

Oxford Institute for Energy Studies Submission

Inquiry into the implications of Brexit for energy security in the UK by the EU Energy and Environment Sub-Committee of the House of Lords

Summary: We conclude that Brexit could have an impact on interconnecting-pipeline regulations. The use and value of these infrastructures could be affected by negotiations, leading to some new risks for UK in terms of not only Security of Supply but also energy pricing competitiveness vs the Continent. We also focused on Ireland, as this country, which is very well connected to the UK and poorly connected to the rest of the EU, will have a special position regarding Brexit negotiations. Finally, we stress that the price outcome of CO₂ emissions determined by the EU ETS will also impact energy security in the UK because it dictates the fuel mix.

Question: What are the implications of the UK's withdrawal from the EU for the UK's energy security?

1) Brexit is coming at a time when UK North Sea gas production is in terminal decline and the main UK storage facility (Rough) is closing down. These specific issues will make the Brexit negotiations even more difficult for the UK as far as gas is concerned.

2) As the outcome of Brexit is still unknown, we can only draft hypotheses ranging from a benign (soft) energy Brexit with virtually no changes, through to a full (hard) energy¹ Brexit leading to massive changes (via solutions similar to those reached in Norway or Switzerland²). From being the leader and at the core of the EU liberalised energy market, the UK after Brexit will be outside the EU market. Additionally, Ireland would also be effectively cut off from Continental Europe. This means we have to look at three energy issues relating to Brexit: 1) the impact on the UK; 2) the impact on the EU-26, and 3) the impact on Ireland (which is still part of the EU but cut off by the UK from the EU energy markets). It is worth clarifying some terms used in this submission:

- “EU”: This refers to the EU post-Brexit, i.e. the 27 Member States excluding the UK. EU-26³ refers to the EU members in Continental Europe i.e. excluding the UK and Ireland.
- “Foreign dependency”: Up until this point, UK gas has been labelled EU gas and the UK has been able to access Norwegian gas (part of the European Economic Area) and EU piped domestic gas. As soon as Brexit is formally completed, the UK will still have its own domestic gas supply and will still need to access what will be labelled by the EU as “foreign gas” from Norway and EU member countries to meet demand. By applying this definition,

¹ Energy could suffer in the crossfire as many other issues will have to be negotiated.

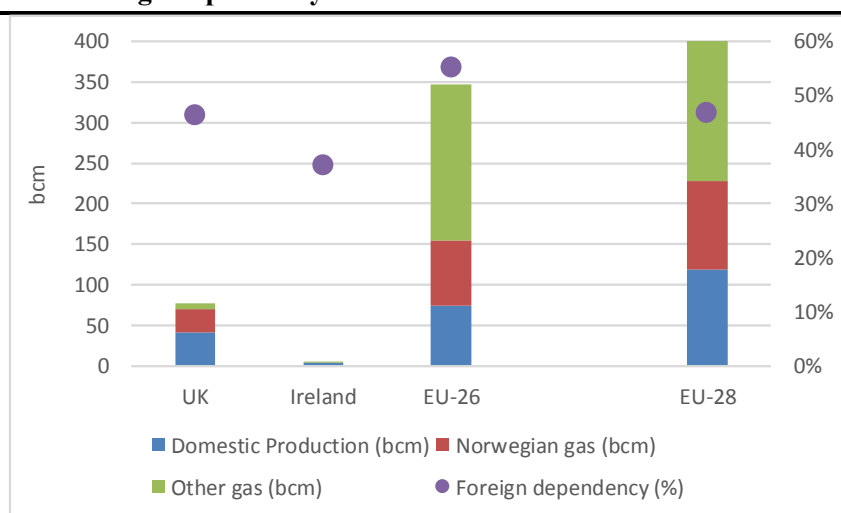
² The European Free Trade Association (EFTA) is an intergovernmental organisation set up for the promotion of free trade and economic integration for the benefit of its four Member States: Iceland, Liechtenstein, Norway and Switzerland. In 1973, the UK left EFTA to join the EU. EFTA is responsible for the management of the European Economic Area (EEA) Agreement, which enables three of the four EFTA Member States (Iceland, Liechtenstein and Norway) to participate in the EU's internal market. Switzerland has, via treaties, adopted various provisions of EU law in order to participate in the EU's single market. This will not be the UK option as Theresa May's Lancaster House speech on 17 January made it clear that the UK would be leaving the EU single market and the Customs Union, and that it would negotiate a new relationship with the EU that would not equate to, “partial membership of the European Union, associate membership of the European Union, or anything that leaves us half-in, half out.” Nor would the government, “seek to adopt a model already enjoyed by other countries.” Furthermore, in her 29 March 2017 letter to Donald Tusk triggering Article 50, Prime Minister May wrote: “That is why the United Kingdom does not seek membership of the single market”.

