COMMON CROSS-BORDER COST ALLOCATION DECISION ON THE BISCAY GULF PROJECT

This document sets out the Joint Cross-Border cost allocation decision of the National Regulatory Authorities (NRAs) in France and Spain, the Commission de Régulation de l'Energie and the Comisión Nacional de los Mercados y la Competencia respectively, under Article 12 of Regulation (EU) No 347/2013 for the Biscay Gulf electricity interconnection project. This follows an assessment by both NRAs of the investment request submitted by Réseau de Transport d'Electricité and Red Eléctrica de España, which are the transmission system operators of France and Spain. The NRAs have concluded an agreement on the way costs should be shared between the project promoters taking into account the expected economic benefits and the European Union's financial assistance.

INTRODUCTION

The European Union (EU) has developed a strong energy policy, based on the need for a secure, competitive and sustainable energy. The EU has therefore set out high objectives to be reached at the Union level, regarding energy efficiency, development of renewable energy sources and reduction of CO_2 emissions. In order to reach these objectives, EU Member States are aiming for a more integrated energy market.

In this context, the development of electricity interconnection capacity between the Iberian Peninsula and the rest of Europe is a priority, with the objective of reducing the isolation of Spain and Portugal. The importance of the further increase of interconnection capacity between Spain and France has been emphasized in the Madrid Declaration signed on 4 March 2015 by the President of France, Mr François Hollande, the Prime Minister of Spain, Mr Mariano Rajoy, the Prime Minister of Portugal, Mr Pedro Passos Coelho and the President of the European Commission, Mr Jean-Claude Junker. This text underlines the fundamental importance to attain a fully functioning and interconnected internal energy market and sees building the necessary energy infrastructures as "actually imperative for the Member States which have not yet attained a minimum level of integration in the internal energy market such as the Portugal and Spain". The High Level Group for South West Europe was established following this declaration, with the aim of monitoring the development of interconnections in the region.

In this respect, significant developments have been achieved during the past few years with the commissioning of the 2000 MW Baixas-Santa Llogaia HVDC[1] line in 2015. The phase shifter transformer commissioned in Arkale in June 2017 will allow reaching 2800 MW of exchange capacities between the two countries. Building the Biscay Gulf offshore interconnector is considered as the next step, this project being expected to bring total interconnection capacities to 5000 MW. This project has been proposed by the transmission system operators (TSOs) in a Common Strategy Paper quoted by the Madrid Declaration.

The Biscay Gulf project has been part of the European wide Ten Year Network Development Plan prepared by the European Network of Transmission System Operators for Electricity (ENTSOE) since 2012. Biscay Gulf has been declared as a Project of Common Interest (PCI) in 2013 and in 2015 (under the number 2.7), and is candidate to be included in 2017 list.

Investment request for the Biscay Gulf project

The project promoters, Red Eléctrica de España (REE) and Réseau de transport d'Electricité (RTE), sent an investment request for the Biscay Gulf project to the Spanish and French regulatory authorities (respectively the Comisión Nacional de los Mercados y la Competencia and the Commission de Régulation de l'Energie, hereinafter "CNMC" and "CRE"). REE sent a first document on 27 January 2017 and a complement on 27 March, CRE received the investment request from RTE on 27 March. The investment request is composed of two documents, the "Investment request file", and the "Investment request file – complementary information". CNMC and CRE have jointly assessed REE's and RTE's investment requests, taking into account the Recommendation issued by the Agency for the Cooperation of Energy Regulators (ACER) on 18 December 2015[2]. The information received was considered satisfactory, the investment request was thus considered receivable and notified to the ACER.

In particular, CNMC and CRE came to the conclusion that the project is mature enough to submit an investment request with the aim of determining a cross-border costs allocation. Preliminary studies are achieved, as well as the technical and economic studies. The permitting phase has begun in both countries. In Spain, REE received a written acknowledgement from the Ministry of Industry, Energy and Tourism on the start of the permit granting process on 15 July 2016, and submitted the concept for public participation and the Scoping Report on 11 August 2016. In France, the Energy Ministry formally accepted RTE's official notification of the project on 14 June 2017. RTE submitted the case to the French National Public Debate Commission in June 2017.

Legal framework

[1] High Voltage Direct Current

[2] Recommendation of the Agency for the Cooperation of Energy Regulators No 05/2015 of 18 December 2015 on good practices for the treatment of the investment requests, including cross- border cost allocation requests, for electricity and gas projects of common interest

Regulation (EU) No. 347/2013 has introduced a set of provisions aiming at promoting the interconnection of the European networks. This Regulation is an essential tool to reach the objectives of the European Union's energy policy, i.e. enable a competitive and functioning market, reach an optimal use of the energy infrastructures, improve energy efficiency and integrate the renewable energies. It should contribute to reducing the fragmentation of the European market and to end the isolation of the least-favoured areas.

This Regulation introduces the concept of PCI, which, in the electricity sector, can cover transmission, storage infrastructures and smart grids. Projects that are declared as PCI are considered necessary for the implementation of the priority corridors. The PCI status opens the possibility for projects to benefit from mechanisms designed to enable their development.

As part of the measures aiming at facilitating the implementation of PCIs, Regulation (EU) No. 347/2013 foresees the use of financing mechanisms that could mitigate the commercial viability issues, when those are an obstacle to the investment decision. Article 12 of this Regulation provides that, at the request of project promoters and on the basis of an analysis of the costs and benefits of the project for the beneficiary countries, the concerned national regulatory authorities decide on coordinated allocation of the investment costs. This decision opens the possibility of requesting financial help from the European Union in accordance with article 14 of the Regulation.

In order to complement this Regulation, the ACER published a recommendation regarding cross-border costs allocation requests and decisions (recommendation No. 05/2015). In particular, this document recommends to identify hosting country(ies) on which the project has a net negative impact, and to design a cost sharing key alleviating this negative impact.

