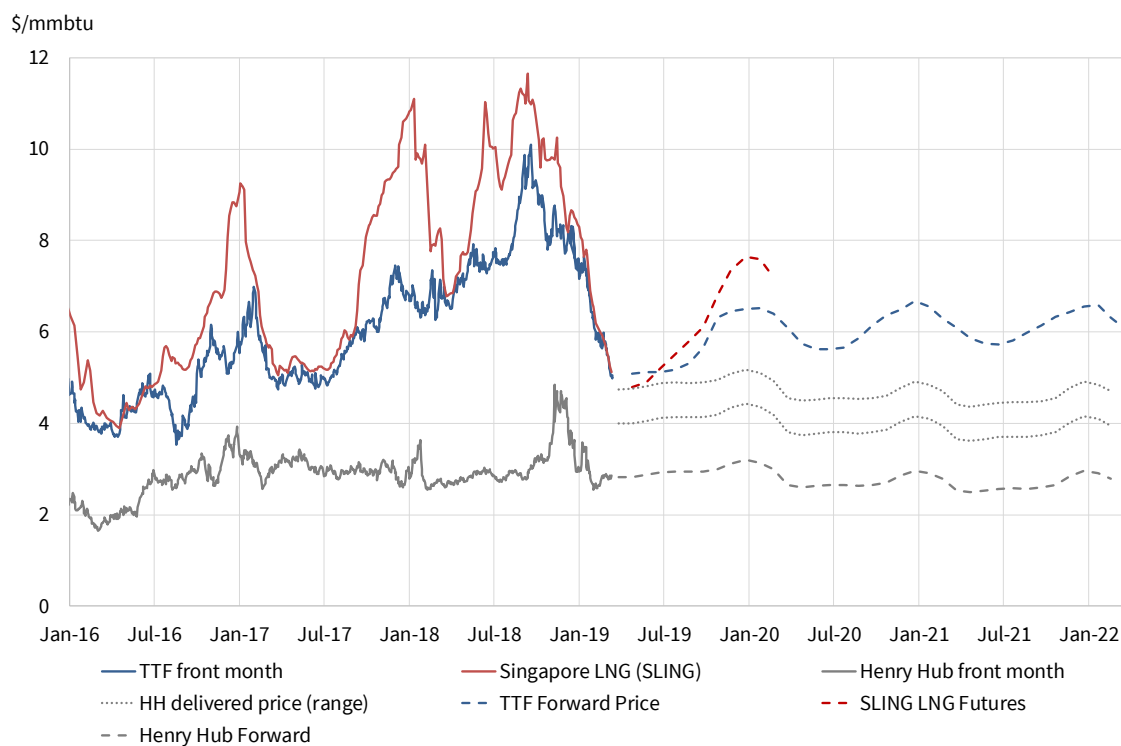


Q1 2019: TTF volatility commentary

In our last commentary, we described the sharp fall in TTF prices across Q4 2018, with TTF Front Month falling from 27.3€/MWh (Mid-Sep) down to 23€/MWh (early Dec). In Q1 2019, TTF prices have continued with an even steeper fall, breaking below 14€/MWh towards the end of March as shown in the chart below.



The relentless fall in gas prices across Q4 and Q1 has been driven by the cumulative effect of several bearish fundamentals:

1. LNG: sendouts in Europe have continued to rise, surging again in Mar-19 to new highs.
2. Russian flow: Russian flows have been strong across Winter 18 and ramped up to near maximum capacity (Nordstream, Yamal, Brotherhood) at the end of March.
3. NCS: Norwegian exports have been strong throughout the Winter, ranging 330-370mcm/d.
4. Demand: Demand has been relatively low on the back of very mild weather.
5. Storage stock: European storage stocks are 40% full (as of late Mar), up by 20% y-o-y.
6. Coal and Carbon: Coal prices continued the steady decline initiated at the start of Q4-18 and Carbon started to decline in December, reducing the TTF price levels at which coal to gas switching occurs.

