



ZIRCON INDUSTRY AND MARKET TRENDS REPORT

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MARKET TO STAY TIGHT IN 2022

- The global zircon market was in a state of imbalance in 2021, with zircon supply struggling to meet demand despite the 15% year-on-year growth in global zircon supply. Major western zircon producers drew down inventory levels in order to supply customers' needs with the result that sales for 2022 are likely to be constrained by production.
- Underlying demand is strong across most geographies and end-use applications. TZMI estimates global zircon demand in 2021 at 1.21 million tonnes, up 19% year-on-year, led by India, Europe and China in volume terms. Compared to 2019 demand, global zircon consumption for 2021 is only 3% above the pre-pandemic demand levels.
- In addition to the increase in the underlying prices of zircon, logistical challenges were a major theme throughout the year with zircon exporters struggling to deliver timely shipments to end-users. The surging freight rates resulted in zircon prices in CIF terms trending at levels not seen since 2012. By year-end 2021, CIF price levels of above US\$2,000 per tonne for premium zircon were increasingly prevalent particularly for uncontracted spot sales into China.
- Major western zircon producers had implemented a series of quarterly price increases during the year, but western prices continue to lag Chinese domestic spot prices. Chinese domestic zircon prices started 2021 at close to RMB10,000 per tonne inclusive of VAT, rising to as high as RMB18,000 per tonne inclusive of VAT in August before retreating to RMB16,550 per tonne inclusive of VAT by the end of the year. At the peak of domestic Chinese prices in August 2021, the price gap between imported prices (landed) and domestic Chinese spot prices was as high as US\$800-900 per tonne.
- The market tightness and elevated pricing trends witnessed during 2021 have continued into Q1 2022 and TZMI expects those trends to persist for most of 2022. Major western producers have implemented another round of price hikes in Q1 2022 and it appears further price increases may occur for Q2, as Chinese domestic zircon spot prices have been trending upwards since the start of the year.
- It is important to note that the major western zircon producers, which collectively accounts for 65-70% of global supply, have lagged small and medium producers in implementing price increases. Quarterly price adjustments announced by western producers have also lagged spot sales by a long way.
- Supply growth from existing operations appears to be more constrained for 2022 as several mines are scheduled to transition to lower grade orebodies despite the onset of several new projects and the return to normal operations at Richards Bay Minerals and in Indonesia.
- Demand appears to be holding up well, despite the uncertainty surrounding the European market, particularly in the ceramics end-use segment which is set to experience significant input cost inflation due to rising energy prices exacerbated by the ongoing Ukrainian conflict.
- It is understood that the conflict has also thrown into disarray the supply of other key materials for the ceramics industry such as white clay and alumina, for which an important fraction is sourced from Ukraine. In terms of zircon, Ukraine's output is estimated at approximately 2% of global zircon output in 2021 and TZMI has made provision for lower zircon supply from this region in 2022 (down approximately 60% from 2021 levels) due to anticipated supply disruptions from the conflict.
- In summary, TZMI estimates the zircon market to remain tight for 2022 with prices remaining elevated at above the US\$2,000 per tonne level. New supply is necessary to avoid the potential of long-term demand destruction due to a lack of supply.

MARKET UPDATE

Zircon sand market confidence improves

Chinese domestic commodity transportation has been heavily disrupted in many regions since 15 January 2022. Many zircon sand suppliers are actively processing previous orders and have stopped accepting new orders. Market confidence has improved with suppliers increasing price quotations and holding back sales in anticipation of further price increases to come.

Architectural materials benefit from old town renewal investment

Old township renewal is a key task in 2022 according to China's National Conference on housing and urban rural development. More than 100,000 residential areas have been earmarked in the old township renewal development plan in 25 provinces across China for 2022. This investment is expected to drive consumption of architectural materials including ceramic tiles and other products.

ZIRCON FEEDSTOCK PRODUCERS

Base Resources 2021 and Q4 report

Base Resources' flagship Kwale mine produced 6,400 tonnes of zircon in Q4 2021, 3,000 tonnes more than Q3 2021, taking its 2021 calendar year total production to 27,000 tonnes. Q4 2021 zircon sales totalled 6,200 tonnes, compared to 6,400 tonnes in the same quarter in 2020. On a full year 2021 calendar year basis, Base's zircon sales volume was 26,100 tonnes. Base reported that the price for its Q4 contracts increased by approximately US\$600 per tonne. Due to ongoing uncertainties in China and the seasonally weaker winter period, average zircon pricing agreed for Q1 2022 contracts have seen only a marginal increase from Q4 2021.