³ In EU-26, Cyprus has no gas business, and Malta is just starting to import LNG.

in 2016, 47% of UK demand was ‘foreign’ gas⁴. In the future, UK gas production is bound to decline and domestic shale gas production does not look promising enough to alter the trend. ‘Foreign dependency’ will also become a major issue for Ireland once the Corrib field, that started production in 2015, starts to decline around 2020. In 2016, Ireland was getting 37% of its gas from the UK and in the internal market this was labelled EU gas, but post-Brexit, this same gas will be labelled ‘foreign’ gas. And with no regas capacity, all Irish ‘foreign’ gas will either have to be sourced from the UK or be transited via the UK.

- “EU-26 gas exports”: So far, the EU has been a net importer of gas and its only gas imports were in fact re-exports such as Russian gas being re-exported to Ukraine or LNG being re-loaded. Post-Brexit, the UK will make up its gas shortfall by importing Norwegian gas but also EU-26 gas (a mixture of domestic and imported gas).

“Foreign dependency”: Post Brexit vs 2016 EU-28 situation



Source: Net flows from BP Statistical Review June 2017, thierrybros.com

3) In short, post-Brexit, EU-26 would be slightly more dependent on foreign gas than the former EU-28 but the UK would be much worse off. From being hardly foreign dependent at all, the UK would become 46% dependent on foreign gas (assuming that Norwegian gas is viewed as “foreign” in the UK). In a world awash with LNG (at least after the Brexit outcome), the issue of security of supply is not the primary issue in Brexit negotiations. But as the LNG supply and demand balance is forecast to tighten during the 2020s, the UK and Irish agendas should then be concentrated on security of supply as: 1) the NBP would have moved from being a major international hub to a regional one with less liquidity than the TTF⁵; 2) the UK would have moved “down the pipe” with supply coming from further away (UK regas competing with EU regas; piped gas transiting via the EU, Norway’s⁶ ability to swing supply between the UK and the EU), and 3) the UK has very little (and diminishing) storage capacity (equal to 6.0% of annual UK demand⁷ if taking Rough into account). Ireland, which would be cut off from Continental Europe, has an even lower storage capacity compared to annual demand (4.8%). And how is Ireland, once disconnected from the rest of the EU market, going to implement the EU Security of

⁴ As a first estimate we have here assumed that the Norwegian exports to UK and Continental Europe are not re-exported and we balanced the annual demand with “other gas” that is coming by pipe or as LNG (mainly from Qatar). In the following question, we will go more in-depth about interconnections.

⁵ According to OIES “European traded gas hubs: an updated analysis on liquidity, maturity and barriers to market integration” (available on <https://www.oxfordenergy.org/publications/european-traded-gas-hubs-updated-analysis-liquidity-maturity-barriers-market-integration/>), TTF has become the premier European hub since 2016. The changes in the hub’s liquidity and churn ratio will continue to be looked at during Brexit negotiations.

