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MARKET DESIGN FOR NATURAL GAS: THE TARGET MODEL FOR THE INTERNAL MARKET

The Council of European Energy Regulators ("CEER") is in the process of developing a 'target model' for the design of EU gas markets, which should guide the ongoing development of the technical rules for trading gas ("network codes") at EU level. In this article we describe some of the work that we recently carried out for Ofgem as input into the gas target model debate.

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WHY IS A TARGET MODEL NEEDED?

In 2007, the European Commission published the final results of its Energy Sector Inquiry[1]. The Inquiry highlighted the problem of vertical integration of supply, generation and infrastructure. Vertical integration led to a lack of equal access and insufficient investment and the possibility of collusion between incumbent operators[2].

One aspect of vertical integration the Commission focused on for gas markets was the problem of "contractual congestion"[3]. Contractual congestion is where incumbent gas utilities hoard capacity on gas pipelines by signing capacity contracts for most or all of the available capacity on cross-border pipelines, so as to make it unavailable to potential entrants who might use it to import gas and compete with the incumbent. This gives the appearance that the interconnector is congested, preventing other shippers from gaining access to capacity. It is distinguished from 'physical congestion' because in a situation of contractual congestion the amount of physical import capacity is large enough to meet the needs of the market, but some of it is not available because it is tied up in contracts.

The European Commission's response to the problems highlighted by the Energy Sector Inquiry was to launch the "Third Package"[4] of legislation. This mandated the unbundling of vertically integrated monopolies, the formation of the European Network of Transmission System Operators for Gas ("ENTSOG") and the creation of new network codes that would set harmonized EU rules for trading gas, ensuring a more level playing field (with parallel developments for electricity).

The Third Package has been passed into law and is in the process of being implemented at national level. The combination of the Sector Inquiry, subsequent competition actions, the Third Package itself (along with changes in market fundamentals in a number of Member States) has been to create genuine progress in parts of the EU. While the level of progress varies greatly across different parts of the EU, there is now greater trading of gas on market hubs and a significant degree of price convergence in North-West Europe.

However, there are concerns that for the Third Package to be fully implemented, an over-arching vision is required. ENTSOG, the European regulators (through the new EU 'quasi-regulator', the Agency for the Cooperation of Energy Regulators ("ACER"),

[1] 'DG Competition report on Energy Sector Inquiry', 'Prospects for the internal gas and electricity market' and 'Inquiry pursuant to Article 17 of Regulation (EC) No. 1/2003 into the European gas and electricity sectors (Final Report)', all 10 January 2007.

[2] IP/07/26, Competition: Commission energy sector inquiry confirms serious competition problems, European Commission, IP/07/26, 10 January 2007.

[3] Paragraph 223, 'DG Competition report on Energy Sector Inquiry', 10 January 2007.

[4] Together Directive 2009/72/EC, Directive 2009/73/EC Regulation (EC) No. 713/2009, Regulation (EC) No. 714/2009 and Regulation (EC) No. 715/2009.

which officially opened for business earlier this year, and the European Commission, in consultation with the stakeholders, are in the process of developing the detailed network codes, and arguably this requires a coherent high level vision. This has been the response to the Third Package in EU electricity markets, where a target model of "Flow-based Market Coupling" has been developed[5].

If such a target model is required then clearly with hindsight it would have been better to develop one earlier in the process, rather than doing so in parallel with writing the network codes. However, there is also a good argument for "better late than never", and on that basis regulators are now developing a gas target model. In terms of process, CEER has consulted on an initial set of questions, held a series of stakeholder meetings throughout 2011, and will shortly consult on a proposed draft of the gas target model, with the aim of finalising later in 2011[6].

The British energy regulator Ofgem hired the FTI energy team (then still under the LECG banner)[7] to produce a report earlier this year as input to the gas target model debate. We presented our findings at CEER's workshop in Bonn in February, and at the Florence School of Regulation in March, and the report was published by Ofgem in March[8]. Below we outline some of our key findings.

WHAT IS THE PURPOSE OF A TARGET MODEL?

The idea of a target model is to set a holistic vision for how Europe can move from its current fragmented state into an integrated European market. The target model will have to consider all of the key aspects of market design, such as how gas will be traded between market participants, how participants will access transport capacity, what charges they will face for transport capacity or using the network to transport over long-distances and what arrangements market participants will face for balancing the gas being put in and taken off the system.

The aim of a target model is to promote the internal EU gas market, through increases in competition, efficiency and security of supply. Specifically, a target model will need to:

(1) Promote liquid trading to enable new entrants to easily buy and sell gas and capacity, for example through the formation of trading hubs.

(2) Prevent contractual congestion by preventing holders of capacity contracts from leaving the capacity unused without allowing other shippers the opportunity to buy the unused capacity rights.

