$2 Gas in Europe: Groundhog Day?
In the classic 1993 film *Groundhog Day*, Bill Murray plays Phil Connors, a cynical, self-centred TV weatherman covering the annual Groundhog Day event in Punxsutawney, Pennsylvania, who becomes trapped in a time loop forcing him to relive February 2 repeatedly. The popularity, and cult status, of the film resulted in the term entering dictionaries to describe “a situation in which events are or appear to be continually repeated”. A question facing the European gas market, and gas prices in particular, is whether 2021 will be Europe’s Groundhog Day, repeating the very low prices of 2020?

This Comment is the fourth in the ‘$2 gas in Europe’ series. The first one, published in October 2019, considered the possibility of $2 gas in Europe during 2020. By $2 gas it referred to the average monthly price for TTF or NBP being below $3 i.e. start with $2. The Comment was prompted by historically high utilisation levels for European gas storage by early October 2019, and the possibility of a mild winter coupled with a deal on Ukraine transit, thus leading to gas in storage in Europe at the start of the injection period in April 2020 still being at relatively high levels. When combined with a further 10 per cent increase in LNG supply between 2019 and 2020 and weaker demand in the key Asian markets, the Americas and Middle East for LNG imports, it was considered that this would in all likelihood lead to $2 gas in Europe in Q3 of 2020.

The mild winter and a deal on transit in Ukraine happened and by the time we reached the end of February 2020, $2 gas had arrived much earlier than anticipated, with the month-ahead TTF index for March closing at $2.91/MMBtu and for NBP at $2.88/MMBtu. Even Asian spot LNG prices dipped below $3/MMBtu with the ANEA (Argus Northeast Asia spot LNG) month ahead price for March averaging $2.92/MMBtu. All this was happening before the real impacts of COVID-19 were felt in the global gas markets, other than in China. These developments prompted OIES to publish a follow up Energy Comment, which questioned where all the rapidly rising LNG supply would now go, in the face of collapsing demand. Not all suppliers, be they LNG suppliers, pipeline exporters to Europe or indigenous producers such as Norway, could possibly achieve the same levels as in 2019, especially in the summer months, even with storage filling again. The question asked, therefore, was – who will blink first?

A third instalment on $2 gas in Europe looked at that very question and also how much more supply needed to be taken off the market as the impact on demand of COVID-19 continued. It was clear that pipeline imports, especially from Russia, had fallen significantly, but there were also considerable LNG shut-ins, especially from the US, for deliveries in the June to September period. The Comment concluded that prices could stay stubbornly low in 2021, if Asian LNG demand did not grow extremely strongly, and/or European gas storage utilisation remained high. What are the prospects now for a Groundhog Day for European gas prices?

**What are forward price curves telling us?**

The OIES LNG Tightness Calculation shows the prices for TTF in the Netherlands, the ANEA spot price in Asia and the Henry Hub price in the US. It then calculates the highest netback from Europe or Asia to the Gulf of Mexico based on the relevant transport costs. In 2018 the margin was, for the most part, above $3 which meant it easily covered the full cost of delivering LNG to the respective markets, including the cost of liquefaction. In 2019 prices collapsed and the margin fell sharply but was still positive, meaning on a variable cost basis, exporting US LNG was still profitable. This all changed in

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2 Source: Argus Direct.

3 Source: Argus Direct.


6 115 per cent of Henry Hub
2020 as the impact of COVID-19 saw prices in Europe below $2 and in the low $2 in Asia, leading to negative variable cost margins and substantial shut-ins of US LNG.

**Figure 1: OIES LNG Tightness Calculation**

![LNG Tightness Graph]

Source: OIES and Argus Media

The prospects for 2021 look brighter for LNG exporters as the forward curves place prices in Europe and Asia in the $4 to $5 range, and even with higher Henry Hub prices, the margin becomes positive on a variable cost basis, if not on a full cost basis. However, what market circumstances would be needed to ensure that we do actually see the price levels in 2021 suggested by the forward curves?

Figure 2 shows the historical correlation between the year-on-year change in storage utilisation and the year-on-year change in the TTF gas price in Europe. As we identified in the third $2 Gas in Europe paper⁷ there appears to be a relatively strong correlation between the two measures, and while any statistician knows that correlation does not imply causality, it would seem that the two are both driven by the same supply and demand factors. As a result, if one can estimate the outcome for one of the measures, then one can make a reasonable prediction for the other.

The forward curve for TTF implies a sharp year-on-year rise in prices, especially in the summer months, which, if the relationship still holds, should be accompanied by a significant fall in storage utilisation for most of 2021. This would suggest a faster withdrawal from storage and/or a much lower rate of injection.