⁶ And if the UK does not rejoin EFTA, Norway should be better off selling its gas to the EU unless there is a sizeable extra margin to be made in the UK to cover any new trade barrier/tax.

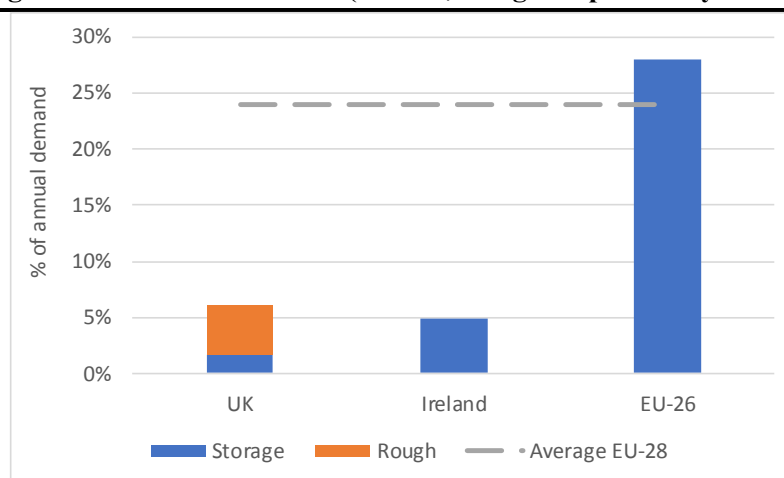
⁷ Derived from GIE December 2016 storage data and Eurogas 2016 demand data.

Supply directive? Post-Brexit, it would be impossible for Ireland alone to mitigate a serious gas supply disruption (known as N-1, for example the shutdown of a major supply infrastructure or its equivalent).

4) The UK needs to reshape its energy diplomacy which has, in the last decade, increasingly been handled by Brussels, with a concomitant decrease in knowledge and power within the UK. In the future, the UK will need to negotiate not only with the EU but also with Norway, which provides 37% of its gas.

5) A seasonal analysis is also needed to look at storage in Continental Europe. As indicated on the IUK flow graph (see next question), the UK is a net exporter but needs imports in winter due to its limited storage capacity. Under normal circumstances, where there is no supply emergency, “foreign dependency” is just a shift in terminology as there is no reason to expect a change in the movement of molecules. But when there is a supply emergency “foreign dependency” becomes very important because the UK and Ireland can no longer rely on the EU-26 solidarity mechanism.

Storage as % of annual demand (for UK, Rough is specifically mentioned)



Source: GIE, Eurogas, thierrybros.com

6) The graph data assumes Rough (36.5 TWh as stated in the GIE December 2016 spreadsheet) is not operating any longer following the Centrica Storage decision on 20 June 2017 to permanently cease operations⁸. As it accounted for 67% of UK storage capacity, this closure massively impacts the UK storage picture. With Rough out, UK storage capacity represents a mere 1.7% of its annual consumption, so that the question of the huge impact of such a low storage capacity that can be called on in the case of an emergency must be addressed. Three options are open to mitigate this new security of supply risk during winter for the UK and Ireland:

- A rational outcome for the UK and Ireland to secure winter supply could be to use both regas (in competition with the EU) and the ample EU-26 storage, especially that located in NWE (28.0% of EU-26 annual demand) thanks to the BBL and IUK interconnectors⁹. As EU-26 is very long in storage, the EU will probably not prevent the UK from using continental storage. If this rational outcome is achieved, the NBP-TTF spread should represent the cost of the interconnections (inclusive of any potential tariff to exit the EU and to enter the UK). But there is still a risk of license obligations / regulations in Continental Europe preventing export of gas outside the EU single market in case of a crisis.
- Alternatively, as there is no guarantee that the UK will be included in the EU-26 solidarity mechanism, new underground storage could be built in the UK. However, as Europe has a surplus of storage capacity, winter-summer spreads are too low to allow the financing of new

