Project Sheet

Biscay Gulf

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Key Information

Cross Border Project
Offshore DC transmission cable
New

PCI number 2.7 (4th list, 31 Oct. 2019)
In Permitting

Description

The project consists of 370 km HVDC-VSC link (2 bipoles of 1000 MW each) mainly subsea in the Biscay Gulf, between Gatica (Basque Country, ES) and Cubnezais (Aquitaine, FR). Included in the Madrid Declaration, this project aims at improving the interconnection ES-FR. This project was included in the 2013,2015 and 2017 PCi list (PCI 2.7)

Project promoters

Red Eléctrica de España
RTE

Countries

Spain
France

National development plan(s)

Spanish NDP, Spain, 2015-2020, Project Label TI-2 and Project Sheet in Annex III, page 144 - French NDP, SDDR (Schéma Décennal de Développement du Réseau -Ten Year Network Development Scheme), France, 2019, project n°476, page 441, https://www.rte-france.com/fr/article/evolution-du-reseau-electrique-francais-l-horizon-2035

Additional information on the project

- PCI page – link to EC platform:
http://ec.europa.eu/energy/infrastructure/transparency_platform/map-viewer/main.html

- Project website:
https://www.ree.es/es/actividades/planificacion-electrica/planificacion-europea

- Other links

- Spanish National Development Plan:
https://energia.gob.es/planificacion/Planificacionelectricidadygas/desarrollo2015-2020/Documents/Planificación%202015_2020%20%202016_11_28%20VPublicación.pdf

- French National Development Plan
http://www.rte-france.com/fr/article/schema-decennal-de-developpement-de-reseau

- Inter-Governmental agreement (Madrid and Lisbon Declarations):
https://ec.europa.eu/energy/sites/ener/files/documents/Madrid%20declaration.pdf
,
https://ec.europa.eu/info/sites/info/files/lisbon_declaration_energyinterconnections_final.pdf

- Constitution of the High Level Group on Interconnections for South West Europe:
http://europa.eu/rapid/press-release_IP-15-5187_en.htm

Related projects

This project has interdependence with the internal projects P378 and P379 that reinforce the Gatica area in Spain. These internal reinforcements should be commissioned together with the Biscay Gulf. Although the clustering of all projects would have sense, it was not possible due to ENTSOE clustering rules. A global profitability would have sense considering the 3 projects together.

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 HVDC interconnection in the western part of the border via DC subsea cable in the Biscay Gulf (cable and converters at the end).

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	370	Gatica (ES)	Cubnezais (FR)	In Permitting	2027	Investment on time	

Reason for investment clustering

This project has interdependence with the internal projects P378 and P379 that reinforce the Gatica area in Spain. These internal reinforcements should be commissioned together with the Biscay Gulf. Although the clustering of all projects would have sense, it was not possible due to ENTSOE clustering rules. A global profitability would have sense considering the 3 projects together.

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 to reduce price differentials between EU and/or non-EU countries	The increase of interconnection capacity will be essential to cope with the residual load ramps challenge. The increase of interconnection capacity between countries will allow to exchange

Need		How the project addresses each need (explanation provided by the project promoter(s))
		the power flows from flexibility sources.
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%.	IoSN report shows that for the 2040 time horizon there is need for developing projects in the French-Spanish border.
	Infrastructure to facilitate and accommodate future scenarios, cross-border flows or loop flows.	By increasing interconnection capacity on ES-FR border, the project contributes to enhance flow distribution and RES integration, and to increase exchanges between France and the Iberian Peninsula.
	Infrastructure designed to enable cost-efficient grid connection of high volumes of RES and/or reduce RES curtailment	TYNDP shows a reduction of RES spillage considering the increase of interconnection capacity.

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)	Spain - France	2200	2200

Boundary capacity diagram

Network boundary the projects helps mitigate

Iberian Peninsula integration

Boundary capacity diagram

ENTSO-E

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	145 124 104	227 221 216	>	>	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	max average min	22 12 5	36 34 32	>	>	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	max average min	30 26 21	297 278 263	>	>	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B4 Non-CO2 emissions (kg/year)

B4a Nitrogen oxides	average	-1187	-2247	n/a	n/a	ENTSO-E assessment
B4b Ammonia	average	-181	-145	n/a	n/a	ENTSO-E assessment
B4c Sulfur dioxide	average	-319	-1941	n/a	n/a	ENTSO-E assessment
B4d Particular matter 5	average	14611	-44571	n/a	n/a	ENTSO-E assessment
B4e Particulate matter 10	average	-80	-146	n/a	n/a	ENTSO-E assessment
B4f Non-methane volatile organic compounds	average	14621	-44461	n/a	n/a	ENTSO-E assessment

