

Ferro-alloys Global Market Outlook

What are the key developments in the main ferro-alloys markets, and how will these affect prices?

Ferro-alloys prices have generally seen increases in 2017. What's driving price movements, and will the trend continue? In this piece, Metal Bulletin Research provides market analysis snapshots for ferro-silicon, silicon metal, manganese, chrome, nickel, molybdenum and vanadium, along with forecasts into 2018.

Metal Bulletin

Ferro-silicon

- ▶ Ferro-silicon prices found a floor in Q4 2016 before improving through 2017
- ▶ Prices spiked in Q3 2017 on supply-side concerns, particularly in China
- ▶ We forecast prices will remain elevated in Q4 2017 and into early 2018

After facing immensely difficult conditions in 2015 and the bulk of 2016, ferro-silicon prices finally began to move higher in the fourth quarter of 2016 on the back of the cost-driven increases evident throughout the steel, manganese and chrome markets.

Ferro-silicon prices remained elevated through the first eight months of 2017 before spiking higher in September 2017 after environmental inspections by the Chinese government forced the closure of ferro-silicon producers and prompted ferro-silicon supply shortages. European ferro-silicon prices soared to around €1,450 per tonne in September 2017. US prices have also seen impressive strength in recent months on sharply reduced import flows into the market.

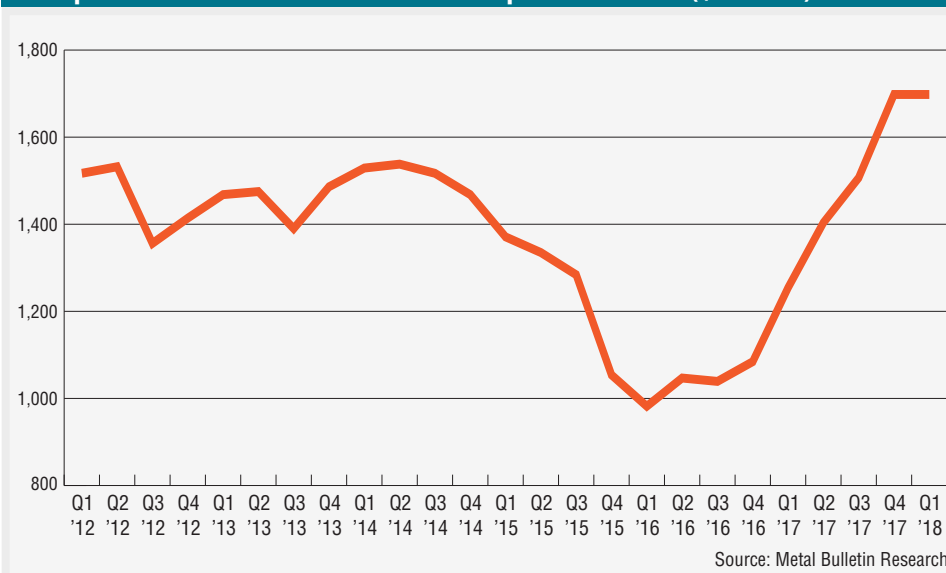
Ferro-silicon prices have since seen

a modest downward correction as Chinese ferro-silicon furnaces restarted production after the government-enforced environmental stoppages, but prices will see further support later in the fourth quarter 2017 and into the first quarter of 2018 on seasonally reduced hydroelectric power supplies in the northern hemisphere's winter season. High power costs in both China and Europe will lead to reduced ferro-silicon output and will help to offset the modest downturn expected in steel output in the fourth quarter 2017.

As ferro-silicon supplies return to more normal levels by the second quarter of 2018, we expect to see a modest downward pricing correction, although average annual prices in 2018 will remain above those in 2017.

Even as prices correct, we will not see ferro-silicon prices return to their recent lows. Instead, our view is that prices will improve from 2015-16's unsustainable lows and return to a level more reflective of production costs and the underlying supply-demand balance. ■

European ferro-silicon 75% – Prices & price forecast (\$/tonne)



Silicon metal

- ▶ US silicon metal prices have benefited from successful trade action
- ▶ Environmental closures spurred a Chinese supply shortage, and high winter power costs will keep Chinese supply tight in the coming months

US silicon metal prices look set to extend increases into November as the market is being propelled higher on worries about tightened supply since the imposition of preliminary dumping duties on imported metal from Brazil, Australia and Norway. The silicon metal spot price was last assessed at \$1.26-1.29 per pound, reaching the highest point since July 2015. US silicon metal prices are up more than 26% from \$1.00-1.02 per lb at the start of 2017.

