The last 18 months have stressed global supply chains on many products like no other period in recent history. The pandemic gets credit for sparking the difficulties, but other factors, including changes in the energy sector, will ensure that significant challenges for sulphur continue into the foreseeable future. In this article I will discuss those supply chains, their post-pandemic performance, and what companies can do to reduce supply chain risks going forward.

My comments on sulphur are based partly on personal experience with molten sulphur, but I observe that both formed sulphur and sulphuric acid share many parallel characteristics. A textbook definition of supply chain has the point of sulphur recovery as the start, with conclusion at the destination, often a sulphuric acid plant. In our supply chain scope are all transfer, transportation and terminating assets. Not insignificantly, finance and management systems running the supply chain are also in play.

Sulphur’s ‘sharp edges’ deserve early reference, even though they are familiar to many readers. Supply chain assets are usually product-dedicated and are often sufficiently utilised that spot or immediate access is not possible. Next, sulphur handling does carry environmental, health and safety risks and while those concerns are manageable, specialised equipment and thorough training procedures are necessary. Finally, sulphur is also often considered to be ‘doubtful fat’, meaning that supply interruptions at either end, points of production or consumption, threaten operating rates on a very expensive asset. Supply chain failures can be damaging, to both large plant assets, and individuals!

In addition to the previously mentioned ‘sharp edges’ there are a plethora of significant non-product threats threatening healthy sulphur supply chains. Nature delivers tropical storms, blizzards, and freezing temperatures. Accidents do periodically occur along key transportation routes, and labour-related constraints have been increasingly at the core of carrier performance problems. Plant operating rates can and do sometimes change, and a culture of ‘best efforts’ commercial agreements can hinder the ability of participants to quickly correct imbalances.

Sulphur’s performance

Given this backdrop of high supply chain risk, how has sulphur fared during the huge challenges of 2020-21? My assessment is that sulphur has held up very well, particularly compared to other materials. Certainly the industry has had threats and supply interruptions, although many of those issues were prompted by changes at origin or destination location points outside of the supply chain defined by transportation/terminus/transfer. Transportation delays did occur, but were typically expressed in days and percent impacted, and the challenges were less for than for many comparable industries. Sulphur consumers did have to slow their usual usages, but their post-mortem statements were usually sparked by slowed recovered production. My positive assessment is a relative one, and not meant to sugar coat performance. The people recognise that their company supply chain will also someday need assistance.

Company supply chain bottlenecks and strategic participation choices are typically driven by multiple factors, including degree of social, political, financial, technology, and regional alternatives and resources. Strongness and resilience of supply chains are periodically observable. For example, since 2000 many companies have invested in assets to secure sulphur supply chains adding optimally. Others have increased their direct participation in the supply chains as sulphur risks increase, focus your modelling farther up and down stream when practical. Sulphur logistics excellence always swings on strong communication habits, internal and external. Formulate your assets and make them routine, often a costly but necessary cost. Know your options, and as supply chain risks mount – ensure you own more of the chain.

Supply chain excellence always swings on strong communication habits, internal and external. Formulate your assets and make them routine, often a costly but necessary cost. Know your options, and as supply chain risks mount – ensure you own more of the chain.

Sulphur supply chains: still mission critical in 2021

The key principles and behaviours that underpin effective sulphur supply chains are:

- **Linguistics**: Language is usually reflective of broad philosophy and perceived value. Make sure sulphur has the status of either co-product or raw material, and banish the words waste byproduct.
- **No commodity here**: Never make the mistake of transacting sulphur or its services on the basis of a tender or auction. Yes, sulphur *is* a bulk commodity, but only on the basis of chemistry! Service and supply performance can make a world of difference to your business and must be carefully considered in your evaluation of price-to-value.
- **Team Ever in the smallest businesses, there will be key roles, responsibilities and skills and tasks across multiple desks and departments. Make sure sulphur is placed as a team sport.**
- **Discipline and rigor required**: Process rigor and flawless execution must support daily sulphur management processes. Supply excellence begins with the successful execution of daily tasks while maintaining an eye on inventory levels relative to standards. Use inventory threshold levels and alerts.
- **Change management is our business**: Sulphur supply excellence comes from a system of Monitor – Communicate – Change Management – Repeat. Safety excellence and superior housekeeping often go hand in hand. In high performing supply chains, both rooted in similar principles and practises.

Leading practices

These principles flow into leading practices which can be adopted to suit your supply chain footprint and requirements:

- **Start with your annual program and plan**: Include changes that address updated sulphur fundamentals, both regional, national, and global. Review at least quarterly and make appropriate changes to suit evolving marketplace fundamentals.
- **Have a requirement-based discussion with sulphur customers, suppliers, and service providers**: Use of a performance scorecard is often surprisingly illustrative and useful, and a great insurance policy to support your unique chain fundamentals. Develop and utilise sulphur inventory models. Add frequency and key attributes (forward months and locations) to supply performance. As sulphur risks increase, focus your modelling farther up and down stream when practical.
- **Sulphur logistics excellence always swings on strong communication habits, internal and external. Formulate your assets and make them routine, often a costly but necessary cost. Know your options, and as supply chain risks mount – ensure you own more of the chain.**
- **Sulphur logistics excellence always swings on strong communication habits, internal and external. Formulate your assets and make them routine, often a costly but necessary cost. Know your options, and as supply chain risks mount – ensure you own more of the chain.**
- **Supply chain risk management for other co-products or raw materials. In my experience, sulphur is deserving of special modifications, partly to address those sharp edges. Two other factors tend to drive sulphur supply chain excellence. First, sulphur companies need to know and own the management principles in place. Second, it is highly beneficial to custom-adapt leading practices with rigour to fit the characteristics of your supply chain, and make them work.
- **Sulphur supply chain management will surely be just as critical and challenging in the coming years. Some industries are investing in artificial intelligence and machine learning to help them with supply chain management.**

From my desk, these tools are not particularly well suited to help with sulphur logistics. However, the good news is that there are other principles and leading practices that do fit sulphur very well and you can reduce your risks through adopting them to suit your sulphur activities.