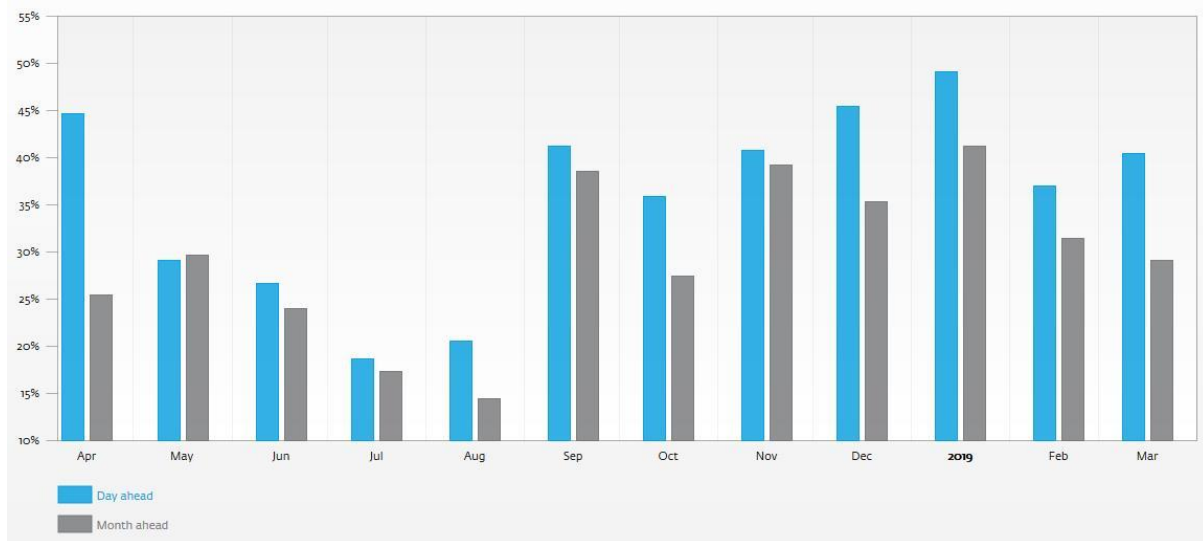
What is happening with TTF volatility?

While prices were falling, Day Ahead price volatility rose from ~35% in October to 50% in January. Month Ahead price volatility rose from less than 30% to 40%. Prices were responding to higher demand as October/November saw relatively cold weather. Q4 was

also a period of broader volatility in financial & commodity markets as increasing evidence emerged of a slowdown in economic growth.

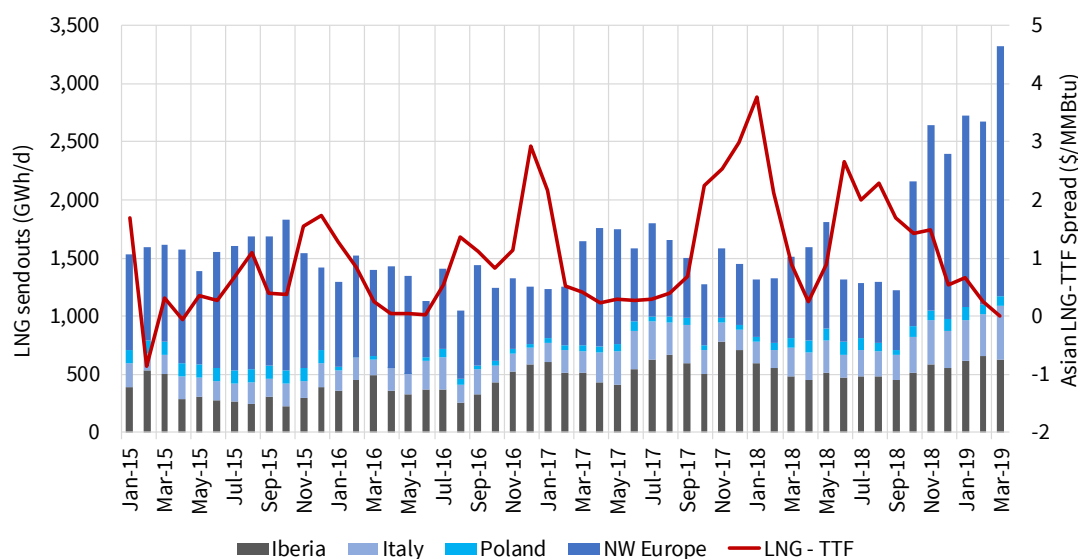
December and the first half of January were very mild. Then the second half of January has seen another wave of cold weather. Price volatility was also supported by increasing gas demand from the power sector, which reached a peak in January in most NW European countries. During this period, there has been particularly high intramonth volatility on time spreads between short term contracts (WD, DA, WE, WDNW, BOW, BOM).

From February, volatility has declined back towards levels from the start of winter, as TTF prices have continued a steady decline. The evolution of historical volatility across the current winter is shown in the Energystock volatility index chart below.



High LNG imports driving down prices

The surge in LNG deliveries to Europe that started in Oct-18 has continued across the winter. This has been consistent with a fall in Asian LNG spot prices which has reduced the spread between Asian and European gas prices. The spread continued to narrow across Q1, falling from $\sim 1.5\$/\text{MMBtu}$ in October, to $\sim 0.6\$/\text{MMBtu}$ in January, before turning negative in late March. This has incentivised strong LNG deliveries to Europe to continue and even increase in March as shown in the chart below.



From November to February, LNG deliveries were relatively stable with European sendout around 2500GWh/d. March has seen another surge in sendouts, with total monthly sendouts reaching 3320GW/d. This coincides with Asian LNG spot prices breaking below TTF prices towards the end of March.