Eramet full year 2021 results

Eramet reported full year 2021 results with the Mineral Sands business unit turnover up to €349 million, an increase of 26% from 2020. EBITDA increased by 51% to €137 million, reflecting the good operational performance as well as a favourable price environment, partially offset by increased energy costs and an unfavourable currency effect. In Senegal, mineral sands production continued to increase in 2021, reaching a record level of 804,000 tonnes (up 6%). Zircon production from Eramet's mineral sands mine in Senegal was up 8% to 64,000 tonnes in 2021, while zircon sales volume grew 2% to 63,000 tonnes.

The average zircon price achieved for sales in 2021 was US\$1,496 per tonne FOB, an increase of 12% over 2020. Eramet said demand for zircon is expected to remain strong in 2022, nonetheless with some uncertainties (logistics, energy prices in Europe, construction market in China). However, the market is expected to remain in deficit, which should enable prices to hold up well in 2022.

Guangdong Orient releases 2021 financials

Guangdong Orient Zircon Ind Sci & Tech Co., Ltd reported its financial forecast for 2021 with net profit for the year expected to be RMB140-180 million, a reversal of two consecutive years of deficit. The zircon industry recovered in 2021 with increased prices and sales for key products. Guangdong Orient Zircon Ind Sci & Tech Co., Ltd reported 2021 financials with revenue for 2021 increasing 67.5% year-on-year to RMB1.29 billion. Net profit for listed shareholders was RMB151 million, an improvement from the deficit status in 2020. Prices for most zircon products increased from 60% to 100% on an annual basis due to a recovery in the industry driven initially by feedstock supply tightness. ZOC sales for the company increased 205.9% year-on-year with sales for zirconia, opacifier, compounded zirconia and fused zirconia all increasing substantially. Exports of fused zirconia, ZOC and compounded zirconia increased 104%, 64% and 40% for respectively, with agreements signed between the company and international customers.

Kenmare Resources Q4 report

Kenmare's Q4 2021 zircon production increased 11% to 12,400 tonnes compared to the previous corresponding period. For the full year 2021, zircon production was up 30% to 56,300 tonnes and concentrate production increased by 25% to 43,900 tonnes. During the quarter, Kenmare shipped a record 15,700 tonnes of zircon to customers. The company said the tight supply situation for zircon had led to quarter-on-quarter price increases in Q2, Q3 and Q4 and this had continued into 2022, with further price increases expected in Q1.

Iluka Resources announces Q4 report

Iluka announced its Q4 2021 results with zircon production of 94,000 tonnes (Q4 2020: 61,000 tonnes). For the full year, zircon sales were 355,000 tonnes, reflecting continued strong demand for Iluka's products across all markets. Iluka said the weighted average price achieved in Q4 for premium and standard zircon was US\$1,590 per tonne. Zircon sand prices increased US\$120-\$170 per tonne in Q4, with a further US\$220 per tonne increase effective 1 January. Guidance for the 2022 annual zircon production (including zircon in concentrate) is lower at 285,000 tonnes for the group. Iluka has also said that its Q1 2022 zircon sales are fully contracted.

Image Resources releases 2021 results

Image Resources released its Q4 2021 report. During the quarter, Image completed the sale and purchase agreement to acquire a package of tenements in Eneabba for A\$24 million cash. HMC production was up 83% quarter-on-quarter to 69,700 tonnes. In 2021, HMC production was 295,000 tonnes which was within the guidance range. Year to date 2021 sales of HMC were 292,600 tonnes, which was just below the 2021 guidance of 300-320,000 tonnes. Q4 pricing for HMC was up 43% quarter-on-quarter to A\$904 per tonne due to increased benchmark prices for zircon and ilmenite and higher average zircon content in the company's HMC.

Image buys McCalls; updates mineral resources

Image Resources announced the binding sale and purchase agreement of the McCalls project from Sheffield Resources. Total consideration for the acquisition was A\$12 million cash. The McCalls mineral resources is estimated at 5.8 billion tonnes at 1.4% THM. Image Resources released a mineral resource update on seven of the eight the Eneabba tenements acquired from Sheffield Resources, and also at its Boonanarring and Atlas projects. At Eneabba the total mineral resources for the seven projects is 199 million tonnes at 2.8% THM, including a combined total of 19% zircon plus rutile. The company said the new mineral resources double the company's contained heavy minerals accessible by dry mining from 5.5 million tonnes to 11 million tonnes. The Boonanarring ore reserves update, as at 31 December 2021, was 3.9 million tonnes at 7.1% THM and 19% zircon. Atlas ore reserves are unchanged at 9.5 million tonnes at 8.1% THM and 11% zircon. The company said that based on the estimates the ore reserves at Boonanarring will be depleted in Q1 2023. The wet concentration plant will then be relocated to Atlas.