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⁷ Forward curve as at October 14
⁸ Fulwood M. & Sharples J. (2020) "$2 gas in Europe (Part III): Down, down, deeper and down"
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Figure 2: Year-on-year change in storage utilisation and TTF gas price\(^9\)

The figure above has truncated the change in TTF prices in 2021, since the forward curve points to a rise in year-on-year prices of over 150 per cent next summer. Based on the statistical analysis of the change in TTF prices and the change in storage utilisation, this would suggest that storage utilisation next summer would be up to 50 per cent lower than this year. Mathematically this implies very large storage withdrawals in July, followed by very large injections in September and October. However, the forward curve rise in prices is well outside the observations that the correlation is based on. The year-on-year change in prices since 2012 has been in the range plus/minus 60 per cent, and the year-on-year change in storage utilisation in the range plus/minus 20 per cent. Any predictive power of the relationship established is only valid within the range of the historical observations and, even then, there will be a statistical error and range around the correlation.

The forward curve for the 2020/21 winter period suggests prices at similar levels or slightly lower than the outturn prices of last winter. If the correlation is to hold then storage utilisation would be similar or slightly higher through this winter than last winter, with storage withdrawals at a slower rate than the previous year. By the end of March 2021, therefore, the amount of gas in European storage might be slightly above the March 2020 level – which was 56 bcm (54 per cent utilisation).

It is in the summer of 2021 where the large price differences (150 per cent) year-on-year occur in the forward curve. This would suggest much lower rates of storage injection next summer, so that utilisation by the end of the injection period would be significantly below the end September 2020 level, where it was around 95 per cent. By the time we reach the end of 2021, the forward curve prices are some 15 to 20 per cent higher than this year, with storage utilisation between 2 per cent and 10 per cent lower, if the correlation holds (and within the range of statistical error). This would translate into the volume of gas in storage being between 2 bcm and 9 bcm lower at the end of 2021 than at the end of 2020.

The forward curve for TTF prices is telling us something about what might happen to storage but this is only part of the narrative. What is happening to the supply – demand balance in Europe generally is of

\(^9\) Forward curve as of October 14
key importance in determining prices and also the consequent impact on the LNG market. We have utilised the Nexant World Gas Model to consider the global gas market and Europe specifically to assess if this provides a similar view on prices as does the forward curve. We will then look at what this means for the LNG market.

Outlook for the European Gas Balance\(^\text{10}\)

2019 saw rising European gas demand, especially in the power sector, and continued decline in production, particularly in the Netherlands as Groningen declined but also in Norway as well. The supply gap, therefore, widened significantly by some 40 bcm. This contributed to the surge in LNG imports, but despite the increase in demand these could not all be consumed and this resulted in a significant proportion of the increase in LNG supply going into storage – a large negative stock withdrawal for the year.

Table 1: European Gas Balance 2018–2021

<table>
<thead>
<tr>
<th>BSCM</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>534.7</td>
<td>551.0</td>
<td>535.7</td>
<td>541.1</td>
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<tr>
<td>LNG Exports</td>
<td>5.8</td>
<td>6.4</td>
<td>4.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Pipe Exports</td>
<td>13.0</td>
<td>15.6</td>
<td>15.0</td>
<td>12.5</td>
</tr>
<tr>
<td>Production</td>
<td>-247.6</td>
<td>-230.1</td>
<td>-212.3</td>
<td>-211.7</td>
</tr>
<tr>
<td>Import Gap</td>
<td>305.9</td>
<td>342.9</td>
<td>342.4</td>
<td>346.3</td>
</tr>
<tr>
<td>Pipe Imports</td>
<td>245.5</td>
<td>237.8</td>
<td>216.2</td>
<td>235.2</td>
</tr>
<tr>
<td>LNG Imports</td>
<td>69.3</td>
<td>116.0</td>
<td>120.7</td>
<td>101.9</td>
</tr>
<tr>
<td>Net Stock Withdrawal</td>
<td>-5.4</td>
<td>-20.0</td>
<td>4.4</td>
<td>8.0</td>
</tr>
<tr>
<td>Statistical Difference</td>
<td>-3.4</td>
<td>-9.1</td>
<td>1.2</td>
<td>1.1</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Pipe Imports</th>
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<tbody>
<tr>
<td>Algeria</td>
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<tr>
<td>Libya</td>
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<tr>
<td>Azerbaijan</td>
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<tr>
<td>Iran</td>
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<tr>
<td>Russia</td>
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</tbody>
</table>

Source: OIES, IEA and Nexant World Gas Model

In 2020, the impact of COVID-19, following a mild winter, was expected to result in a sharp fall in European gas demand, with initial estimates suggesting a decline of as much as 8 per cent – a fall of over 40 bcm. This assessment now looks misplaced, with gas demand in power much stronger than expected – with even lignite being partially displaced – and the prospect of much higher residential demand in the last quarter of this year, if there is a normal winter, due to more working from home and potential regional lockdowns. Now it seems that the decline in European demand may be only half as much as previously thought. Production has continued to decline, as Groningen output fell again but also as Norway held back some volumes. The supply gap is, therefore, very similar in 2020 to 2019. However, with the storage balance likely to be slightly lower at the end of 2020 than the end of 2019 – a small net stock withdrawal – and LNG imports marginally higher than the 2019 level, pipeline imports, especially from Russia, have fallen sharply.

