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GAS INTERCONNECTIONS BETWEEN THE IBERIAN PENINSULA AND THE REST OF EUROPE

DRAFT SUMMARY NOTE ON COMMENTS

RAMBOLL

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1. THIS SUMMARY NOTE

1.1 Iberian gas interconnection – draft final report discussions

The present note captures some of the discussions during the presentation of the draft final report at a technical meeting in Brussels on 27 January 2016.

During the meeting, and supported by the following written comments and contributions, it is clear that there are different views on a number of issues among stakeholders. This is also reflected in judgement of and comments to the draft final report, its analyses and conclusions.

1.2 Written contributions

The written comments to the draft final report are attached to this note. This includes contributions from the following stakeholders:

- DGEC – Ministère de l'Ecologie, de l'Energie et de la Mer, France
- CRE – Commission de Régulation de l'Energie (CRE), France
- Enagas, Spain
- REN, Portugal
- GRTGaz, France
- TIGF, France

The written comments and contribution are very comprehensive with more than 30 pages of comments.

Due to the amount of comments, it was agreed with the Client to condensate the most important response to the comments in a note as background for next technical meeting in association with HLG meeting.

1.3 The study on the benefits of additional gas interconnections between the Iberian Peninsula and the rest of Europe – Scope and budget

The Scope of Work for the study of benefits of additional gas interconnectors is attached to this memo. Ramboll's approach to the study was described in our technical proposal.

The overall budget for the study was 75.000 EUR with a maximum of 75 man-days.

With the limited budget it was necessary to focus on the most important aspects and to use a combination of qualitative and quantitative analyses. Also, it was chosen to give most focus on the interconnection between Spain and France, which from Portuguese side may be less satisfactory as the 3rd interconnector has been analysed with less details.

1.4 Ramboll reflections to the comments and contributions

Ramboll's approach to the present assignment has been to create a broad assessment of the benefit of additional gas interconnections between the Iberian Peninsula and the rest of Europe. This includes market aspects as well as security of supply issues. Hereby, we have had to touch upon many general aspects of the European gas industry and even issues of relation to the global gas market.

Within the limited budget it is not possible to do detailed analyses of important aspects like the detailed capacity of the relevant gas transmission systems. Instead, the detailed capacity evaluations had to be based on input from stakeholders.

We agree with some critics of the draft final report that this report cannot be the sole basis for decision making. However, we find that sufficient evidence for establishing additional interconnector has been found to initiate detailed feasibility and conceptual analyses to create a firm basis for decision-making and final investment decision.

In the execution of the study we had to choose if it should be a mere replication of work already done by ENTSO-G and others, or if we should have a wider approach and include other elements. We have chosen a combination with demand mainly taken from ENTSO-G, while security of supply was more open and with more focus on long term disruptions than the stress tests and other security of supply analyses done by ENTSO-G.

In the analyses we have chosen to use quantitative analyses on some issues combined with qualitative assessments and judgements on others. Some of the quantitative analyses have the purpose of illustrating possible solutions and impact. Due to the many variables, it has not been possible to make complete combinations of the many different parameters. Therefore, we have also chosen to base the quantification on likely outcome based on expert knowledge and recognise that there may be different realised outcome depending on decisions made by main actors in the business.

A shared study performed in cooperation between the three TSOs Enagas, TIGF and GRTGaz on the technical capacity was made available to Ramboll. However, detailed information about the network, flows from exit point and use of storage was not available.

The use of existing LNG terminals and suppliers priority showed to have a determining impact on the expected use of new interconnectors. We have demonstrated how important this aspect is, particularly when there is low utilisation of terminals as in France and Spain.

The main concerns about the cost and benefit of additional interconnectors are from some French stakeholders, as France is in a comfortable supply situation with pipeline import possibilities from several countries; Norway, Belgium, Germany and in the future also Italy via Switzerland and a new LNG terminal coming on-stream adding to import possibilities. Further, the large underground gas storage capacity adds to security of supply in a market which does not show much growth as fossil fuels are being replaced by renewables. However, the geography dictates that France is the most obvious transmission route between Iberian Peninsula and the rest of Europe, although direct offshore pipeline between Spain and UK or Belgium would be realistic alternative solutions. There may be considerable benefits for France in terms of additional transit income, while LNG import terminals may lose activity. Further work needs to be done to balance the risk and reward for France as such and for specific stakeholders.

