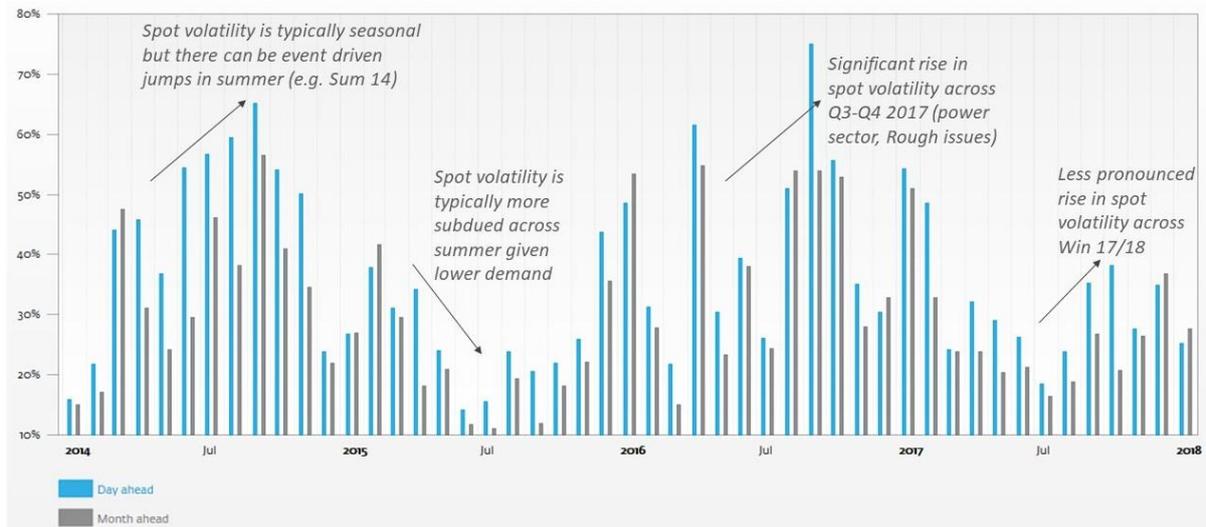


Q1 2018: TTF volatility commentary

Winter 2017-18 has so far been quite a subdued one in North-West European gas markets. This has been reflected in lower outturn levels of TTF spot price volatility as shown by the EnergyStock volatility indices in Chart 1 below.

Chart 1: EnergyStock historical volatility indices



Source: EnergyStock Volatility Dashboard

Volatility typically rises across winter periods as the gas market tightens with higher demand. Although this does not preclude event driven jumps in volatility across summer as well (e.g. the major price decline in Sum 2014 and the power sector/Rough related volatility in Q3 2016).

However Chart 1 shows a less pronounced rise in volatility across Winter 17/18 (so far at least). This has been the result of a combination of healthy supply, robust storage levels, a lack of supply infrastructure interruption and a calmer power sector than Win 16/17 (which was dominated by French nuclear outages).

Despite calmer behaviour of historical spot volatility this winter, there are some interesting structural shifts underway that may impact volatility going forward.

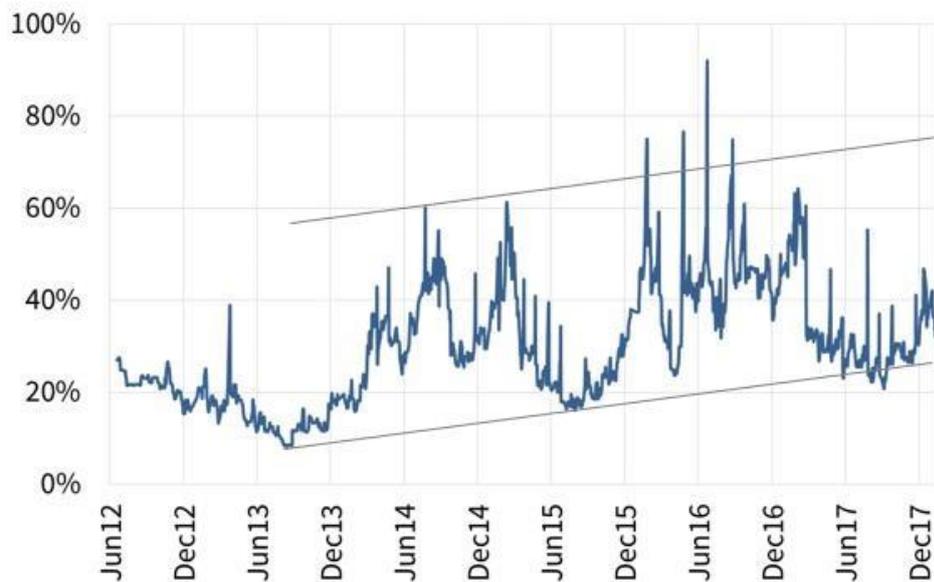
Contrasting historical with implied volatility

Expectations on the level of gas price volatility can be 'implied' from TTF gas options. This involves calculating the volatility level consistent with a traded option's price, via using an options pricing formula and other transparent assumptions (e.g. strike price, underlying gas price and time to expiry).