Structure of the document

The document is structured as follows. Section 1 provides an overview of the project. Section 2 presents an assessment of the costs of the project while section 3 provides an assessment of its benefits. Figures given in sections 2 and 3 constitute the raw data necessary to subsequently perform economic analysis and are provided on a yearly basis. Section 4 then develops cost-benefit assessments in net present value (NPV) terms. Section 5 assesses the need for EU financial assistance, and section 6 details the joint decision of the NRAs.

1. DESCRIPTION OF THE PROJECT

1.1 Technical description of the project

The Biscay Gulf project consists in the construction of two independent HVDC links, each rated 1000 MW, between Cubnezais (FR) and Gatica (ES). It will be composed of the following elements:

- technical adaptations of the Gatica 400 kV and Cubnezais 400 kV existing substations;
- 400 kV AC connections from the Gatica 400 kV and Cubnezais 400 kV existing substations to the new Gatica HVDC and Cubnezais HVDC converter stations (2 in Gatica, 2 in Cubnezais);
- four new 1000 MW HVDC converter stations (2 bipoles in Gatica, 2 in Cubnezais);
- two 1000 MW links (4 cables) (90 km terrestrial, 280 km submarine through the Biscay Gulf);
- The voltage of the HVDC links will be defined once the tender process will be completed, possibly in the range of 400-500 kV.

Overall, 70 % of the total 370 km project route is located in French territory and 30 % in Spain.

RTE and REE conducted extensive technical studies since 2011 to define the exact route of the project especially in the submarine part. Indeed, the geological characteristics of the Capbreton submarine canyon make its crossing the major challenge of the project. According to technical studies, phenomenon such as erosion and accretion prevent from laying the cable directly over the canyon on the route firstly considered. Further geophysical and geotechnical investigations led to adopting a preferred technical solution consisting in a marine drilling under the canyon.

1.2 Schedule

The project is expected to be commissioned in 2025. The end of the permitting process is expected mid-2020, allowing for the construction phase to be finalised in the second semester of 2024.

2. ASSESSMENT OF COSTS

This section presents the estimates of the different costs of the project by TSOs as well as their assessment by NRAs. Following the TSOs investment request, three types of costs are considered: investment costs (CAPEX), operational and maintenance costs (OPEX) and losses in the electric system.

2.1 Investment costs

TSOs' estimate

Total investment costs are estimated by the TSOs at 1750 M€ +/- 200 M€. They are decomposed as follows:

Spain	[redacted]	[redacted] €	Total 559 M€
	[redacted]	[redacted] €	
	[redacted]	[redacted] €	
	[redacted]	[redacted] €	
France	[redacted]	[redacted] €	Total 1191 M€
	[redacted]	[redacted] €	
	[redacted]	[redacted] €	
	[redacted]	[redacted] €	
	[redacted]	[redacted] €	

According to the description above, 68 % of the investment costs of the project will be engaged in France and 32 % in Spain.

Annual expenditures should follow the time series presented below (in M€):

2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
5.7	7.9	4.3	1.8	25.6	172.6	569.1	519.3	375.8	67.8

NRAs' assessment

The submarine cables' per-km assumed costs tend to be higher than the other submarine projects presented in the investment request documents. However, the lowest estimates of the benchmark correspond to the projects NSN Link and Nord Link which are much longer than the Biscay Gulf project (about 700 km long), the procurement cost of cables on a per-km basis is thus likely to be lower.

Besides, NRAs note that project costs are subject to significant uncertainties:

- Capbreton Crossing Marine Drilling is a technological feat whose cost remains uncertain and is estimated to range between [redacted] €;
- The costs of undersea cables may vary significantly with the outcome of the procurement process;
- The cost of each converter station is estimated at [redacted] €, for a total of [redacted] € (the project needs 4 converter stations). The latest procurement process carried out by RTE on a similar project (interconnector IFA2 with the UK) closed at [redacted] € per converter station[3].

The project incurs a high cost because, instead of a short overhead line connecting both countries (that would have insurmountable environmental and social constraints), a long submarine link is needed. Besides that, by-passing the weaker and more congested zones close to the border also increases the cost. As a result, NRAs have accepted a project much more expensive than the last recently built interconnection line between the two countries.

Considering these elements, the TSOs cost estimation of 1750 M€ will be used for the purpose of the computation of the cost-benefit analysis below. However, given the technical challenges of the project, NRAs point out the significant risk of a cost increase. Such an increase would damage the general economic balance of the project, thus needing a close oversight from NRAs.

2.2 Operation and maintenance costs

TSOs' estimate

The project operating & maintenance costs are estimated by TSOs at about 10.2 M€/year.

These costs are assumed to be shared on a geographical basis for the submarine cables and on a 50/50 basis for fixed and converter stations' operation and maintenance costs. Under these assumptions, RTE bears 60 % of total operation and maintenance costs while REE bears the remaining 40 %.

[3] See for example : http://subseaworldnews.com/2017/04/07/abb-wins-e270m-deal-in-uk-france-interconnection-project/

Accordingly, costs related to damage on the submarine cable will be shared on a 60/40 basis regardless of the location of the incident.

NRAs' assessment

NRAs endorse this cost sharing key. They point out however the estimate of operation and maintenance costs represents only 0.6 % of the investment costs of the project. This ratio lies in the lower end of typical ratios encountered for similar projects.

2.3 Power losses

TSOs' estimate

Estimates of power losses are provided in the Ten Year Network Development Plan (TYNDP) 2016 at a European level. These estimates rely on a physical model of the European electricity grid which allows computing power flows and the associated power losses. The obtained volume of losses is then monetized at a representative electricity price.