We agree that the quantitative cost-benefit analyses for additional interconnector become very uncertain. However, the analyses clearly raise some questions which may be easier to communicate:

- Shall it be possible to supply all parts of EU with gas transported by pipeline from inside Europe?
- Shall EU be able to withstand long-term disruption of gas from one of its main external suppliers – Russia, Norway, Algeria or Qatar?
- Are large national entry-exit zones acceptable?

2. MAIN DISCUSSION ISSUES

2.1 Iberian interconnector as regional or EU project – who benefits and who pays

The Iberian interconnectors can be seen as regional projects or it can be seen as projects which impact a larger part of Europe as well as supply countries, and hereby the possibility of attracting new suppliers to EU. Existing gas suppliers to EU can also benefit from the increased interconnector as it will open the Iberian market for gas from Russia and Norway on the one side and from Algeria and LNG on the other side, depending on the flow direction. At present, the Iberian Peninsula is the only part of EU which cannot be fully supplied by pipeline.

The comments from CRE, the French Ministry and GRTGaz focus on the lack of benefit from France by establishing additional interconnectors between the Iberian Peninsula and the rest of Europe. This is because benefits will mainly be in countries without own LNG facilities like Germany, Czech Republic etc. on security of supply and for Spain and Portugal on market issues and some security of supply, and not least by activating idle LNG terminals – to a certain degree in competition with French LNG terminals.

The argumentation has also been that for security of supply it will be better to establish new LNG terminals in countries vulnerable to Russian supply. However, our analyses and assessment have shown that such strategy would tend to push Russian and Norwegian gas further to the south and west as such new LNG terminals will also be used for normal diversification.

France will benefit considerably from additional interconnectors if they are used, as the tariff system reflects the long distance of transportation, and there will consequently be considerable income. Also, French gas storage owners will potentially benefit from increased capacity.

Increased pipeline interconnection will create more competition and smoothening of prices. Losers may hence be suppliers who benefit from a fragmented market and facility owners of underground gas storage and LNG terminals which will be exposed to more competition.

Conclusion:
Increased gas interconnector shall be seen as an EU project with benefits for the entire EU and specifically for Portugal and Spain, suppliers from outside EU, countries without own LNG terminals in Central and Eastern Europe as well as the main transit country, France.

2.2 Definition of Midcat – First step and need for additional investments in France and Spain

The definition of Midcat and the need for Eridan and Arc Lyonnais has been one of the main discussion issues as the cost of Eridan and Arc Lyonnais is much higher than for the first phase.

The need for additional investments in respectively France and Spain is based upon a shared study by the three TSOs. However, the conclusions of the shared study were not clear as only a few cases was analysed. That is why Enagas carried out probabilistic analyses for the Spanish system.

In the comments from the French Ministry it said that probabilistic analyses are not possible for the French system as the conditions will change after creation of a single zone in France in 2018.

We agree that the conditions will change when the present bottleneck between the North and South zone in France disappears. However, it is still possible to make analyses taking into account the combined flow (normal demand, CCGT, injection and withdrawal from storage) based on historical data.

The shared study also showed that a western route in France could be possible, but it was not analysed further, and the Eridan and Arc Lyonnais were preferred as they are more mature.

In the shared study, the combination of the three elements in France was a 36" MidCat project and 48" Eridan and Arc Lyonnais. It is evident that this combination will result in overinvestment if Eridan and Arc Lyonnais is only justified by MidCat. One solution could be only to implement (the cheapest) sections of Eridan and Arc Lyonnais or to harmonise dimensions with a 48" MidCat.

Conclusions:
More comprehensive flow calculations of the French system are required to establish the exact volumes which can be transported when the Val-de-Sâone project is implemented. Such analyses were not part of the scope.

2.3 Firm versus interruptible capacity – probability calculations

Short term peak gas demand can be covered in Spain by use of LNG storage and in France by combination of underground gas storage and LNG. Also, in the rest of Europe the short term demand can be covered by such combination of underground gas storage and LNG and in some cases market instruments.