⁸ <http://www.centrica-sl.co.uk/news/permanent-cessation-storage-operations-1>

⁹ For the UK, and Moffat for Ireland

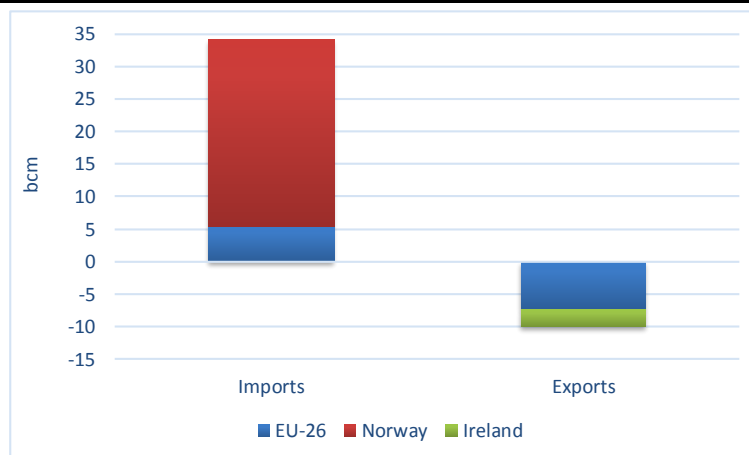
facilities. It would therefore require a UK government policy decision to push companies to invest in new facilities as they would normally be more likely to wait for future NBP winter-summer spreads to increase before taking a Final Investment Decision.

- A third possibility is that Gazprom could offer to go back to its original plan and change Nord Stream 2 to Brexit Stream, channeling gas straight to the UK (through the EU), which could, post-2019, be free of the EU Third Energy Package. This would allow both Russia and the UK to strike a deal which would give security of demand and security of supply. In the cases of TurkStream and Brexit Stream, the Ukraine transit risk would only be an issue for the EU-26.

7) Brexit negotiations will have an impact on the NBP-TTF spread. So far, NBP and TTF future curves are still aligned as Brexit negotiations have not started. We believe that a possible outcome could be for the NBP premium to increase versus TTF particularly in winter. In addition, with the NBP becoming a smaller regional hub, trades will be reduced (and with financial services moving away from the UK, the NBP paper market could shrink), and NBP volatility could increase compared to the TTF. This is something policy makers like to avoid but it would benefit independent trading houses.

Question: What will be the effect of Brexit on UK-EU gas interconnection?

Split of 2016 UK imports and exports



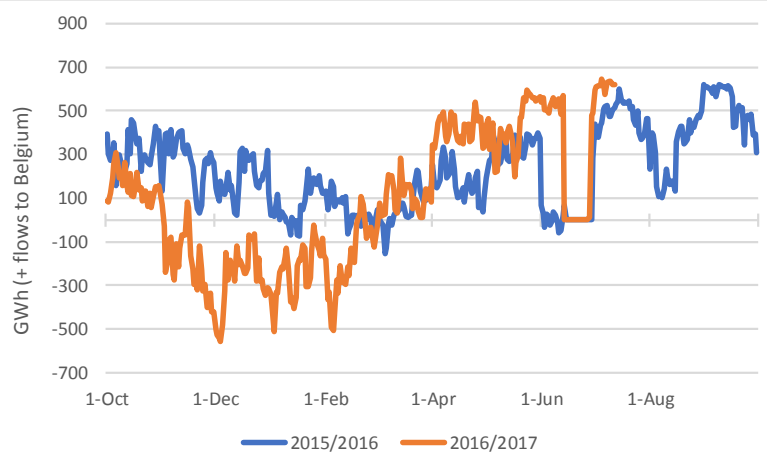
Source: BP Statistical Review June 2017, thierrybros.com