In their investment request, TSOs have proposed a breakdown of the cost of losses between France and Spain based on the values agreed by the Regional group "North-South Interconnections in Western Europe". One should note in particular that because power flows obey to non-linear physical laws, losses on the French and the Spanish networks have no reason to be equal.

Spot year	2020 EP	2030 V1	2030 V2	2030 V3	2030 V4
Losses Europe (M€/yr)	30	40	55	35	55
Losses France (M€/yr)	15	20	31	19	20
Losses Spain (M€/yr)	15	20	24	16	35

NRAs' assessment

The estimates for the cost of power losses are based on the TYNDP 2016. However, TSOs point out that the results are very sensitive to assumptions regarding the detailed locations of generation assets. As such, the range of uncertainty for the losses is pretty large (between 17 % and 36 %). Besides, losses amount to a significant total cost in NPV terms (36 % of CAPEX on average).

The TYNDP uses an availability rate for the interconnection of 100 %. However, TSOs have stated in their investment request that they rather expect an availability rate of 92 % (see Appendix 1 of the complementary information document), given the technological challenges faced by the project. This lower availability rate is mainly due to unplanned outages which make the interconnector unavailable for a few hours.

NRAs understand that it is impossible to estimate precisely the availability rate impact. Even if a new computation of the CBA were done, the impact of multiple hypotheses would make the results not robust. As a consequence, the estimated impact of the availability rate proposed by the TSOs has been taken into account in the calculations with the rough approximation that the cost of losses is derated accordingly:

Spot year	2020 EP	2030 V1	2030 V2	2030 V3	2030 V4
Losses Europe (M€/yr)	28	37	51	32	51
Losses France (M€/yr)	14	18	29	17	18
Losses Spain (M€/yr)	14	18	22	15	32

3. ASSESSMENT OF BENEFITS

This section presents the estimates of the benefits of the project computed by the TSOs as well as their assessment by the NRAs.

Among these benefits, two kinds of benefits are monetized (fuel savings and security of supply). Potential additional benefits are also discussed.

3.1 Socio-economic welfare (SEW)

TSOs' estimate

The savings in fuel costs enabled by the interconnector, coined as socio-economic welfare (SEW) in the TYNDP, represent the main part of these benefits. The TYNDP published in 2016 provides the gross estimates for these savings, which have been split between countries by the TSOs in their investment request. The figures are as follows:

Spot year	2020 EP	2030 V1	2030 V2	2030 V3	2030 V4
SEW Europe (M€/yr)	200	120	150	120	240
SEW France (M€/yr)	51	37	19	35	89
SEW Spain (M€/yr)	110	97	162	70	170

NRAs' assessment

These SEW estimates include in particular the benefits brought both in terms of reduced CO_2 emissions (as an estimated CO_2 price is taken into account) and in terms of renewables' integration (which substitute to technologies with higher short-run marginal costs, generating fuel savings).

Similarly to the situation of losses presented in section 2.3, these figures are based on the TYNDP which uses a rate of availability of the interconnection of 100 %, which the TSOs consider optimistic. Therefore, as suggested by the TSOs, an availability rate of the interconnector of 92 % has been retained for the calculations. Fuel savings are de-rated accordingly as an approximation:

Spot year	2020 EP	2030 V1	2030 V2	2030 V3	2030 V4
SEW Europe (M€/yr)	184	110	138	110	221
SEW France (M€/yr)	47	34	17	32	82
SEW Spain (M€/yr)	101	89	149	64	156

3.2 Security of supply

TSOs' estimate

Increasing interconnection capacity between France and Spain brings an added value in terms of security of supply. Indeed, increasing the possibility to exchange energy in tight supply or demand situations can reduce the risk of demand curtailment and compensate for a potential lack of peak generation capacity. Promoting security of supply is a key objective of the Regulation (EU) No. 347/2013.

According to the TSOs, the monetisation of benefits in terms of security of supply is complex and the TYNDP 2016 may underestimate the related potential benefits of the project. In its methodology, ENTSOE introduced a criterion in its cost-benefits analysis methodology to measure the benefits brought by an interconnector in terms of improved security of supply. This indicator provides the subsequent decrease in Expected Energy Not Supplied (EENS) or in Loss of Load Expectancy (LOLE) following the commissioning of an interconnector. For the Biscay Gulf interconnector, the indicator appears to be null for two main reasons. Firstly, the installed production capacities taken into account in the TYNDP scenarios appear to be high enough so that no significant issue related to security of supply appears. Secondly, a limited number of stochastic variations are investigated, notably regarding demand. However, security of supply concerns tend to emerge in rare occasions following stochastic shocks with relatively low probabilities.

In the investment request, project promoters propose an estimation of the security of supply value of the Biscay Gulf project based on avoided investments in gas turbines, assuming lower installed generation capacities than in the TYNDP scenarios and taking into account more climatic variations.

These additional benefits are estimated by the TSOs to **40 M€/year** (starting as early as the year of commissioning), independently of the considered scenario. This represents a NPV of 470 M€ over the project's lifetime.

NRAs' assessment

This complementary assessment of security of supply benefits provided by the TSOs relies on scenarios significantly different from TYNDP 2016's scenarios, which raises a risk of lack of accuracy.

As an example, the installed capacity of conventional thermal plants (coal, gas and nuclear) in Spain is roughly 50 % higher in TYNDP's scenarios than in the scenarios used to assess security of supply benefits[4].

For a given peak hour for the system, the TSOs' analysis thus considers that:

- on the one hand, the interconnector allows to save fuel costs by decreasing the load served by peak suppliers (as captured by the fuel costs savings computed based on TYNDP 2016's scenarios where installed capacities are high) ;
- on the other hand, the interconnector allows to increase the security of supply because peak suppliers may not be able to serve the whole load otherwise (as captured by the "capacity value" computed based on TSOs' scenarios where installed capacities are lower).