New LNG supply could take several months to mobilise. It was seen in March 2013 when underground gas storage in EU reached a low level. LNG could not enter the market quickly as the vessels were in Japan or elsewhere. This is a changed situation compared to the situation where USA was net importer of LNG and it was possible to redirect vessels to EU.

Pipeline supply can react much faster than new LNG. However, if the firm capacity is booked (and used) there may be a need to wait until there will be spare capacity. Such use of interruptible capacity is still much faster than new LNG. However, it needs to be ensured that capacity is not left unused.

The shared study of the technical capacity is based on only three flow situations; peak winter, average winter and summer. In reality there are many more relevant situations. Enagas has made probability calculations for the Spanish system.

According to French stakeholders, it is difficult to make probability calculations of the available capacity in French as historical data will be of less relevance as the market situation will change after introducing the single zone in France in 2018. However, in Ramboll opinion, it is still possible to use historical data for exit points, including storage, and the physical capacity of individual pipeline systems can also be foreseen.

According to ENTSOG "Network Code on Harmonised Transmission Tariff Structures for Gas" the probability should be calculated as basis for interruptible products and also for tariff calculations.

Conclusion:
Firm capacity is not the most important. Instead, it should be ensured that all capacity can and will be used, which is the main purpose of CAM.

We strongly recommend that probability based capacity of the French system is calculated for the most important points in the system.

2.4 Cost estimations and maturing of project

The cost estimates for the different elements of the Midcat and other elements are uncertain as discussed in the draft final report. Some of the comments from the Spanish and French TSOs explain the uncertainty by terrain (crossing Natura 2000 areas, wine yards, dense urban areas), difference in labour cost etc.

As discussed above there are possibilities to align the capacity of the first phase MidCat with the Eridan and Arc Lyonnais or potential western routes. It is possible only to implement sections of Eridan and Arc Lyonnais and hence gradually increase capacity if needed.

Ramboll did not have access to the proposed routes and it was outside our scope to establish such routes. Offshore route was not considered in the shared study.

It seems as if right-of-way compensation for landowners for crossing of wine-yards etc. is important cost driver for pipelines in France and is one explanation for the apparent higher cost for pipeline construction in France compared to Spain.

Conclusions:
There is a need for maturing of project with respect to routing, sectioning and need for crossing of sensitive areas. Right-of-way seems to be a particular issue in France which needs to be addressed.

Alternative routing, including offshore routes, could be considered.

2.5 Security of supply scenarios and their relevance

2.5.1 Long versus short term disruption

The EU security of supply regulation 994 focuses on short term disruptions. In the draft report, we describe that it takes a long time to mobilise new LNG supply.

The main security of supply cases are technical disruption of major Norwegian gas infrastructure (like Troll (35 bcm/year) or Ormen Lange (20 bcm/year)) or political disruptions which can have a duration of years. One example is the sanctions against gas export from Iran.

Some of the comments do not share the view of relevance of long term disruption.

Conclusion:
For security of supply the long term disruption is most important as Spain and France can fulfil the short term supply disruptions by use of underground gas storage. We have chosen one year, but it may be relevant to also analyse ½ year, 2, 5 years.

2.5.2 Russian gas interruption by 100 bcm/year for one year

The main gas interruption case for EU has for a long time been a risk for disruption of Russian gas supply or disruption of transit via Ukraine or Belarussia. Most of such assessments have been based on short term disruptions like in 2009. In our analyses, we have focused on a longer disruption of one year with a 2% probability.

Some comments question the availability of 100 bcm LNG per year to replace such loss of Russian gas. We agree that this can be a challenge, and that it will take time to mobilise. It may be that there will only be a partly replacement.

Some comments have been that such duration is extremely unrealistic and that focus should be more on short term disruptions.

In our view, short term disruptions should be covered by underground gas storage as LNG can only be mobilised after some months, and therefore is best suited to long-term disruptions. The EU stress test for security of gas supply was based on 6 months disruption of supply, but did not include any probabilities.