Looking at the breakdown per country, we can see most of the increase in delivery was impacting NW European hubs (UK, FR, NL, BE). In March, the m-o-m increase in sendouts was felt mostly in France and in the UK via Dunkerque and Grain. Both countries are now showing a similar level of sendouts (~790GWh/d) and are the highest receiving countries in Europe.

The factors that have contributed to the convergence of Asian and European spot prices are:

1. Ongoing growth in global supply as new liquefactions projects continue to ramp up
2. Asian buyers well contracted and not bidding for cargoes in the spot market
3. Declining shipping costs
4. Slightly milder than usual winter in Asia.

Power sector absorbing incremental gas & setting prices

There was a strong increasing trend in power sector gas burn from September to January, increasing from ~ 2000 GWh/d (Sep) to ~3100 GWh/d (Jan), in line with seasonal increase in load and TTF prices falling relative to coal switching levels.

January 2019 saw the highest power sector gas demand since January 2017 (during the French nuclear outages), with all major markets showing a steep increase. However in March, gas demand from the power sector fell back to Sep-18 level, driven by a reduced load and strong wind output. We explore the importance of power sector switching dynamics in more detail in a blog article here <https://timera-energy.com/power-sector-setting-gas-prices-in-europe/>

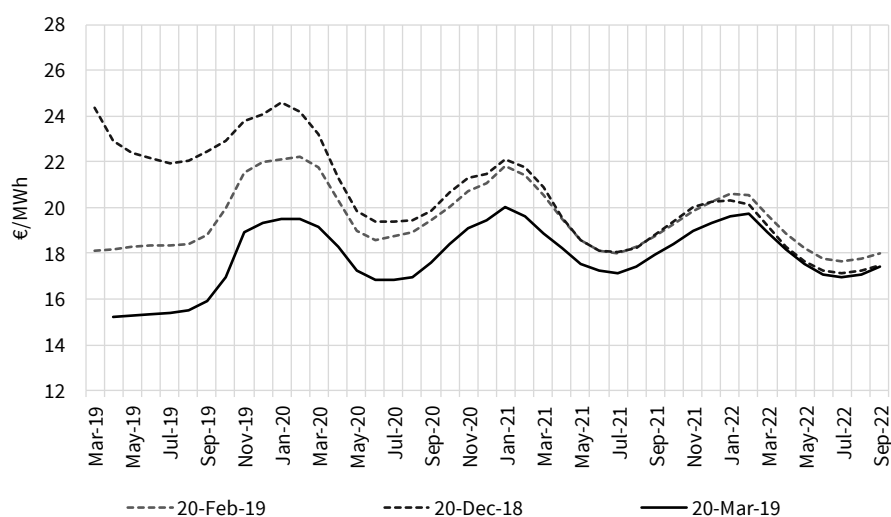
In Q1-19, coal prices have continued to decline with front month ARA prices falling from 87 \$/t mid-December down to 60 \$/t by the end of March. Carbon prices were more volatile, especially around December and January, reaching 25€/t on multiple occasions, before finally dropping to 21€/t at the end of March.

The drop in coal and carbon prices has in turn reduced coal to gas switching price levels. This means the support levels for incremental gas demand from the power sector have fallen, adding downward pressure to hub prices.

The power sector will be key to watch this summer. With low levels of supply flexibility across European markets (strong supply, high stocks), the power sector is the key response mechanism to absorb incremental supply. The price levels at which gas plants become more profitable than coal in the different countries should set gas prices. The main countries to watch are UK, DE, NL, SP, IT. As a result, we should continue to see gas prices highly correlated to coal and carbon price movements this summer.

Unusual TTF forward curve shape & implications for storage

Across Winter 18-19, not only have spot prices plunged, but the shape of the TTF curve has undergone a major shift from backwardation to contango as shown in the chart below. The change in curve price shape was initiated in Q4-18 but was most pronounced over the first two months of 2019. This reflects a huge shift across the last 6 months in the market's expectations of the nearer term availability of gas (from drought to flood).



As a result the 2019 summer/winter spread had risen to 3.6 €/MWh by mid-March, its highest level since 2012. A blowout in seasonal spreads sounds like good news for storage. But higher front year spreads don't necessarily translate into greater margins, given forward hedging of summer injection profiles. 2020 spreads have also widened but by a lesser extent, reaching 1.8€/MWh (from below 1.5).

Factors to watch into the summer

We finish with a summary of key factors to keep an eye on as summer develops:

- LNG: Will high volumes of 'price taking' LNG imports continue to flow into Europe across the summer?
- Russia: will Russian flows continue near historic high levels or could we see some response to falling prices?
- Power sector: How will gas demand across European power markets evolve into summer (as described above)?
- Coal and Carbon: The key drivers of coal to gas switching levels will be important in driving the direction of TTF
- US LNG shut ins: Will prices continue to decline to a level that incentivises the shut in of US LNG exports?

We will return next quarter to see how these factors are evolving.