



# The evolution of European traded gas hubs

*Executive Summary*

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This is the third paper by the Author that explores the development of traded gas hubs in Europe. The first explained how new traded markets work and focused on the path taken by the British NBP to become a successful, mature traded gas market, used for physical deliveries and balancing but also, and more significantly, for risk management trades. Then followed a paper setting out the early stages of liberalisation of the Continental gas markets and posing the question whether they were ready to offer credible price creation, discovery and reference points, which could be used to provide a price index on which to base medium and long-term gas contractual pricing terms. The paper identified the Dutch TTF as a strong contender to become a second benchmark hub, after NBP.

In this paper, the Author has conducted an extensive review of all the European gas hubs, in the context of the European Commission's vision for a single energy market (in gas) and examines whether the hubs comply with the very prescriptive provisions for market opening stated in the EC's Third Package and Gas Target model. The research and subsequent analysis is based not only on the Author's own quantitative and subjective measures but also incorporates the work of other relevant surveys and academic analyses. The paper reviews the various projects to create regional gas hubs and whether any of these could one day become significant in helping the EU's vision become a reality. The results provide conclusions as to the individual 'ranking' of each hub relating to its stage of development and highlight the limited progress made by other hubs in 'catching up with' the Dutch and British hubs.

Following a description of the 'path to maturity' and the 'routes to market' that can help establish a successful traded gas hub, the Author describes the functioning of the European gas hubs. Despite the progress made in the establishment of new hubs, there are still important hurdles to overcome before we have efficient, successful and mature gas markets that can provide a reliable price reference for contracted gas supplies. The three main areas of concern are liquidity and data transparency; physical connectivity; political willingness and cultural attitudes. Government commitment and a willingness to embrace liberalisation by all stakeholders is a precondition for success in achieving a liquid traded gas hub. The situation can be improved when a country has its own production, thereby allowing the government to influence, if not impose, changes in the structure of the gas market and even to the commercial terms of the trading of gas on the wholesale markets.

The most developed part of Europe in terms of liberalised gas hubs is the North-West. This is also the one with the most disparity between the 'mature', 'poor' and 'illiquid' hubs: from the fully mature British and Dutch hubs, to the 'middling' German, Belgian and northern French hubs, to the illiquid southern French hubs and, finally, to Ireland which has yet to create its gas hub. The Central European region is the one showing promise for further development over the coming years, both in infrastructure and in market development. The Iberian Peninsula is essentially a separate market, heavily dependent on and linked to LNG. The Italian market was for a long time lagging in its development (although it is now catching up). Most of Eastern Europe is still heavily dependent on Russian gas supplies, arriving



through the historic network of ‘transit’ pipelines: their local gas networks are generally poor and there is a major need for better north/south connectivity.

The EU’s vision of a Single Energy Market implies a high degree of market integration across the Member States so that the differences in prices at different locations should only reflect transaction or transportation costs. This situation should also mean that prices in different Market Areas would respond to overall changes in supply and demand in the same way, at the same time. It is useful therefore to look at gas price convergence, the price correlations across the markets as well as the volatility of gas prices in the different markets. This provides an important additional tool in assessing the development of traded hubs. These concepts are described and the results of both the Author’s and independent analyses are presented, including those by ACER, by EFET and by two other OIES Authors: Beatrice Petrovitch’s “Price de-linkages between European gas hubs” and Sybren de Jong’s “Leaders and Followers: the ‘Starlings theory’”. The results show that, in line with the Author’s in-depth analysis of the traded hubs, the two dominant hubs in Europe are the British NBP and the Dutch TTF.

The main part of the paper is the Author’s analysis of the European gas hubs: comprising two types of analysis used to categorise the European traded gas hubs and to determine their level of development towards fully liberalised, mature, liquid markets. The first is an objective analysis of traded data, for those hubs where such data is available; the second is a more subjective analysis of the development of each hub in relation to the EU’s Gas Target Market policies and the Commission’s Single Energy Market vision. Of the two types of analysis, the first is more comprehensive, based on 5 Key Elements and easier to form conclusions from. However, it only covers up to 9 out of the 28 Member States, where gas trading is of any recordable significance. The second type of analysis is based on 3 Main Indicators: political will, cultural attitude and commercial acceptance.

