PUBLIC CONSULTATION

Consultation by CRE (French Energy Regulatory Commission) regarding the interconnector "IFA2" between France and Great Britain

In a letter dated April 25th 2016, the French transmission system operator (TSO) RTE submitted to the French Energy Regulatory Commission (CRE) an application to be granted a financial incentive to build the IFA2 interconnector between France and Great Britain. RTE made it explicit that their application was written under the assumption that the United Kingdom (UK) would remain a member of the European Union (EU).

On June 23rd 2016, British citizens chose by referendum to "leave" the EU. On October 7th 2016, CRE asked RTE to update their application taking into account this new environment, and the related uncertainties regarding the future framework of the relationship between France and the UK. RTE's updated application has been sent to CRE on November 23rd 2016.

In addition, in their investment programme submitted to CRE for the year 2017, RTE included 8.9 M€ of expenses related to the project IFA 2. In her decision of December 1st 2016 approving RTE's investment programme for the year 2017, CRE mentioned that her approval did not imply an approval of the whole project IFA 2, and that further analysis was needed.

In order to respond to RTE's application by the end of January 2017, and given the uncertainties raised by the British referendum of June 2016, CRE wants to consult market participants regarding, on the one hand, the expected benefits of the project and, on the other hand, the contemplated regulatory framework designed to limit the risks faced by consumers.

Answering the consultation

CRE would like to invite all interested parties to send their answer by no later than January, 3rd 2017 :

- by email to: dr.cp3@cre.fr ;
- by visiting CRE's (www.cre.fr), section « Documents/Consultations publique » ;
- by post to: 15, rue Pasquier –F-75379 Paris Cedex 08 ;

CRE will publish non-confidential contributions.

Please indicate in your response whether you wish your response to be considered as confidential or anonymous. Otherwise, your contribution will be considered to be neither confidential nor anonymous. Interested parties are invited to send their observations justifying their positions.

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1. LEGAL FRAMEWORK

Articles L. 341-2 and L. 341-3 of the French Energy Code provide that CRE has the authority to set distribution and transmission networks' access tariffs (the "Tarif d'Utilisation des Réseaux Publics d'Electricité" (TURPE)). These tariffs are built so as to ensure the budget balance of an efficient TSO.

Article L. 341-3 specifies that CRE decides "*the evolution of distribution and transmission networks' access fees"* and can implement "*a monitoring of the evolution of distribution and transmission networks access fees, both on the short and the long-run, in order to encourage distribution and transmission network operators to improve on their performances, in particular regarding the quality of supply, the integration within the electricity internal market and the security of supply, and to look for efficiency enhancements."*

The fourth paragraph of the same article specifies that CRE "*consults, according to her own methodology, energy market parties*".

CRE's deliberation of November 17th 2016 on the fifth TURPE[1] (TURPE 5) built on the same principles as the fourth TURPE[2] (TURPE 4) regarding incentive regulation, but introduced some changes. In particular, under the TURPE 5 for the transmission network, the network expansion projects with capital expenditures higher than 30 M€, and whose final investment decision is taken after CRE's approval of RTE's investment programme for 2017 of December 1st 2016, are subject to an incentive regulation mechanism regarding their costs.

However, given the unprecedented environment of uncertainty in the aftermath of the June 23rd 2016 referendum on whether the UK should remain a member of the EU, and the corresponding specific risks raised for the project IFA 2, CRE is considering implementing a strengthened incentive regulation mechanism, in order to mitigate the risks faced by the users of the French transmission network.

2. THE INTERCONNECTOR « IFA2 »

2.1 Project features

The interconnector project IFA 2 is aiming at increasing the cross-border capacity between France and Great Britain. This project was granted the status of "Project of Common Interest" (PCI) for the priority corridor North Seas' Offshore Grid ("NSOG") both in October 2013 and in November 2015. It consists in a 1000 MW power line between the substation of Tourbe (near Caen, Calvados, France) and Chilling (near Southampton, Hampshire, United Kingdom). The cross-border capacity between France and Great Britain is currently of 2000 MW (interconnector "IFA").

(Source for the picture: RTE)

Further details can be found in the application that RTE submitted to CRE, which is available online (except for its confidential appendices)[3].

[1] http://www.cre.fr/documents/deliberations/decision/turpe-htb3
[2] http://www.cre.fr/documents/deliberations/decision/turpe-4-htb
[3] http://www.cre.fr/documents/consultations-publiques/projet-d-interconnexion-france-angleterre-ifa2/consulter-l-annexe-de-rte

Schematically, the interconnector IFA2 consists in the following components (source for the drawing: RTE):

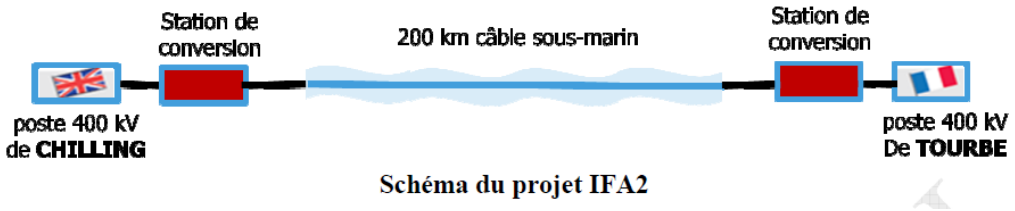


Schéma du projet IFA2

2.1.1 Submarine cable

The Channel submarine link is planned to be about 200 km long. It is planned to be a DC cable made of two conductors, each composed of a core in copper or aluminium, and several insulating and protective layers.

Cables' diameter are planned to be about 10 to 15 cm long, and weigh about 45 to 50 kg per meter.

2.1.2 Conversion stations

AC-DC conversion stations are planned to use VSC (Voltage Source Converter) technology, similarly to the recently built interconnector between France and Spain, and the currently under-construction interconnector between France and Italy.