NRAs consider that both benefits are provided by the project, and in consequence, both concepts should be monetized. Fuel costs savings are valued by means of the SEW computation while the scenarios used for these calculations may not allow to grasp the whole value of savings in new generation.

As a consequence, although NRAs agree to take the security of supply estimate provided by the TSOs at face value in the context of this investment request and taking note of the limits of the TYNDP 2016 methodology, they consider that the methodology used by the TSOs is not mature and should be improved. Instead, security of supply benefits and fuel cost savings' assessments should rely on consistent assumptions, while making sure that significant stochastic variations are taken into account to capture security of supply benefits. Therefore, the "capacity value" should be seen as a rough approximation and NRAs welcome the on-going work to improve the assessment of security of supply benefits in the context of the TYNDP 2018.

3.3 Contribution to reaching the 10 % interconnection capacity target in 2020

Regulation (EU) No. 347/2013 aims at developing market integration and security of supply. In this respect, the 10 % interconnection capacity target by country is included in the Regulation as a goal for the market integration of the European Union. The interconnection capacity between the Iberian Peninsula and the rest of the EU market is exclusively located at the border between Spain and France, that is why Spain and Portugal pay due attention to the principle of the 10% interconnection capacity target, which is defined at a national level. In 2017, Spain's interconnection capacity amounts to 5.6 GW, including 2.8 GW with France only, compared to an installed generation capacity of about 100 GW. Bringing more than 2 GW of additional interconnection capacity, the Biscay Gulf Project will contribute to converging towards the 10 % target, and, more generally, to the interconnectivity of the Iberian Peninsula.

3.4 Contribution to the European Union energy and climate objectives

Spain (and more broadly the Iberian Peninsula) benefits from one of the most important potentials for the development of renewable energy sources (RES): Spain currently has a RES generation capacity of 23 GW for wind and 5 GW for photovoltaic. Increasing interconnection capacity will enable the development of these renewable energy sources in the Iberian Peninsula, allowing the produced energy to flow towards the rest of Europe. This configuration will help the Iberian Peninsula to contribute to the European energy and climate objective, taking advantage of its renewable development potential.

As the integrated Spanish energy and climate plan for 2030 is under development, the long-term renewable commitments are not established yet. However, it is expected that Spain will have to make an important effort to contribute to the European energy commitments considering the potential of the country. In 2016, renewable electricity accounted for 41 % of electricity demand in Spain, and it is foreseen in several scenarios for 2030 that electricity renewable share of 80 % in electricity demand[5] will have to be reached in order to fulfil with the European commitments, which means an important challenge for the system operation of the Iberian Peninsula.

In this respect, the Biscay Gulf project can be seen as an element facilitating the development of a political ambition in terms of RES development. As an illustration, the vision 4 of the 2016 ENTSOE's TYNDP, "European Green Revolution", is based on a development of RES generation where RES are located in Europe according to the potential resources of each country, as well as a sustained increase of power consumption. In that scenario and according to the assumptions chosen, the net present value of the Biscay Gulf project is significantly higher than for the other scenarios (see section 4.1. below).

[4] http://www.cre.fr/documents/consultations-publiques/schema-decennal-de-developpement-du-reseau-de-transport-de-rte-elabore-en-2016

[5] Different scenarios are under study to the date of drafting of this report. The renewable share of 80% would correspond with a renewable target of 27%, considering that final energy consumption structure of 2016 is maintained in 2030.

3.5 Benefits for non-hosting countries

TSOs' estimate

The TSOs assessed the national net impact of the project on non-hosting countries. The study shows that, depending on the scenarios considered, between 15 % and 40 % of the sum of the gross benefits are captured by non-hosting countries. However, these benefits are spread between a significant numbers of Member States and each of them only captures a small amount of benefits.

Germany and Portugal are the countries on which the project has the most impact. However, this impact is small and lies within the uncertainty range of the calculation. The TSOs have therefore concluded that neither Portugal nor Germany should be asked to contribute financially to the project.

RTE and REE consulted the Portuguese and the four German TSOs, who all stated that the amount of net benefits was not significant or certain enough (or event negative in the case of Portugal) for them to contribute financially to the project.

NRAs' assessment

NRAs would have expected some positive impact on Portugal, although, following ACER's recommendation and taking into account the Portuguese and German net benefits and the margin of error of the results, NRAs understand the conclusions adopted by RTE an REE.

3.6 Innovation and associated benefits

TSOs' estimate

The geophysical conditions at the border between Spain and France induce technical challenges to be overcome by project promoters when developing interconnectors. Moreover, the configuration of the electric transmission networks in the area also constrains the reinforcement of interconnection capacities between Spain and France: congestion at the corridors already interconnected needs to be relieved. In this context, the offshore route chosen by the project promoters brings various benefits.

Regarding congestion management, studies showed that building a new link at the western side of the border would prove the most efficient to improve the interconnection capacity between Spain and France. The Biscay Gulf project, by bypassing the more congested areas and linking Bordeaux to Bilbao (which are stronger network nodes) will allow for an increase of capacity of 2200 MW.

The submarine route also shows social and environmental benefits, as it avoids passing through the Pyreneans. The Pyreneans routes are indeed characterised by citizens' concerns regarding the construction of overhead lines in the region. This brings potential delays in the implementation of projects and induces higher costs due to the need to use underground cables.

However, this submarine route brings several technical challenges. The main difficulty is the crossing of the Capbreton canyon, which will be realised through an horizontal directional drilling, a technique largely tested in land but which requires innovative solutions to be implemented in a marine area. These solutions could later benefit other project promoters. In addition, the crossing of the submarine canyon constrains project promoters to increase the route length by 70 km due to water depth.