The anti-dumping investigations have cut supply into the US market, and related tightness should persist well into 2018. The investigation has also been delaying 2018 contract negotiations, with a wide gap between supplier and buyer offer-price expectations. Typically such agreements would have already

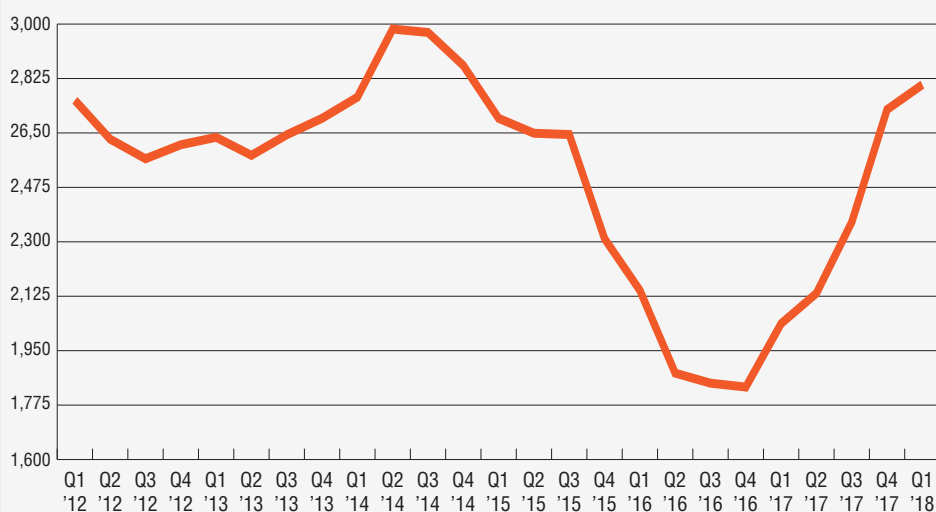
been settled, at least for the first quarter of the calendar year, but buyers have no interest so far in supplier offer prices. Industry sources reported offers at up to \$1.40 per lb for 2018 supply, with buyers setting their bids at mostly below \$1.30 per lb.

Environmental protection checks instituted by the Chinese government have prompted disruptions at refineries in southern China, which are set to persist in the near term. The inspections led to significant capacity closures during the third quarter 2017, with the supply shortfall driving incredible pricing gains and propelling Chinese silicon metal export prices to multi-year peaks in September. Both Chinese domestic and export silicon metal prices are set to increase further in the fourth quarter

2017 ahead of the dry season, with lower rainfall putting upward pressure on electricity prices in a country heavily reliant on hydro-generated power. Higher production costs have also weighed on refineries' margins.

European prices also look set to climb in the fourth quarter 2017, with firm fundamentals driving the market in coming weeks. Limited supplies and firm demand has pushed prices up to €2,215-2,325 (\$2,581-2,710) per tonne for Metal Bulletin assessed grade-441 silicon. Grade-553 spot prices are also up to €2,150-2,200 (\$2,506-2,564) per tonne. Demand strength is expected to persist through the middle of the fourth quarter, at least, on low inventories and restricted supply. ■

European silicon metal – Prices & price forecast (\$/tonne)



Source: Metal Bulletin Research

Manganese

- ▶ Production cuts and a resurgence in Chinese demand propelled ore prices higher in Q4 2016, and the supply response led to moderation in ore prices during 2017
- ▶ Alloy prices followed ore price volatility initially, and are now showing increasing stability

Manganese ore and alloy prices plunged throughout 2015 and into 2016, in line with collapsing steel prices and steel production cuts. By late 2015, numerous manganese ore and alloy producers had closed mines and alloy furnaces in response to record-low pricing. The contraction in manganese ore and alloy production coincided with an improvement in demand from Chinese steelmakers in early 2016, helping manganese prices to find a floor, and subsequently leading to impressive gains in manganese ore prices.

