The increasing hub pricing and market integration in Europe

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The growth of hub trading 2007–14

Since 2007, the sale and purchase of natural gas in Europe has been evolving from a 'traditional' model based on bilateral long-term contracts with prices (largely) linked to those of oil products, to trading by means of standardized contracts concluded between a large number of participants with prices set by supply and demand 'at the hub'. As of 2014, the main hubs where gas is delivered in Europe are:

- NBP in Great Britain;
- TTF in the Netherlands;
- NCG and Gaspool (GSL) in Germany;
- Zeebrugge (ZEE) in Belgium;
- PEG Nord (PEGN), PEG Sud (PEGS), and PEG TIGF (PEGT recently merged into PEGS) in France;
- PSV in Italy;
- CEGH in Austria.

Evidence used in this article relating to trading at these hubs is based on raw data from about four million trades recorded by the Tankard Parties (ICAP, Marex Spectron, and Tullett Prebon) over the period 2007–14. OIES accesses this database under licence for research purposes only and estimates that the database represents about 70–80 per cent of total European OTC hub-traded volumes.

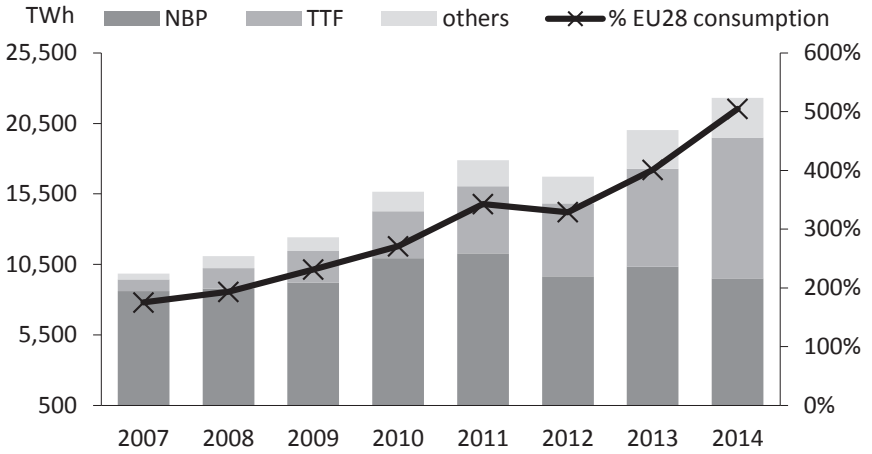

Figure 1.1. Total gross traded volumes, OTC market (TWh and % of total EU28 consumption)

Source: Tankard Parties, Eurostat, and Eurogas

Figure 1.1 shows that since 2008 gross traded volumes delivered at the main European hubs have steadily increased on the OTC market (which still accounts for the majority of trades). As the 'same' molecule may get traded within a specific (entry/exit) zone many times before delivery to final end users, total traded volumes may be several times greater than the figure for total demand in the corresponding area.

Hub trades are highly concentrated at the NBP and TTF, being almost an order of magnitude higher in volume

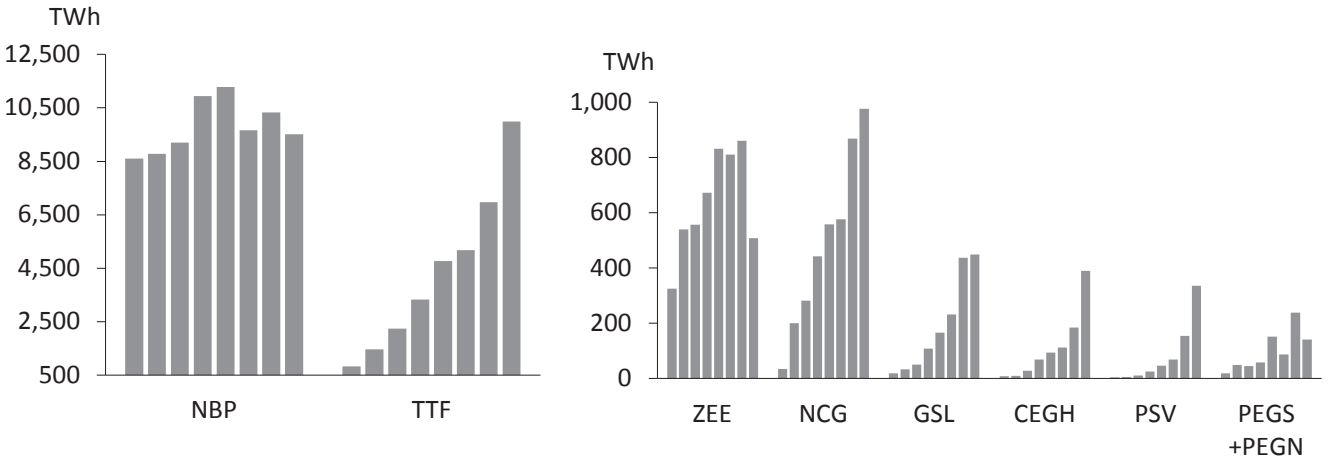

Figure 1.2. Total gross traded volumes, OTC market by hub (TWh)

Note: each bar represents a year in ascending order, starting from 2007.

