Stringent regulations for the 2022 Winter Olympics worsen China's supply chain crisis as outlined in this report. Automotive, electronics, solar, and construction manufacturers will face skyrocketing prices and severe shortages.

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EXECUTIVE SUMMARY

• China accounts for more than 50 percent of the world’s steel and aluminum production while possessing a near-monopolistic dominance in the production of magnesium and silicon. Production requires large amounts of energy and causes substantial pollution.

• The Chinese government imposed stringent regulations designed to reduce energy use and lower pollution in advance of the winter Olympics. Restrictions have severely impacted materials production, and Chinese metal producers face difficulties in maintaining production.

• Production decline has created skyrocketing prices and severe metal shortages for global manufacturers in the automotive, electronics, solar, and construction industries.

• Companies should increase the visibility and risk assessment across their multi-tier supply chains to anticipate rising material costs and limit the risk of shortages.
China has leveraged its abundant mineral deposits and lax environmental laws to become a global mining powerhouse in the 21st century. The country accounts for more than 50 percent of the world’s steel and aluminum production while possessing a near-monopolistic dominance in the production of magnesium and silicon. These metals are critical materials used in various manufacturing processes across different industries.

A key pillar of the Chinese economy, the metallurgical industry is one of the most energy-intensive and environmentally detrimental sectors of the economy. Industry estimates suggest that greenhouse gas emissions by this sector account for roughly one-third of China’s overall carbon emissions.

In 2020, President Xi Jinping announced China’s pledge to become carbon neutral by 2060. Since then, the Chinese government has implemented a legislation series dubbed the “Dual Control System of Total Energy Consumption and Intensity” to achieve its climate objectives. The system allows each provincial government to set its own energy consumption target and develop individualized plans to reach it. However, by September 2021, only 10 of the 30 Chinese regions had accomplished their energy reduction goals. The lack of discernible progress resulted in provincial authorities enforcing harsher penalties on provinces that failed to meet their energy targets.

With Beijing also set to host the 2022 Winter Olympics from February 4 -20, stringent restrictions on the metals industry are likely to remain in place until March 2022, causing further shortages to an already depleted metals market. Due to increased media attention on Beijing during major international events such as the Winter Olympics, Chinese officials have extended smog-reducing efforts to 64 cities. The central authorities have specified air quality targets for harmful microscopic particles and set limits on the number of severe pollution days allowed in cities between October 2021 and March 2022. The area encompasses some of China’s most important metal-producing regions. Officials have signaled that the steelmaking regions of Tianjin and Tangshan, the magnesium mines in Shanxi, and the aluminum hubs of Shandong and Henan province will face strict production control measures during the first quarter of 2022.
Energy and environmental regulations have impacted the production output of several key metals in China over the course of 2020. The drop in production levels will have implications on the availability of these critical materials, particularly on magnesium, silicon, aluminum, and steel.

**Magnesium: Smelters face production cuts and increased environmental inspections**

![Global Magnesium Production in 2020](image)

Figure 1: Magnesium production by country in 2020. Source: United States Geological Survey
As seen in Figure 1, China accounted for more than 80 percent of the world’s magnesium production with 900,000 metric tons, followed by Russia with 60,000 metric tons in 2020. Most of China’s magnesium deposits are located within Yulin county in Shaanxi province. The province alone accounts for roughly 60 percent of China’s total magnesium exports.

China’s magnesium production began experiencing setbacks in September 2021 when officials ordered magnesium smelters in Yulin county to either suspend or reduce production levels. In total, 35 of the 50 magnesium smelters across Yulin county ceased production, while the remaining 15 operated at 50 percent capacity. Although most of the county’s magnesium plants were allowed to resume operations at 80 percent capacity in October 2021, the regulatory uncertainty has forced magnesium smelters in Yulin to continue operations at only half of the allocated capacity for the remainder of 2021.

In December 2021, central authorities stepped up environmental inspections at magnesium plants in Yulin in the run-up to the Winter Olympics. Smelters that fail inspection criteria must immediately halt operations to perform equipment maintenance.

In neighboring Shanxi province, which accounts for 15 percent of China’s total magnesium output, producers have warned of potential stoppages as authorities crack down on heavy-polluting industries before the Winter Olympics. Producers in Shanxi are increasing their stockpiles in preparation for a potential ban on production.
Silicon: Automotive industry faces disruptions from energy consumption restrictions

Similar to magnesium, China possesses a near-monopolistic dominance in silicon production, accounting for approximately 70 percent of the world’s supply, as seen in Figure 2. Silicon is used to make alloys including aluminum-silicon, an important input for manufacturing engine blocks and cylinder heads in the automotive industry, and ferrosilicon (iron-silicon) used in manufacturing silicon steel for transformer cores and electromotors.