NRAs' assessment

NRAs confirm that the project presents key innovations which could benefit to future comparable projects and bring benefits in terms of location and lead times. NRAs however underline that while the over-cost has been estimated by the TSOs at 1000 M€ in comparison with an overhead line, this figure has to be regarded carefully. A comparison with a credible alternative interconnection would be welcome, notably taking into account the terrain and the needed reinforcements on both networks.

4. COST-BENEFIT ANALYSIS

In this section, NRAs use the hypotheses they endorsed as exposed in sections 2 and 3 to perform a cost benefit analysis.

4.1 Net present value of the project at the European perimeter

Variable costs and benefits described in previous sections are available for 2 spot years: 2020 (scenario EP 2020) and 2030 (4 different scenarios: V1 to V4). In order to compute yearly cash flows from such annual estimates, TSOs proposed, for each "vision", to linearly interpolate the results between 2020 and 2030 for the considered vision, and to replicate the results of year 2030 from 2031 onwards.

The obtained cash flows are converted into a Net Present Value using the following assumptions which are consistent with ACER's opinion on ENTSOE's CBA guidelines[6]:

[6] http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Opinions/Opinions/ACER%20Opinion%2001-2014.pdf

- a time horizon of 25 years after commissioning is considered (2025-2049), with no remaining value (after 2050);
- a discount rate of 4 % is used.

The following table provides the obtained NPV at the European perimeter, computed at year 2017 in the different scenarios (non-positive figures are in parenthesis). Appendix 1 details the different underlying cash-flows in the case of scenario V1. The computation of the other scenarios follows the same logic.

Scenario	V1	V2	V3	V4	Average
NPV@2017	(481)	(318)	(427)	656	(143)

Obtained NPV with an availability rate of 100 % and absent additional security of supply benefits

As mentioned above, given the technological challenges faced by the project, NRAs have followed the recommendation of TSOs, considering the availability rate of 92 %. Assuming this availability rate acts as a de-rating factor applied to fuel savings and power losses, as exposed in sections 2.3 and 3.1, NPV estimates become:

Scenario	V1	V2	V3	V4	Average
NPV@2017	(564)	(415)	(515)	482	(253)

Obtained NPV with an availability rate of 92 % and absent additional security of supply benefits

Under the previous assumptions, the results are positive only in vision 4.
Following the TSOs' proposal and taking into account, as exposed in section 3.2, additional security of supply benefits of 40 M€/year (from 2025 onwards), the average NPV of the project becomes positive.

Scenario	V1	V2	V3	V4	Average
NPV@2017	(90)	60	(40)	957	222

Obtained NPV with an availability rate of 92 % and with additional security of supply benefits

The value of the project is hence mainly driven by its potential to accommodate very ambitious objectives in terms of installed capacities of renewables (as described by scenario V4), and by its contribution to security of supply as assessed by TSOs using an *ad hoc* methodology.

5. EU FINANCIAL ASSISTANCE REQUEST

According to the Article 12(4) of the Regulation (EU) No. 347/2013, the cross-border cost allocation decision should include an estimation of congestion rents and the regulators should take into account "the economic, social and environmental costs and benefits of the projects in the Member States concerned and the possible need for financial support". Article 10(3) of Regulation (EU) No. 1316/2013 states that the maximum amount of EU financial assistance should not exceed 50 % of the project's costs.

5.1 Eligibility of the project to Union financial assistance: commercial viability

The eligibility of PCIs to Union financial assistance is framed by the Article 14(2) of Regulation (EU) No. 347/2013 which states that the CBA should provide evidence that the project is "*commercially not viable according to the business plan and other assessments carried out, notably by possible investors or creditors or the national regulatory authority*." NRAs consider this condition to be fulfilled and the project to be eligible, as demonstrated below.

According to the business plan developed by the project promoters, the amount of direct revenues stemming from congestion revenues or inter-TSO compensation mechanism is estimated at 104 M€/year. Taking into account the costs and benefits directly borne and gained by the TSOs (CAPEX, OPEX; losses and congestion revenue) over the 25 years of the project's lifetime, the NPV of the missing revenue for the TSOs represents 413 M€.

Assuming a 50/50 split of investment costs between the two TSOs, the estimated impact of the project inclusion in the network access tariffs of France and Spain remains relatively low (respectively 1.2 % and 1.5 %[7]). However, these projects are not the only investment in interconnectors carried by these countries. For instance, in France, the Biscay Gulf Project represent the equivalent of 72 % of RTE total realized investment costs in interconnections between 2013 and 2016. Besides the total increase in tariffs linked to the realisation of planned investments interconnections over the next 10 years is estimated at +3.5 % in Spain. Moreover, the realisation of the Biscay Gulf

[7] Considering current structure of demand and allowed transport and distribution revenues

project would increase the amount of fixed assets of RTE and REE by respectively 6.4 %[8] and11 %[9], which would deteriorate their financial situation.

5.2 Externalities

In addition to the lack of commercial viability, article 14(2) of Regulation (EU) No. 347/2013 refers to the need to provide evidence regarding “the existence of significant positive externalities, such as security of supply, solidarity or innovation”. Moreover, article 4 of Regulation (EU) No. 1316/2013 sets the criteria of market integration, sustainability and security of supply as objectives for the Connecting Europe Facility (CEF) when assessing grant requests. The Biscay Gulf project indeed contributes to these three targets.

These externalities are however indirect, thus not compensating for the missing revenues and the lack of commercial viability demonstrated above.

5.2.1 Innovation

As indicated in section 3.6, the route chosen for the Biscay Gulf project induces technical challenges and thus benefits in terms of innovation. Going through the Biscay Gulf brings several advantages, namely the possibility to maximise the increase of capacity at the border by avoiding internal congestions, and the circumvention of environmental and societal obstacles. The NRAs estimate that this route allows to hasten the process of developing interconnections between France and Spain and to gain several years compared to the development of a similar interconnection crossing the Pyreneans.

