



Ferroniobium and HSLA steel

An oligopoly with a lack of substitutes creates a critical commodity



What is ferroniobium?

Ferroniobium is an iron-niobium alloy. The alloy is created from the minerals pyrochlore or columbite through an aluminothermic process.

In this process, pyrochlore or columbite concentrates are combined with aluminium, iron oxide, quicklime and sodium nitrate to create an exothermic chemical reaction at temperatures of 2,200°C. The exothermic reaction creates ferroniobium.

Why is ferroniobium used in HSLA steel?

Ferroniobium is predominantly used in the alloying of high-strength low-alloy (HSLA) steel. 80% of the global output is used in the HSLA industry.

The physical properties of ferroniobium mean that when added to steel as an alloy, it increases the steel's resistance to corrosion at the same time as making it stronger and lighter than pure steel.

The combination of these properties in ferroniobium means there are no substitutes for ferroniobium in HSLA, making it highly valuable to the steel industry.

HSLA steel is used in oil and gas pipelines, vehicles, bridges, construction equipment, tools, ship hulls, railroad tracks and any other structure that needs a good strength-to-weight ratio.

What is the ferroniobium oligopoly?

Ferroniobium production is controlled by four companies. The dominant producer is CBMM, which produces 85% of global production. Magris Resources, China Molybdenum and Anglo American produce the balance.

In geographic terms, Brazil accounts for 88% of production, Canada 11% and Russia 1%.

The oligopoly structure of the ferroniobium market means that no new niobium mines have been put into production since 1976 as existing producers can increase production to fill demand, and we believe this is unlikely to change in the near term.

As a result, there is a significant risk for any new producer, which may find it difficult to sell its ferroniobium since existing producers have been reliable and have long-term sales contracts in place with most end-users.

Which junior companies offer exposure to ferroniobium?

Despite the difficulties associated with the oligopoly, several companies are trying to develop ferroniobium projects.

Cradle Resources is seeking to develop the Panda Hill project, located in Tanzania, while [Alkane Resources](#) is attempting to develop the Dubbo polymineral project, located in Australia.

Globe Metals & Mining is completing a feasibility study at its Kanyika project, located in Malawi.

Commerce Resources and Saville Resources are advancing their joint venture at the Eldor Niobium project, located in Quebec. NioCorp has completed a feasibility study at its Elk Creek project, located in Nebraska.

Has demand for ferroniobium increased?

Ferroniobium demand has increased dramatically over the past decade, because of its importance as a microalloy in HSLA and stainless steels in the automotive industry.

Ferroniobium's importance to the automotive industry is highlighted by the World Steel Association's research.

This research points out that just US\$9 of niobium reduces the mass of a vehicle by 100kg and increases the vehicle's fuel efficiency by a staggering 5%.

Demand is expected to continue to grow due to increased requirements for higher-quality steels from Brazil, Russia, India and China. These countries mostly use steel with a lower ferroniobium intensity.

Annual ferroniobium demand is typically between 90,000t and 100,000t per year.

Just how important is ferroniobium?

Ferroniobium is one of 23 minerals that the

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'Ferroniobium is of critical importance to industrial projects requiring steel. It improves structural integrity and delivers economic efficiencies. The market oligopoly makes it difficult for new entrants, but could deliver significant rewards.' Dr Ryan D Long, Edison mining analyst

US Department of the Interior has identified as critical. A critical mineral is defined in this context as *'a non-fuel mineral or mineral material that is essential to the economic and national security of the United States, that has a supply chain vulnerable to disruption, and that serves an essential function in the manufacturing of a product, the absence of which would have significant consequences for the economy or national security.'*

Ferroniobium is strategically significant to the US due to the lack of domestic production, making it reliant on imports, and a lack of effective substitutes. This is in addition to its importance as an alloy in military equipment, such as missiles and other aerospace applications.

How is ferroniobium priced?

Ferroniobium is not openly traded on a market. Instead, sales occur through confidential sales contracts. In this opaque market, finding clear pricing figures is highly difficult.

We can get an idea of ferroniobium prices through the declared value of niobium materials that traders import or export. Prices were flat at US\$9/kg between 2004 and 2006, then rose to a high of US\$28/kg in 2012, before falling to US\$21/kg in 2016. Prices have increased since 2016, reaching US\$33/kg in late 2018.