![Figure 2: Global silicon production in 2020. Source: United States Geological Survey](image)

Traditionally, producers tend to rely on the ample supply of clean hydroelectric power during the rainy season to ramp up silicon production. However, due to energy consumption restrictions, silicon production only reached maximum capacity from June to August in 2021. In September 2021, authorities in Yunan Province, which accounts for 20 percent of China’s total silicon production, announced the decision to cap the production of local industrial silicon companies at no more than 10 percent of their August output. Similar power rationing measures have affected silicon producers in Sichuan province where producers were ordered to suspend production at least eight hours a day in the same month.
Largely unaffected by environmental regulations in the lead-up to the Winter Olympics, silicon production will remain muted in China until after the conclusion of the dry season. Producers plan to use the lull to undertake critical maintenance works before ramping up production during the next monsoon season in June.

**Aluminum: Smelters to halt production during Winter Olympics due to severe pollution**

As seen in Figure 3, China accounts for more than 57 percent of the world’s supply of aluminum. In September 2021, the Inner Mongolia Autonomous Region along with the provinces of Qinghai, Gansu, and Yunnan announced the decision to cancel preferential electricity prices for aluminum smelters. The Xinjiang Uygur Autonomous Region, China’s second-largest aluminum producer, also ended preferential electricity prices for aluminum smelters on January 1, 2022.

![Global aluminum production (thousand metric tons)](image)

**Figure 3: Global aluminum production in 2020. Source: United States Geological Survey.**

Moreover, aluminum smelters in other Chinese regions – most notably in Guizhou, Henan, Guangdong, Guangxi, and Ningxia – were affected by power and production cuts last year. For instance, smelters in Guangxi province were only allowed to operate for two days a week while smelters in neighboring Guangdong province had regular power supplies on Fridays and Saturdays.
Following various disruptions, as seen in Figure 4, production in the aluminum market is expected to remain constrained in the first quarter of 2022. Severe weather pollution in Shandong and Henan provinces, two major aluminum-producing regions, have forced the intervention of the central authorities. Aluminum producers in these provinces can only continue production while using eco-friendly technologies until February 4, while all production activities must be halted from February 4 – February 20 due to the Winter Olympics.

Local governments have also ordered aluminum smelters in other provinces such as Yunnan, Guangxi, and Guizhou to halt production until the end of March due to further curbs on pollution amid the 2022 Winter Paralympics set until March 13.
Steel: 56 percent of world’s steel supply faces restrictions until March 15

Similar to aluminum, China accounts for more than half of the world’s steel supply, as seen in Figure 5. According to the China Iron and Steel Association (CISA), steel mills had been ordered to shut or cut production because of the power supply crunch since September 2021. In addition, new regulations introduced by two Chinese Ministries stated that steel production cuts would continue until March 15. The order aims to help Beijing combat environmental pollution in the run-up to the Winter Olympics.

In the first phase (November 15 – December 31, 2021), steel producers in the rust belt area of Beijing-Tianjin and the provinces of Hebei, Shanxi, Shandong, and Henan must complete production cuts in line with local targets. In 2020, these cities accounted for more than 40 percent of China’s total crude steel output. According to our research data, the local government of Hebei province announced a decision for all steel enterprises in the province, including state-owned enterprises and entities from Tianjin, to limit steel output starting from November 15, 2021. Similarly, at least 22 steel manufacturers in Tangshan have halted production from November 17, 2021.

Phase two coincides with the Winter Olympics from February 4 – February 20. It aims to reduce China’s air pollutants and limit off-peak production of steelmakers to 30 percent. Steelmakers who employ blast furnaces must abide by regulations stipulated in phase two, while electric arc furnaces are exempted.
RECOMMENDATIONS

- Everstream Analytics is advising its customers to keep abreast of the latest developments and restrictions impacting production in China using Everstream Analytics’ Intelligence Monitoring. The solution delivers early and near real-time alerts vetted by an expert team of intelligence analysts.

- As strict environmental regulations are likely to continue into the first quarter of 2022, Everstream customers will be alerted about potential shortages and delivery delays from Chinese suppliers, with recommendations to consider suppliers in alternate geographies.

- Customers should rely on Everstream Analytics’ Supplier Risk Assessment to understand potential risks across multi-tier supply chains. This tool helps identify which 2nd or 3rd tier suppliers may be subject to production halts or reduced production capacity.
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