

Will The Market Delivery Security of Gas Supply? The case of the UK and Italy

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The UK Market Can Delivery Security of Gas Supply at Competitive Prices

Although a remarkable concurrence of events unfolded in the week of 11th December 2017 that may have caused a potential crisis in the UK gas supply, the gas system of the country is very resilient to such events. This is thanks to a diversity of infrastructure and supply sources and, importantly, to the UK's well-functioning gas market that is making sure that Britain gets gas when it is needed, at the most competitive prices available.

On the Monday, the Forties Pipeline System, which carries around 40% of North Sea oil and gas to the UK, was fully shut down for a few weeks due to faults found in the oil pipeline. The pipeline is important to UKCS gas production because without access to NGL gas production and processing from some of the fields connected to the Forties system becomes impossible and hence they were partly halted on the 8th and were fully shut down on the 11th (Figure 1). On the next day, an explosion happened at Baumgarten, a major delivery hub of gas coming all the way from Russia, through Ukraine, deep into Central and Southern Europe, causing the shutdown of a major pipeline to Italy, which declared a state of emergency. Added to these events was news about problems with the supply of gas coming from Norway. These supply mishaps are against the background of one of the coldest weeks in the past few years in Britain and Europe. Market prices reacted immediately: the within-day gas price in the UK reached ca. 90p/therm at some point on the 12th, an increase of at least 50% compared to closing day-ahead prices just a few days before these events.

The price jump to the highest seen in the past few years attracted great interest from the general public, but also signalled the scarcity faced by the UK gas system, which has allowed alternative sources of supply – storage facilities, imports from Europe, as well as LNG (Figure 1) – to respond to supply shortfalls. In particular, this significant price jump triggered BBL, an import pipeline from the Netherlands, to send 28 mcm of gas, which is significantly above the long-term booked capacity of 19 mcm on Monday. On the next day, the pipeline imported 41 mcm and 45 mcm on Wednesday. The same pattern was observed for the flow through the IUK pipeline, a bi-directional pipeline connecting the UK with Belgium: it imported 39 mcm on Monday, 56 mcm on Tuesday and 47 mcm on Wednesday. On Tuesday, at the height of the Troll (Norwegian gas field) outage, the combined import flow of 101 mcm, was the largest flow across these two lines since March 2013 (when another acute price spike happened).

Here comes another issue – the UK’s gas system has been built to accommodate flows from north (abundance of supplies from North Sea) to south (where majority of gas demand is) but due to the curtailment of North Sea production (Forties pipeline shut-down) the transmission system could not accommodate large volumes coming from south (Bacton terminal, where gas from both the BBL and the IUK pipelines lands) further up north. So, by the end of Tuesday, National Grid, transmission system operator, instructed BBL that nominations may not be met. Ultimately, the combined import capacity of both pipelines – BBL and IUK – of 115 mcm/day, therefore, cannot be guaranteed due to domestic bottlenecks, especially given lower production from North Sea.