A long-term direct disruption of Russian gas supply will most likely be driven by political issues. Duration of such events can be very long and may even be permanent. The use of one year is for illustration of long-term possibilities.

The best example of long-term disruptions of gas supply is the embargo against Iran, which prevented gas export to EU via Turkey. The duration of this event has been several years.

The probabilities of political disruption are not a random process as it will depend on actual political decisions from different stakeholders. The use of 2% is justified by examples of embargos and stop of ex- and import between Russia in other sectors than natural gas.

Conclusion:
The long term disruption of Russian supply is relevant as short term disruption is covered by use of gas storage. By using a full year disruption, the timing of the disruption becomes less important.

The percentage of 2% is used to show the realism in a possible event, but is not based on detailed studies of sub-events which could create such situation. We suggest changing to a 1% probability instead in order not to imply that the number is based on exact calculations.

Disruption of Russian gas supply is not a random process. On the contrary, it is more a deterministic event based on political decisions and events, which can be initiated on both sides. Increased interconnector capacity will hence improve the negotiation position of EU on energy policy.

2.5.3 Norwegian gas interruption by 50 bcm/year for one year

Norway is together with Russia the main gas supplier to EU with increased importance due to the decline in gas production in EU member states. In total, the Norwegian supply was 108 bcm in 2015. All the Norwegian gas is transported to a few countries in North Western Europe, Germany, UK, France and Belgium. There are no direct connections to Eastern Europe, but a connection via Denmark to Poland is being studied, while previous attempts to create connections to Sweden failed.

The pipeline system is integrated with no single pipeline transporting more than 20% of the total export to EU. The deliverability has in recent years been more than 99%.

Although the Norwegian gas transmission is well integrated, the majority of gas comes from a few major fields; Troll and Ormen Lange being the most important. Further, there are a few key terminals, on- and offshore, which could significantly reduce the export.

We see a possible disruption of supply from Norway as mostly a technical issue. If major events happen, it may take several years to reconstruct.

In the report we have used a probability of 1% for a major event which interrupts less than half of the Norwegian export. This percentage is not based on analyses of sub-events but rather taken as an event which could take place. The size of the event is chosen as an interruption of one of the key fields or nodes in the transmission system. The duration is randomly taken as one

year to avoid difference in timing, as it is assumed that short term events will be covered by gas storage etc.

Conclusions:
The long term disruption of Norwegian supply is relevant as short term event is covered by use of gas storage. By using a full year disruption the timing of the disruption becomes less important.

The percentage of 1% is used to show the realism in a possible event, but is not based on detailed studies of sub-events which could create such situation.

2.5.4 Increased demand in France due to nuclear outage

Increased gas consumption in France and neighbouring countries is included based on a similarity of the events in Japan in 2011 due to the tsunami hitting Fukushima plant and the subsequent closing of other Japanese nuclear power plants.

In our report we have included such event as the use of nuclear energy is one reason why natural gas consumption in France is relatively low. We used a probability of 1 % based on global events but understand that this can be misunderstood as a probability for the French system.

Some stakeholders comment that the electricity study did not include nuclear incidents. Ramboll has tried to get access to the electricity report, but it has not been available and unfortunately there have not been any meetings.

If a major event happens, the duration of one year is conservative. In reality it could be much longer.

Conclusion:
We will omit any probabilities for events related to nuclear incidents as no specific analyses have been done for this part. However, the case is still relevant as it is one of the only events which can trigger a rapid and large increase in consumption in France as well as other EU member states.

2.6 Benefits for France of additional gas interconnections between Iberian Peninsula and rest of Europe

In more comments it is stated that there is no benefit for France of the additional gas interconnections or that the main benefits are for Iberian Peninsula or for the central and Eastern European member states with no or limited access to LNG import facilities.

We agree that in most cases France, due to its location and relatively low penetration of gas, is in a much more favourable situation than member states in the periphery of EU or landlocked member states without possibilities for developing LNG import terminals.

In the study we have not included secondary benefits of impact in case of disruption of gas supply to main trading partners with France. However, one of the goals of the Energy Union is to look upon the benefits for the entire EU. The presence in Europe also shows the importance in creating growth around the Mediterranean Sea. Hence, benefits to neighbouring countries like Algeria may also benefit the EU and its member states.