2.1.3 Transmission network connection

The substations connecting IFA 2 interconnector to inland transmission networks will be the existing 400 kV substations of Chilling, England (near Southampton), and Tourbe, France (near Caen).

RTE's ten-year national development plan for the French transmission network does not include any network reinforcement made necessary by IFA 2 interconnector.

2.2 Estimated schedule

RTE's estimated schedule for the project is the following:

- Public participation and consultation: October to December 2014.
- Application to administrative authorizations: December 22nd, 2015.
- Public enquiry: August 8th to September 10th 2016.
- French "Declaration of Public Utility": expected for the end of 2016.
- Administrative authorizations: S1 2017.
- Construction work: 2017 – 2020.
- Commissioning: end of 2020.

2.3 Contractual relationship

IFA 2 interconnector is a joint project of RTE and *National Grid Interconnector Holdings Limited* (NGIH), a company owned by the international group *National Grid Holdings 1 plc* (whose business is focused on electricity and natural gas, and which owned by National Grid plc, NG). *National Grid Holdings 1 plc* owns the transmission network in England and Wales, through its subsidiary *National Grid Electricity Transmission Ltd*, NGET). NGIH builds and operates each one of its interconnectors using dedicated subsidiaries. For the IFA 2 project, NGIH created the company *NG IFA2 Ltd* (100% owned by NGIH).

An incorporated joint venture, equally owned by RTE and NG IFA2 Ltd, will perform IFA 2 construction work. Operation will be managed by an unincorporated joint venture between RTE and NG IFA2 Ltd.

2.4 Costs of the project

RTE submitted to CRE detailed estimates of project's costs. In what follows, these costs are broken into capital expenditures (CAPEX), and operational expenditures (OPEX).

2.4.1 CAPEX

Project's investment costs, as estimated by RTE, amount to about 740 M€$_{2017}$[4]. This estimate is consistent with ENTSO-E's *Ten Year Network Development Plan* (TYNDP) 2016. RTE indicates that their risk assessment shows that costs could increase to 830 M€$_{2017}$. No lower bound for costs is given.

Half of these expenditures are dedicated to the Channel submarine link. The remainder is split between conversion substations, underground cables between the French seashore and the conversion substation, and connections to national transmission networks. On the British side, the link between the conversion substation and Chilling substation will consist in a submarine 400 kV AC line, due to environmental constraints.

As specified in the contractual relationship between RTE and NG IFA2 Ltd (see 2.3), RTE will bear half of the costs of the project.

Question 1: Do you have any remark on the level of the expected capital expenditures for the project?

2.4.2 OPEX

There are two main categories of operational expenditures: operation and maintenance (O&M) costs, and network power losses.

- Operation and maintenance costs:

In their application to a financial incentive of April 2016, RTE has estimated O&M costs to be about 9.6 M€/year (1.3 % of capital expenditures).

In their updated application of November 2016, these estimates were revised down to 4.5 M€/year (0.6 % of capital expenditures). RTE explains such a decrease by a change in the method they use to compute the project net present value. More specifically, their updated method does not take into account the end-of-life value of the interconnector after 25 years. As a consequence, the costs of retrofitting the control centre and the HVDC valves were ignored (translating into a decrease in annualized O&M costs of 4 M€/year). In addition, RTE indicated that their estimate of operating costs also decreased by 1.1 M€/year.

CRE's preliminary assessment

CRE considers that it is not relevant to ignore the costs of retrofitting the control centre and the HVDC valves, given the lifetime of the project if significantly greater than 25 years[5].

Hence CRE is considering taking into account an estimate of 8.5 M€/year for O&M costs (1.15% of capital expenditures). This estimate takes in consideration the decrease in RTE's estimate of operating costs, but does include the cost of retrofitting the control centre and the HVDC valves.

Question 2: Do you agree with CRE's assessment regarding operation and maintenance costs?

[4] The corresponding CAPEX annuity (for a project lifetime of 45 years and a discount rate of 4.5 %), including interim interest charges, is about 41 M€/year.
[5] Consistently, the capital expenditure annuity previously given is based on a project lifetime of 45 years.

- Network power losses

In order to assess the cost of the power losses caused by IFA 2, RTE used the estimates given by the TYNDP 2016. These are the only publicly available estimates available to this day. The TYNDP studies a scenario « expected progress » for 2020, and four differentiated prospective scenarios for 2030 (see appendix). These scenarios differ in the underlying assumptions regarding the demand for electricity in European countries, the different generation fleets, the marginal costs of the different production technologies… They span different levels of coordination between the national energy policies of European countries on the one hand and of achievement of the goals set by the European common energy policy on the other hand.

The estimated costs of network power losses for each scenario are given in the following table[6] :

En M€	EP 2020	V1	V2	V3	V4
HVDC IFA 2 losses (source RTE)	8	13	10	10	12
French network power losses	-1	-8	7	15	17
British network power losses	-21	-1	-1	17	19
Rest of Europe power losses	--	-4	0	-3	-5
Power losses - total (source ENTSOE)	-14	0	16	39	43

CRE's preliminary assessment

In their initial application to a financial incentive, RTE considered the costs of power losses on the sole IFA2 power line, rather than the change in the costs of power losses for the whole European network.

Because ENTSO-E's method to assess network losses at the European scale remains to be fully understood, and since no other estimate is available, CRE is considering to approximate the cost of network losses by the costs of power losses on the sole IFA2 power line, as proposed by RTE.

Question 3: Do you agree with CRE's assessment of the cost of the power losses due to the interconnector IFA 2?

3. IFA 2 WELFARE ANALYSIS AT THE EUROPEAN LEVEL

3.1 Assumptions and methodology

RTE suggests performing the welfare analysis of the project using the assumptions of ENTSO-E's TYNDP 2016.