\(^{10}\) Europe includes the EU 27 plus the UK, Norway, Switzerland, the Balkans and Turkey.
For 2021, some rebound in gas demand might be expected, as economies recover, but it will also be weather dependent, and a colder winter could lead to a sharp increase in demand. On the other hand, if gas prices rise as suggested by the forward curve then gas may not be as competitive against coal as it has been in the last couple of years. The decline in production may, at least temporarily, stall as Groningen declines less and Norwegian production rebounds. The import gap, therefore, may not widen very much at all, compared to what might have been expected. If pipeline imports rebound back to 2019 levels, then something has to give. In modelling the global gas market, the higher 2021 prices balance the market by reducing LNG imports into Europe, resulting in more gas being withdrawn from storage. In effect, to arrive at higher prices the model is curtailing the highest cost supply to the European market.

Imports from Russia are projected to rebound back to 2019 levels, with Nordstream 2 assumed to start up in 2021, as uncontracted Russian supply is lower cost than spot LNG. However, even if Nordstream 2 is delayed, Gazprom could still look to book additional capacity via Ukraine over and above the 40 bcm contracted for 2021.

Alternative outcomes are discussed further below but clearly LNG could continue to come into Europe next year and fill storage again. However, the economics to make this happen would require lower summer prices in 2021 \(11^1\) than either the current forward curve or the modelling suggest.

**Prospects for LNG Balance**

Total LNG trade is projected to be slightly higher in 2020 than in 2019, despite the impact of COVID-19 on demand. In the July Quarterly Gas Review \(12^2\), we projected that global gas demand would decline by some 3.5 per cent in 2020 over 2019, which was less than the projected fall in global GDP. This decline now looks to be too pessimistic, with Asian gas demand, especially in China and India looking stronger, and Europe looking less weak than expected. The fall in gas demand may now be around 3 per cent rather than 3.5 per cent.

European LNG imports are expected to be similar in 2020 as in 2019, as are total Japan, Korea and Taiwan imports, which were weak in 2019. Growth in Chinese and other Asia Pacific imports more than offset declines in the Americas, Middle East and North Africa. On the export side, US exports are expected to rise sharply in 2020, despite the considerable number of cargo cancellations this summer. This more than offsets the declines in African and Latin American exports.

If, as projected above, European LNG imports fall by almost 20 bcm in 2021, then for total trade to grow – as more supply comes onstream - would require significant growth in imports elsewhere in the world. The prospects in Asia look positive and not only in China. There is likely to be some recovery in Japan, Korea and Taiwan as well as other Asian markets. Total Asian import growth is projected at just under 30 bcm, which would be a return to 2017 and 2018 volume growth. Overall, LNG imports are forecast to grow by some 10 bcm. On the export side, US LNG exports grow, but still remain lower than export capacity suggesting further cargo cancellations. Exports from other countries could also be curtailed including Australia and African exporters.

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\(11^1\) Gas can go into storage in the summer but would get withdrawn and sold in the winter when prices are higher, after allowing for the costs of storage

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The total growth between 2019 and 2021 in LNG trade is projected to be 20 bcm. In the meantime, LNG export capacity has continued to increase, notwithstanding issues at some plants resulting in extended shutdowns, predominantly in the US. Available LNG export capacity\(^\text{13}\) averaged around 505 bcm in 2019 and is expected to rise to 545 bcm on average in 2021 – a rise of 40 bcm or 8 per cent, double the rise in LNG trade.

\[\text{Figure 4: LNG Export Capacity and Utilisation}\]

Source: OIES, IEA and Nexant World Gas Model

\(^{13}\) Available LNG export capacity is nameplate capacity adjusted for regular and unplanned maintenance, technical issues and outages, and feedgas problems plus the ability of some plants to produce above nameplate.
Figure 4 compares the total available LNG export capacity with total imports and calculates the percentage utilisation. Historically, the utilisation of available LNG export capacity has rarely been above 93 per cent, so this level would only be achieved in a relatively tight LNG market. 2018 and 2011 (after Fukushima) had utilisation levels just under this level. In 2019, actual capacity utilisation was estimated at around 92 per cent, similar to 2018, but this included the 20 bcm of LNG that was effectively “hidden” in European storage and not consumed. Allowing for this, capacity utilisation was around 89 per cent, slightly lower than for 2020. With capacity still increasing through 2021, as the new US terminals ramp up to full capacity, utilisation remains depressed next year as well.