1) The UK is linked to the EU by three pipelines: Moffat to Ireland, Interconnector UK (IUK) to Belgium, and the Balgzand Bacton Line (BBL)¹⁰ to the Netherlands. The respective national regulatory authorities (Ofgem in the UK, CREG in Belgium, ACM in the Netherlands and CER in Ireland) are currently charged with regulating and supervising these pipelines (IUK (Ofgem and CREG), BBL (Ofgem and ACM) and Moffat (Ofgem and CER)) under the EU Third Energy Package. It is important to consider how the UK and EU delegations are going to view existing bi-lateral agreements for these pipelines. Will it be the case that the existing separate bilateral agreements (UK-Ireland, UK-Belgium and UK-Netherlands) will continue in order to comply with EU rules or could the EU step in and impose a single legal UK-EU agreement post-Brexit?

2) In the Moffat and BBL pipelines, gas only flows physically one way (from the UK to Ireland for Moffat and from the Netherlands to the UK for BBL). A virtual, administrative reverse flow can only be allocated when forward flow capacity has been nominated. Only the IUK is a real bi-directional pipeline.

¹⁰ Moffat, IUK and BBL's respective headquarters are in Ireland, UK and the Netherlands.

IUK daily flows between Belgium and the UK



Source: Interconnector UK, thierrybros.com

3) In 2016, net exports of 51.7 TWh to Belgium from the UK were recorded, made up of 67.1 TWh flowing from the UK to Belgium and 15.4 TWh in the opposite direction. With the closure of Rough, we should see the UK more and more dependent on Continental Europe in winter (assuming the price of using the IUK stays competitive with alternative solutions).

4) The NBP-TTF¹¹ spread provides the direction for gas to flow but the incentive to use BBL and/or IUK is linked not only to this spread but also to the cost of the service versus other options (Norway's ability to swing, LNG regas). To date trade has been at sunk cost levels for capacity, i.e. zero, underpinned by long term contracts. Irrespective of Brexit, as these long-term contracts expire, the NBP-TTF spread will have to increase for EU gas to move to and from the UK. The UK's interest in keeping integrated energy markets is obvious as it will prevent the NBP from de-coupling too much from the TTF. On the other hand, why would the EU provide a level playing field to the UK when it is not part of the same club any longer? Some countries in Europe could be tempted to impose severe and costly regulation on EU-UK pipelines to push up energy prices in the UK, allowing the EU *de facto* to be slightly more competitive. In addition, the EU Commission does not want to see any gross welfare loss¹² in the future, and could possibly request some form of solidarity mechanism for Ireland to be levied on EU gas exports. It is possible that the EU could add some fees (at EU transmission system operator level) or taxes when piped gas is exported (to the UK), with little risk of retaliation as the UK will be an energy importer. The issue of Irish security of supply is going to be extremely important during negotiations and could be used by the UK to try to preserve the status quo as this is the cheapest way to provide security of supply to Irish consumers¹³. For IUK and BBL, the "merchant model" is going to have to adapt to allow greater commercial flexibility in parallel to the Brexit negotiations, as the end of the initial long-term contracts (IUK 2018, BBL 2022) puts further stress on the NBP-TTF spread and the viability of those assets. On the other hand, Moffat is a regulated pipe owned by the Irish TSO.

¹¹ We assume that ZEE and TTF are completely correlated and that TTF is the main European hub.

¹² €4.5bn estimated by ACER in its annual report on the results of monitoring the internal gas markets in 2015.

¹³ Without this option, Ireland would need to build a dedicated regas terminal. Brexit could improve the ability of LNG producers/portfolio players to arbitrage EU/UK and to improve profits.

5) The outcome of the Brexit negotiations on these three specific pieces of infrastructure¹⁴ will be watched carefully. The way these interconnectors will be regulated post-Brexit is also going to be very interesting when considering other international pipelines (e.g. North Stream 2). As regulation in both the UK and the EU will continue to evolve post Brexit, we can assume that the current simple solution is unlikely to continue in the long term. We could see some minor changes with the aim of improving the whole system for the benefit of all consumers, or major changes with the aim of providing a harmonised unified EU/third party regulatory system for transportation pipelines.