The gross benefit created by IFA 2 is computed by assessing the decrease in power production costs allowed by the interconnector (the energy mix being the ones described in the scenarios of the TYNDP). RTE suggests considering a gross annual benefit from the project obtained by taking the average between the gross annual benefit in 2020, and the average of the gross annual benefits for the four scenarios for 2030.

Several assessments of gross benefits have been performed:

- TYNDP 2016 estimates ;
- RTE's initial estimates of April 2016 ;
- RTE's updated estimates of November 2016.

[6] A negative figure corresponds to a decrease in the cost of power losses.

3.2 Reference cross-border capacity assumption

The gross benefit from the project depends on the reference cross-border capacity that would be available between France and Great Britain in the absence of IFA 2. As a consequence, RTE performed gross benefits' assessments for several reference cross-border capacities:

- an increase from 2 to 3 GW: a reference capacity of 2 GW implies that IFA 2 is the only new interconnector commissioned between France and the United Kingdom for the considered time horizon ;
- an increase from 3 to 4 GW: a reference capacity of 3 GW implies that an additional project of 1 GW has also been commissioned at the considered time horizon. Such a project may for example be ElecLink, whose commissioning is expected for 2019-2020 ;
- an increase from 4.4 to 5.4 GW: a reference capacity of 4.4 GW implies that an additional cross-border capacity of 2.4 GW has been commissioned at the considered time horizon, for example the projects ElecLink and FAB Link.

RTE suggests using a weighted average of the results obtained with different assumptions regarding cross-border capacity:

- in 2020, RTE suggests using the following weights: 75% for 2 to 3 GW and 25% for 3 GW to 4 GW ;
- in 2030, RTE suggests using the following weights: 33% for 2 to 3 GW, 33% for 3 to 4 GW ; and 33% for 4.4 to 5.4 GW.

CRE's preliminary assessment

CRE is considering taking into account a reference cross-border capacity which is consistent with the assumptions of the TYNDP 2016, that is to say a reference capacity of 3 GW in 2020 (following the commissioning of ElecLink) and a reference capacity of 4.4 GW in 2030 (following the commissioning of an additional project). Numerous projects are indeed under consideration at the border between France and Great Britain:

- « ElecLink » (1 GW) whose commissioning is expected in 2019-2020 ;
- FAB Link (1.4 GW) between Northern Cotentin and Southern England (expected for 2022) ;
- Aquind (2 GW) between Normandy and Southern England (expected for 2021-2022) ;
- other interconnector projects between the British Islands and the continent.

Question 4: Do you agree with CRE's assessment regarding the cross-border reference capacities in 2020 and 2030?

3.3 Estimates of gross benefit

The following table gives the gross benefit estimates by RTE, under different assumptions regarding the reference cross-border capacities. ENTSO-E's TYNDP 2016 assessments are also provided.

Year	Scenario	Gross annual benefit (M€/yr) TYNDP 2016	Gross annual benefit[7] (M€/yr) Using RTE's assumptions regarding reference capacities	Gross annual benefit (M€/yr) Using CRE's assumptions regarding reference capacities
2020		[70;110]	112	102
2030	Vision 1	[50;70]	49	42
	Vision 2	[90;110]	99	83
	Vision 3	[70;110]	94	78
	Vision 4	[70;90]	82	65

[7] These estimates do not take into account any potential "capacity value" of the interconnector, as explained below.

CRE compared RTE's estimate to both the estimates given in the consultation draft of the TYNDP 2016 (released in June 2016) and her own simulations. CRE's simulations were based both on data from RTE (for France) and on publicly available data (for the rest of Europe). The obtained results were consistent with RTE's estimates.

In addition, RTE mentioned in their updated application of November 2016 a potential "capacity value" of 24 M€/year for the interconnector. This "capacity value" stands for the savings in generation assets' investments that the interconnector may allow. CRE considers that it is premature to take such savings into account. Indeed they are not derived from an in-depth analysis from RTE allowing CRE to assess their relevance. In addition, CRE notices that there seems to be no non-served energy in TYNDP 2016 scenarios, despite the fact that demand is assumed to be inelastic. As a consequence, it does not seem relevant to take into account a "capacity value" under such scenarios.

3.4 Estimates of net benefit

From the previous estimates of gross annual benefits, capital expenditures, operation and maintenance expenditures, and power losses, an order of magnitude of the net annual benefit derived from the project at the European scale (in M€/year) can be computed (CRE's computations based on RTE's estimates)[8] :

	2020	2030 (V1)	2030 (V2)	2030 (V3)	2030 (V4)	Average 2030	
Gross benefit (RTE's assumption*)	112	49	99	94	82	81	
Gross benefit (CRE's assumption*)	102	42	83	78	65	67	
CAPEX annuity	41	41	41	41	41	41	
O&M costs	8,5	8,5	8,5	8,5	8,5	8,5	
Power Losses IFA 2	8	13	10	10	12	11	Average 2020-2030
Net benefit (RTE's assumption*)	54	-13	40	34	21	20	**37**
Net benefit (CRE's assumption*)	45	-21	24	19	4	6	**25**

(*) Assumption regarding the cross-border reference capacity in 2020 and 2030, as explained in 3.2

To conclude, CRE considers that within the current regulatory framework, the project IFA 2 seems to bring a positive net benefit to the European Union as a whole (including the United Kingdom).

Question 5: Do you agree with CRE's assessment that the current European Union (including the United Kingdom) as a whole derives a positive net benefit from the project IFA 2?

The next section provides further analysis CRE asked RTE to provide given the uncertainties raised by the result of the British referendum.

4. BREXIT AND RISKS SPECIFIC TO THE PROJECT IFA 2

4.1 Background on the Brexit

The outcome of the British referendum of June, 23rd 2016 was a majority in favour of a "leave", that is in favour of the United Kingdom leaving the European Union (also known as the "Brexit").