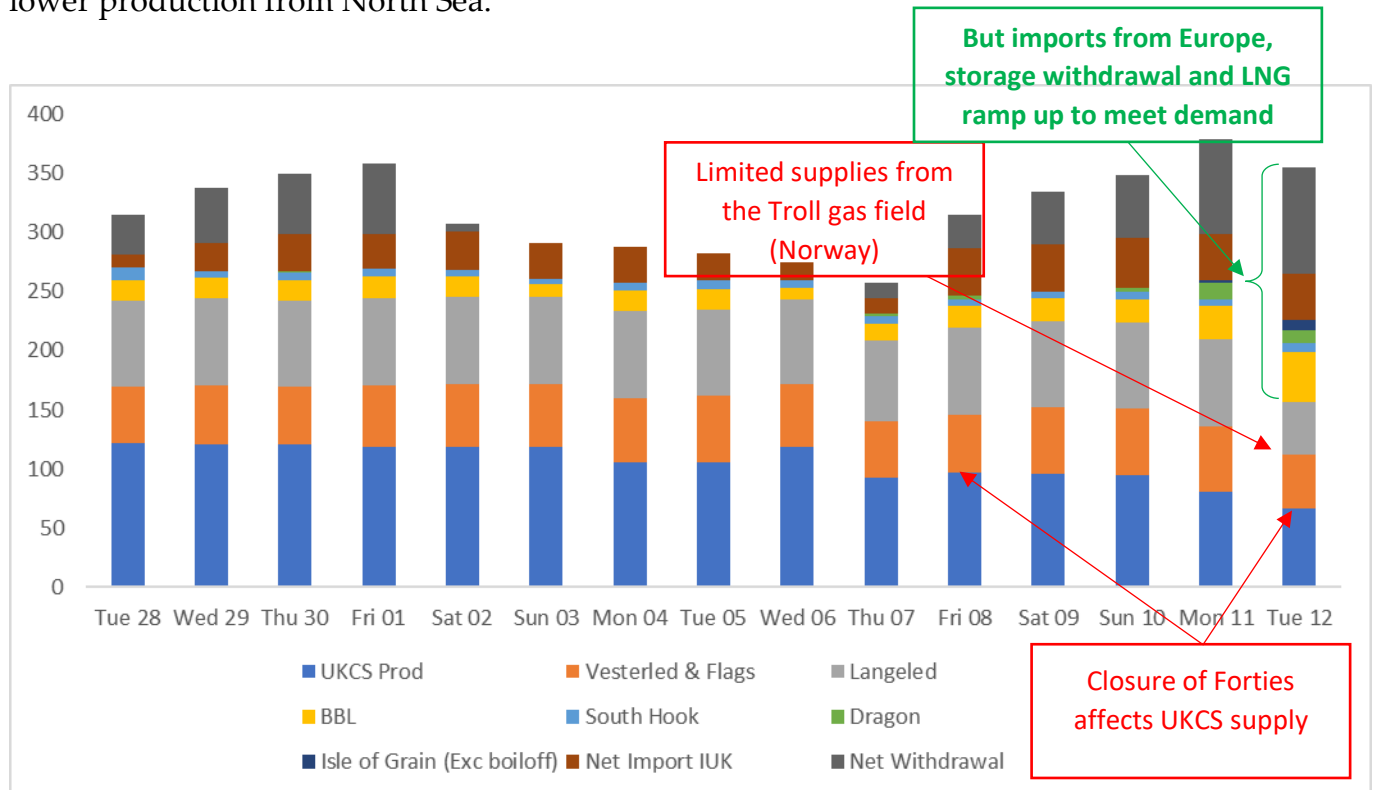


Figure 1: UK gas supply composition (mcm/day)

Given this dynamic, flows from storage facilities have been called upon and they were 83 mcm/day on Tuesday (maximum combined capacity is close to 90 mcm/day). Next in ‘merit order’ were flows from the LNG terminals: 11 mcm flowed from Dragon and 12 mcm from Isle of Grain. Flows from South Hook, the LNG terminal predominantly used to import LNG from Qatar, did not respond to the price spike, with send-out rate remaining low. Qatar LNG cargoes were flowing to China, Korea, India and Turkey to meet high seasonal demand there.

Despite this price hike, the closing wholesale price for the day of the 12th, was 67.5p/therm, or just 17% above the closing wholesale price of December 5th. The next day, the price stabilised at 61.25p/therm. British consumers will not feel such a temporary price hike at all in their energy bills, as wholesale costs are only a fraction of their bills. The dramatic increase in the

within-day price is paid for by shippers and suppliers who were short on the day and, hence, had to pay potential imbalances (e.g., suppliers who were relying on supplies from the UKCS fields connected to the Forties Pipeline System sought alternative supply arrangements, the cost of which pushed up the within-day and forward prices).

Hence, the extra cost of high prices on the day are paid by the suppliers to those who can provide the extra gas needed to close their short positions. In this case, the international LNG market reacted promptly: the maiden LNG cargo from Russia's Yamal LNG project, initially heading to Asia, was diverted and sold on the spot to a UK-based trading arm of Petronas, a Malaysian oil and gas company. This company will take the cargo to the Grain LNG terminal to offload the super-chilled gas, and inject it into the UK's gas system.

In fact, the within-day price of 90p/therm is ca. 21% higher than the landed spot price of that day in Japan and China, it is ca. 27% higher than in Argentina and Mexico and ca. 30% higher than in Turkey. This high price for the day was a premium against all NBP forward contracts, therefore, allowing the Grain LNG terminal to optimise its stocks and attract the spot cargo from Russia. Consequently, high within-day spot price, and the premium against forward contracts, pushed up NBP Jan-18 forward contract to 74p/therm, slightly below the landed spot LNG in Asia. It is therefore clear that on the netback basis, LNG from Russia's Yamal responded to price hike due to relatively shorter distance from Yamal to the UK than to north Asia. Had the situation been more drastic or lasted longer, the forward contract prices would have been higher than the Asian spot prices and hence triggering more LNG diversion towards the UK. It is only possible to attract spot LNG when the near-term forward markets are sufficiently liquid due to the simple fact that it will take time (from a few days to a couple of weeks) for a spot cargo, which is in the middle of somewhere, to land in the UK. Within-day or day-ahead price hike as such is not enough to attract spot LNG cargoes. Shippers and suppliers who would like to respond to such price signals need to lock-in the prompt premium whereas the physical delivery of the LNG cargo will happen only shortly after the price spike (after the shortage event). This is indeed the case because after the price spike on the 12th, the next day prices stabilised to the pre-crisis level and hence should the LNG cargo land in the UK at the after-crisis price level there would no premium to pay exporters for the cargo and hence no economic incentives for diversion. The spot cargo from Russia's Yamal will land on the 28th of December. All in all, the UK was very competitive market in the international context that day, and with at least 25% of LNG cargoes traded on short-term and flexible basis, which is 1000 cargoes a year (in 2014), the security of supply of such a scale appears not to be a problem.