Manganese ore prices began accelerating again in August 2016, on the back of renewed demand from Chinese steelmakers thanks to government economic stimulus activity. As demand from Chinese steelmakers improved,

manganese ore shipments out of South Africa faced significant transportation disruptions and delays, leading to supply shortages and driving manganese alloy prices higher.

Metal Bulletin's manganese ore index 44% Mn cif Tianjin peaked at over \$9.00 per dry metric tonne unit (dmtu) in December 2016. Manganese ore prices began to correct, with high prices prompting the restart of idled and high-cost manganese ore capacity. High prices also encouraged the transport of manganese ore via non-traditional routes, diminishing the impact of the issues at the Port Elizabeth facility in South Africa. Manganese ore prices have since traded in the band of \$4.50-6.50 per dmtu. We expect the downward correction in manganese ore prices to

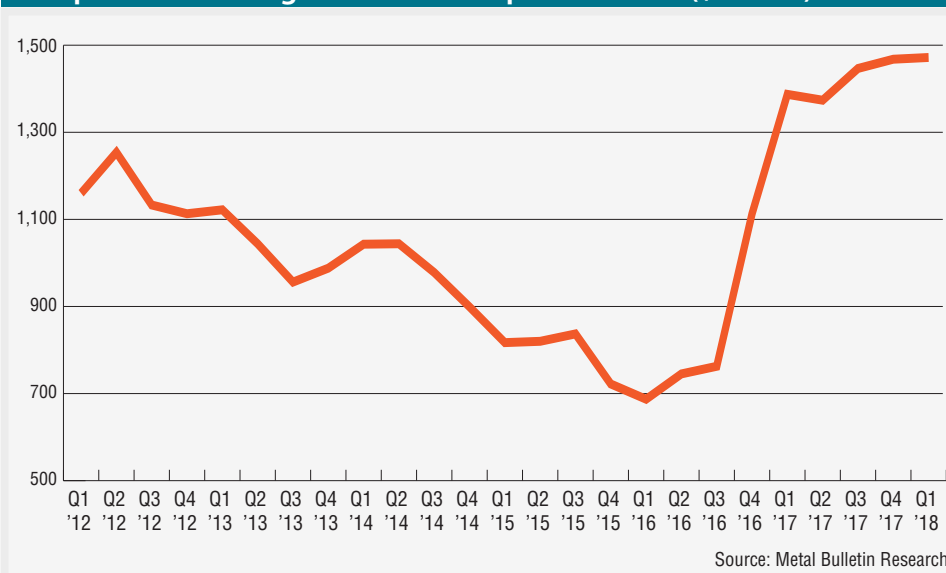
continue through the remainder of 2017 and into 2018, with prices gradually returning to long-term sustainable prices of around \$4.00-4.50 per dmtu.

Manganese alloy prices followed the ore price volatility, with European ferro-manganese prices bottoming out in the first quarter of 2016 at €620 per tonne, before surging late in the year and peaking at €1,350 per tonne in the first quarter of 2017. Similarly, European silico-manganese prices found a floor in the first quarter 2016 at €585 per tonne, before peaking in the first quarter 2017 at around €1,270 per tonne. European manganese alloy prices have now stabilized at around €1,200 per tonne for ferro-manganese and €1,050 per tonne for silico-manganese.

We are forecasting declining demand for manganese ore and alloys next year, in line with reduced Chinese steel production. Declining demand will coincide with rising manganese ore and alloy supply as elevated prices during 2017 prompt additional swing and high-cost producers to return to the market. As a result, manganese ore and alloy prices are likely to face a downward correction in 2018.

Still, manganese ore, ferro-manganese or silico-manganese prices are not expected to plummet, but move to a level more reflective of production costs and the underlying market fundamentals. ■

European ferro-manganese - Prices & price forecast (\$/tonne)



Chrome

- ▶ After sharp downward correction in Q3 2017, benchmark chrome prices will move higher in Q4
- ▶ High-carbon ferro-chrome spot market prices slid on reduced stainless output and ample stocks
- ▶ Ferro-chrome prices are expected to trend stable to lower in the near term

In line with other steel and alloy markets, chrome prices plunged in 2015 and 2016, with prices falling below production costs and prompting numerous chrome ore mine and ferro-chrome smelter closures, particularly in South Africa. The reduction in supply helped to propel chrome prices sharply higher in late 2016 and early 2017 as demand from stainless steel mills, particularly in China, recovered. Charge chrome benchmark prices have shown great volatility this year, with first-quarter 2017 contracts settled at \$1.65 per lb, before plunging in the third quarter 2017 to just \$1.10 per lb, and most recently settling higher at \$1.39 per lb in the fourth quarter 2017.