Implied volatility provides an interesting contrast to historical volatility. It is market based and provides forward (vs backward) looking insight into market expectations of gas price volatility.

Chart 2 shows the evolution of implied volatility for TTF front-month options.

Chart 2: TTF front month 'at the money' implied volatility



Source: Timera Energy, Marex Spectron

Implied volatility has also been lower in Winter 2017/18 than it was the previous winter. However this appears to be a temporary decline in what looks like the start of a broader uptrend in volatility across the 2013-18 time horizon.

We write in more detail about how to understand and interpret implied volatility in an article [here](#).

A review of key supply dynamics

Three key fundamental drivers that are important for a structural recovery in volatility are:

1. Ageing flexible supply infrastructure
2. Increasing European import dependency
3. Rising power sector gas flex requirements

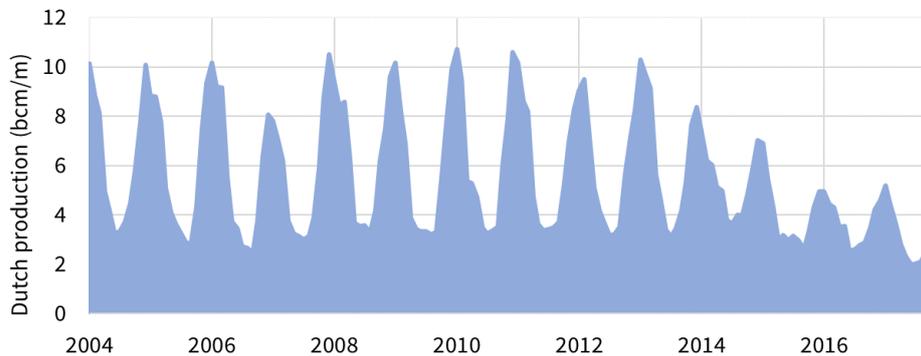
We consider recent developments for these drivers in a bit more detail.

Ageing infrastructure

Earthquake problems relating to the giant Dutch Groningen gas field continue. In late January 2018, the Dutch regulator SodM recommended that the government reduce the Groningen production cap to 12 bcma (from 21.6 bcma currently). This would represent a 70% reduction in Groningen output since 2017.

Chart 3 shows how declining Groningen production has rapidly reduced Dutch gas supply flexibility over the last 5 years. The impact of cuts is focused more on loss of seasonal flexibility, but declining production also reduces shorter term deliverability into the Dutch market.

Chart 3: Dutch monthly gas production (2004-18)



Source: Timera Energy

UK and Norwegian production flexibility is also set to decline into the 2020s, increasing Europe's reliance on imported flexibility.

Import dependency

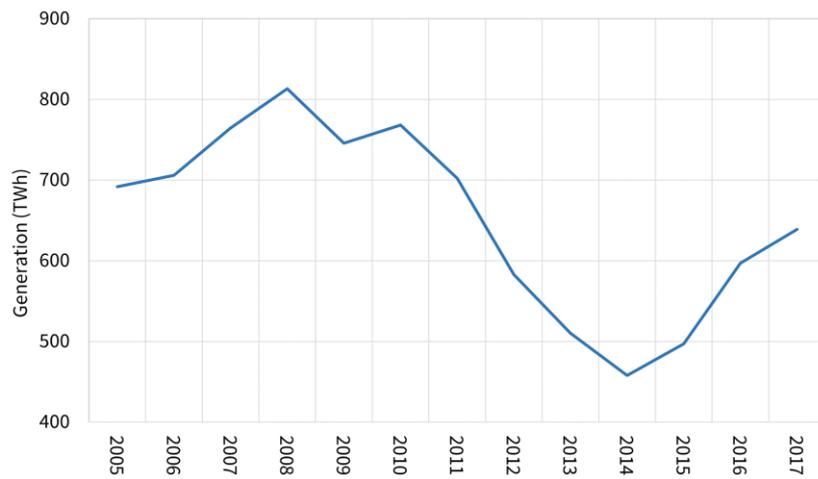
The supply gap being created by declining domestic production is being filled by a combination of Russian pipeline imports and LNG. Russian imports saw another step up in 2017, with 185 bcma of supply (once reverse flow is netted out). Russia has been able to place higher volumes as a result of declining Groningen output, strong Asian LNG demand and rising European gas demand.

LNG imports to Europe also rose in 2017 by around 10 bcma. The volume increase was focused on Southern Europe e.g. given drought conditions on the Iberian peninsula. Growth in deliveries to North West Europe has so far been limited given strong Asian LNG demand. But we are watching carefully to see whether that will change in 2018.

Power sector dynamics

European gas demand rose again in 2017, primarily driven by higher CCGT load factors in the power sector. This is a continuation of a trend that has been underway since 2015 as shown in Chart 4.

Chart 4: Pan-European gas-fired generation



Source: Timera Energy, Sandbag

Rising power sector demand has been supported by higher coal vs gas prices across 2015-18. But it is set to continue going forward as policy driven coal and nuclear closures improve the position of gas-fired plants in the merit order. This is supportive of spot price volatility as it is swings in gas plant load factors that are increasingly required to support growing intermittency in wind and solar output across North-West Europe.