Source: Tankard Parties

than those of France, Germany, Italy, Belgium, and Austria. However, the pace of growth (Figure 1.2) has been very fast for some of the less liquid hubs; CEGH volumes in 2014, for instance, were over 40 times larger than in 2007, while the NBP volume remained relatively stable. In 2014, only ZEE and the French hubs experienced a significant decline in traded volumes – possibly due to the creation of a new euro-quoted hub (ZTP), and players preferring to trade on the (French) Powernext exchange rather than OTC.

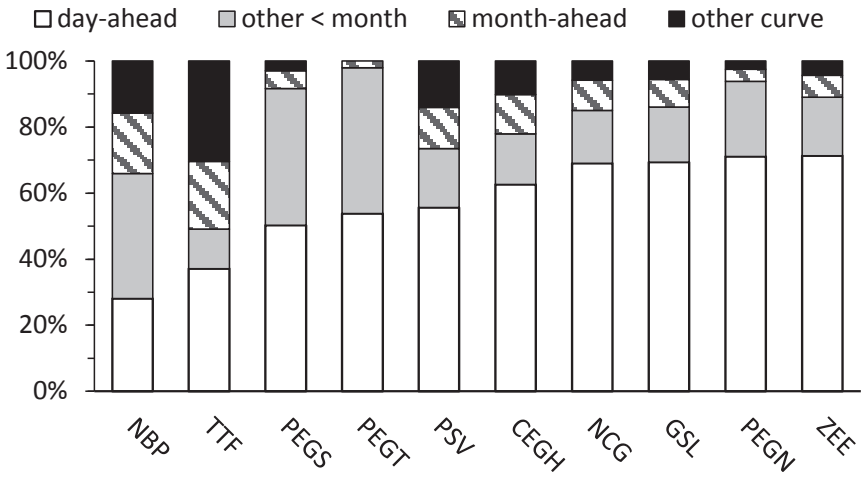

Figure 1.3. Breakdown of number of OTC trades by product in 2014 (% compared to total hub trades)

Source: Author's analysis of Tankard Parties data

Hub products and price correlation

Day-ahead is by far the most frequently traded product (Figure 1.3) on all European hubs, with the exception of TTF and NBP, at least 50 per cent of trades are for day-ahead delivery. Products for future delivery (quarterly, seasonal, calendar, and gas year products) are traded mostly on TTF and NBP, which account for almost 90 per cent of European curve trade.

Notwithstanding differences in traded volumes, European hub prices are broadly aligned (Figure 1.4), suggesting that they are spatially well integrated and competitive. In other words, parallel price movements suggest that there are no barriers to trade across borders, and no evidence of price manipulation or anticompetitive behaviour. When the prices of a commodity quoted in different interconnected markets move in tandem, and transportation costs can be considered constant over time, it indicates the fact that freedom to trade the commodity across borders is driving price differentials to zero (net of transportation costs). This supports the argument that hub prices are the result of supply and demand forces.

A simple metric to quantify the strength of price alignment ('correlation') between gas hubs is the Pearson correlation coefficient. A score close to 100 per cent indicates the strongest price alignment, meaning that when the price in market *A* goes up by *x* per cent, the price in market *B* also goes up by *x* per cent, and vice versa. The daily prices of the day-ahead product (the most liquid contract across all the hubs) in general feature good correlation scores over the 2007–14 period, with few exceptions.

The North West Europe core group (ZEE, TTF, the German hubs, and PEGN) stands out as it remains almost perfectly correlated over the whole period, with these hubs behaving as a single integrated market area. Periodic de-linkage occurs at the more peripheral hubs: NBP, PEGS, CEGH, and PSV. Drops in correlation scores signal that, at times, barriers prevented gas flows – and hence price correlation – between these markets and members of the core group. The nature of these barriers is mainly physical: de-linkages occur when there is physical congestion of the interconnecting infrastructure, whereas there is no evidence of other widespread non-physical barriers to trade. The origin of physical bottlenecks is related