As addressed in the report, France will benefit of increased transit tariffs by increased interconnector capacity. Also, there may be direct benefits for gas storage owners and operators.

The cost of the additional interconnector will mainly be in France. This is the case for the first phase and almost entirely for the full MidCat. The high cost of pipeline construction in France is

according to some stakeholders due to environmental concerns and crossing of Nature 200 areas and wine yards and due to the high labour cost. Although not normally included in socio-economic analyses, there will be considerable employment and transfer included as part of the project. Such effects are much more normal in countries with high unemployment than in countries with full employment.

We have not had access to detailed cost information and it has consequently not been possible to compare the high right-of-way cost with the potential losses of landowners. However, there may be some benefits for landowners, and hence for France if the cost is paid by gas consumers and shippers in other countries.

Conclusion:
Firstly, the project should be seen as an EU project and should not necessarily create benefit for all member states.

Secondly, the opportunity for France to create a better utilisation of its existing gas transmission system can create benefits.

Thirdly, the compensation for right-of-way and the employment may contribute to French economy, in particular because the cost for pipeline construction is much higher than seen in e.g. Spain.

There are significant benefits for France as part of the increased interconnector. To what degree these benefits will be counteracted by environmental impact etc. need to be quantified as part of the maturing of the project.

2.7 Tariff system and impact of high exit tariffs

In the report the issues of tariffs are analysed due to the potential impact on use of the additional interconnector capacity, in particular for use of interruptible capacity based on short term contracts.

The entry-exit system of France will by far be the largest in the EU in terms of area. Although the ultimate goal of the EU may be to create a single zone, it is well-known from the literature that very large entry-exit zones may create problems. Reference can be made to a recent paper by Dr. Harald Hecking: http://www.naturalgaseurope.com/images/ewi%20Policy%20Brief%20-%20Rethinking%20entry%20exit.pdf

When long-term bookings have been made for gas transmission, the shipper may choose only to make a short term marginal cost consideration, at least when he has spare capacity. However, there is no reason for him to do so if competitors have to book short term capacity at a higher cost.

It is to our knowledge correct that the unified French gas transmission system will be in accordance with the European Gas Target Model (EGTM). However, it should be kept in mind that EGTM also says that “As a general rule, entry-exit zones should not be defined on the basis of national boundaries, but based on physical realities and market needs.”

In “Network Code on Harmonised Transmission Tariff Structures for Gas” it is as a general rule said that “Where the entry-exit split is used as a parameter of the reference price methodology, it shall be equal to 50/50, unless otherwise set or approved by the national regulatory authority”. We understand that CRE has taken into account the cost of delivering to different exit points.

With the present French tariffs the cost of transit through France is 114+208+496= 818 EUR/MWh/day/year. Assuming a load factor of 0.5 the cost of transporting 1 bcm/year through

France will hence be around 50 MEUR or more than 4 EUR/MWh. Further, there will be costs in other countries and systems.

Our approach has been not to focus on the peak load as there is amble peak load capacity in Spain and France. The focus has instead been on using the French system where and when there is unused capacity. Here, the use of 75 percent of normal tariffs for interruptible tariffs may be reflecting that there is no such spare capacity. However, this should be demonstrated by probability calculations.

Conclusion:
The analyses of tariff system and the functioning of large entry-exit zones are relevant in particular for the interruptible flow as a new interconnector will primarily serve such market.

More work need to be done on unlocking capacity of the French system during non-peak days. This should also include probability analysis as basis for setting the tariffs for interruptible capacity.

2.8 Cost benefit analyses – uncertainties and stepwise approach

The cost-benefit analyses are based on a combination of market based and security of supply benefits and cost associated with the construction of the MidCat and other elements necessary to provide capacity. The security of supply benefits has been capped to the cost of LNG terminals.

As outlined in the report, there are huge uncertainties in the comparison of cost and benefits. This is due to uncertainty about gas demand in EU, gas supply policy by main external suppliers and probabilities of disruptions, capacity of the French system for interruptible supply after unification of the system, tariff systems and also cost of the different elements.