The British referendum might lead the UK to trigger article 50 of the Treaty on European Union, which provides that a member State can unilaterally withdraw from the Union after having notified the European Council of its intention, and after having negotiated a withdrawal agreement. The withdrawal would only become effective at the time of the agreement signature or, failing that, two years after the notification. In the meantime, the United Kingdom remains a full member of the Union. It is worth mentioning that the two-year delay to negotiate a withdrawal agreement may be extended if member States unanimously agree to do so.

[8] The annuity of capital expenditures was computed by using a project lifetime of 45 years and a discount factor of 4.5 %.

If so, new agreements may have to be negotiated in order to provide a framework for the future relationship between the United Kingdom and the European Union. The specific content of such agreements is unknown at this stage, notably regarding the conditions allowing the UK to access the internal market, including the electricity market.

This is an unprecedented situation which raises uncertainties, in particular regarding the rules that may apply as regards the operation of electricity interconnectors and, more generally, the access to the internal electricity market.

The outcome of the British referendum hence raises two questions. First, one has to check that the project is interesting for the European electricity system, even in a situation where the United Kingdom would no longer be a member of the European Union and an active member of the internal market. Second, a specific analysis of the risks raised by the consequences of the British referendum, and the measures taken to mitigate such risks, is needed.

4.2 IFA 2 benefits' sharing

In her letter to RTE dated October, 7th 2016, CRE asked RTE to perform further analysis in order to understand how the net benefit brought by the interconnector IFA 2 is split between European countries.

In order to assess how the net surplus is split between countries, one has to compute market clearing prices. These prices define the surplus sharing rule between consumers, producers and interconnector owners of the different countries. By essence, such an exercise is not as robust as the assessment of gross benefits at a European scale. Indeed the latter only needs to focus on production costs' savings allowed by the interconnector at the European level. In particular, the net surplus sharing rule will in practice depend on market imperfections, congestions on national networks, bilateral contracts and so on.

While the exact surplus sharing rule is uncertain, a clear trend arising from RTE's simulations is that the United Kingdom captures the bulk of the net surplus created by the interconnector. The project is almost balanced for the European Union without the United Kingdom. France derives a positive net benefit in all scenarios thanks to the intensification of trade between France and the United Kingdom. This intensification has a negative impact of the benefits derived from the interconnectors between France and other countries. The following table breaks down the annual net surplus (in M€/year) between the United Kingdom and the rest of the European Union, assuming a cost sharing rule of 50-50 between NG IFA2 Ltd and RTE:

	UE without UK		United Kingdom	
	Ref. RTE*	Ref. CRE*	Ref. RTE*	Ref. CRE*
2020	4	-2	50	46
2030 (V1)	-6	-9	-7	-11
2030 (V2)	-17	-28	57	51
2030 (V3)	3	-9	31	27
2030 (V4)	-11	-24	32	27
Average 2030	-8	-17	28	24
Average 2020 - 2030	-2	**-10**	39	**35**

(*) Assumption regarding the cross-border reference capacity in 2020 and 2030, as explained in 3.2

Given the information currently available and the limited accuracy that can be expected from surplus sharing simulations, CRE considers that the project is roughly balanced for the European Union without the United Kingdom. As a consequence, the British referendum does not question drastically the project IFA2 from an economic standpoint. However, the legal and regulatory uncertainties raised by the result of the referendum, and the fact that the project is barely balanced for the European Union without the United Kingdom, make it necessary to analyse the new risks the project is facing.

Question 6: Do you agree with CRE's assessment of the economic benefits derived from the project, given the results of the British referendum?

4.3 Uncertainties raised by the Brexit regarding the project IFA 2

Because of the result of the British referendum, the European Union rules, and notably the network codes that define interconnectors' operating rules, may not be enforced in the United Kingdom anymore, raising uncertainties regarding future allocation rules. If new such rules[9] turn out to be implemented and to differ significantly from the European network codes (code FCA[10] for long-term capacity allocation, code CACM[11] for day-ahead capacity allocation, and market coupling for intraday capacity allocation), they may question the magnitude of the net surplus created by the project IFA 2.

Question 7: Do you agree with CRE's assessment that the result of the British referendum raises new risks for the project IFA 2?

4.4 Contractual relationship and risk hedging

A joint venture equally owned by RTE and NG IFA2 Ltd, a subsidiary of NGIH, should be responsible for IFA 2 construction work on their own behalf as well as on behalf of the parties.

In the operational phase, the previously mentioned joint venture should be dissolved. A Joint Operating Agreement between RTE and NG IFA2 Ltd will define the interconnector operating rules, notably regarding costs and revenues sharing, as well as capacity commercialisation. This agreement will be signed before the creation of the joint venture in charge of the construction work. However, several appendices will be added to it later on.

RTE states that long-term capacity sales should be handled through the platform SAP, as prescribed by the network code FCA. RTE does not specify the expected commercialisation rules for the other time horizons (day-ahead and intraday).

According to the information currently available to CRE, NG IFA2 and RTE did not take any additional significant specific measure to adapt their contractual relationship as a consequence of the result of the British referendum, notably regarding risk sharing rules in case of sunk costs in the construction phase, or of reduced revenues in the operating phase.

Question 8: Do you have any comments regarding the above description of the risk sharing rules contemplated by RTE and NG IFA2 Ltd, following the result of the British referendum?

5. INCENTIVE REGULATION FRAMEWORK FOR THE PROJECT IFA2

RTE considers that the result of the British referendum does not have any significant impact of the benefits created by the interconnector IFA 2. As a consequence, they apply for the business-as-usual incentive regulation framework, as described in the TURPE.

