

## Between the acts – reinventing the gas market



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Energy in the UK continues to make records, with coal generation reaching historic lows and renewables output rising to new heights.

But, while the focus of policy narrative is on power trends and emergent technology,

there are significant changes also underway in the gas market.

In this week's *Energy Perspective*, we look at the state of the GB gas market. Gas has long been referenced as a transition fuel, to be burned while other more harmful fossil fuels are switched off. However, there are signs that the sector is capable of reinventing itself just as profoundly as it did from the 1960s when the local, dirty town gas infrastructure was converted to clean-burning natural gas from the North Sea.

### To the lighthouse

Gas still does much of the heavy lifting in the energy system. It is particularly critical for home heating and hot water, and in 2016 met nearly two-thirds of total domestic energy demand. Final gas consumption increased by 3.2% with domestic consumption up around 5% (see Figure 1). Across GB there are just 15% of households that do not have access to mains gas, and some 60,000 new domestic connection points are being added annually.

It is now also widely acknowledged that gas is an “essential partner” to renewables in balancing the electricity system. The argument that gas is the cleanest fossil fuel and should at least displace coal in the power sector continues to hold a steady grip with policy-makers even as they struggle to successfully call forward new large-scale CCGTs.

### Paper darts

The struggle for new investment in CCGTs is due to a number of factors. One is the low global coal price, combined with an ineffective carbon price. This context has undermined the economics of gas-fired power generation at just the same time as there has been a volume squeeze from renewables, but the longer-term prognosis continues to improve.

Back in 2012 the government of the time published the *Gas Generation Strategy*. This paper, which was below the radar for many at the time, sought to address concerns that low clean spark spreads and uncertainty about the outlook for gas plant could mean the UK did not see enough investment in the sector to maintain capacity margins.

As a result, the government implemented a series of measures – most significantly the introduction of the Capacity Market. It also confirmed its intention to explore the potential for shale gas development in the UK. If shale gas production could be shown to be “economic and safe”, it could offer a significant economic opportunity.

This was followed in 2014 by the publication of the *Wood Review* into the oil and gas sector, which set out a strategy of maximising economic recovery from the UK Continental Shelf (UKCS).

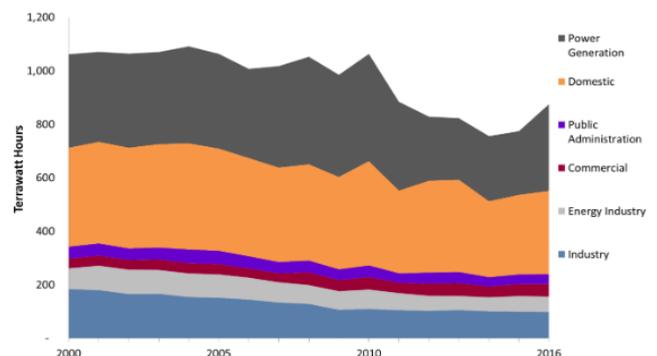
But as with the rest of the energy landscape, despite the stumble on carbon capture and sequestration (CCS) with the cancellation of the demonstration competition, the picture for gas has shifted significantly since the publication of these documents.

### Simple gifts

On the supply side, the pattern of gas supply in GB has changed dramatically in the last 15 years. Despite recurrent oil and gas licensing rounds – the latest of which was launched in July, with a focus on mature areas of the UKCS – the UK has gone from being self-sufficient in gas to relying on imports for around half of its needs in 2016.

We also heard last week that UK shale gas reserves might have been “hyped”. According to Professor John Underhill from Heriot-Watt

Figure 1: Changes in gas demand over time



Source: BEIS

University the UK's potential shale deposits were likely to have been disrupted by shifts in the earth. He said the government would be wise to formulate a Plan B to fracking for future gas supplies. We will soon know more as Cuadrilla is ramping up its test drilling at Preston New Road in Lancashire this month.

But with the long-term decline of the UKCS inevitably set to continue, imported gas is becoming even more important. Structurally much of the shortfall has been made good by new Norwegian supplies, which accounts for two-thirds of imports. But LNG is now a key player too. From 2012 to 2016, LNG provided an average of 16% of UK gas demand. Indeed in three out of four of National Grid's recent Future Energy Scenarios (FES) gas' role increases going forward. Indeed in the Consumer Power case it could still supply more energy than electricity by 2050.

## The waves

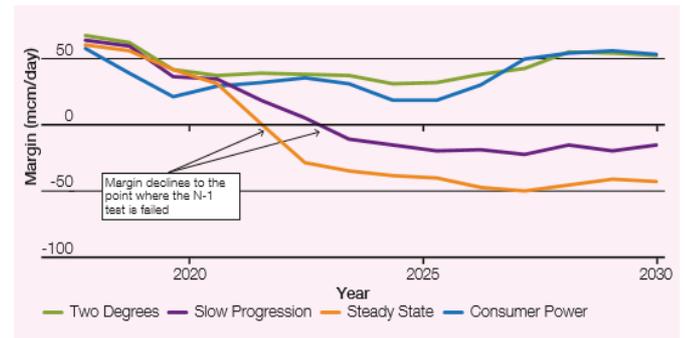
Complicating the gas system's resilience has been the announcement of the closure of Centrica's Rough gas storage facility. The closure of Rough has removed around 70% of the volume available for storage, and around 25% of the daily storage supply capability. Although the asset has been partially closed over the past year, the industry has warned that the closure could mean greater volatility for gas prices this winter, and this fear is now being passed through in to wholesale prices.