Image board unchanged after meeting

Image Resources announced the results of the section 249D meeting. None of the six resolutions proposed by Murray Zircon were approved by the company's shareholders and the company's board remains unchanged.

Mineral Commodities announces quarterly activity report

Mineral Commodities (MRC) announced its quarterly activity report to 31 December 2021. During the quarter, MRC reported an increase to its Tormin Inland Strands' mineral resources to 212 million tonnes at 9% THM. Sales from Tormin were 2,912 tonnes of zircon/rutile

concentrate, 38,091 tonnes of ilmenite concentrate and 32,604 tonnes of garnet concentrate for the quarter. For 2021, sales were 14,968 tonnes of zircon/rutile concentrate up from 9,072 tonnes in 2020, and 92,191 tonnes of ilmenite down from 109,249 tonnes in 2020. The company said not all ilmenite and zircon/rutile concentrates could be shipped due to the challenging global shipping environment. Product sales revenue was US\$13.6 million, up from US\$6.6 million in the previous quarter.

PYX Resources reports on 2021 performance and announces price hikes

PYX Resources announced its full year 2021 operations update. In Q4 2021, PYX produced 2,192 tonnes and sold 2,105 tonnes of premium zircon, an increase of 33% and 13% respectively. Full year production of premium zircon was 7,233 tonnes, an increase of 10% from 2020, and sales were 6,855 tonnes, an increase of 2% on 2020. The company said that it grew its customer base by 71%. During 2021 PYX acquired Tisma, and completed a placement to raise funds to accelerate growth, starting with the Mandiri's mineral separation plant increasing its capacity to 24,000tpa, allowing for future production of rutile, leucoxene, and ilmenite. In November 2021, the company dual listed on the main market of the London Stock Exchange.

PYX implemented four zircon price rises during 2021, with the company recently flagging that a further premium zircon price step up from US\$2,305 per tonne to US\$3,100 per tonne, effective immediately. The company said the worldwide shortages and low inventories, coupled with increased demand have prompted the increase.

NEW ZIRCON PROJECTS

Orient Zirconic Resources (Australia) signs agreement with LB Group

Orient Zirconic Resources (OZ Australia), a subsidiary company of Guangdong Orient Zirconic Ind Sci & Tech Co., Ltd, signed a strategic co-operation agreement with LB Group regarding mineral sands project investment in Australia. According to the agreement, LB Group will assist OZ Australia to expand its aim to achieve HMC capacity of 1 million tpa in five years. LB Group will give priority to OZ Australia as a supplier of Australian mineral sands products, while OZ Australia will give priority to LB Group for secure supply. OZ Australia will also give priority to Longbai Intelligent Equipment Manufacturing Co., Ltd, a subsidiary company of LB Group, to procure mining equipment.

Hyperion (now IperionX) signs MoU with Mario Pilato

Hyperion Metals announced the signing of a non-binding MoU with Mario Pilato for the potential annual supply of up to 20,000 tonnes of zircon products from its Titan project in Tennessee, US. Hyperion also announced a change of the company's name to IperionX Ltd.

Strandline Resources issues Q4 2021 report

Strandline Resources issued its Q4 2021 report, with construction at its Coburn project 50% complete. Financial close for Coburn and first drawdown of debt facilities has been achieved in accordance with the development plan. The company said demand was outpacing supply in the robust mineral sands market and spot pricing was at least 25% higher than its DFS assumptions. During the quarter, a framework agreement was executed between Strandline and the Government of Tanzania for its mineral sands projects in the country. Fungoni will be the first to be developed followed by Tajiri.

Strandline Resources advised that it has received the environmental certificate from the Minister of State of the Vice President's Office for the Tajiri mineral sands project. This is a pre-requisite for the granting of the special mining licence.

Strandline Resources released its 2H 2021 financial report. At the Coburn project construction is progressing and the company said it remains on track for first production of HMC in Q4 2022. In Tanzania the company signed a framework agreement with the Tanzanian Government and established a joint-venture company called Nyati Mineral Sands Ltd (Nyati) with Strandline owning 84% and the government acquiring a 16% non-dilutable free carried interest. The agreement covers the Fungoni project and the company's other emerging mineral sands assets.