Because of the uncertainties raised by the British referendum, and given the fact that RTE and NG IFA 2 did not take any significant specific measure, CRE is considering enforcing a strengthened incentive regulation framework in order to balance the way risks are shared between RTE and the users of the French transmission network. Indeed, within the regulatory framework currently in place, users bear the bulk of project's risks (withdrawal, revenue losses and so on), provided the project is expected to be profitable at the perimeter of the European Union.

Section 5.1 describes the considered incentive regulation framework. Different risk sharing rules are then proposed in section 5.2.

[9] These rules relate to the computation of the capacity commercially available, the way this capacity is allocated and so on.
[10] https://ec.europa.eu/energy/en/topics/wholesale-market/electricity-network-codes
[11] Idem.

Question 9: Given the uncertainties regarding the consequences of the British referendum, do you think the business-as-usual regulation framework of the TURPE should apply, or do you consider on the contrary that a strengthened incentive regulation framework should be used to share risks between RTE and users?

5.1 Considered incentive regulation mechanism structure

The structure of the considered incentive regulation framework is broadly consistent with the framework defined by the TURPE 5 HTB.

5.1.1 TURPE 5 incentive regulation framework structure

The financial incentive to build interconnectors set up by TURPE 5 has three components:

- **A fixed bonus**, whose goal is to encourage the development of interconnectors, provided they bring a positive expected net surplus.
- **A "usage" variable bonus**, whose goal is to provide incentives to operate the interconnector efficiently. It consists in a yearly positive or negative bonus. Its amount depends on the realized volume of additional cross-border flows between France and Great Britain made possible by the interconnector compared to the flows predicted by RTE:

  $$PV_{usage} = -\Gamma \times \text{Unit value} \times (\text{Usage Rate}_{\text{ex ante}} - \text{Usage Rate}_{\text{ex post}})$$

  This bonus is a proxy to make RTE face the *realized*, and not estimated, gross benefits created by the interconnector. It is thus implicitly assumed, as a first approximation, that the gross benefit created by the interconnector is proportional to cross-border flows. As such, the unit value of a one-per-cent usage rate is defined as:

  $$\text{Unit value} = (\text{Gross Benefit}_{\text{ex ante}} - \text{Cost of line power losses}_{\text{ex ante}}) / \text{Usage Rate}_{\text{ex ante}}$$

  The usage rate is defined as follows[12] :

  $$\frac{100\%}{8760}\sum_{h=1}^{8760}\frac{\max(0,\ \text{used capacity}_{h,FR-GB} - \text{available capacity}_{h,\text{without IFA 2}})}{\text{available capacity}_{\text{with IFA 2}} - \text{available capacity}_{\text{without IFA 2}}}$$

  where used and available capacities are expressed in absolute values, independently of the direction of the cross-border flows.

The deliberation TURPE 5 sets a floor to the sum of the received revenues and paid penalties due to the fixed bonuses and "usage" variable bonuses. In the situation where realized cross-border flows are below predicted flows, the penalty can at most cancel the equivalent annuity of the fixed bonus.

- **A "costs" variable bonus**, whose goal is to provide incentives to minimize capital expenditures. It consists in a positive or negative bonus. Its amount depends on the realized costs of the project compared to the predicted costs. Within TURPE 5 regulatory framework, RTE bear 20 % of the difference (positive or negative) between predicted and realized costs. However, the bonus only kicks in if the realized capital expenditures differ from the predicted ones by more than 10 %. If RTE's realized capital expenditures for the project lie between 90 % and 110 % of the planned budget, no bonus applies. If realized capital expenditures are below 90 % of the planned budget, RTE earn a bonus equal to 20 % of the difference between 90 % of the planned budget and the realized capital expenditures. If RTE's realized capital expenditures are above 110 % of the planned budget, RTE bear a penalty equal to 20 % of the difference between the realized capital expenditures and 110 % of the planned budget.

  In the situation where realized costs are above predicted costs, the amount of the penalty is capped so that the total of all the bonuses together cannot imply a return to RTE lower than WACC - 1%.

Finally, RTE is implicitly incentivized to commission the power line in due time by the fact that bonuses are only paid after the commissioning of the interconnector.

[12] For leap years, the formula with be modified accordingly.

5.1.2 Strengthened regulatory framework

A strengthened regulatory framework would consist in:

- **A floor** taking as a reference RTE's regulated return on their assets:

  Floor = WACC - Y%

- **A cap** taking as a reference RTE's regulated return on their assets:

  Cap = WACC + Y%

The cap and the floor would apply to the sum of the three bonuses during the period of enforcement of the incentive regulation mechanism. They would refer to the realized capital expenditures.

The "costs" variable bonus would be enforced as soon as realized capital expenditures differ from predicted capital expenditures.

Rewards and penalties would be handled through the "Compte de Régularisation des Charges et des Produits" (CRCP) for a period of ten years, starting after the interconnector has been commissioned[13].

Question 10: If you are in favour of a strengthened regulatory framework for the interconnector IFA 2, do you find the structure of the envisioned incentive regulation mechanism relevant?

5.2 Considered incentive regulation mechanism level

CRE is considering several scenarios within the same incentive regulation framework, which correspond to different levels of risk sharing between RTE and transmission network users.

5.2.1 Common parameters

The different scenarios share the following parameters:

- Target CAPEX: predicted capital expenditures ;
- OPEX: annualized operation and maintenance costs (but power losses) ;
- Power losses: cost of the power losses on IFA 2 interconnector ;
- Discount rate: advised discount rate for French public investments[14] ;
- WACC: as defined in the currently enforced TURPE HTB ;
- Target Usage Rate: predicted average usage of IFA 2 capacity (in per cents) ;
- Estimated gross benefits for 2020 and 2030: see section 3.2. ;
- Mechanism length: number of years during which the incentive regulation mechanism is enforced.