B2a Annual CO2 variation from market simulation (ktonnes / year)		max average min	-199 -523 -947	-1142 -1225 -1272	>	<	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	19 40 87	39 88 197	< < <	< > >	ENTSO-E assessment
B2b Annual CO2 variation due to network losses (ktonnes / year)		average	516	655	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	-24 -49 -106	-21 -47 -105	n/a	n/a	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)		max average min	651 541 424	8156 7431 6916	>	<	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	1298	2711	n/a	n/a	ENTSO-E assessment
B5_€ Variation of network losses monetised (M€ /		average	57	56	n/a	n/a	ENTSO-E assessment

year)					

Security of supply

B6 Annual reduction in Energy Not Served (MWh / year)	max average min		7470	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	74.7	>	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	259	227	ENTSO-E assessment
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	61	50	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	379	283	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market	average	-1144	-1436	ENTSO-E assessment

simulation (ktonnes / year)				
B2a_€ Annual Societal cost variation resulting from CO2 variation from market simulation monetised (M€ / year)	CO2 price	60€/ ton 100€/ ton 189€/ ton	8 54 156	36 93 221	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	7748	6610	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**	
HVDC Gatica-Cubnezais (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€ /	average	134	ENTSO-E assessment

year)			
B1_CO2 Annual Socio-Economic Welfare increase resulting from CO2 emissions reduction	average	19	ENTSO-E assessment
B1_RES Annual Socio-Economic Welfare increase resulting from RES integration	average	76	ENTSO-E assessment

Reduction of CO2 and GHG emissions

B2a Annual CO2 variation from market simulation (ktonnes / year)	average	-692	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	22 50 111	ENTSO-E assessment

Integration of renewable energy sources

B3 Annual avoided curtailment (RES integration) (GWh / year)	average	1437	ENTSO-E assessment
B3a Connected RES (MW)	-		ENTSO-E assessment

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

The project helps to integrate RES generation of the Iberian Peninsula: it mainly allows to replace nuclear in France by RES generation that would have been curtailed without the project. It sometimes also helps to decrease thermal generation in Spain and Portugal and farther in Europe substituting it by available RES. This leads to a considerable reduction of the total generation costs (SEW) in all scenarios. Furthermore SEW benefits are higher in 2040 horizon after nuclear phase out in France (see IoSN report).

When analyzing the results of the different scenarios studied, it can be concluded that the higher the penetration of RES in the Iberian Peninsula, especially solar generation, the higher the SEW of the project is. Thus, the SEW is the lowest in scenarios NT 2025 and CT 2030, and the highest in scenario DE 2030. These scenarios frame the results of scenarios NT2030 and GA2030, which are equivalent in terms of SEW results.

The TYNDP 2018 showed greater benefits. Indeed, the scenarios used at that time corresponded to a more ambitious objective of nuclear phase-out in France and the French nuclear installed capacity was therefore much lower. Thus, the avoided curtailed energy in the Iberian Peninsula, instead of replacing cheap French nuclear generation, replaced a much larger share of thermal generation. Additionally the Spanish thermal capacity in TYNDP 2018 scenarios was greater than the one considered in these new scenarios in which the forecasted gradual closure of coal-fired power plants is considered.

The project shows a significant contribution to avoid ENS. The SOS indicator shows that this interconnection project gives large benefits to use existing thermal generation in the Iberian Peninsula to avoid potential ENS in Western Europe. In addition, an increase of transfer capacity between Iberia and the rest of Europe would improve the system security and its robustness from the dynamic point of view.

The project increases flows in both directions, from France to Spain and from Spain to France, and especially from Spain to France in NT 2030.

Amount of losses are quite high in all the scenarios as the project allows higher long transit power flows on long distances in order to supply the demand with the cheapest generation available through Western Europe. These results in MWh are aligned with TYNDP2018, however monetization drops sharply mainly due to the decrease of marginal cost.

This project helps to integrate the Iberian Peninsula in a full-integrated European internal energy market, as it reduces its historical electric isolation (Spain won't yet fulfill the 10% objective for 2020 in spite of the strong technical and political efforts, as Spain would still be a range of 6-7%. This project also helps to integrate the high RES potential in the Iberian Peninsula. In addition, it also contributes to the security of supply, not only regarding adequacy (especially in tight situations), but also regarding flexibility and stability of the system.

The project reduces the congestion rate in a range from 16 to 22% in NT 2030 scenario, depending on the climate year. Nevertheless after the commissioning of the project the congestions are limited to 59-67%.

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
HVDC Gatica-Cubnezais	In Permitting	11	

Residual social impact

Investment	Investment status	Distance (km)	Type of sensitivity
HVDC Gatica-Cubnezais	In Permitting	0.269	Sensitivity regarding population density - Land that is close to densely populated areas

Project Costs

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

	CAPEX (Meuro)	Uncertainty range (%)	OPEX
38. HVDC Gatica-Cubnezais	1750	11.4	10.2
Total	1750		10.2

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

38 Procurement / construction cost uncertainties