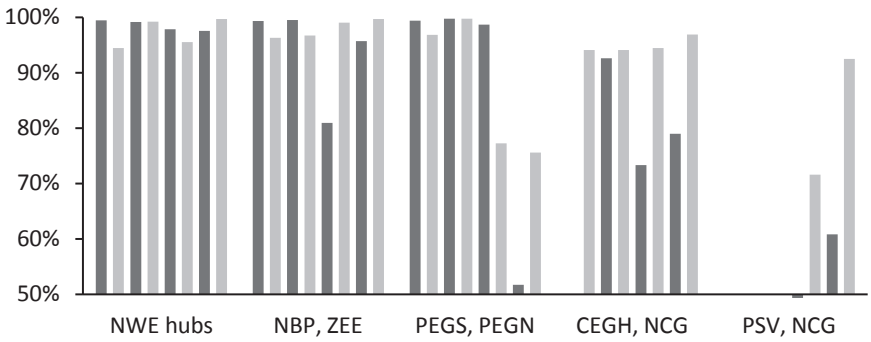

Figure 1.4. Average yearly correlation scores for OTC day-ahead prices, 2007–14 (%)

Note: each bar represents a year in ascending order, starting from 2007; PSV, NCG are for 2012–14 only.

Source: Analysis of Tankard Parties data

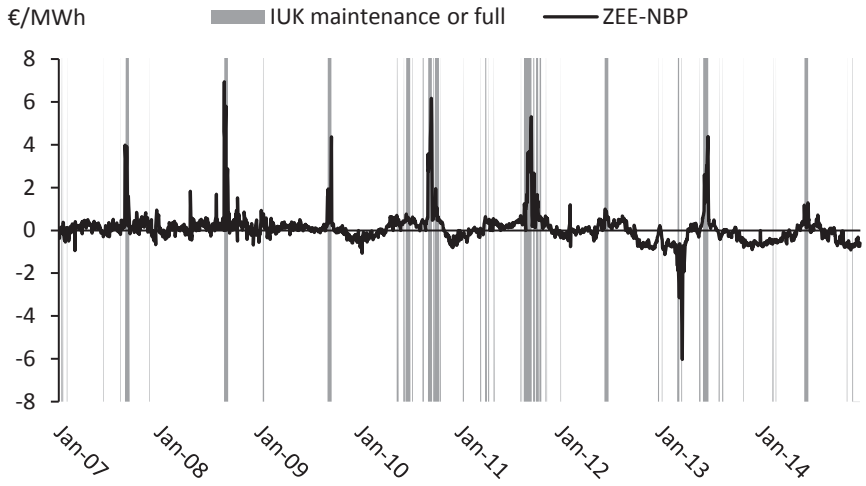

Figure 1.5. ZEE–NBP OTC day-ahead price spread (€/MWh) and periods when IUK is on maintenance or close to full capacity

Source: Tankard Parties, IUK

to periods of network maintenance (shutdown) and changes in flow patterns across Europe. The latter category involves changes in the use of European infrastructure – such as the 'LNG wave' hitting the UK in 2009–11, and the diversion of LNG flows from Europe to Asia during 2011–14.

Explaining price de-linkages

NBP de-linkage from other North West hubs can largely be explained by Interconnector (IUK) maintenance periods and occasions when the pipeline is close to full capacity. During these periods, the British market disconnects from the Continent and the resulting supply glut – supported by ample LNG imports – drives NBP below NW European prices (Figure 1.5). When import capacity from the Continent is physically congested, as happened during the cold spring of 2013, prices spike more at NBP than at ZEE, temporarily widening the spread. When there is spare capacity in the pipeline, prices at the two adjacent hubs are well aligned.

Similarly, PEGS delinks when physically separated from PEGN due to LNG supply being diverted, requiring consumption to be met by higher flows from the north, which in turn congests the N–S Link. Figure 1.6 illustrates events in 2014, showing that as soon as the LNG supply increases in the south of France, the spare transmission capacity between the two adjacent French zones restores price alignment within the country. The semi-permanent congestion of the French N–S link has already prompted a decision for investment in reinforcing the physical infrastructure, with the aim of creating a single French market by 2018.

Austrian hub de-linkages are related to physical congestion at Oberkappel (between NCG and CEGH); this tends to occur due to heavy exports from Germany to Austria during the summer and physical constraints on the German side (disparity between entry and exit capacity), which may be solved by additional investment.

However, PSV is a somewhat different story. Although the PSV premium increased significantly in H2 2013 and H2 2014, the route from the lower-priced NW European hubs to the Italian hub is not physically congested for most of the time. In 2014 at least 20 per cent of interconnecting capacity was normally available; it was fully utilized only for limited periods in September (Figure 1.7). This suggests that, due to non-physical barriers to trade (possibly relating to contractual congestion), market players did not fully exploit arbitrage opportunities.