(3) Prevent pancaking, where price distortions are caused by paying a number of tariffs to cross multiple borders between price zones in order to transit gas long distance.

(4) Avoid disrupting long-term supply contracts, which are typical in the natural gas market. If revisions to long-term contracts are needed, this may create uncertainty and harm investment.

THREE POSSIBLE OPTIONS

We focus in particular on three options, which we consider of most practical relevance to the current debate:

(1) Explicit transmission capacity combined with national/sub-national price zones. We refer to this as **"Business As Usual"**, because we view it as the likely outcome of the current framework guidelines development process to form the basis of new network codes, unless the choice of gas target model provides an alternative vision[9]. "Price zones" would remain a similar size to now,[10] with most countries containing a few regional price zones;

(2) Explicit transmission capacity combined with larger, regional price zones (**"Merged Markets"**). This would be analogous for continental gas markets to (in electricity) the creation of a British market by the

[5] Target Model for Interregional Congestion Management, the Project Coordination Group.

[6] http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT

[7] Our report came out before FTI's acquisition of LECG, when we were still part of LECG, and is therefore usually referred to as "the LECG report".

[8] click link to reference *(http://www.fticonsulting.com/global/resources/documents/market-design-for-natural-gas-the-target-model-for-the-internet-market.pdf)*

[9] We refer to this option as "Framework Guidelines Driven" in our report.

[10] As part of the Third Package, all EU markets should take the form of "entry-exit" systems,where shippers pay to put gas into and take it out of a gas system (but not to transport it from one place to another within the system). As a consequence there is a single price for gas in the system, e.g. in Great Britain this is the "National Balancing Point" price. An entry-exit zone can therefore also be described as a "price zone".

merger of Scotland with England and Wales under British Electricity Trading and Transmission Arrangements ("BETTA"), or the creation of the Single Electricity Market ("SEM") all-Ireland electricity market. To some extent it would be a natural extension of the merging of zones within individual countries that has occurred in France and Germany over recent years. The main difference would be that the merged markets would generally be supra-national in scope; and

(3) Implicit transmission capacity combined with national/sub-national price zones (**"Coupled Markets"**). We assume that, at least for the present, market coupling would be used for the allocation of short-term rights, while TSOs would continue to provide long-term explicit rights. Under this approach, buyers and sellers of gas make offers (through a specified platform, typically operated by a TSO or energy exchange) to buy or sell gas at specified times and locations, and at specified prices. The platform then produces a 'programme' for gas flows based on accepting bids so as to maximise surplus (the difference between the price buyers are willing to pay and the price sellers are willing to accept) while respecting system constraints. This procedure also produces locational prices, i.e. a gas price in each zone. The price in two zones will be the same if there are no transmission constraints that limit flows between the two zones (and will differ if there are such constraints).

This would operate similarly to market coupling arrangements already in place in electricity markets such as Nordpool[11] and CWE[12]. However, there are important technical differences, as well as the fundamental difference that because gas only comes from a limited number of upstream sources, cross-border flows are more fundamental to EU gas markets than to electricity markets, with a large part of gas consumption transported long-distance across the continent.

ASSESSMENT OF THE POSSIBLE OPTIONS

Experience to date shows that the Business As Usual model encounters significant difficulties with contractual congestion and capacity hoarding.

Effective implementation of Use-It-Or-Lose-It and Use-It-Or-Sell-It mechanisms (rules that prohibit contractual congestion by taking unused capacity away from its owners) has proven difficult, and is still opposed by many market players[13]. The alternative approach of 'over-selling' might prove more successful[14], but will also be difficult to implement. The Merged Markets approach would mitigate the problem, by removing explicit capacity rights on certain borders. Its effectiveness depends on the extent to which regions can be merged. Coupled Markets automatically deals with problems of contractual congestion.

The larger number of price zones with the Business As Usual model risks problems of pancaking. Coupled Markets can help to prevent problems with pancaking, but the benefit would be limited if coupling is used only for shorter-term rights, while long-term explicit transmission rights remain as there would still be the same number of borders as in the Business As Usual model. Merged Markets would help prevent pancaking by reducing the number of borders.

A move towards Merged Markets may mean that the delivery point in a long-term contract is no longer a point at which the TSO will make deliveries. For example, merging two countries into a single price zone would mean that the TSO would no longer deliver at a border point between the two countries. This would require long-term contracts to be re-written.

Under the Business As Usual model, trading risks being fragmented by the existence of a large number of relatively illiquid 'hubs'. This would be improved by Merged Markets as there would be a smaller number

[11] The electricity market splitting area encompanssing Norway, Sweden, Finland and Denmark.