6) Currently the UK is fully implementing the EU network code. But how will the UK network code diverge from the EU network code post-Brexit? The market will have to price in new commercial risks for potential discontinuity.

7) BBL, IUK and Moffat pipeline regulations are going to be crucial to the way Brexit impacts on gas markets. The use and value of these infrastructures could be affected by negotiations.

Question: Potential impacts on Ireland?

1) Ireland will have a special position regarding Brexit negotiations and should use it at the EU level. The UK and Ireland have a long trade history pre-dating the EU. But ahead of an unknown Brexit outcome, what are Ireland's options to continue to benefit from the advantages of the EU gas markets whilst being geographically blocked by a third country, the UK? Moreover, under the EU security of supply regulation, the UK provides a great deal of security to Ireland but if the UK is not required to do so any longer, Ireland could be placed in a difficult situation.

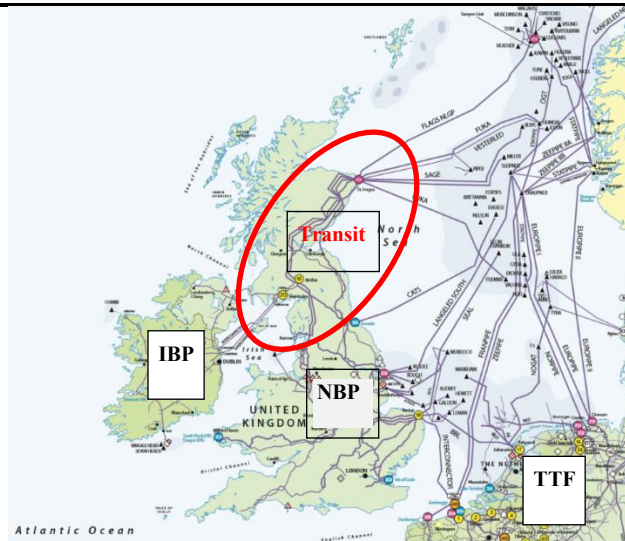
2) The Irish Balancing Point (IBP) could move away from the NBP to the more liquid, less volatile and potentially cheaper TTF hub. It would also make much more sense for a Eurozone country to trade its gas in euros and not in pounds. For Ireland to benefit from this move it needs to avoid ending up with a premium¹⁵ to the TTF. In addition, instead of trying to establish a new domestic hub to meet the EU Gas Target Model, the Irish regulator would need to state that the TTF would be the new proxy used everywhere in Ireland (as the Italian regulator did back in 2013¹⁶ when the PSV was not liquid enough to provide a trusted price signal for the domestic market). Corrib gas would then be sold at just below TTF, which should be acceptable for the producer. The EU should favour this option, which would have the interesting outcome of surrounding the UK gas market with the same price signal to both East and West.

¹⁴ Contrary to producing pipes linking a field to a market, these three infrastructures are for transporting gas from one market to another.

¹⁵ The premium could be calculated as the extra cost needed to push gas from the Netherlands to Ireland via the UK/EU interconnectors plus entry and exit fees payable to the UK TSO (the National Grid) plus an entry fee in Ireland.

¹⁶ The Italian regulator ruled then that regulated retail prices must be linked 20% to the TTF between April and the end of September 2013 and 100% as of October 2013.