It is not just that the UK system is resilient to these types of events, due to its diversity of gas infrastructure and available supply sources, but the market design in place allowed within-day prices to react immediately to supply and demand imbalances (e.g., the so-called Gas Security of Supply Significant Code Review, put forth by the UK's regulator, Ofgem). In turn,

sharp increases in within-day prices triggered demand-side responses, in the form of switching more from gas to coal-based electricity generation (Figure 2). As a result, the price hike on the day is a result of competitive forces determining whether, and how much, to buy LNG (and from whom, based on spot prices) and whether to switch off gas plants and fire up coal plants, and by how much. Had we not wanted to have the Russian LNG cargo, for political reasons, perhaps we could have burnt more dirty coal instead (and for a higher cost)!

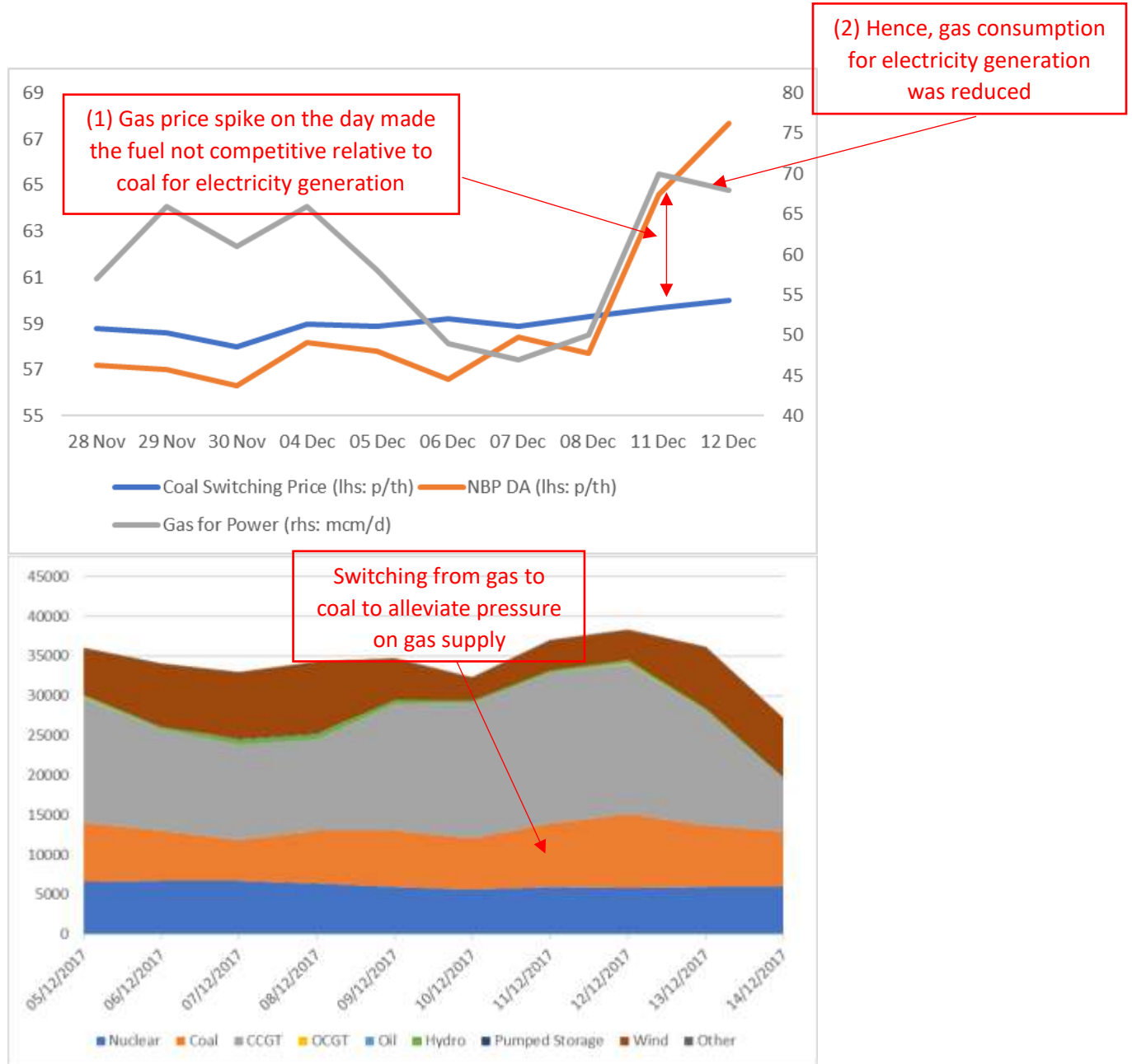


Figure 2: Electricity generation (y-axis: MW) in the UK by technology

Gas Market Integration in Europe – What Integration?

The situation in Italy on the 12th is a stark contrast to the one in the UK. Italy declared a state of emergency after the explosion at Baumgarten affecting deliveries of Russian gas to the country. On the 12th of December, the PSV, the Italian wholesale price marker, reached €75/MWh, which is more than three times higher than the price the day before and is more than three times higher than the price at the Dutch TTF, the most liquid market in Europe (Table 1).

Table 1: Closing day-ahead prices in Europe and the UK, €/MWh

	11-Dec	12-Dec	13-Dec
TTF	21.77	22.17	21.5
PSV	23.8	75.00	23.45
NBP	24.85	26.12	23.71
delta TTF-PSV	-2.03	-52.83	-1.95
delta TTF-NBP	-3.08	-3.95	-2.21

At such a premium, all sources of supplies to Italy responded, except for spot LNG. Unlike the UK case with the Russian Yamal LNG cargo, we are not aware of any diversion of LNG cargoes to the Italian LNG terminals to respond to the price spike there. Two possible reasons could explain the situation in Italy: (1) PSV is not a liquid spot or forward market, unlike NBP for the UK or TTF for North-west Europe; (2) there was a clear disconnect between TTF and PSV market areas because for otherwise we would have seen price spike in TTF market area as well on the 12th.

Even if PSV is not a liquid spot and forward market, the Italian suppliers who were in the short position (due to unavailability of Russian gas through Baumgarten) could have procured spot LNG cargoes using TTF or even NBP forward market prices, which would allow the premium for LNG spot transactions to be locked in immediately. This should work because PSV and TTF are connected by a long-distance pipeline, TENP, that goes through Germany and Switzerland to