[13] In what follows, the fixed bonus and the "costs" variable bonus are expressed in annuities over a ten-year period (lifetime of the incentive regulation mechanism) in order to make the comparison between the different options of the regulatory framework easier.
[14] http://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/archives/CGSP_Evaluation_socioeconomique_17092013.pdf

Predicted CAPEX at commissioning date[15]	783 M€	
Target CAPEX (RTE)	391 M€	
OPEX	8.5 M€ / year	
OPEX (RTE)	4.25 M€ /year	
Power losses (total)	9.6 M€ / year	
Power losses (RTE)	4.8 M€ / year	
Discount rate	4.5 %	
TURPE 5 WACC	6.125 %	
Annual gross benefit (total)	2020 : 102 M€	2030 : 67 M€
Annual gross benefit (RTE)	2020 : 51 M€	2030 : 34 M€
Useful life of the interconnector	45 years	
Mechanism length	10 years	

Year	Predicted Usage Rate	Equivalent Usage Rate
2021	72.4 %	65.8 %
2022	70.8 %	65.8 %
2023	69.2 %	65.8 %
2024	67.6 %	65.8 %
2025	66.0 %	65.8 %
2026	64.4 %	65.8 %
2027	62.8 %	65.8 %
2028	61.2 %	65.8 %
2029	59.6 %	65.8 %
2030	58.0 %	65.8 %

The equivalent usage rate is the constant rate defined as the target usage rate of the incentive regulation mechanism.

5.2.2 Fixed bonus and incentive rate

At this point, CRE is considering several alternative incentive rates and fixed bonuses.

The scenario A corresponds to the regulatory framework of TURPE 5, for which the incentive rate (Γ) used to compute the "usage" variable bonus would be set at 10 %. The scenarios B and C correspond to a strengthened incentive regulation framework:

Scenario	Incentive rate (Γ)	Fixed yearly bonus (M€/year)	Fixed yearly bonus (WACC+X)
A[16]	10 %	1.0	0.3 %
B	30 %	2.0	0.5 %
C	50 %	3.0	0.8 %

5.2.3 Cap and floor

The floor and the cap take as a reference RTE's regulated return on their assets:

$$\text{Floor} = \text{WACC} - Y\%$$

$$\text{Cap} = \text{WACC} + Y\%$$

Several alternative floors and caps are considered:

[15] This amount is greater than the predicted 740 M€ cost of the project because it takes into account interim interests during the construction phase.
[16] As explained in 5.1.1, the incentive rate applies to the "usage" variable bonus, the "costs" variable bonus incentive rate being fixed to 20 %.

Scenario	Floor	Cap
A	WACC – 1.0 % for costs and WACC for usage	No default cap
B	WACC – 2.4 %	WACC + 2.4 %
C	WACC – 4.1 %	WACC + 4.1 %

- Scenario A: in accordance with TURPE 5, if the realized costs are above the target costs, the amount of the penalty paid will be capped so that the total of all the bonuses together cannot imply a return to RTE lower than WACC - 1%. If realized cross-border flows are lower than predicted flows, the amount of the penalty paid can only cancel the fixed and "costs" bonuses. No default remuneration cap is set.
- Scenario B: the floor is set at the cost of debt considered in the TURPE enforced at the time. For TURPE 5, this cost is 3.7%. It is based on long-term averages of bond rates.
- Scenario C: the floor is set at the cost of spot debt that is about 2.0 %. This cost is based on current bond rates. Such a method to define the floor, consistent with the fact that we are considering a new project and not a historic portfolio of assets, is similar to the one used in the so called "Cap & Floor" regime, the British regulatory framework applying to non-merchant interconnectors.

Average of 10-year and 30-year long-term bonds[17]	1.20 %
Spread	0.60 %
Corporate tax	34.43 %
Interest deductibility	75 %
Cost of debt	2.0 %

Beyond the first 10 years after IFA 2 commissioning, RTE earn a return on IFA 2 at a rate defined by the TURPE enforced at the time.

For each scenario, the incentive rate is chosen consistently with the floor. As such, the floor is reached in scenarios B and C if the realized usage rate is zero, and realized costs equal the target costs.

5.2.4 "Costs" variable bonus

The "costs" variable bonus is a function of the difference between predicted and realized capital expenditures.

Once the realized investment cost is known, CRE envisages computing the "costs" variable bonus as follows:

- In scenario A, the computation would follow the description of section 5.1.1. The "costs" variable bonus will be zero is realized costs are between 90 % and 110 % of the target costs. It will be positive if they are below 90 % of the target costs, and negative if they are above 110 % of target costs.
- In scenarios B and C, the "costs" variable bonus would be computed as follows:

$$PV_{costs} = \Gamma \times (CAPEX_{annualized,\ ex\ ante} - CAPEX_{annualized,\ ex\ post})$$

The "costs" variable bonus will be zero if realized costs equal target costs. It will be positive if realized costs are below target costs, and negative otherwise.

Scenario	Incentive rate
A	20 %[18]
B	30 %
C	50 %

5.2.5 "Usage" variable bonus

The "usage" variable bonus would be computed as follows:

$$PV_{usage} = -\Gamma \times \text{Unit value} \times (\text{Usage Rate}_{ex\ ante} - \text{Usage Rate}_{ex\ post})$$

The corresponding parameters in the different scenarios would be:

[17] Average between November, 25th 2016 and November, 30th 2016.
[18] In scenario A, the "costs" variable bonus only kicks in if realized costs differ by more than 10 % from target costs, as explained in 5.1.1.

Scenario	Incentive rate (Γ)	Unit value (of one per-cent usage point)	Unit value x Γ
A	10 %	0.57 M€	0.06 M€
B	30 %	0.57 M€	0.17 M€
C	50 %	0.57 M€	0.28 M€

Question 11: Do you find the level of the different scenarios appropriate? Which one do you favour?

5.2.6 Examples of total bonuses

For illustrative purposes, a sensitivity analysis of the considered incentive regulation mechanism is performed in the following tables.