The need for an innovative technical solution for the Biscay Gulf project is thus justified by the geophysical characteristics of the Franco-Spanish border. Besides, this project can become a reference for future projects that will have to overcome similar technical challenges, as the technologies implemented may later benefit other project promoters.

The project presents several technical challenges requiring innovative solutions in its submarine part:

- the main one is to the crossing of the Capbreton canyon: the technical solution for the canyon crossing has been identified to be a Horizontal Directional Drilling (HDD), a type of micro-tunnelling for pipe installation under the canyon basin, with start and end points at sea (water depths of 20 to 35 meters). This is a special construction technique used in land but highly innovative in the application for Biscay Gulf project at sea. Offshore platforms and specific configuration of the drilling rigs will have to be considered for this exceptional application. Additionally, for cable installation through the drilled pipes, specific methodology and marine resources will also be needed;

- high voltage submarine cable systems have a current technical limitation on maximum installation water depths of around 1600 m. The existence of Capbreton canyon and its great depth far from the French coast require the submarine route to follow the continental platforms, parallel to the Spanish and French coastlines, implying an increase in 70 km (+ 25 %) of the cable length.

Biscay Gulf project also requires the design and the implementation of innovative solutions on the land sections:

- on the French side, the project route follows a land section of 80 km, which will when realized be the longest land section of an HVDC underground cable of all European interconnectors built or planned so far. Not only the length of the land section in France is challenging, but the soil conditions at Medoc area require special attention to the thermal behaviour of the cable system and specific design of the cable system, trench and backfill, in order to comply with the rating of the interconnection;

- on the Spanish land side, a short overhead section (OHL) might be designed. Not having a continuous insulated cable system between the submarine HVDC cable and the OHL section, has relevant implications for the equipment design, mainly because of the difficulty of reliably identifying, in case of a fault, the location of the problem - the cable or OHL sections. This new situation will impact the converter stations system design and configuration (half/full bridge), the protection coordination, the insulation level coordination, and the physical cable/OHL interphase equipment to be installed.

Beside construction challenges, Biscay Gulf project raises new questions related to the security of the system due to a mix of synchronous and non-synchronous interconnections that have never been experienced on this border. Biscay Gulf HVDC interconnection will work in parallel to other AC lines and to the HVDC Baixas-Santa Llogaia link at the eastern border. An innovative energy control management solution for the transfer capacity between the Iberian Peninsula and France is required for an efficient coordination between eastern and western HVDC links, as well as with the AC lines in order to maximize the available transfer capacity while assuring safety of supply.

[8] As of 31.12.2016, RTE’s regulatory asset base amounts to 13,728 M€ (not considering assets under construction).
[9] According to RED ELÉCTRICA DE ESPAÑA, S.A.U. audited financial statements as of 31.12.2016, the company´s fixed assets are 7,813 M€ (not considering assets under construction).

The over-cost has been estimated by the TSOs at 1000 M€ in comparison with an overhead line of 2000 MW. This figure however has to be discussed according to the actual design of alternative interconnections, notably taking into account the terrain and the needed reinforcements on both networks.

5.2.2 Security of supply

REE and RTE estimated the value of the security of supply at 470 M€ considering the saving in generation capacity that brings the new interconnection. However, security of supply is a wider concept than generation adequacy. The development of market integration in Europe also leads to higher levels of interdependencies between Member states. In sum, the interconnections have become a key element of the security of supply at an EU level, allowing the community to benefit from integration of its partners at an efficient cost. As such, the development of interconnection capacity between Spain and France benefits to the resilience of the European power system. The Biscay Gulf project contributes to enhance the security of electricity supply in the Iberian Peninsula and France. Considering the size and geographical situation of these countries, the stability of the corresponding electric systems also benefits significantly the rest of the European Union. Moreover, security of supply may arise from other aspects than stability, such as a more efficient use of resources in the real time through balancing exchange between Member states. Such benefits are difficult to monetise.

5.2.3 Market integration

Bringing the interconnection capacity between Spain and France from 2.8 GW to 5 GW, Biscay Gulf would be a key achievement for the integration of the Iberian Peninsula into the European electricity market (notably enhancing price convergence between the Iberian Peninsula and continental Europe). It will in particular help bridging the remaining gap with the 10 % level of interconnection capacity target. Due to its specific location in the west, this project makes best use of the existing networks and thus helps limiting the need for internal reinforcements and congestion alleviations. This externality can't be monetised.

5.2.4 Sustainability

The results of the project's cost-benefit analysis are highly dependent on the assumptions regarding the development of RES generation. The results are highly positive (NPV[10] estimated at 957 M€) for TYNDP scenario Vision 4. Also known as "European Green Revolution", this scenario assumes a coordinated development of RES generation in the EU, allowing an optimal location of new capacity. Therefore, Vision 4 reallocates installed RES capacities across Europe, with the aim to concentrate efforts for RES integration in places that maximise the benefit for all end-consumers. The Iberian Peninsula is one of the European regions with the highest potential for solar generation. Another factor that helps solar installation in Spain is a low population density which leaves a lot of surface available. Moreover, grid parity seems to have been reached by solar technologies in recent auctions in the Iberian Peninsula. In consequence, vision 4 considers a huge deployment of solar energy in Spain. By alleviating constraints over electricity flows to the EU market, the Biscay Gulf project can enlarge the outlets for renewables and thus allow for their strong development in Spain and Portugal. Such a development would contribute to the achievement of the European Union energy policy targets.

In contrast to Vision 4, scenarios Vision 1 and Vision 2 fail to be on track for the realization of the energy roadmap 2050 and no additional policies are implemented after 2020 to stimulate the commissioning of additional RES except locally due to local subsidy schemes. In Vision 3, the future generation mix in 2030 is on track to reach the targets but it is determined by parallel national policy schemes, without addressing an optimal approach.