Some of these uncertainties can be mitigated by more detailed quantitative analyses and maturing of the project, while others need to be accepted as embedded into the analyses and will only be clarified over time. Therefore, a stepwise implementation is a significant advantage which is possible in this case as the first step is quite small compared to the overall potential investment.

For the first step of MidCat, the main uncertainty is the capacity of the French system as interruptible capacity. Some of the uncertainties in the cost-benefit analyses can be mitigated by maturing the project and more detailed analyses. This includes in particular cost estimates, capacities and tariffs. Market issues and in particular security of supply probabilities and durations are much more uncertain and subjective. The initial implementation of the first phase will create much more visibility.

Conclusions:
The results of the cost-benefit analyses are very uncertain and should primarily be seen as calculation examples and should not be used for final decision making. Instead, the calculations are illustrations of orders of magnitude and inspire to the following questions:

- Shall it be possible to supply all parts of EU with gas transported by pipeline from inside Europe?
- Shall EU be able to withstand long-term disruption of gas from one of its main external suppliers – Russia, Norway, Algeria or Qatar?
- Are large national entry-exit zones acceptable?

2.9 Open season and market test versus TSO decision

Some of the stakeholders suggest that market test should be used to demonstrate the need for additional interconnector. Previously, an open season was made for increased capacity.

There may be advantages of a market test, in particular if there is one strong player who wants to push for the increased interconnector - typically a supplier or main player in the market. However, there may also be strong players who benefit of lack of capacities and barriers towards use of the existing capacity.

The Iberian interconnector influences the entire EU more or less directly. It cannot be expected that market players not directly involved will be active in a market test.

Some of the main external players in the EU gas market, like Russia, Norway, Algeria and Qatar may all have interest in not supporting additional interconnections. The same may be the case for strong importers of LNG and owners of LNG terminals.

As an example, additional interconnector capacity at reasonable cost will give Russian gas access to the Iberian Peninsula via pipeline and thereby increase their market access. On the other hand, the capacity will reduce the Russian bargaining power and possibility to dominate the Central and Eastern European gas markets.

Conclusions:
Market test can be a tool to demonstrate the need for additional interconnector. However, it cannot be expected that major players contribute positively in such test as they may all have interest in dominating parts of the EU market.

2.10 3rd interconnector between Portugal and Spain

2.10.1 Focus on 3rd interconnector in the report

REN comments on the lack of focus on the 3rd interconnector in the report. More contacts were made to stakeholders of the MidCat project at an earlier stage than with the Portuguese stakeholders.

Ramboll recognises that priority was given to MidCat in most of the analyses, because the main focus should be to analyse the cost and benefit of additional interconnection to the Iberian Peninsula as a whole. Such additional interconnection will also benefit Portugal.

In the following is commented upon more specific issues on the 3rd interconnector.

2.10.2 Ending isolation of peripheral member states

Portugal is a peripheral member state with borders to only one other member state; Spain, who in turn only has additional border to one other member state; France. Further, there are no other member states located close to Portugal allowing for offshore pipeline connections. This places Portugal in a disfavoured situation with respect to integration with the rest of EU in particular when Spain cannot be fully supplied by pipeline. In situations with disruption of Algerian supply by pipelines or with high LNG prices, there is no guarantee that the limited amount of gas which can be imported by Spain from France will be shared with Portugal.

Other peripheral member states have better possibilities for mitigating isolation. Ireland has some own production of gas, Greece can establish gas connection with Italy, Sweden could if needed establish own direct connections with Germany or direct import from Norway, Finland is a direct importer of pipeline gas from Russia and is being connected to Estonia.

Conclusion:
Portugal is due to its location depending on the gas market in Spain. The peripheral situation of Portugal can create isolation and makes Portugal more dependent on LNG import than most other peripheral member states.

2.10.3 Coal phase out, renewables and impact on need for additional interconnector

Portugal has a very high penetration of renewable energy, in particular wind and hydro power, with 27 percent share in 2014. The goal for 2020 is 31 percent, which is much higher than the goal for Spain of 20 percent and France of 23 percent. Due to its limited size, Portugal will hence become exposed to large variations from year to year depending on climatic conditions. So far a coal fired power plant has been used as back-up in years with lack of wind or hydro, which will often coincide. It is now expected that the coal fired power plant will be phased out between year 2020 and 2025. Hereafter, Portugal will be entirely depending on CCGT as back up. It cannot be expected that Spain will have surplus electricity in such situations.