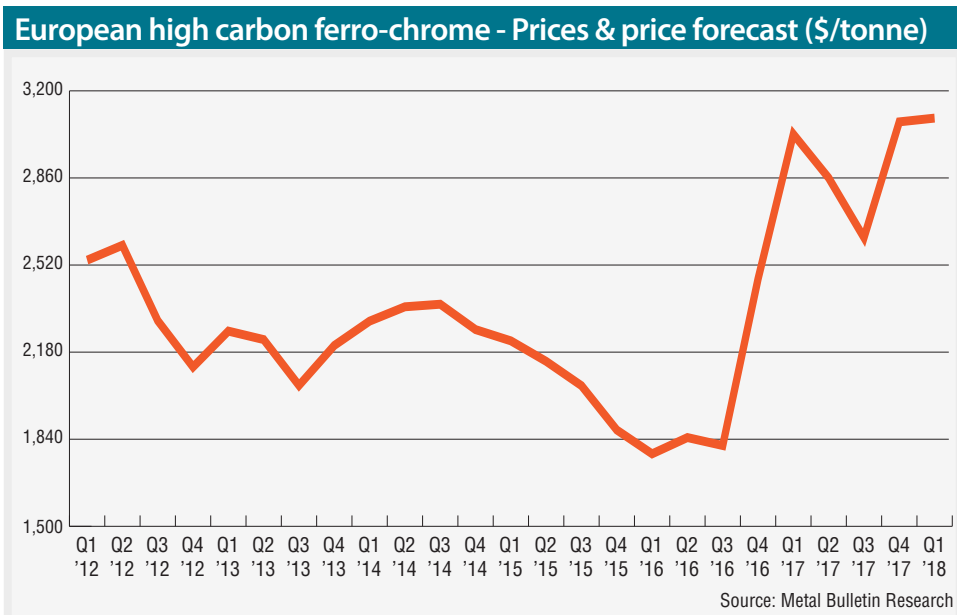
Despite the recent improvement in the fourth-quarter contract prices, however, spot high-carbon ferro-chrome

prices have been retreating again in recent weeks, especially in China. The fourth quarter of the year is typically a slower period, with stainless steel mills in Europe in particular having reduced need for raw materials given planned outages during the Christmas and New Year period. Furthermore, we understand that stainless mills in most regions are well-stocked in raw materials for the final quarter of the year, including in China. Indeed, China's major stainless steel mills lowered their tender offers for ferro-chrome supplies for October delivery.

Short-term factors supporting elevated prices over the past one to two months are also dissipating. Transport issues at South African ports have been largely resolved, with only the port at Durban still experiencing some

delays into October. This should free up previously delayed shipments of chrome materials, which in any case may now increase given that the winter season has come to an end in South Africa – South African ferro-alloy smelters typically reduce operating rates during this time due to higher electricity tariffs during the winter for industrial users.

Our expectations for now are that chrome prices will trend stable to lower through the fourth quarter given ample stock levels across most parts of the stainless steel value chain. The main uncertainty with regard to short-term expectations of further price declines for chrome products comes from developments in the nickel market. Sharp falls in nickel prices through mid-September had seen stainless steel buyers curtail their purchases as they waited for stainless steel prices to stabilize at a lower level. In turn, stainless steel mills, particularly in China, were rethinking their fourth-quarter production plans in anticipation of lower demand. All of this was seen as being negative for raw material demand and thus for prices. A sharp reversal of the downward movements in nickel prices may spur the opposite response, lifting demand and prices for ferro-chrome. Given ample stock levels across most parts of the stainless steel value chain, we see this as unlikely but not impossible. ■



Nickel

- ▶ Gains in Chinese stainless production and government-enforced nickel pig iron (NPI) facilities have spurred higher prices
- ▶ Nickel supply is poised to rise with increased output from Indonesia and the Philippines
- ▶ The market is expected to be in deficit for the second consecutive year in 2017

In line with other steel and alloy markets, nickel prices plunged through 2015 and into early 2016, with nickel pricing recovery accelerating from mid-2016 amid growing nickel supply concerns from Indonesia and the Philippines, as well as improving demand from China's stainless steelmakers. Nickel prices peaked in November 2016 at \$11,735 per tonne before retreating through most of the first half of 2017 as supply-side developments became increasingly bearish, despite continued expansion in demand from Chinese stainless steelmakers.