If the project were seen as a key building block of the EU policy, as a counterpart of reaching the Vision 4, the possibility that this policy would not be actually implemented brings a loss for Europe that should be monetized. To compute the difference between the NPV estimates for Vision 4 (957 M€) and the average of all the possible scenarios (222 M€) could give an approximation of the value of the EU policy. Is would mean that **the value of the project in terms of implementation of the EU policy can be monetised at 735 M€ of the NPV** used in the CBA.

Finally, the Biscay Gulf project could facilitate the entry in Europe of important amounts of renewable energy coming from North Africa, resulting in a stronger interconnection with this continent, helping in this way to reach the renewable energy commitments.

5.3 Conclusion on the request for subsidy

In the Madrid declaration, heads of State of France, Spain and Portugal as well as the President of the Commission have emphasized the importance of promoting the development of electricity interconnections between Spain and France in particular to achieve the 10 % interconnection target. They have also particularly underlined that "the development of these infrastructures should benefit from the full support available at the European level, notably through the Connecting Europe Facility, the structural funds and the European Fund for Strategic investment".

The Biscay Gulf project brings several externalities that will not benefit only to the hosting countries, but also other project promoters and the European Union as a whole. Some of these externalities, such as the contribution to EU target of 10 % interconnection cannot be monetised. The estimation of the monetisation of the other externalities is provided above.

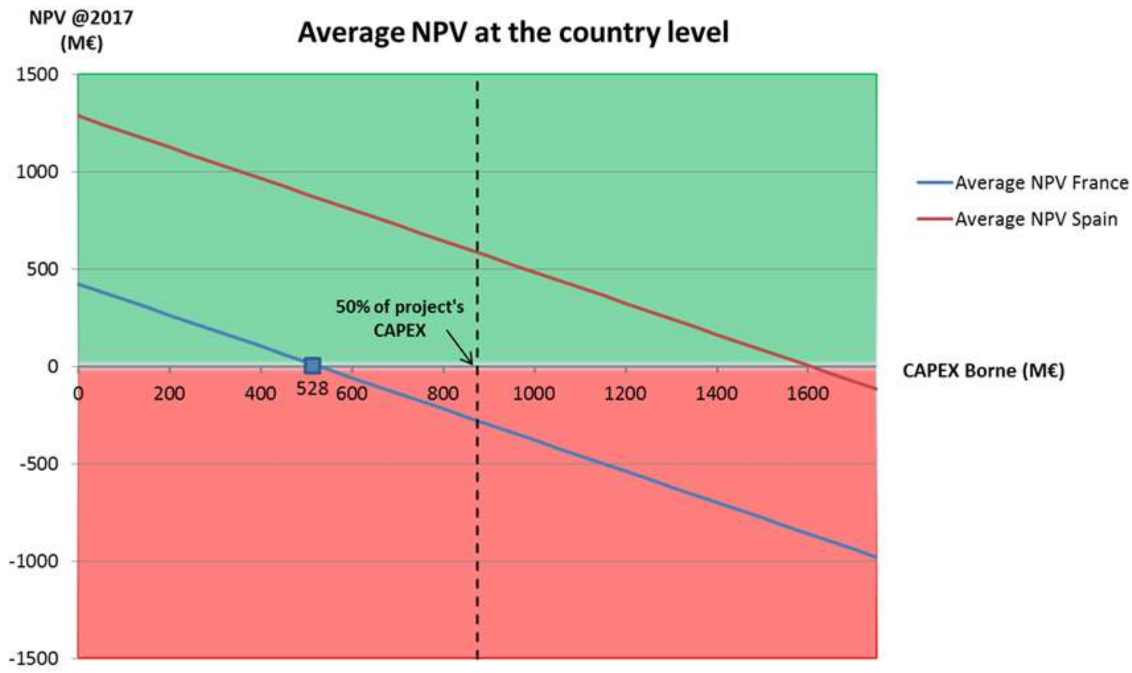
[10] including monetised security of supply benefits

As a consequence, CRE and CNMC conclude that the Biscay Gulf project should benefit from an ambitious - but nevertheless below the 50 % theoretical limit - financial support from the European Union that they estimate at 40% of the project cost, namely 700 M€.

6. CROSS BORDER COST ALLOCATION DECISION

The costs-benefit analysis conducted at national level reveals that the costs and benefits of the project are highly unbalanced: 68 % of the investments will take place in France, and 32 % in Spain, while 35 % of the benefits of the hosting countries will be harvested by France and 65 % by Spain, as the Iberian Peninsula is a peripheral area of Europe.

Assuming the investment request, and 40 M€/year of additional security of supply benefits (shared equally between France and Spain), the graph below presents the project's average NPV (over the four TYNDP scenarios) for France and Spain, depending on the CAPEX borne by RTE and REE respectively:



This graph shows that the **French NPV turns negative when RTE's contribution to the project costs exceeds 528 M€ (while 68 % of costs are located on French territory and 32% on Spanish territory)**.

Having regard to the assessment of the investment request and the conclusions developed above, CRE and CNMC recognize the need for a CBCA, in order for the French NPV not to be negative. Computations show that in order to reach this objective, RTE's contribution to the investment costs of the Biscay Gulf project can't exceed 528 M€.

NRAs understand that this project is a key building block of the EU policy and an important part of the estimated benefits will fall in Europe as a whole and not only in the Iberian Peninsula. In this context, and considering what is exposed in section 5, NRAs support the TSOs' application to a CEF subsidy of 700 M€.

Building on the TSOs' hypothesis of a 50/50 share of the investment costs, both countries would contribute 875 M€ to the project. CRE and CNMC decide the EU financial assistance should be allocated so that the French NPV becomes neutral (meaning that 350 M€ should be attributed to RTE, whatever the amount of the subsidy attributed). If the financing received from the CEF is less than 350 M€, CNMC and CRE shall mutually agree on a review of the cost allocation, in terms that guarantee the prompt implementation of the Biscay Gulf project.