Sheffield Resources releases Q4 2021 report

Sheffield Resources released its Q4 2021 activity report. The company said the engineering, design and third party independent review has taken place for the Thunderbird mineral sands project (50% Sheffield interest). Onsite, the mine access road and clearing for the process plant and accommodation has been completed. NAIF financing arrangements have advanced and detailed due diligence

is under way. The company expects the BFS to be completed in early 2022, and first production remains targeted for Q1 2024. The Eneabba project was acquired by Image Resources for a total cash consideration of A\$24 million. The company also released its 2H 2021 report.

Sheffield Resources advised that Kimberley Mineral Sands (KMS) has completed a BFS on a simplified process flowsheet following a detailed review of the product mix from its 50% owned Thunderbird project. This has resulted in lower capital costs and improved margins for a significant improvement in project economics. The total funding requirement is estimated at A\$484 million, including capitalised financing costs, working capital and a cost overrun facility. Financing due diligence is well advanced. KMS and Yansteel have executed a binding, long-term magnetic concentrate offtake agreement after removing the Low Temperature Roast (LTR) ilmenite from the previous agreement. KMS has executed an EPC contract with GR Engineering Services (GRES) for the process facilities with the fixed price of A\$179.5 million. A limited notice to proceed has been issued to enable GRES to mobilise to site in April 2022 and commence site works. An updated Ore Reserve of 754 million tonnes at 11.0% HM contains 83 million tonnes of HM compared to the previous Ore Reserve of 748 million tonnes at 11.2% HM containing 84 million tonnes of HM.

Astron Corp releases quarterly activities report

Astron Corp released its quarterly activities report for Q4 2021. At the Donald mineral sands project, a bulk metallurgical pilot test trial was completed. The company says results are expected in Q1 2022. The Donald project DFS is scheduled for completion in Q3 2022. Subject to confirmation of the DFS, planned production levels are approximately 120,000tpa of zircon, more than 200,000tpa of TiO₂ feedstock products and 16,000tpa of rare earth concentrate. An ore reserve delineation drilling program is planned for Q1 2022.

Diatreme Resources issues Q4 2021 report

Diatreme Resources issued its Q4 2021 report. The company is continuing to have discussions with potential project partners regarding its Cyclone zircon project in Western Australia, and is examining the potential for Cyclone's holding vehicle, Lost Sands, to be annexed into a separate process.

CERAMICS END-USE

More than 200 ceramic lines built in China in 2021

More than 200 ceramic production lines were constructed in China during 2021 via technical upgrade and greenfield investment. Most of the new production lines were noted in Fujian Province and Guangdong Province, accounting for 55% of all lines constructed in 2021. Jiangxi and Guangxi were also key areas for expansion with 46 production lines constructed in 2021. More than 21 lines in Hunan, Hubei and Shandong were able to resume production after completing technical upgrade.

Large format tiles output expands in China

There were expansions of 142 ceramic production lines in China in 2021, with approximately 64% attributed to large format tiles. Jiangxi Province accounted for 30% of the expansions and 70% of those were attributed to large format tiles. Expansions in Guangdong and Guangxi accounted for 26% and 16% of total expansions respectively. Most of the expansions occurred in 1H 2021, but progress has slowed since July 2021.

Ceramic tile output rises in China

According to data published at the China Ceramics and Sanitaryware Industry Market Conference, ceramic tile output was 8.9 billion m² in 2021, a year-on-year increase of 4.6%. Total revenue for the industry increased 11.1% year-on-year to RMB34.6 billion. Ceramic tile demand in 2021 was estimated in the range of 6.7 billion to 7.4 billion m². Sales revenue for the top 20 ceramic suppliers in 2021 was RMB70.5 billion, an increase of RMB12.7 billion compared to 2020. Sales for the top 20 suppliers accounted for 20.4% of the total sales revenue.

Chinese sanitaryware exports rise in 2021

Chinese sanitaryware exports increased 11.4% year-on-year to US\$15.8 billion in 2021. China remains the largest sanitaryware and architectural ceramic exporter this year. Ceramic tiles export volume declined marginally, but the unit export value has improved. Sanitaryware exports enjoyed double-digit growth in both volume and value terms. Approximately 80% of ceramic tile exports were attributed to developing countries, particularly those that are part of 'One-belt-one-road' initiative, while 50% of sanitaryware exports were targeted at developed countries.

