Helium Shortage 3.0:
Current status, impact and outlook

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As we enter March 2019, Helium Shortage 3.0, the third period of sustained helium shortage since 2006, has now persisted for over a year. The consensus view is that the shortage began in February 2018, when two of the world's major suppliers began to allocate (i.e. ration) supply to their contract customers.

However, there are some who would argue that Helium Shortage 3.0 can be traced back to June 5, 2017, when a group of countries led by Saudi Arabia and the United Arab Emirates (UAE) announced an embargo of Qatar which resulted in the temporary shutdown of Qatar's helium production and caused a helium shortage that lasted into the Fall of 2017.

Besides taking roughly 30% of global supply off the market for several weeks and disrupting logistics, the Qatar Embargo caused the US Bureau of Land Management (BLM) to begin allocating the supply of crude helium to the four helium refiners (Air Products, Linde, Messer and Keyes Helium – company names reflect completion of the Praxair/Linde merger

and related divestitures) who depend on the BLM for feed gas to run their plants. While helium markets temporarily returned to near normal during the Fall of 2017, the BLM has never discontinued its allocation of crude helium feed gas and logistics for helium from Qatar remain challenging.

Causes of the shortage

The current shortage is the result of gradually diminished production capacity, the lack of new capacity coming into the market and renewed growth in helium demand.

Depletion of the US Federal Stockpile has greatly reduced the BLM's deliverable capacity of crude helium feed gas to the helium refiners over time and the BLM System's capacity has been reduced to less than half of what it once was, removing more than 2 BCF/year of supply from the market.

Other sources, such as the two plants in Algeria, are producing well below nameplate capacity due to a lack of feed gas. Natural gas processing and LNG plants require periodic maintenance and 2018 had more than its share of both planned and unplanned maintenance outages which negatively impacted helium supply.

Finally, the Helium 3 project in Qatar, which was supposed to be contributing 425 MMscf per year of supply by 2018 has been delayed until at least 2020.

On the demand side, the strong global economy experienced during the last few years gave rise to renewed growth, especially in the rapidly growing Chinese market (especially in electronics) and the large US market. A spike in demand from the aerospace segment and growing electronics demand have also contributed to demand growth. While helium demand growth might only be a few percentage points worldwide, that is a very significant increment in a tight market.

Severity of the shortage

Due to the fact that the helium business is very opaque, it is difficult to pinpoint the precise magnitude of the shortage at any point in time. Moreover, the severity of the shortage varies over time due to factors like planned and unplanned plant maintenance outages and seasonality of demand.

A quick and dirty method to estimate the supply deficit is to multiply i) the allocation percentages for those suppliers who are rationing supply by, ii) their approximate global market shares and then sum all of the results. For example, if Supplier A has a 15% market share and is allocating supply at the 80% level, you would multiply .15 X (1 - .8) to get .03 or a 3% global supply deficit. You would do the same calculation for each of the global suppliers who are allocating supply and then add the results together.

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Using this technique, the estimated global helium supply deficit is probably around 10%. Some helium consumers might be surprised by that estimate, particularly if their supplier is rationing supply at a level of less than 90%. While a deficit of around 10% may be the "baseline" for the current shortage, the shortage can be much worse when a major source goes off-line. For example, the partial curtailment of ExxonMobil's Wyoming production in September/October 2018 due to unplanned maintenance immediately increased the helium supply deficit to more than 20%. It is important to remember that this is not a static situation and the shortage can vary significantly from supplier to supplier, as not all suppliers have been allocating supply, and even from region to region for the same supplier.

Impact on helium markets

The obvious impact of any shortage is that many customers are unable to obtain as much supply as they desire. More specifically, if you are a customer of a supplier who is allocating supply, your supply would be cut back to a specified percentage of your historical demand during a prior period.

Depending on how critical helium is to your manufacturing process or business, this can be very disruptive. If you are not purchasing helium under a contract, your helium supply could be cut off entirely.

Helium prices have also been increasing fairly dramatically during the shortage. While the outcome of the BLM's FY 2019 Crude Helium Auction & Conservation Sale has been the catalyst for sharply higher costs for the major suppliers, the shortage has provided the ideal environment for the major helium suppliers to pass cost increases through to their customers. It is safe to say that the major suppliers have taken full advantage of the shortage, with price increases as high as 100% observed in some cases.

It follows from the above explanation that if you have a new requirement for helium right now, it could be extremely difficult to obtain supply.

There are a very small number of transactions occurring in the spot market (<1% of total demand) and those are typically taking place at prices that can be a multiple of what would be considered "normal" contract prices. Certain demand segments that are viewed as less critical to society than others may be having a particularly difficult time. The party balloon sector in the U.S. seems to be having an especially hard time obtaining supply and has been absorbing large price increases.

What factors will cause the shortage to subside?

Like all commodity shortages, they eventually subside when new supply enters the market or demand is reduced. While there are a handful of relatively small projects that could result in modest increments of new supply entering the market in 2019, the next significant

increment to helium supply is expected to be the start of production from the Helium 3 project in Qatar. This project, which has been delayed significantly by the rupture of an undersea pipeline that was going to transport feed gas to the Barzan LNG Plant, is expected to add an estimated 425 MMscf per year to global supply.

Information related to the timing of Helium 3's start-up has been closely guarded, but the consensus expectation (admittedly with relatively low confidence) is that supply from Helium 3 may enter the market in mid-late 2020. Supply from Helium 3 will certainly reduce the severity of the helium shortage and, when combined with other factors discussed herein, could be sufficient to rebalance the market.

Other new projects, most notably Gazprom's Amur Project, which is expected to add 700 MMscf per year increments to supply in 2021, 2023 and 2026, but also including projects like Irkutsk Oil Company's project in Siberia, as well as contributions from non-hydrocarbon projects in Southwestern US and Alberta/Saskatchewan, Canada, are expected to finally restore a comfortable balance between supply and demand in 2021 or the early 2020's.

One other factor that might not get as much attention as it deserves is "demand destruction". During Helium Shortage 2.0, which lasted from 2011- 2013, an estimated 10% of global helium demand was permanently lost due to increased recycling of helium, substitution by cheaper or more readily available gases, and increasingly efficient use of helium.

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While there is a view that the easy targets for reduced usage were already realized during Helium Shortage 2.0, it is safe to assume that the difficulty in obtaining helium, combined with sharply higher prices, will provide continued incentives to reduce helium consumption.

While demand destruction is unlikely to cure the current shortage on its own, it can certainly be a contributing factor to rebalancing helium markets. Also, let's not forget that just as a global economic expansion has driven renewed growth in helium demand, a global slowdown would have the opposite effect.

Expected Duration of the Shortage

Putting all of the above information together, it seems reasonable to conclude that:

- Helium Shortage 3.0 is likely to persist throughout 2019 at varying levels depending on how individual plants are operating at any given time
- Production from Qatar's Helium 3, assuming a mid-late 2020 start-up, should bring significant relief to the market, and, when combined with other small increments to supply and potential demand destruction, may be enough to end the shortage (although the timing of Helium 3 remains uncertain)
- Production from Gazprom's Amur Project in Eastern Siberia, expected to enter the market in 2021, should contribute enough supply to bring an end to Helium Shortage 3.0, if Helium 3, other new projects and demand destruction have not ended the shortage prior to that time
- A global economic slowdown would reduce demand for helium and could relieve the shortage sooner than anticipated
- Pushing back the start-up dates for the Helium 3 and/or the Amur Project could result in a longer shortage than currently anticipated.

ABOUT THE AUTHOR

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