Infrastructure Map showing the Scottish transit and the 3 hubs



Source: ENTSOG, thierrybros.com

3) To be profitable (and to hedge their risks), Irish mid-streamers would therefore need to buy gas from outside the UK under a TTF proxy and use UK transportation as a transit route. As the UK is a member of the Energy Charter it is bound to follow the Energy Charter Treaty¹⁷ that addresses the complex political, economic and legal problems associated with energy transit. Irish buyers could therefore sign a contract with Norwegian producers for gas to transit via the UK (and specifically Scotland) from St Fergus to Moffat and be priced under the TTF. Norwegian producers could be better off as they would be able to have TTF contracts for the EU, and NBP contracts for the UK and could make sure that they always provide swing while benefitting from the highest possible revenues. In short, this would allow for a nice new segmentation of markets for Norway which is currently not allowed under EU regulation but which would be possible as soon as the UK leaves. This would also provide increased security of supply to Ireland once the Corrib field starts to decline around 2020.

4) In the long run (post-2025), in order to increase diversity of supply, Ireland should revert to the EU Commission. To foster an integrated EU energy market, the European Commission has drawn up a list of 195 key energy infrastructure projects known as projects of common interest (PCI)¹⁸. These are seen as essential projects for completing the European internal energy market and for reaching the EU's energy policy objectives of affordable, secure and sustainable energy. In the Priority Corridor “North-South Gas Interconnections in Western Europe”, Shannon LNG¹⁹ terminal and 26km of connecting pipeline in Ireland are included in the PCI list. This list will need to be amended once the UK leaves the EU, and Ireland could fast-track Shannon LNG and also access financial support from the Connecting Europe Facility (CEF). This EU funding instrument supports the development of high performing, sustainable and efficiently interconnected trans-European networks. CEF investments connect the missing links in Europe's energy, transport and digital backbone. Once the regas Final Investment Decision is taken, Irish utilities would then need to access LNG at TTF pricing. This could be done by buying it from an LNG producer or an LNG aggregator that would not see a major difference between

¹⁷ The Energy Charter Treaty promotes the principles of freedom of transit and of non-discrimination and an obligation to provide national treatment for energy in transit, but prohibits the interruption of flows and the placing of obstacles to the construction of new energy transport facilities. The Treaty goes further than World Trade Organisation (WTO) / General Agreement on Tariffs and Trade (GATT) in developing a specific transit-related regime for the energy sector. This has allowed Energy Charter member states to benefit from stable, predictable and non-discriminatory trade rules in the energy sector. Norway, Russia, the EU and the UK are members of the Energy Charter but neither Norway nor Russia has ratified the Energy Charter Treaty.

¹⁸ List available at http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2016_019_R_0001&from=EN

¹⁹ Shannon LNG is a conventional regas project with an ultimate capacity up to 10 bcm/y. With Floating regas becoming cheaper and faster to build (18 months vs 5 years for a conventional onshore regas), we believe the project could be revised to a floating one.

berthing its cargo at Shannon or Gate terminal in the Netherlands. (For some LNG producers, Shannon could even represent a shorter route than Gate).

5) Another solution would be to review the Irish gas market by taking into account Directive 2014/94/EU on the deployment of alternative fuels infrastructure. This states that LNG refuelling stations are to be installed in all 139 maritime and inland ports on the trans-European Transport (TEN-T) Core Network by 2025 and 2030 respectively. For Ireland, the relevant ports are Cork, Dublin and Limerick²⁰. To deal with both issues (Brexit and Directive 2014/94/EU), Ireland could go for a cheaper FSRU instead of the usual onshore regas. In addition, an Irish utility could sign a deal with an EU company providing LNG at the French or Spanish terminals to access reloaded LNG while benefiting from the subsidies available under the EU trans-European network of “Motorways of the Sea”.

6) The Irish solution to use the UK as a transit country could also be used by the UK vis-à-vis the EU. UK utilities could sign contracts with Russia based on NBP pricing for gas to be delivered in the UK using the EU as a transit country, with the Energy Charter guaranteeing the benefit from stable, predictable and non-discriminatory rules. In this case, the Regional Economic Integration Organisation (REIO) clause would apply, meaning that transit should follow the same rules as transportation inside the EU. So the UK buyer or the Russian seller would “only” need to deal with transporting gas across each EU country between Russia and the UK, a lengthy and costly task of pancaking entry/exit fees.