Sensitivity to realized capital expenditures

The following table shows the sensitivity to realized capital expenditures, assuming realized cross-border flows equal predicted ones.

Difference with target costs	Scenario A		Scenario B		Scenario C	
	Bonuses in M€/yr[19]	WACC + X% over 10 yrs	Bonuses in M€/yr	WACC + X% over 10 yrs	Bonuses in M€/yr	WACC + X% over 10 yrs
-30%	2.6	1.0%	6.2	2.4%	10.6	4.1%
-20%	2.0	0.7%	5.0	1.7%	7.9	2.7%
-10%	1.0	0.3%	3.5	1.0%	5.5	1.6%
0%	**1.0**	**0.3%**	**2.0**	**0.5%**	**3.0**	**0.8%**
10%	1.0	0.2%	0.5	0.1%	0.5	0.1%
25%	-0.5	-0.1%	-1.7	-0.4%	-3.2	-0.7%
50%	-3.0	-0.5%	-5.4	-1.0%	-9.4	-1.7%

Sensitivity to realized cross-border flows

The following table shows the sensitivity to realized cross-border flows, assuming realized capital expenditures equal predicted ones.

Realized usage rate	Difference with target usage	Scenario A		Scenario B		Scenario C	
		Bonuses in M€/yr	WACC + X% over 10 yrs	Bonuses in M€/yr	Bonuses in M€/yr	WACC + X% over 10 yrs	Bonuses in M€/yr
0%	-100%	0.0	0.0%	-9.0	-2.4%	-15.2	-4.1%
17%	-75%	0.0	0.0%	-6.4	-1.7%	-11.0	-3.0%
33%	-50%	0.0	0.0%	-3.6	-1.0%	-6.3	-1.7%
50%	-25%	0.1	0.0%	-0.8	-0.2%	-1.7	-0.4%
66%	0%	**1.0**	**0.3%**	**2.0**	**0.5%**	**3.0**	**0.8%**
83%	25%	1.9	0.5%	4.8	1.3%	7.7	2.1%
100%	51%	2.9	0.8%	7.7	2.1%	12.5	3.4%

For scenario A, which corresponds to the regulatory framework of TURPE 5, RTE's returns are very little sensitive to realized cross-border flows.

When both realized costs and realized usage rates differ from their target value, the "costs" and "usage" variable bonuses add up, until eventually either the floor and the cap is reached, as described in 5.2.3.

[19] Within TURPE 5 regulatory framework, the "costs" and "usage" bonuses are normally settled in a one shot payment after commissioning. In the above tables, these bonuses are annualized over 10 years in order to ease the comparison with scenarios B and C.

5.3 Comparison with the British regulatory framework

On the British side of the border, NGIH was declared eligible to the so-called "*Cap & Floor*" mechanism by Ofgem in July 2015. This mechanisms guarantees a minimum return to the project developer (the "*floor*"), in exchange for setting a maximum return (the "*cap*") beyond which the revenues from the project are shared with British consumers.

On several aspects (price spread exposure, incentive rate, duration, floor level), the British mechanism makes NGIH bear more risks than the incentive regulation mechanism contemplated by CRE does for RTE. In particular:

- the "*Cap & Floor*" regime makes project developers face the price spreads between France and Great Britain. These spreads turn out to be volatile and depend on the exchange rate between the euro and the pound. On the contrary, the considered incentive regulation mechanism is only contingent on realized cross-border flows ;
- the default incentive rate of the British mechanism is 100 %, against between 10 and 50 % for the considered French mechanism ;
- the British mechanism is enforced for 25 years, against 10 years for the French one ;
- the "*floor*" is based on a benchmark calculated using a 20-day trailing average of the GBP Non-Financial iBoxx index of bonds with 10+ years to maturity, with a credit rating of A/BBB. This floor is enforced for 25 years, and is thus lower than the lowest floor considered above, given they are only enforced for 10 years.

Based on these observations, CRE considers that the contemplated regulatory framework, whichever the chosen scenario, is not prone to induce a cautious and efficient TSO to delay or give up the project.

6. SUMMARY OF QUESTIONS ASKED

Question 1: Do you have any remark on the level of the expected capital expenditures for the project?

Question 2: Do you agree with CRE's assessment regarding operation and maintenance costs?

Question 3: Do you agree with CRE's assessment of the cost of the power losses due to the interconnector IFA 2?

Question 4: Do you agree with CRE's assessment regarding the cross-border reference capacities in 2020 and 2030?

Question 5: Do you agree with CRE's assessment that the current European Union (including the United Kingdom) as a whole derives a positive net benefit from the project IFA 2?

Question 6: Do you agree with CRE's assessment of the economic benefits derived from the project, given the results of the British referendum?

Question 7: Do you agree with CRE's assessment that the result of the British referendum raises new risks for the project IFA 2?

Question 8: Do you have any comments regarding the above description of the risk sharing rules contemplated by RTE and NG IFA2 Ltd, following the result of the British referendum?

Question 9: Given the uncertainties regarding the consequences of the British referendum, do you think the business-as-usual regulation framework of the TURPE should apply, or do you consider on the contrary that a strengthened incentive regulation framework should be used to share risks between RTE and users?