In mid-2017, LME nickel prices again found a floor at around \$8,715 per tonne, with government environmental inspections in China forcing the temporary closure of Chinese NPI

production facilities and prompting renewed supply-side concerns, driving prices higher to a peak of \$12,380 per tonne in September.

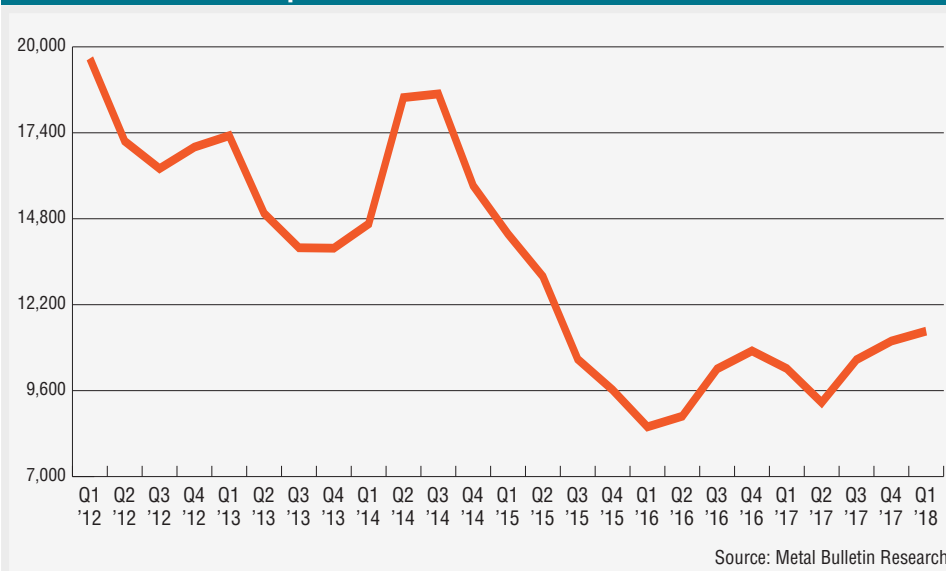
The nickel supply fundamentals went from bullish to bearish this year, first with Indonesia relaxing its export ban on low-grade nickel ores, and then with the Philippines' government changing its stance on mining, which most likely means that nickel ore exports from the Philippines will also be rising. Indonesia is also behind climbing global refined nickel production, with global output forecast to grow 3.1% in 2017 as Indonesia boosts NPI output. In part, this came as Indonesia ramped up NPI/ferro-nickel production after a series of investments by Chinese producers in

recent years began to bear fruit.

Although nickel overshot on the upside at its September high of \$12,380 per tonne, there were a number of good reasons for the summer rally: The Philippine authorities have begun talking tough on mining again; some of the nickel majors have downgraded their annual guidance, reportedly due to odd unplanned disruptions; there have been sporadic NPI capacity suspensions; First Quantum put Ravensthorpe on care and maintenance; and VNC is facing the threat of closure. On the demand side, the Chinese stainless steel market went through a phase of raw material restocking and raised production in the third quarter 2017, which drew on domestic stocks of nickel.