Chinese ceramic tile producers announce price rises

According to the Chinese Body Ceramics Information, more than 100 ceramic tile producers from the main producing regions in China have announced price increases, with some of them increasing prices twice in March 2022. According to the price increase announcement in Linyi, Shandong Province, prices for small to medium sized and large sized tiles increased by RMB0.05-0.1 and RMB3 per tile respectively. Price increases in Yunnan ranged from RMB0.1-0.2 per tile. The price rises were mainly driven by increasing natural gas, coal, packaging and transportation costs. Coal prices reached RMB900 per tonne by the end of 2021 and increased to RMB1,300 per tonne recently according to a tile producer in Shandong Province. Transportation fees rose due to interruptions from the re-emergence of COVID-19 cases and policies imposed by local authorities to achieve zero-case targets.

Foshan ceramic tiles output rises in 2021

According to the Foshan Ceramic Industry Association, ceramic tile output in Foshan city increased 8.3% year-on-year to 973 million m² in 2021. Sanitaryware output in 2021 was 21.4 million units, a year-on-year increase of 29.9%. Architectural ceramic exports declined 2.6% year-on-year to 6.12 million tonnes, while household ceramic exports in 2021 were 260,000 million tonnes, a year-on-year increase of 13.3%.

China's ceramics industry resumes output

The resumption rate for more than 2,500 ceramic tile product lines in China was 68% to 9 March 2022 with more on the way. The resumption rate remains low in Guangdong Province with less than 50% of local producers resuming production due to surging natural gas prices. Jiangxi, Hunan and Hubei Provinces recorded the highest resumption rate at 95% followed by Fujian where more than 70% of producers have resumed production. Gao'an, one of the key ceramic manufacturing cities located in Jiangxi Province, resumed operations earlier than expected with 80% of the lines back in operation before 15 February due to low inventory pressure. Many plants in the region suspended operations earlier in 2021 compared to previous years due to high costs and interruptions due to construction upgrades. It was expected that operating rates in Gao'an would recover to 100% by the end of February. The resumption rate was low in North China due air pollution controls in Q1 2022.

Ceramic expansion in Sichuan Province slows

There were eight ceramic plant expansions commissioned in Sichuan Province in 2021, with more than 60% for the production of large format tiles. Expansion slowed in 2021 compared to previous years. Two large format tile expansion projects were suspended in 2021. Many ceramic tile producers have been shifting attention from manufacturing to sales channel development as competition in large format tile market becomes more intense.

Chinese ceramic companies report revenue growth in 2021

There were 14 listed ceramic companies in China that reported revenue growth in the first three quarters of 2021. Two of the companies experienced significant growth of approximately 100% year-on-year during the period. The total asset value for the 14 ceramic companies in 2021 was RMB172 billion, with the total asset value in 2H 2021 increasing 7.8% sequentially. However, the net profit margin for most leading producers declined to less than 8% due to rising raw material, packaging material, natural gas, coal and electricity costs. According to the China Architectural Ceramics and Sanitaryware Association, industry profitability based on the performance of medium to large-scale producers was stable at approximately 6% in previous years but has declined to 5.8% in 1H 2021. Despite the increase in revenue, some producers could be operating at a loss.

Higher gas prices push up costs for ceramic producers in China

Natural gas prices increased rapidly after the Lunar New Year holiday in China from RMB5,500-5,900 per tonne on 7 February to RMB7,200-7,300 per tonne a week later in the southeast coastal area. Natural gas prices in Qingyuan, one of the key ceramic manufacturing regions, increased from RMB4.15 per m³ to RMB5.31 per m³ in a week, a 28% sequential rise. Costs for glazed tiles sized 800x800mm increased by RMB1.6-2.5 per M².

More than 200 Chinese ceramic lines suspended in 2021

A downward trend has continued for ceramic tiles, polished tiles and exterior wall tiles in China for seven consecutive years. In 2021, there were more than 200 production lines in these three categories suspended for technical upgrading or permanently shut. In 2020, there were 157 polished tile production lines in China but there are now only 99 lines left, a decline of more than 30% year-on-year. All polished tile production lines in Guangxi

and Sichuan Provinces are understood to have been shut down. According to incomplete statistics, there were still 385 porcelain tile production lines by the end of 2020 and a further reduction of 50 porcelain tile lines is anticipated by the end of 2021. The majority of the porcelain tile production lines have switched to glazed ceramic tiles production.