Italy. However, on the 12th, according to ENTSO-G, the import flow to Italy was 234.3 TWh, which is 37% of its technical capacity. On the next day, the import flow increased to 424.6 TWh, or 67% of the capacity. Therefore, it is unclear why the huge price differential between TTF and PSV persisted on the 12th. The official website of the TENP pipeline did not report any technical fault in the pipeline that would have limited its technical capacity on the 12th. Thus, it could only be either contractual congestion on the TENP pipeline or that marginal source of supply to Italy was not gas from TENP, in which case, the situation hints to the existence of distortions in the Italian gas market (and/or perhaps in other markets along the TENP route). Had the Italian market been well-integrated with the TTF market area we would not have seen such a huge price differential on the 12th while the capacity of the pipeline, TENP, was significantly underutilised. Had there been no market design imperfections, the price differential between PSV and TTF would have been

much narrower and the spot prices in Italy would have been lower than was the case on the 12th.

Conclusions

In the case of the UK, even with a significant reduction in storage capacity, the market navigated through the 'perfect storm' comfortably, guaranteeing continued delivery of gas at the most competitive prices. Although the UK's gas system is currently resilient to shocks, the situation may change as the country becomes more reliant on imports from a range of sources. Thus, the UK government recently conducted a strategic review of its gas supply security, from the present to 2035, and has [published its assessment on the subject](#). EPRG played a key role in delivering the analytical work for this review, using sophisticated global gas market simulation models to assess a range of future supply and demand conditions (81 scenarios in total, reflecting a wide range of hypothetical technical, international market and geopolitical risks to the future of the UK's gas system), and how they may impact the UK's gas security. The key conclusion from the study is that the UK gas system is resilient against major and prolonged disruptions to its gas supply now and in the future. UK consumers will enjoy this level of security as long as its gas market works such that prices promptly reflect scarcity conditions and possible imbalances in the system. Having a market-based solution to a security of supply event, such as the recent one, means that the cost of meeting these unexpected events is as low as possible, while the price for that security is transparently and competitively set. And the Italian case highlights the importance of having right market-based solutions to the security of gas supply problems.