Shortly after the announcement trade body the Energy and Utilities Alliance (EUA) called for a Parliamentary inquiry into the long-term consequences of the decision. The EUA points out that recent winters have been mild and the market has not so far come under particular strain when Rough was unavailable. "The closure of Britain's largest storage site for natural gas gets rid of a vital supply buffer, which allowed us to reduce reliance on gas imports [...] this almost certainly means greater volatility for gas prices this winter", the alliance said.

The closure of Rough has highlighted the problems faced by ageing infrastructure in challenging economic conditions. SSE has also mothballed a third of the capacity at its Hornsea medium-range storage facility and sites elsewhere in Europe are struggling. There is presently little premium in seasonal wholesale gas prices to justify the costs of storing gas bought in summer for release in the winter.

Strategic storage, where investment is socialised across the consumer base, has yet to return to the

**Figure 2: Peak supply margin under N-1 conditions with storage closures**



Source: National Grid

agenda as it did periodically in the last decade. But a cold winter or disruption in the LNG market could well see a debate on it return.

## Granite and rainbow

One aspect of the gas strategy that has been implemented is the capacity market (CM). However, this has not led to a new dash for gas that was hyped by many. The various auctions have cleared at prices well below the hopes of those looking to build new large-scale CCGTs. Only one such station has come forward, Trafford, but that project gave up its agreement after it failed to meet a CM milestone in 2016.

With the next round of CM auctions coming up, the rewards for small-scale peak generation through embedded benefits have attracted considerable government and Ofgem attention, and are to be scaled-back. The sector will look on with interest to see what clearing prices emerge and who wins contracts in the next T-4 auction early next year.

The key question is whether BEIS might consider more fundamental intervention in the event new scale gas generation is not pulled through, given the increasing reliance of the system on the flexibility provided by it.

## A room of one's own

Capturing the new mood of optimism surrounding gas' role going forward, National Grid Gas launched its *Future of Gas* project in November 2016, and has also developed a free-standing website to disseminate information and stimulate debate. In July it published a progress report.

This developed three sensitivities that examine the impact of different levels of supply and demand:

- High electrification describes an ambitious approach to the electrification of heat and sees a very high roll-out of renewable generation,

requiring significant government support and intervention. This is effectively a low case for gas demand

- Two degrees is one of the core Future Energy Scenarios and reflects a medium case for gas, where CCS-enabled generation is deployed along with nuclear and renewable technologies, and
- Decarbonised Gas is grid's high gas case and sees the 2050 carbon reduction target met without a wholesale switch to electric heating. Heating in some cities is provided by burning hydrogen rather than natural gas.

Going forward, these sensitivities will be used as a way of testing that the NTS is robust enough to cope with a wide range of future supply and demand scenarios.

The successful demonstration of CCS is a key variable. Norway has said it could achieve full CCS by 2022, with media attention falling recently on Gassnova's TCM testing facility. Unlike the previous UK projects which failed to get off the ground, one of the Norwegian government's crucial decisions has been to divide responsibility for different parts of the CCS chain between the state and industry, with Gassnova footing the bill for any proposals taken forward.

## The voyage out

The gas industry is, of course, much more than wholesale production and generation, as National Grid's project highlights. But significant financial investments are also sunk in the local distribution pipes, and attention is turning to what extent they too can play a role in decarbonising heat.

Against this background, it is worth highlighting some other recent initiatives. Two gas networks are testing whether a decarbonised heat source – hydrogen – can be shipped through their existing infrastructures.

Cadent's flagship initiative is the Liverpool-Manchester Hydrogen Cluster project. It is a study to "develop a practical and economic framework" for introducing hydrogen into the company's gas network in that region. Natural gas would be converted in to "clean-burning hydrogen gas" through a process that removes the carbon dioxide for transfer in to storage.

Northern Gas Networks' H21 Leeds City Gate project is aimed at using similar technology to convert the distribution grid in Leeds. The company claims the project has already shown:

- The gas network has the correct capacity for such a conversion
- It can be converted incrementally with minimal disruption to customers
- Minimal new energy infrastructure will be required compared to alternatives, and
- The existing heat demand for Leeds can be met via steam methane reforming and salt cavern storage using technology in use around the world today.

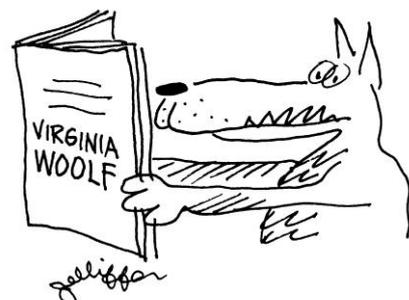
## A summing up

In the immediate term, the gas sector faces challenges in meeting winter demand, with the North Sea in long-term decline and Rough Storage removed. Shale gas fracking is still uncertain in its potential contribution in Great Britain, but elsewhere the technology means that gas is much more freely available on world markets than we would have expected a decade ago. At home, the fuel retains a considerable advantage as the preferred fuel for heating with a considerable delivery infrastructure and support network to maintain consumers' equipment.

When gas was cast over a decade ago as a transition fuel, the expectation was that it would be squeezed out of the electricity market with a final role providing peak power. A more enduring position in homes and businesses was envisaged for electricity, not gas, as electrical capacity built up to support heat pumps.

That view is obviously out of date. At the very least we would expect the Clean Growth Plan due this autumn to set a trajectory for long-term decarbonisation, but it also offers the opportunity to define much more clearly what the enduring role of gas in the generation and wider energy mix should be.

So gas is reinventing itself, and as we explore (this issue, page 16), this is not exclusively a GB phenomenon.



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