The average correlation for the European hubs in 2014 was 96 per cent and only PEGS prices were substantially different from the other hubs, with minor de-linkages in Italy and Austria. However, these differences involve non-negligible costs due to the fact that (according to IGU/

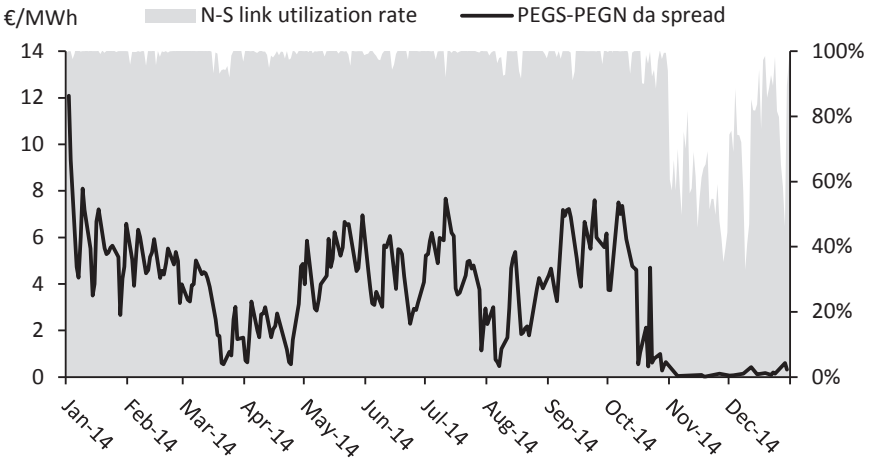

Figure 1.6. PEGS–PEGN OTC day-ahead price spread (€/MWh) and utilization rate of the N–S link (%)

Source: Tankard Parties, GRTgaz

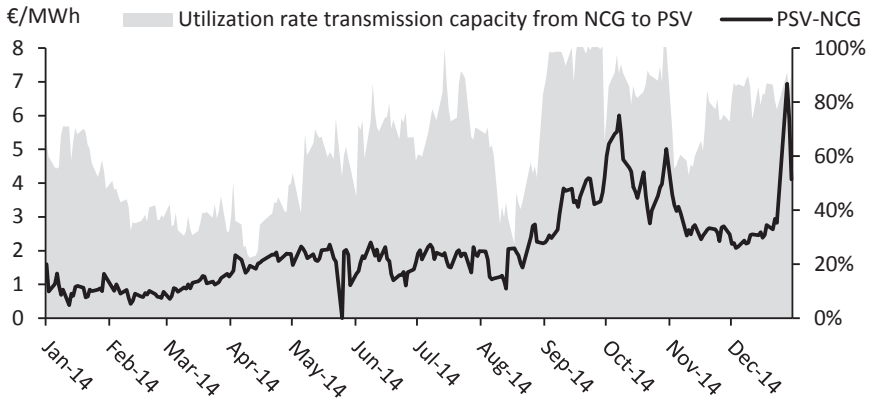

Figure 1.7. PSV–NCG OTC day-ahead price spread (€/MWh) and utilization rate of the transmission capacity from NCG to PSV (%)

Source: Tankard Parties, ENTSOG Transparency Platform, ENTSOG Capacity Map

Nexant data) more than 60 per cent of consumption in the countries with the less aligned hubs (France, Italy, and Austria) is priced on the basis of gas-on-gas competition.

Physical congestion between Germany and Austria resulted in an additional gas procurement cost in 2014 of about €60 million, most of which was accounted for by CEGH prices being higher than NCG in September and October 2014. Although the total volumes of gas sold at hub-based prices at PEGS are similar to those at CEGH, the wider de-linkage of prices in the south of France compared to those at the adjacent PEGN translated into a cost of €240 million. The size of the Italian market meant that, in 2014, barriers to flow into PSV resulted in an estimated increase in purchase costs of €330 million. These costs were incurred mostly in September–December, when the average premium over NCG exceeded €2/MWh (although for most of the time the cross border capacity was not fully utilized).

Summary and conclusions

In summary, it is increasingly difficult to deny the fact that hub prices represent market (supply–demand) prices in Europe. Price correlation across the North West hubs is almost perfect, and central Europe and Italy have improved significantly over the past five years. Some price disconnection still occurs in Austria, France and Italy for both physical and contractual reasons, but this issue is likely to be addressed by building new infrastructure and enforcing rules on congestion management procedures. However, it needs to be stressed that this article has focused on North West Europe, Central Europe, and Italy. In Spain and South East Europe, hub development is still at an early stage or absent. Once again, however, new infrastructure and, in particular, planned interconnections with markets further north, can be expected to align these markets with hub prices over the next several years.