In order to evaluate the depth, liquidity and transparency of the traded gas hubs across Europe, the results of 5 Key Elements are analysed; as far as these are available. The 5 Key Elements analysed are:

- Who trades in each of the hubs;
- What products are traded there;
- How much volume is traded, and over which periods;
- The Tradability Index;
- The churn rates.

They are all important but the churn is possibly the pre-eminent factor. It is essential to review as a minimum these 5 criteria to permit a rigorous analysis; but not all of the elements are consistently available for all of the hubs. From the results it is possible to determine which hubs are ‘mature’, which are active, which are improving and which are yet to show signs of development.

When considering the results for Key Element 1, there are four hubs clearly in the lead, NBP, TTF and the German hubs combined: NCG and GPL. Then there is a middle group of four hubs that do have a reasonable number of active traders, who could in time improve liquidity: ZEE, PSV, VTP and PEG Nord. Finally, the last four hubs really do not yet have enough active traders to provide the liquidity needed to help develop their overall standing. This said, the VOB is improving year on year whereas the three others appear for now to be static.

When considering the results for Key Element 2, there are two hubs clearly in the lead, NBP and TTF. There is a middle group of four hubs that have a reasonable amount of trading in several different products along the curve: NCG, GPL, ZEE, and PEG Nord, but they are some way behind. Finally, three hubs, PSV, VTP, and PEG Sud scored poorly and PEG TIGF was very poor.

When considering the results for Key Element 3, there are again just two hubs clearly in the lead, NBP and TTF, and by a large margin. The two German hubs are mid-market with the Belgian ZEE not too far behind, and the remaining 6 hubs are fair to poor. Although NBP has lost volume to the TTF, it



does still remain the predominant hub in 2014 but, for how long? The phenomenal pace of growth registered at the Dutch hub appears to be continuing and it looks as though TTF might finally overtake NBP during the course of 2015.

When considering the results for Key Element 4, there are again just two hubs firmly in the lead, NBP and TTF. The German NCG is mid-market but, when considering this metric, all the remaining 6 hubs are poor and the PEG Sud and TIGF are not ranked at all.

The fifth and last of the Key Elements is the churn rate. The churn rate is the multiple of traded volume to actual physical throughput: a measure of the number of times a 'parcel' of gas is traded and re-traded between its initial sale by the producer and the final purchase by the consumer. Commodity markets are deemed to have reached maturity when the churn is in excess of 10 times. In this one metric all others are, necessarily, reflected: if there are many participants, trading many different products in large quantities, then the churn rate is likely to be high.

When considering the results for Key Element 5, it is clear that there are only two 'mature' hubs in Europe in 2014 the NBP and the TTF; all the other hubs are poor. The British NBP and the Dutch TTF dominance has continued and strengthened in 2015. These are likely to remain leading benchmark hubs in Europe, the NBP a Sterling contract used to price all the gas for the British Isles and some LNG supplies; the TTF a Euro contract used to price gas for delivery to north-west Europe and for LNG supplies.

When each of the five Key Elements are grouped in one summary table, it becomes very clear to see that the NBP and the TTF stand out in front as the only two 'mature' hubs. Next are the two 'active' German hubs, with the Zeebrugge, PEG Nord, VTP and PSV classified as 'poor'. The VOB, PEG Sud, and PEG TIGF are 'inactive'. The AOC is also included in the summary using data taken from the Spanish regulator's annual report but this hub is also categorised as 'inactive'. The remaining European hubs are classified as 'inactive' also as they simply do not have any or enough data for a valid analysis.

#### European traded gas hubs development based on the 5 Key Elements

2014		5 KEY ELEMENTS					
HUB	Active Market Participants	Traded Products*	Traded Volumes	Tradability Index (Q4)	Churn Rate	Score /15**	
NBP	40	46	20505	19	26.2	15	
TTF	30	45	13555	19	36.0	15	
NCG	25	24	1750	16	3.7	10	
GPL		21	1000	13		9	
ZEE	15	17	850	7	4.9	7	
PEG Nord	10	17	435	9	1.6	7	
CEGH/VTP	10	11	400	10	4.6	6	
PSV	12	11	525	9	0.8	6	
PEG Sud	5	13	80	n/a	1.0	4	
VOB	<10	n/a	35	8	0.4	4	
PEG TIGF	0	4	5	n/a	0.1	3	
AOC	<5	n/a	(165)	n/a	(0.6)	2/3	

\* Score /64 derived from the OTC and Exchange product categories in the Traded Products Table.  
\*\* Score based on each of the Key Elements scoring zero for Grey; 1 point for Red; 2 points for Amber; 3 points for Green.