Conclusion:
Renewable energy may need back-up due to natural variations in climatic conditions. As a consequence, the gas transmission system should allow for a certain overcapacity to provide back-up supply, as use of oil for power generation will normally be expensive and result in very high electricity prices, which can hurt the economy.

2.10.4 3rd interconnector and first phase of MidCat

REN comments on the conclusions, and states that the 3rd interconnector can also be relevant if only the first phase of MidCat is implemented.

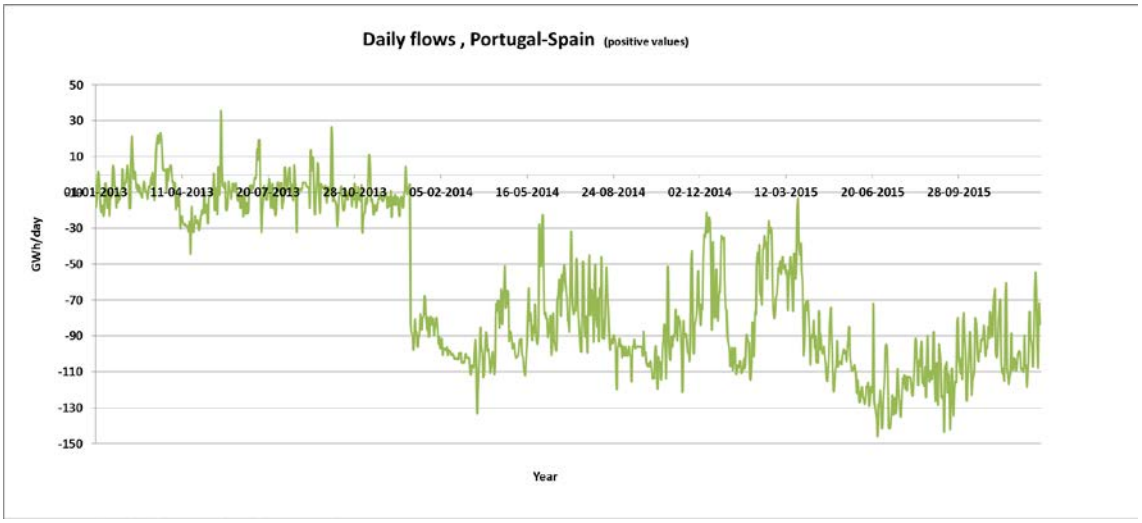
Ramboll agrees with this when the need in Portugal is mainly for security of supply to cover technical disruptions of infrastructure in Portugal or Spain like failure of Sines LNG terminal, failure of Mugardos LNG terminal or rupture of one of the pipelines between Spain and Portugal.

However, when the need is for market access and more strategic security of supply issues, like disruption of supply from Algeria, the 3rd interconnector will be of less value with only a limited capacity between Spain and France.

Conclusion:
The first phase of MidCat will also provide benefit for Portugal and may in some cases, particularly isolated security of supply cases, be able to supply gas to the 3rd interconnector.

2.10.5 Daily use of the existing interconnectors between Spain and Portugal

REN asks for analyses of daily use from between Spain and Portugal.



The graph above shows the daily flow between Spain and Portugal for the last 3 years. It clearly shows an increase in the use of the existing interconnectors, which is supporting the need for the 3rd interconnector. The increase follows the competitiveness of LNG versus pipeline gas.

3. SPECIFIC COMMENTS AND ADJUSTMENTS

3.1 Demand scenarios

CRE points out that the demand scenarios used in the analyses, Grey and Green, based on ENTSOG TYDP may be too optimistic. In November 2015, new 10 year plans were published by GRTGaz and TIGF supporting the low demand scenario for France. All three stakeholders suggest using slightly lower demand forecast than the Grey scenario by ENTSOG.

