e Particulate		17655	-39997	n/a	n/a	ENTSO-E

matter 10	average					assessment
B4f Non-methane volatile organic compounds	average	-9161	-24125	n/a	n/a	ENTSO-E assessment
B2a Annual CO2 variation from market simulation (ktonnes / year)	max average min	38 38 38	-593 -593 -593	<	>	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	-1 -3 -6	19 43 95	< < >	< < <	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)	average	-147	-188	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	5 11 24	6 14 30	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	max average min	353 353 353	1817 1817 1817	>	<	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	-309	-396	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-9	-9	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

B10 Reduction of Necessary Reserve for Redispatch Power Plants	**NT2025**	**NT2030**	
In Meuro/year	22	13	This indicator was submitted by the promoter(s). ENTSO-E confirms the consistency of the proposed indicator with the CBA Guideline 3.0. About the computation of this indicator by the project promoter(s)
In MW	1080	625	

This indicator was computed based on NT2025 and NT2030, in a study performed by 50Hertz, Amprion, TenneT DE, TransnetBW in 2020. The promoter(s) stated that the submitted value was computed in accordance with the CBA Guideline and explained it as follows:

As the assessment described in this document in each step follows the guidance given in the 3rd CBA Guideline the compliance with it is given.Furthermore, as demanded within the Implementation Guideline for Redispatch Assessment, the German TSOs participated within the 'Sanity check for minimum modelling requirements' coordinated by ENTSO-E. The quality of the study carried out using the IAEW Redispatch tool has therefore been ensured.

The promoter(s) certified that the values submitted and assessed in the study relate to countries located within the ENTSO-E perimeter only.

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	272	150	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	20	9	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	159	74	ENTSO-E assessment
Reduction of CO2 and GHG emissions				
B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-732	-322	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	5 34 100	8 21 50	ENTSO-E assessment
Integration of renewable energy sources				
B3 Annual avoided curtailment (RES integration) (GWh / year)	average	2411	1589	ENTSO-E assessment

B3a Connected RES (MW) -			ENTSO-E assessment

Security of supply

B10 Reduction of Necessary Reserve for Redispatch Power Plants	DE2030	GA2030	
In Meuro/year	125	25	This indicator was submitted by the promoter(s). ENTSO-E confirms the consistency of the proposed indicator with the CBA Guideline 3.0. About the computation of this indicator by the project promoter(s)
In MW	6249	1254	

This indicator was computed based on DE2030 and GA2030, in a study performed by 50Hertz, Amprion, TenneT DE, TransnetBW in 2020. The promoter(s) stated that the submitted value was computed in accordance with the CBA Guideline and explained it as follows:

As the assessment described in this document in each step follows the guidance given in the 3rd CBA Guideline the compliance with it is given.Furthermore, as demanded within the Implementation Guideline for Redispatch Assessment, the German TSOs participated within the 'Sanity check for minimum modelling requirements' coordinated by ENTSO-E. The quality of the study carried out using the IAEW Redispatch tool has therefore been ensured.

The promoter(s) certified that the values submitted and assessed in the study relate to countries located within the ENTSO-E perimeter only.

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
Wolmirstedt-Isar (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	156	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	-1	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	48	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	38	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	-1 -3 -6	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	1013	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

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

CBA results have been determined in compliance with the draft 3rd CBA guideline and its respective Implementation Guideline for the TYNDP 2020 using a redisptach methodology based on a combination of Market and Network simulations. On top of these results, additional benefits may apply depending on the nature of the project.

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
Wolmirstedt-Isar	In Permitting	78	Other nature protection areas under national law

Additional information by the project promoter(s)

Due to the current planning stage in which the final routing is not fully known yet, the results must be seen as an upper limit, since during the planning process the avoidance of passing through such societal or environmentally sensitive areas is the main issue.

Residual social impact

Investment	Investment status	Distance (km)	Type of sensitivity
Wolmirstedt-Isar	In Permitting	45	Sensitivity regarding landscape - Other areas protected by national law

Additional information by the project promoter(s)

Due to the current planning stage in which the final routing is not fully known yet, the results must be seen as an upper limit, since during the planning process the avoidance of passing through such societal or environmentally sensitive areas is the main issue.

Project Costs

The project costs were provided by the project promoter(s).

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
665. Wolmirstedt-Isar	4220	+-15%	33.8
Total	4220		33.8

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

665 These CAPEX are provided as considered within “investment measures“ according to sec. 23 of the German Incentive Regulation Ordinance (Anreizregulierungsverordnung, ARegV). Future variations, also potentially beyond the 20% threshold indicated above at which BNetzA requires the submission of a change-request for the respective investment measure, are possible due to, inter alia, low maturity, new technologies, cable/OHL ratio,

tendering results and other unforeseen circumstances.

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