Sulfur

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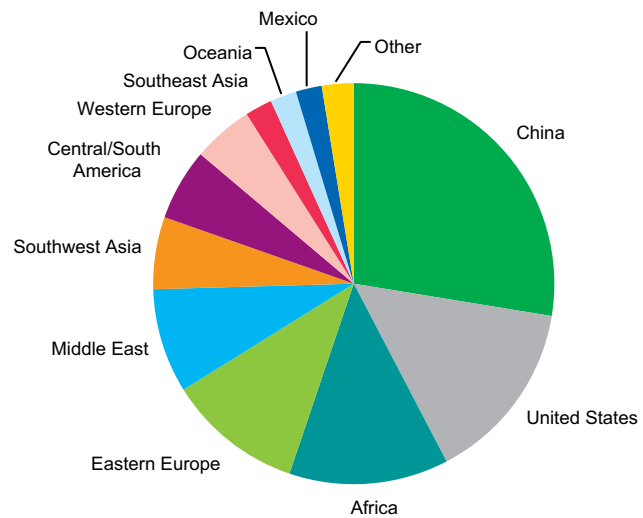
Abstract

Sulfur is one of the chemical industry's most important raw materials. It is used principally as the derivative (sulfuric acid) in many chemical and industrial processes and is particularly important in the manufacture of phosphate fertilizers, the single largest end use for sulfur. Other key uses include rubber processing, cosmetics, and pharmaceutical applications. Sulfur's importance to industrial economies and its relative ease of transportation have made it a commodity of major international interest. It is derived as a by-product from operations such as petroleum refining, tar sands recovery, heavy oil and natural gas processing, and from coking and metallurgical plants.

In the past three years, sulfur production has been affected by reduced natural gas processing, a shift in feedstock mixes from sour to slightly sweet crude, depletion of certain natural gas fields, and changes in demand from some types of fuel. However, China's growing coal chemical industry has developed strict environmental standards, which has led to the establishment of many sulfur recovery plants.

The following pie chart shows world consumption of sulfur:

World consumption of sulfur—2017



Source: IHS Markit

Approximately 90–95% of the elemental sulfur recovered is used to produce sulfuric acid. A new use that is emerging is the use of sulfur as a nutrient through ammonium phosphate derivatives and NPK compounds that are blended with sulfur. Fertilizers are the ultimate use of about 50% of the world's sulfur production. Phosphate fertilizer production

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accounts for about 85% of this total, but ammonium sulfate production is also significant. Thus, the sulfur market is very dependent on the cyclical global phosphate fertilizer market. Global phosphate fertilizer consumption spiked in the mid-2000s; however, it is expected to grow at a nominal rate of about 2.5%. Demand from downstream products such as sulfuric acid–based single superphosphate and potassium sulfate contributes to sulfur demand. There are no substitutes for phosphates in their role as a plant nutrient. After a recent slump, there are indications that sulfur demand is improving, given that the production of di- and monoammonium phosphate in China has been increasing. A similar rise in demand is also happening in India. Though these plants are designed primarily to produce ammonium phosphates, they are often used to produce NPK fertilizers along with sulfur as a nutrient.

Global sulfur supply is expected to continue to grow from both crude refining and natural gas processing operations. Future production will occur mostly in the Middle East, Asia, and Eastern Europe. Regions like Oceania are likely to see reduced production levels while North America and Africa are expected to remain at current levels. Mega projects in Kazakhstan and India, along with Kuwait and Saudi Arabia, are expected to add supplies, which will have a direct bearing on their import needs. Much of the new supplies from the Middle East will satisfy demand from new phosphate production coming up in Saudi Arabia and Morocco. This could lead to production rationalization in regions that export to the Middle East.

Healthy sulfur demand, combined with tight supply, had been keeping prices stable, but with increasing availability, prices have been trending downward in the past three to four years. The recent increase in demand from phosphate-based fertilizers has been keeping demand going. Chinese fertilizer demand also plays an important part in determining sulfur demand. China's sulfur imports decreased in 2017 because of production rationalization; however, they are expected to rise again in the forecast period. But if demand falters or does not meet expectations, it is possible that the current pricing levels will decline further.

In the medium to long term, sulfur supply will be affected by the emergence of abundant shale gas. An increase in shale gas production could lead to a decrease in production from current sulfur sources, resulting in lower production from oil and natural gas sources. This could lead to increased prices. However, increasing extraction from poorer-quality gas and crude oil, along with oil sands production, is expected to lead to increased sulfur production, mitigating the supply situation. Additionally, with stringent standards coming into force in Asia on low-sulfur gasoline and diesel, along with IMO regulations on bunker fuel sulfur content, sulfur production may increase. Bunker fuel demand has been growing at around 3% per year for quite some time, and an increase in bunker fuel consumption with minimal sulfur content could increase sulfur availability. Total demand, however, is not expected to change. Sulfur content in bunker fuels used in seaborne vessels will be reduced to 0.5% in 2020, significantly lower than the current level of 3.5%.

World phosphate fertilizer consumption is forecast to grow at a moderate average annual rate of about 2.0% during the next three years, driven primarily by the growth in Asia and Latin America. Little growth will occur in most developed countries where the agricultural economies are mature. In most developing regions, crop yields and fertilizer application rates are well below the world average and the phosphate/nitrogen fertilizer–use ratio is low, which is generally believed to have an adverse effect on crop yield. Thus, phosphate fertilizer consumption growth is being stimulated not only by population growth but also by a need to increase phosphate application rates relative to the use of nitrogen.

Global consumption of sulfur is forecast to grow at an average annual rate of just over 1.5% during 2017–22.

Contents

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