Ramboll agrees that there is considerable uncertainty about gas demand and that the short term view is towards the low demand. However, this is heavily impacted by price development and not least the economic development in Europe. Here, there is a considerable untapped growth potential in South-West Europe, which is the main reason to keep the Green scenario in the analyses.

A lower gas demand in France, as suggested by CRE, would naturally open for more transit to/from Iberian Peninsula.

3.2 Dunkerque LNG capacity

GRTGaz comments on the capacity of Dunkerque LNG which should be 13 bcm/year and not 11 bcm/year. Ramboll recognises this, but at the same time we may have overstated the capacity of Montoir and Fos slightly.

3.3 Updated capacity of the existing capacity between Spain and France

Enagas, GRTGaz and CRE point out that the capacity of the existing connections from Spain to France has been updated to 225 GWh/day, which corresponds to 7 bcm/year with full load all year. The increase will slightly reduce the benefit of new interconnection, but it may not be possible to have full load all year.

3.4 Capacity of Medgaz

Enagas comments on the capacity of Medgaz pipeline, which has now been upgraded to 9.3 bcm/year instead of the 8 bcm/year used in the report. Our understanding is that this is for one line only and that a second line would double the capacity.

3.5 France dependency to Russian gas

DGEC points out that France dependency to Russian gas is much lower than Germany and other eastern European countries. It may be so, but we do not really know. According to GRTGaz ten year plan 2015-2024, there was a 12% supply of Russian gas in 2014 and 28% from other sources, compared with 38% from Norway. The category “other sources” could in fact be Russian gas, bringing the percentage up to 40.

3.6 Modelling result – green scenario

GRTGaz rightly points out that there is a mistake in the Table 6-2 for the green scenario for which there could be a south to north flow. As written in the text, we assume a full utilisation of the LNG terminals in the Northern part of EU. In the calculations we assume a 80 percent utilisation as there will be limitations in the use of UK LNG all year due to need for use of interconnector to the Continent and so far the BBL has no reverse flow possibilities.

France, Spain and Portugal yearly gas balance			Normal market situatio		GREEN	GREEN
2025			LNG=TTF	"+5 EUR/M	"-5 EUR/MV	"-5 EUR/MV
	Maximum				elastic	
France	Entry	Exit				
Norway - Dunkerque	18		15	15	5	5
Belgium	20	8	7	7	5	5
Germany	19		10	15	0	0
Switzerland	3	7	-5	-5	-6	-6
Spain Pipeline	5	5	0	0	17	17
LNG Fos	12		10	9	12	12
LNG Montoir	11		9	7	11	11
LNG Dunkerque	11		9	7	11	11
Demand France			-55	-55	-55	-55
Total France	99	20	0	0	0	0
Spain						
Algeria pipelines	22		15	10	18	18
Pipeline Portugal	3	5	-4	-4	-2	-2
France pipeline	5	5	0	0	-17	-17
LNG Barcelona	17		9	12	15	15
LNG Bilbao	7		4	5	5	5
LNG Mugardos	4		3	3	3	3
LNG Huelva	12		5	5	8	8
LNG Cartegena	12		5	5	7	7
LNG Sagunto	9		4	5	4	4
Demand Spain			-41	-41	-41	-41
Total Spain	91	10	0	0	0	0
Portugal						
Spain pipeline	5	3	4	4	2	2
LNG Sines	7		4	4	6	6
Demand Portugal			-8	-8	-8	-8
Total Portugal	12	3	0	0	0	0
Total	184	15				
EU balance						
Demand EU			-513	-513	-513	-513
EU production			95	95	95	95
Norway pipeline			115	115	98	115
Russia pipeline			140	155	95	125
Algeria pipeline			25	20	30	30
TAP pipeline			20	20	20	20
Libya pipeline			10	10	10	10
LNG import			108	98	165	118
LNG France, Spain, Portugal			62	62	82	82

3.7 Duration of price difference between LNG and pipeline gas in EU

CRE points out that it is unlikely to have a price difference between low LNG prices and pipeline gas for 40 years. We agree with this, therefore we have for illustration shown that this will only be the case for one out of five years. If there was a permanent price difference, there would be incentives to build new LNG terminals elsewhere in Europe.