Project Sheet

MOG II: connection of up to 2 GW additional offshore wind Belgium

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Key Information

Internal Project
Offshore substation
New

Planned But Not Yet Permitting

Description

Following the concept of MOG (project 75), the MOG II aims at centralizing the offshore wind farms in an offshore hub and transporting it via 220 kV AC cables to a substation along a new corridor Stevin-Avelgem (see project 329). The number of hubs is subject to further studies - whereas current working hypothesis indicate 2 or 3 platforms and cable sets. Structure, capacity, timing etc. are all subject to the identification of new offshore concession zones in the Belgian part of the North Sea and subsequent proces to translate this into an implementation plan with all involved stakeholders.

Project motivation:

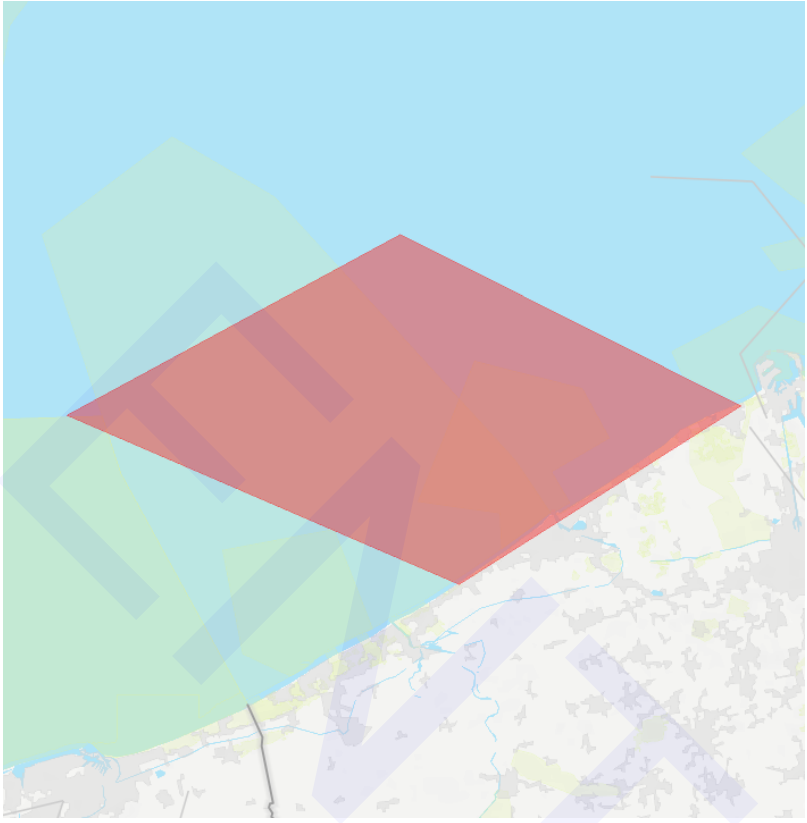
Project consists of offshore grid investments that allows to connect the new wave of offshore energy to the mainland(on top of scheduled 2,3GW) in an efficient & reliable way - hence strongly facilitates RES integration for Belgium. A Belgian law has been approved on 4th of April 2019 (DOC 54 3581/008) creating a legal framework for a second Modular Offshore Grid.

Project promoters

ELIA

Countries

Belgium



National development plan(s)

NDP1, Belgium, 2020-2030, §4.3.2

Additional information on the project

More information can be found following these links:

- Project site:
https://www.elia.be/en/infrastructure-and-projects/infrastructure-projects/mog-ii

- 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): "MOG II envisions the integration of additional wind farms in the Belgian part of the North Sea. One or more offshore platforms centralize the production from these offshore wind farms, and then transport it via 220 kV subsea AC cables to the onshore substation(s)"

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 substation		Offshore (TBD)	Onshore (TBD)	Planned But Not Yet Permitting	2028	Investment on time	

Is the project in the reference grid?

Yes

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 designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	Project consists of offshore grid investments that allows to connect a new wave of offshore energy to the mainland (on top of the scheduled 2,3GW) in an efficient and reliable way - hence strongly facilitates RES integration for Belgium.

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)	Internal (Belgium)	2000	2000

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	329 327 323	243 236 229	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	69 68 66	63 62 60	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic	max average	380 378	311 311	>	>	ENTSO-E assessment

Welfare increase resulting from RES integration	min	375	311			

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	2725	1636	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	201	236	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	5141	3042	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	-6959	-37831	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	426	226	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	-7046	-37764	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	-2889 -2949 -2987	-2140 -2200 -2259	< <	>>>>	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	109 227 490	70 158 354	<<<<<<	<<<<<<	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	-181	219	n/a	n/a	ENTSO-E assessment
B2b_€ Annual Societal cost variation resulting from	CO2 price	60€/ ton 100€/	8 14 30	-7 -16 -35	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	7550 7540 7529	7791 7791 7791	>	>	ENTSO-E assessment
B3a Connected RES (MW)	-	2000	2000	n/a	n/a	ENTSO-E assessment

Impact on grid losses

B5 Variation of network losses (GWh / year)	average	-357	467	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ / year)	average	-15	14	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	386	293	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	122	73	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	385	354	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-2304	-2076	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	16 108 313	52 135 320	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	7814	7860	ENTSO-E assessment
B3a Connected RES (MW)	-	2000	2000	ENTSO-E assessment

Non scenario-dependent indicator(s)

B8.0 Stability (Transient, Voltage and Frequency Stability)	Transient stability	Voltage stability	Frequency stability	
MOG II: connection of up to 2 GW additional offshore wind Belgium (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	363	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	77	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	399	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-2759	ENTSO-E assessment
B2a_€ Annual Societal cost variation resulting from CO2 variation from market	CO2 price 60€/ton 100€/ton 189€/	88 199 444	ENTSO-E assessment

simulation monetised (M€ / year) ton		

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year) average	7546	ENTSO-E assessment
B3a Connected RES (MW) -	2000	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.

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
1625. MOG II: connection of up to 2 GW additional offshore wind Belgium	1100	25%	17
Total	1100		17

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

1625 Considering project status, significant uncertainties exist regarding CAPEX estimations. These uncertainties are estimated based on both historic experience for similar projects and on present uncertainties regarding choice of final grid solution and related material/ resources costs.