Given all this, we cannot be surprised that nickel prices rallied as strongly as they did this summer, especially as this market has a tendency to overshoot. We cannot overlook the enormous inventory overhang still burdening this market; it may still be close to 1 million tonnes, all told. With so much metal around, deficits in the order of 60,000 to 80,000 tonnes this year and next do not make much of a dent. The global nickel market is set to record a deficit of around 40,000 tonnes in 2017, for a second consecutive year. But with total stocks still exceptionally high, it will require far deeper deficits to justify a bullish near-term price outlook. ■

Nickel LME - Prices & price forecast (\$/tonne)



Molybdenum

- ▶ Chinese ferro-molybdenum prices are at a premium over Europe on strong demand from steelmakers
- ▶ Molybdenum supply remains ample, with supply forecast to exceed demand in 2018
- ▶ Due to low-cost byproduct production, prices are expected to remain below long-term averages

Volatility has been a prevailing feature of the molybdenum market in recent years. Ferro-molybdenum prices hit 12-year lows in the fourth quarter 2015, but prices have since improved in the past two years from their lows on the back of improved demand from stainless steelmakers and modest gains in the energy sector. Despite some recovery, however, prices remain well below their 2010-14 heights. Growth in low-cost molybdenum byproduct supply is in part responsible for holding prices below long-term averages. Long-term average inflation-adjusted ferro-molybdenum prices are around \$30 per kilogram in Europe, with current prices of around \$20 per kg below long-term averages.

Chinese domestic ferro-molybdenum

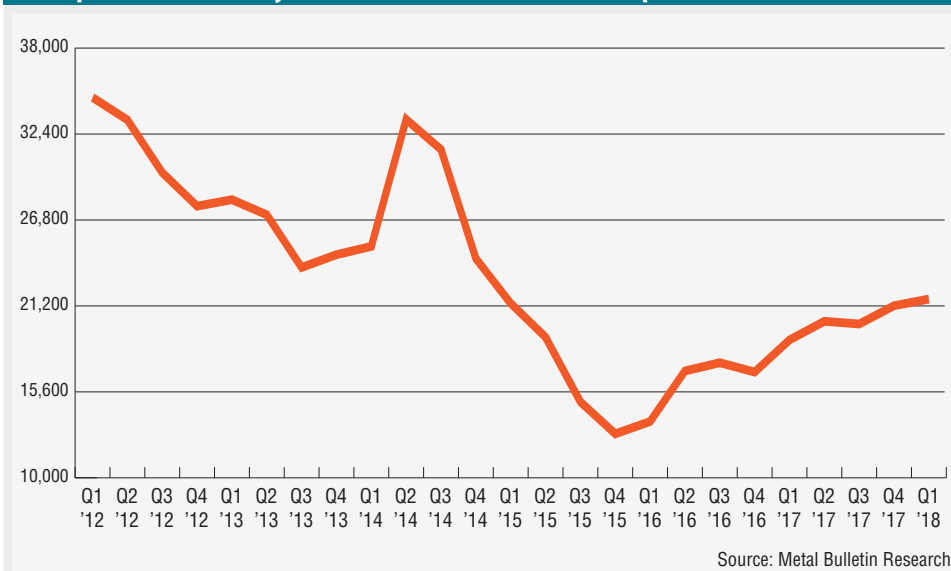
prices are around \$25 per kg and at a premium compared with Europe because of strong steel demand in China. In-warehouse Rotterdam ferro-molybdenum on a spot basis was last assessed at \$20.85-21.20 per kg. Suppliers are trying to breach \$22 per kg, but so far that is proving something of a psychological barrier for consumers in Europe, who seem convinced that if rallying Asian prices were not a factor the European market may well be lower.

With developments in China influencing prices in both European and US markets, any weakening in Chinese prices would inevitably affect prices elsewhere. We do not see the same magnitude of supply-side pressures in the molybdenum market as in numerous

other alloy markets at present, and while we expect prices to exhibit the volatility typical of the molybdenum market in the coming months, prices will remain in a more narrow range than in other alloy markets in the final months of 2017.

Steel pipes are the single-largest consuming sector for molybdenum, making the longer-term outlook for molybdenum highly dependent on the oil and gas industry. Oil prices at \$65 per barrel and below (as we are seeing at present) will subdue molybdenum prices. We expect to see molybdenum supply driven by copper-molybdenum byproduct producers in the longer term, with production decisions made in line with copper market conditions rather than underlying molybdenum market fundamentals. Several copper-molybdenum mines will be coming online in the next several years in Latin America, with molybdenum supply forecast to rise faster than demand next year. ■

European ferro-molybdenum 65-70% - Prices & price forecast (\$/tonne)