Compared to a 93 per cent utilisation rate, the projected rate in 2021 of just under 90 per cent is 3 per cent lower, which represents just under 20 bcm of shut in LNG, equivalent to between 150 and 200 cargoes.

**Key Uncertainties**

The broad narrative of this Comment is that both the forward curve for TTF prices in Europe and the modelling that OIES has done using the Nexant World Gas Model suggest significant volumes of gas need to be shut in again in 2021 in order for the gas and LNG markets to balance and clear. The battleground for gas and LNG again turns out to be Europe. The shock of COVID-19 in 2020 resulted in both significant LNG shut-ins and also a large reduction in pipeline imports into Europe, as well as a collapse in prices. Pipeline imports are projected to be 25 bcm lower in 2020 than 2019 and some 15 to 20 bcm of LNG may be shut in as well.

The forward curve and our modelling are telling us the same thing, namely that the market can only absorb a proportion – maybe half – of this supply overhang in 2021, if prices are to rise back to the $4 to $5/MMBtu level through the year. The modelling tends to mostly shut in LNG and allows pipeline imports in Europe to rise back to 2019 levels. However, it is not clear that LNG might back away from the markets, especially while the forward curves for Henry Hub, TTF and Asian spot prices suggest there is still some margin for US LNG on a variable cost basis in 2021.

There are many uncertainties in this projection, even ignoring the ongoing impact of COVID-19. If the markets are to absorb most or all of this LNG supply overhang in 2021 then there are a number of possibilities:

- The import gap in Europe could be larger as a result of higher demand or lower production. A cold winter would have a significant impact on demand, which could be magnified if there is still significant working from home in the first quarter of 2021. Even slightly lower gas prices could also make gas more competitive against coal. Production may not stabilize if Norway holds some gas off the market again.
- The pipeline exporters to Europe, especially Russia, could curtail flows again. This could be exacerbated if Nordstream 2 does not start up at all in 2021 and Gazprom is reluctant to, or cannot, book additional capacity on the Ukraine route.
- LNG demand in Asia is already projected to rise by 30 bcm in 2021, back to the volume growth seen in 2017 and 2018. More rapid growth is possible in China and India especially and also maybe from the traditional importers of Japan, Korea, and Taiwan, but higher growth would also be needed from the emerging Asia LNG importers, which have very good long-term prospects, but who may lack the infrastructure to provide much immediate growth.

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As noted earlier, Europe could still absorb the LNG in 2021 if storage utilisation returned to 2019 levels by the end of the year – in Table 1 the net stock withdrawal would not be plus 8 bcm but minus 8 bcm, a net injection. However, this is where we might be looking at Groundhog Day with $2 gas in Europe again in the summer to make the economics of storage work.\textsuperscript{15}

The other key factor in European prices, particularly with respect to LNG, is what happens to the Henry Hub price in the US. In Figure 1 the Henry Hub forward curve averages some $2.90/MMBtu in 2021 compared to $4.65 for TTF and $5.10 for Asian spot. Lower Henry Hub prices would allow both European and Asian prices to be lower, while still maintaining a positive variable cost margin. If this led to more US LNG exports then this could put a floor on Henry Hub prices, but it would be lower than the current forward curve. In any event, this could also result in lower European prices.

Conclusions

The forward prices for 2021 of Europe and Asia suggest a fundamental change in the supply – demand balance for the global gas market. However, although an increase in gas demand and hence in LNG trade is expected in 2021, this may not be enough to justify the $4-$5/MMBtu prices seen in the forward curves for the year. In Europe, pipeline imports have taken the bulk of the reduction in demand in 2020, with LNG imports being largely maintained with storage again filling as in 2019. However, our model suggests that pipeline imports will rebound in 2021 and, for prices to rise back as projected, this would imply that LNG supply would again need to be shut in to balance the market at those prices.

Asian LNG demand might rise even more than the sharp growth expected but this would largely rely on demand from China, India and the traditional importers of Japan, Korea and Taiwan to grow even faster. LNG export capacity, or pipeline supplies, have not stood still since 2019 so even if demand in 2021 went back to 2019 levels that would still leave surplus supply on the market.

Europe could, however, again absorb the surplus LNG by filling storage but the logic of that suggests the market clears at much lower prices than the forward curve suggests. This raises the prospect of the Groundhog Day of $2 gas in Europe again next summer.

In the film \textit{Groundhog Day}, Bill Murray’s weatherman, after hundreds, if not thousands of repeats of February 2, finally transforms into a decent, caring human being and is released from the time loop. How long might the time loop last for the European gas market?

\textsuperscript{15} Gas can go into storage in the summer but would get withdrawn and sold in the winter when prices are higher, after allowing for the costs of storage.