- <u>operational costs sharing</u>

A stated in section, 2 these costs will be shared according the following allocation key of the operation and maintenance costs of the project: RTE will bear 60 % while REE will bear the remaining 40 %. Thus the costs related to damage on the submarine cable will be shared according to this cost sharing key regardless of the location of the incident.

- <u>treatment of potential costs overruns</u>

REE will support the costs overruns up to a total net contribution[11] to the CAPEX of 875 M€. Any additional costs overrun above this amount will be born at 62.5 % by REE, and 37.5% by RTE (which corresponds to the relative amount of CAPEX covered by respectively REE and RTE when this threshold is hit, assuming RTE gets 350 M€ of subsidy: 875 M€ by REE and 525 M€ by RTE).

As stated by article 12(5) of Regulation (EU) No. 347/2013, NRAs will pay particular attention to the efficiency of the costs incurred by the TSOs.

National incentive regulations – e.g. as described in CRE's decision on the TURPE 5[12] – will make sure TSOs have incentives to minimize the magnitude of such costs overruns. In particular, this mechanism will consider potential overruns on a before-subsidy basis.

- treatment of congestions rent

The congestion rents of the project will be shared 50/50 between RTE and REE, as assumed in the above computations. However, should the project turn out to be more profitable than initially anticipated, a specific mechanism will be implemented to share these extra benefits.

More specifically, the above computation assumed that, in the absence of the Biscay Gulf project, the available interconnection capacity between France and Spain was 2.4 GW when power is flowing from Spain to France, and 2.8 GW in the other direction. The Biscay Gulf project then brings the nominal interconnection capacity up to 5 GW in both directions.

The realized benefits of the project may be approximated by the usage rate of this extra capacity brought by the Biscay Gulf project (2.6 GW in the direction Spain to France and 2.2 GW in the direction France to Spain). The forecasted usage rate taken into account in this decision is 50 %, in line with the 4 visions of the TYNDP taken into account in the computations done by the TSOs in 2020 and 2030.

Consistently, the realized usage rate will be computed by dividing the realized flows (i.e. flows beyond 2.4 GW in the direction Spain to France and 2.8 GW in the direction France to Spain) by the nominal extra capacity available (2.6 GW in the direction Spain to France and 2.2 GW in the France to Spain).

Any additional point of usage rate beyond the forecasted rate will translate into a payment from RTE to REE of 0.3 M€, consistently with the forecasted gross surplus (net of power losses) and a sharing key stating that RTE transfers to REE 25 % of the extra benefit it gets from the interconnector (so that Spain gets 62.5 % of additional benefits, and France 37.5%)[13].

Should the usage rate turn out to be lower than anticipated for a given year N, the transfer from RTE to REE will be reduced accordingly the next year N+1, unless it yields a negative transfer for this year (N+1) in which case no transfer will be made and the remainder will be passed to the following year (N+2).

The mechanism described above will be enforced during 25 years. If the remainder is negative at the end of the 25 years, no transfer from REE to RTE will be made. After 10 years of operation of the interconnection, NRAs will evaluate this specific mechanism, and could accordingly agree on a different mechanism.

[11] net contribution : investments costs actually engaged by REE minus the amount of financial help received by REE
[12] http://www.cre.fr/documents/deliberations/decision/turpe-htb3
[13] It is fictively assumed that the extra benefits are by default share 50/50 between France and Spain. If RTE transfers 25% of the French extra benefit to REE, REE retrieves 12.5% of the extra total benefits, ending up with 62.5% of the total extra benefits.

Appendix 1

The following table details the different cash-flows for scenario V1 under the assumption of an availability rate of 100% and without taking into account additional security of supply benefits.

Computing an NPV in 2017 with a discount rate of 4% yields the figure given in the main part of the document.

			Scenario V1			Total annual
Year	**CAPEX**	**OPEX**	**Losses**	**Fuel savings**	**Other**	**cash-flows**
2016	(5,7)					(6)
2017	(7,9)					(8)
2018	(4,3)					(4)
2019	(1,8)					(2)
2020	(25,6)					(26)
2021	(172,6)					(173)
2022	(569,1)					(569)
2023	(519,3)					(519)
2024	(375,8)					(376)
2025	(67,8)	(10,2)	(32,2)	147,2	0	37
2026		(10,2)	(33,1)	139,8	0	97
2027		(10,2)	(34,0)	132,5	0	88
2028		(10,2)	(35,0)	125,1	0	80
2029		(10,2)	(35,9)	117,8	0	72
2030		(10,2)	(36,8)	110,4	0	63
2031		(10,2)	(36,8)	110,4	0	63
2032		(10,2)	(36,8)	110,4	0	63
2033		(10,2)	(36,8)	110,4	0	63
2034		(10,2)	(36,8)	110,4	0	63
2035		(10,2)	(36,8)	110,4	0	63
2036		(10,2)	(36,8)	110,4	0	63
2037		(10,2)	(36,8)	110,4	0	63
2038		(10,2)	(36,8)	110,4	0	63
2039		(10,2)	(36,8)	110,4	0	63
2040		(10,2)	(36,8)	110,4	0	63
2041		(10,2)	(36,8)	110,4	0	63
2042		(10,2)	(36,8)	110,4	0	63
2043		(10,2)	(36,8)	110,4	0	63
2044		(10,2)	(36,8)	110,4	0	63
2045		(10,2)	(36,8)	110,4	0	63
2046		(10,2)	(36,8)	110,4	0	63
2047		(10,2)	(36,8)	110,4	0	63
2048		(10,2)	(36,8)	110,4	0	63
2049		(10,2)	(36,8)	110,4	0	63