Vanadium

- ▶ Increasingly stringent vanadium requirements in Chinese rebar supports the vanadium market
- ▶ Chinese environmental restrictions clamp down on vanadium supply
- ▶ Combination of rising demand and declining supply are expected to support ferro-vanadium prices into 2018

The vanadium industry is facing a plethora of factors that have resulted in the tremendous pricing gains evident globally in the second half of 2017. Much to the chagrin of vanadium buyers, we believe these factors will continue to hold vanadium pricing at elevated levels through the fourth quarter 2017 and well into 2018. On the demand side, impressive gains in Chinese steel production this year, with Chinese steel output poised to hit a new record high in 2017, is leading to improved vanadium consumption.

Lending further support to vanadium demand are increasingly stringent vanadium requirements in Chinese rebar products, which we understand could increase Chinese vanadium

consumption by 30%, or 10,000 tonnes per year. Meanwhile, while Chinese vanadium demand is rising, Chinese vanadium production is declining as the government clamps down on polluting industries. Not only is the Chinese government closing vanadium production facilities for environmental inspections, but it is also restricting imports of vanadium-bearing slags and residue – a key raw material supply source for vanadium pentoxide production within China.

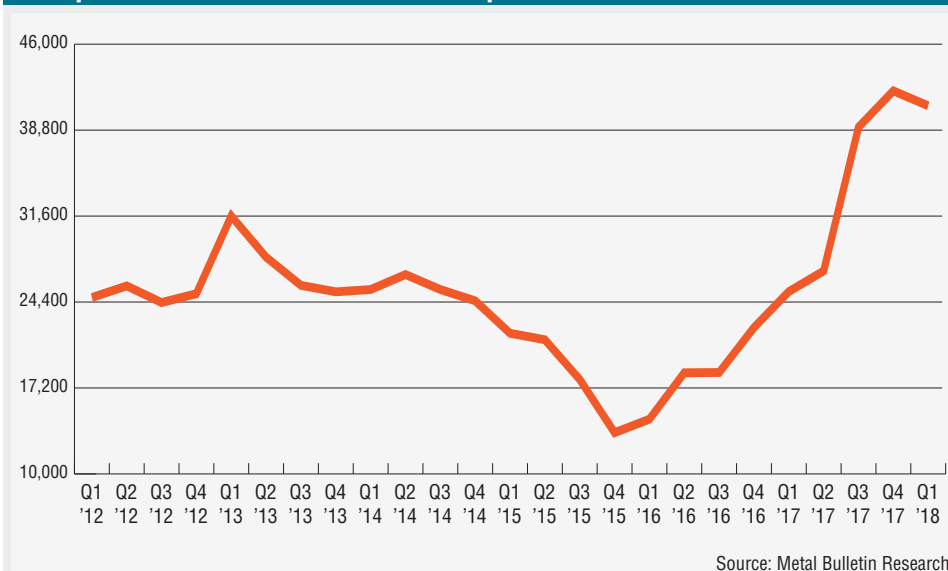
Developments in the Chinese market led the fourth-quarter global vanadium prices higher in the third quarter 2017. After bottoming out at around \$13 per kg in the fourth quarter 2015, European ferro-vanadium prices stagnated at

\$20-26 per kg through the bulk of 2016 and the first half of 2017, before spiking to nearly \$50 per kg in the third quarter 2017. We expect European ferro-vanadium prices to remain above \$30 per kg well into the fourth quarter 2017.

Price recovery of this magnitude, and the likelihood of the vanadium price recovery being prolonged and not just a temporary blip, will inevitably spur discussion of alternative supplies and substitution. We expect to see increased processing of vanadium-bearing slags and residue. This processed material will help to ease the supply crunch, but will see higher cost production in South Korea versus China, and there will be a delay as processing operations and trade flows are established.

Substitution to increased ferro-niobium consumption versus ferro-vanadium is also a consideration. However, we understand only about 20-25% of consumption can effectively be switched to ferro-niobium, and steelmakers are hesitant to do so because it affects the quality of the steel, making it increasingly brittle. With no simple remedies to the current vanadium shortage, we are forecasting vanadium pricing to remain elevated for at least the next six to nine months. ■

European ferro-vanadium - Prices & price forecast (\$/tonne)



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