In order to evaluate the path to liberalisation and market development, the results of 3 Main Indicators are analysed; they are the political willingness and cultural attitudes to trading and the level of commercial acceptance in a given country. The EFET Review of Gas Hubs Assessments is also referred to as this quantifies 5 regulatory conditions, 6 TSO conditions and 6 market conditions; these broadly follow the 3 Main Indicators.

These three Main Indicators are most certainly inter-dependent in enabling the move towards fully liberalised gas markets across the entire EU. There must be the political will to get the process off the ground; there must be the cultural attitude to want to succeed in a trading environment; and there has to be the right commercial appetite to see all the changes followed through.

The European Commission is very keen to see the process of liberalisation completed across all of the Member States so that there will be, one day, a Single Energy Market. Thus far though, it is evident that in many countries there is not the political will to carry out this vision. There are also in many cases strong cultural attitudes that hinder the development of liberalised markets; and finally, there are still too many incumbent or dominant companies that want to protect their current revenue streams.

Therefore, we will only see the emergence of liberalised, open, transparent and efficient traded gas markets in those countries where all three indicators can positively be aligned to fulfil the EU's vision. The level of progress is patchy across the Union. The EFET Gas Hub Development Study is a good proxy for evaluating the three Main Indicators across all countries, including those that do not yet have an operational traded gas hub. This independent analysis, using very different criteria to the Author's, arrives at the same conclusions as to the European hubs' stages of development.

The paper concludes that, although every EU member state will have, in time, its own gas hub into which and from which physical volumes of gas will be traded, only a few of these hubs will likely emerge as price reference hubs. It is clear that the British NBP and the Dutch TTF are now established as benchmark hubs; it is possible that there will be one or more additional hubs developing into marker hubs.

However, there must be a commercial imperative for such hubs to develop, usually driven by the diverse, sizeable import flows into a market of material scale giving rise to different dynamics to those in the other already liquid hubs, thereby creating the possibility of arbitrage in response to price signals having, at their root, different causes. The legislative and commercial environment must be attractive for traders to even contemplate entering a market, and if all these prerequisites are in place, then it is likely that a virtuous circle will be started thereby helping a particular hub to develop and succeed.

The reality at the end of 2014 is that Europe does have two leading, mature, benchmark hubs, a few 'active' hubs and several mid-market hubs that do trade, especially in the spot/prompt and near curve and that are primarily 'balancing' hubs. This trading model could have a third market hub in due course but realism must prevail. The model of concentrating liquidity on one benchmark hub has proved successful in North America and is one that is beginning to develop in continental Europe. It is a model that should provide the required physical flexibility as well as the financial risk management tools.

The emerging hubs will need to adopt the Balancing Network Code and should then be in a position to become efficient balancing hubs; but, this process has already taken a long time and the end point is not clearly determined yet. To return to the question posed in the introduction to the paper: the European Union's vision for a Single Energy Market is still many years off.



## About the Author

Patrick Heather joined the Institute in June 2006. His paper "The Evolution and Functioning of the Traded Gas Market in Britain" was published in August 2010. He co-authored a Comment with Jim Henderson on the "lessons from the February 2012 European gas crisis" and, in June 2012 published his paper on the "Continental European Gas Hubs: Are they fit for purpose?". The focus of his academic research is on the development of the European gas hubs with particular emphasis on the increasing traded volumes and on the developments in Eastern Europe. His third paper "The evolution of European traded gas hubs" was published in December 2015. Since 2004, Patrick has been an independent consultant advising and giving presentations to many different organisations, including the ICE and ICE-Endex futures exchanges and various producer and end user companies, financial institutions, regulators and governments in Austria, Brazil, Britain, Estonia, France, Greece, Holland, Italy, Norway, The Philippines, Poland, Russia, Sweden and Turkey. In 2006, he was appointed Commercial Advisor to South Hook Gas to assist them through the long commissioning phase of their world leading LNG import facility in South Wales; this was successfully achieved in Q4-2009. Prior to that he was Trading Manager at BG Group from 2002 to 2004 and before that he worked at PowerGen plc, where he set up their trading capability and managed the gas and power trading desks. Patrick has over 35 years' experience of broking, trading and risk management in the natural gas, power, oil and oil products markets.