7) On top of the “Business as Usual” / “no change” solution, Ireland has different options to increase its future security of supply while avoiding excessive prices. An interesting one could be for the Irish regulator to acknowledge that TTF is the European index and to use this price signal for Ireland. The UK gas market would then be surrounded with the same price signal to both the East and the West. Instead of sourcing its gas on the UK hub, Irish utilities would then need to sign contracts with Norwegian producers for gas to be delivered in Ireland at a TTF price (with the UK being used as a transit country). Brussels, Dublin and Oslo could have the power to redesign North-West European gas markets in such a way that the UK as a transit country from Norway to Ireland gets a potentially different²¹ commodity price than surrounding countries. There must be a question as to whether the EU and Norway have the political will to confront the UK on this issue, particularly in light of the sensitivity of Brexit negotiations. Once the outcome of Brexit negotiations starts to be clearer and if the UK is not required to provide security of supply to Ireland, Ireland should turn to the EU Commission to fast track if needed a floating regas to foster an integrated EU energy market.

Question: Potential impacts on the EU ETS?

1) As the UK does not want to be part of EFTA, it will not be able to stay in the EU ETS, as the UK does not want to recognize the European Court of Justice. In order to stay in, some new structure would then have to be designed in case of litigation between the UK and the EU. But as this market mechanism has not fully delivered what it was designed for, it could be problematic for UK policy makers to want to stay when the UK has shown that taxation was achieving the required target faster.

2) The UK could follow the Swiss model of having its own cap-and-trade system, linked to the EU ETS. At the start, this should be easy to implement as the UK was part of the EU ETS, but going forward, the UK will have to follow any EU changes without being in a position to influence them! It must nevertheless be pointed out that this linking process is very lengthy²² and the UK will not be able to access any better link than the Swiss.

²⁰ <https://ec.europa.eu/transport/sites/transport/files/themes/infrastructure/ten-t-guidelines/doc/maps/ie-uk.pdf>

²¹ A potentially higher price if Norway decides to segment the UK and the EU markets.

²² Switzerland and the EU have been negotiating the possibility of linking their emissions trading schemes since 2011. Both the Swiss Federal Council and the EU Council of Ministers issued a corresponding negotiating mandate. The technical negotiations were concluded in January 2016 with the initialling of an agreement. Through this bilateral agreement, the two systems will mutually recognize each other's emissions allowances. Once the link is operational, prices should converge, resulting in a level playing field for Swiss and EU based industry. As usual, for the treaty to enter into force, it must be signed and ratified by both sides. The timetable for this is open.

3) The unique European-wide trading system, the EU ETS, already affected by the UK Carbon Price Floor, is going to be even more affected by Brexit. On top of the political will (to stay/to leave on the UK side and to keep/to not keep the UK on the EU side), many adaptations will be needed in a relatively short period of time. We have listed just a few here:

- What happens in the year the UK leaves the EU (2019?) as allowances are calculated on a calendar year? This is now totally discounted by the market, as Business as Usual is used when dealing with Brexit. We argue that this could change once draft EU positions on energy are published, as British companies will then have to decide which strategy to implement. And price volatility could increase due to regulatory unknowns.
- How to recalculate the allowances for the 30 states left (EU-27 plus Iceland, Liechtenstein, and Norway) if the UK leaves? We argue that the EU-27 will have to find a political solution as allowances are no longer national.
- How is Spain going to deal with Gibraltar and, in particular, with Gibraltar's airport, as aviation is included in the EU ETS? We argue that Spain could have an extra leverage, even on this point.

The EU ETS outcome would also impact energy security in the UK as the price outcome of the CO₂ emissions dictates the fuel mix; a much higher CO₂ price will fast track the coal to gas switching in EU as seen in the UK recently, leading to a tighter gas market.