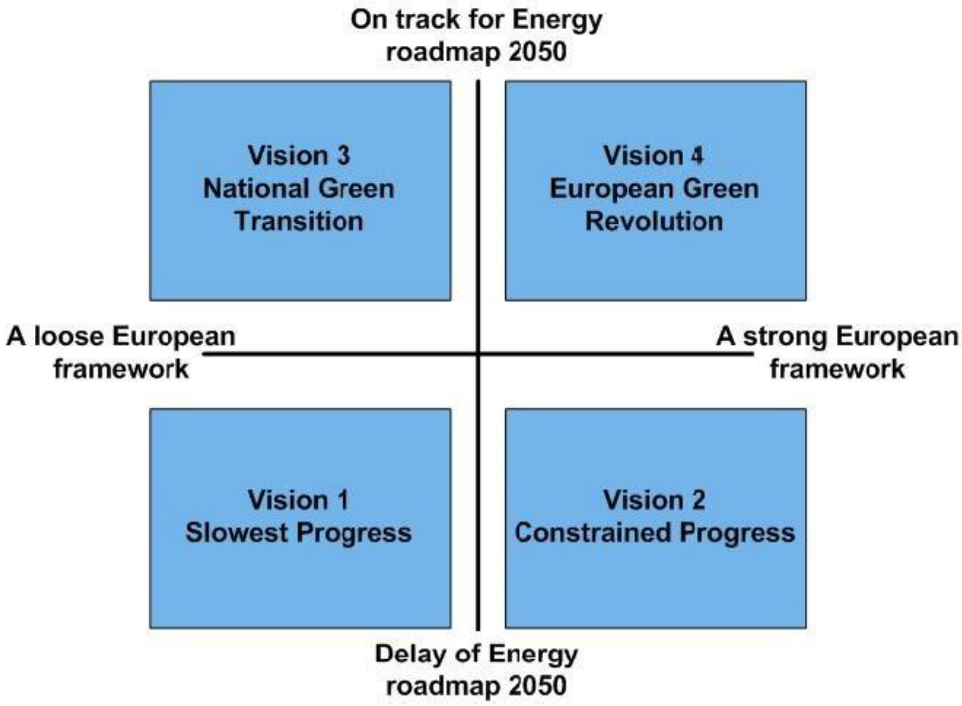
Question 10: If you are in favour of a strengthened regulatory framework for the interconnector IFA 2, do you find the structure of the envisioned incentive regulation mechanism relevant?

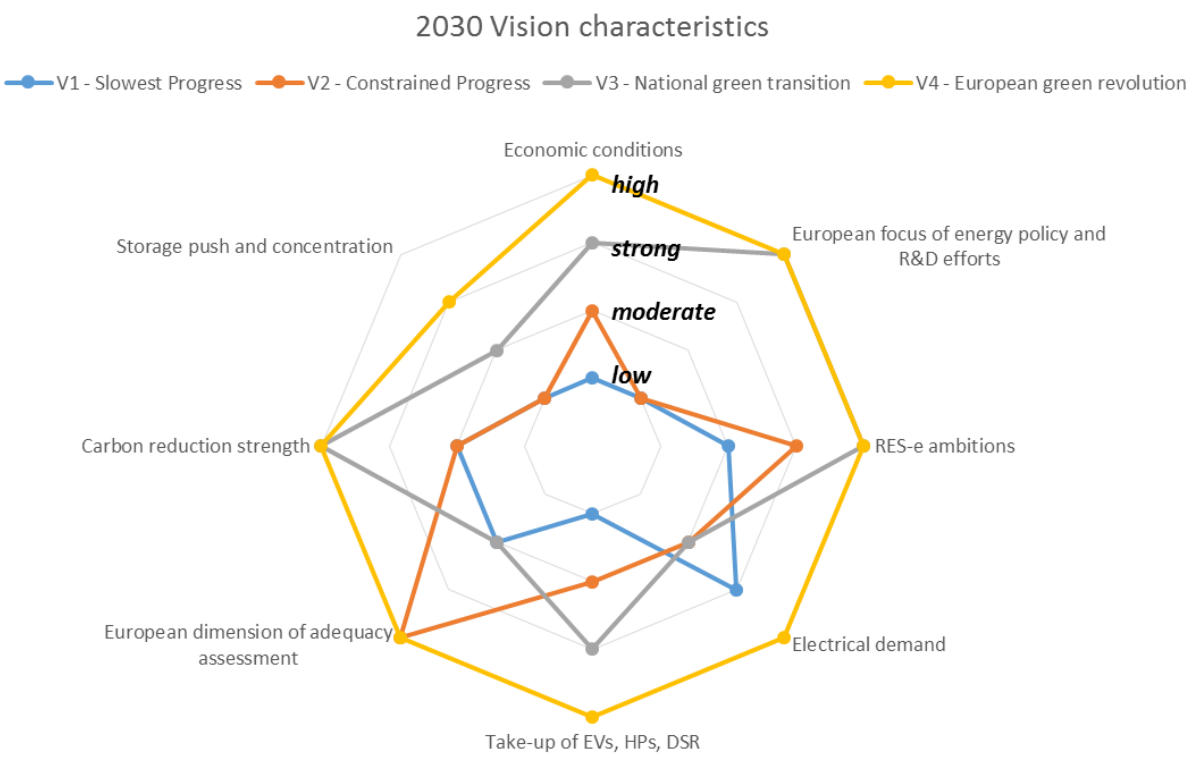
Question 11: Do you find the level of the different scenarios appropriate? Which one do you favour?

APPENDIX – DESCRIPTION OF TYNDP 2016 SCENARIOS

Given the difficulty to forecast what the European electricity system will look like in 2030, ENTSO-E developed 4 prospective scenarios which depict several contrasted futures:

- Visions 1 (*Slow Progress*) and 3 (*Green Transition*) were built using a bottom-up approach, by considering the national energy policies of each individual country ;
- Visions 2 (*Money rules*) and 4 (Green Revolution) were derived using a top-down approach, assuming a more coordinated European energy policy.
- Renewables development: all scenarios predict a significant increase in the installed renewable production capacity. The lowest installed capacities are in visions 1 and 2. Vision 4, and to a lesser extent vision 3, predict greater installed capacities. The share of nuclear power in the electricity mix (notably in France) is lower in visions 3 and 4 than in visions 1 and 2.





(Source for pictures: « TYNDP 2016 Scenario Development Report » November 3rd, 2015)