[12] The Central Western European Market Coupling, encompassing the electricity markets of France, Belgium, the Netherlands, Germany and Luxembourg.

[13] Under Use-It-Or-Lose-It and Use-It-Or-Sell-It mechanisms, a holder of capacity right must nominate capacity to be used before gate closure. After gate closure, no more capacity can be re-nominated. Under Use-It-Or-Sell-It, the rights holder must sell all unused capacity into the secondary market. Under Use-It-Or-Lose-It, all unused capacity is lost and is then re-sold onto the secondary market.

[14] "Over-selling" refers to an approach where the TSO sells more transmission capacity than may be physically possible to provide, based on its estimate of what actual demand will be on the network. Such a system would mean that capacity hoarding by an incumbent was less effective as a means of foreclosing competition, because the TSO would react to routine hoarding of capacity by selling greater volumes. It is used in Great Britain by National Grid (as well as being familiar from the aviation industry).

of hubs with a greater number of market players. Potentially, liquidity could improve even more so if Coupled Markets were implemented with a single regional platform (comparable to Nordpool in wholesale power).

In relation to tariffs, a switch to Merged Markets would lead to higher tariffs because merging price zones means that more congestion is internal to the merged price zone and must be dealt with via re-despatch. The tariffs would be less cost-reflective, because the increased use of re-despatch implies greater 'socialisation' of congestion costs, and therefore greater cross-subsidies.

Both Merged Markets and Coupled Markets imply big changes in TSO roles and responsibilities. In relation to balancing, TSOs would take on a greater role under Coupled Markets, because they would be responsible for all balancing after 'gate closure'. Under Merged Markets they would also take on a greater role, because of the increased need for re-despatch. Merged Markets and Coupled Markets would also both require much greater regional cooperation between TSOs. Merged Markets would probably require early implementation of an ITC mechanism, while Coupled Markets would require close cooperation to implement and deploy the necessary auctions and centralised despatch algorithms.

The Business As Usual model would require least harmonisation of national rules as most price zones would remain within national borders. Merged Markets require a great deal of harmonisation, especially where price zones transcend national borders, which can be difficult to achieve (for example the experience of BETTA in Great Britain). Merged Markets may require less harmonisation, however the effectiveness of the market coupling arrangements (and, therefore, the degree of price convergence) will be improved the more harmonised the price zones within the market coupling area are. Therefore, Coupled Markets could potentially be adopted quicker than Merged Markets provided the political will exists.

CONCLUSION

Each of the options discussed has its own costs and benefits as the basis for a target model. The choice of target model therefore depends on which of the different issues affected are in fact the most material. Ideally the choice of a gas target model would be driven by empirical analysis of these issues, though in practice that does not seem to be the approach taken.

At present the European regulators are largely focused on merging markets as the main goal of the target model, and have proposed ambitious criteria to jusdge whether a market is "big enough". In our view, careful analysis is required to balance the costs and benefits of merging markets. The costs include the need for additional capacity, which arises for a number of reasons. First, larger entry-exit zones give more freedom for shippers to nominate gas flows, and so make it harder for the system operator to know where future flows will be required. To deal with this uncertainty it needs to have more capacity. Second, absent additional investment, larger zones are likely to have greater internal constraints that create costs (that TSOs incur and should then be able to pass on to shippers), so additional investment is probably required to avoid these costs. British experience with merging power markets provides a caveat. The BETTA process created a market for electricity across Great Britain by merging the Scottish market with England and Wales. An unintended consequence of BETTA has been increasing costs of re-dispatch due to congestion at the English/Scottish border, with adverse incentives to generators possibly exacerbating this problem[15].

Coupled markets are an interesting possibility, but it is not possible to tell yet how strong the advantages we have identified really are. Some support for coupled markets has been based on the assumption that what is good for electricity is also good for gas, which is probably too simplistic. However, trials of market coupling in gas are certainly of high value. In France GRTgaz (the main TSO) and Powernext are launching the first gas market coupling mechanism between PEG Nord and PEG Sud, two price zones within France. If this trial performs well, we may see market coupling spread to other European gas markets.

Finally, as hinted above, the target model debate may be happening too late to have an impact on shaping the future European gas market. CEER, the European Regulators' Group for Electricity and Gas ("ERGEG") and subsequently ACER[16] have already been drafting new network codes for the European gas market out of the framework guidelines. It is therefore important that the chosen target model is designed in a way that allows it to contribute meaningfully to the code development process, and also that the codes are

[15] Perekhodtsev, D. and Cergigni, G., "*UK Transmission Congestion Problem: Causes and Solutions*", 6 January 2010.

[16] From mid-2011 ACER has taken over the role of ERGEG.

sufficiently flexible to allow for alternative choices of market design in the future.

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