Consolidation expected for architectural ceramics in China

The 11th National Ceramic Congress and 2021 China Ceramics Conference were held in Foshan, Guangdong Province on 10 December. Keynote speaker Mr Cao said that the consolidation of architectural ceramics is entering an elimination phase in 2021. He forecasts that there will be 700-800 ceramic plants remaining in operation by 2030, with the top 20 companies owning 120 plants while the top 10 ceramic companies will own more than 70 plants. With ongoing city expansions, more and more plants that are currently located close to the cities will be required to shut down and relocated to other areas. Many plants located in Guangdong and Zhejiang are expected to be closed, while many plants located in Northeast and Northwest China that are not industrially integrated are expected to be shut down as well.

Ceramic tiles dominate floor decoration in China and Italy

The 2021 World Ceramic Tile Forum was held on 2 December 2021 in Bali, Indonesia. The forum was told that ceramic tiles dominated the flooring market in China, accounting for 71.4% of total floor area in 2020. Carpet was in second place, accounting for just 11.8% followed by wood flooring at 3.5%. Ceramic floor coverings in Italy accounted for 74.9% of the market by floor area, while that in the US was 13.4%. Carpet remains the main floor covering material in the US at 44.5%.

Mohawk Industries reports full year 2021 results

Mohawk reported a full year 2021 sales of US\$3.9 billion for its global ceramic segment, which represents a year-on-year growth of 14%. For Q4 2021, the global ceramic segment reported sales of US\$949 million, 3% higher than the previous corresponding period but 5% lower when compared to Q3 2021. The company noted its Brazil, Mexico and Russia markets outperformed while it believes it has gained share in the US market due to the impact of freight delivery and costs on imported tiles. Offsetting that was the headwinds from energy costs on its European ceramics business.

RAK Ceramics report annual results

RAK Ceramics reported an annual sales growth of 20% for its tiles and sanitaryware business unit for the full year 2021. The annual rate was skewed to 1H as the growth rate momentum normalised in 2H 2021. Q4 2021 sales growth for its tiles and sanitaryware business unit was down 2% compared to the previous corresponding period, with its European sales down 17% year-on-year as higher freight costs impacted customer offtake in Europe.

Suspensions may worsen labour issues in China

Negatively impacted by weaker sales, increasing feedstock prices, energy consumption control, power rationing and air pollution control, most ceramic plants in China reduced operating rates significantly in 2H 2021, with some of them being suspended since September. The suspension is expected to last till March 2022. These ceramic plants are expected to face recruitment challenges when they resume production after an extended period of suspension. The manager of a ceramic plant in Qingyuan, Guangdong Province said, "Nearly half of our workers have gone back to their hometowns for vacation and only some technical personnel in important positions have been retained. At present, there are less than 10 production lines remaining in operation out of 50 production lines in the industrial park." Earlier this year, some ceramic plants complained that it is hard to recruit workers, even with the offer of a 10% salary increase.

FOUNDRY AND REFRACTORY END-USE

Imerys reports full year 2021 results

Imerys reported full year 2021 results with revenue of €4.38 billion (up 15.4%), with robust organic growth of 15.6% compared to 2020 and growth of 10% in Q4 2021. The company reported a positive price mix impact at 3.2% for the year and up 5.9% in Q4 in a high cost inflation environment. EBITDA was up 20.5% to €761 million, above guidance range, and EBITDA margin was 17.4%, up from 16.6% in 2020. Net income from current operations was up 72% to €288 million. In the Refractory, Abrasives and Construction business area, Imerys has invested €37 million for the construction and commissioning of a greenfields plant in Vizag, India. Imerys has also completed the integration of the Haznedar Group, acquired in December 2020. Haznedar has generated revenue of €75 million. Revenue in High Temperature Solutions, serving the iron and steel, thermal and foundry markets, increased by 17.2% year-on-year. Revenue in the Refractory, Abrasives & Construction business was up 19.9% in 2021 and up 20.9% in Q4, driven by a strong recovery in refractories and abrasives, as well as further growth in building and infrastructure.

RHI Magnesita reports full year 2021 results

RHI Magnesita reported a full year 2021 group revenue growth of 13%, with its steel division sales growth at 16% and industrial division at 6%. In its outlook statement, its steel division has a strong order book for the 1H 2022 but it expects growth to normalise in the 2H. For its industrial division, the current order book has already covered most of 2022 and lead times in some cases exceed 12 months.

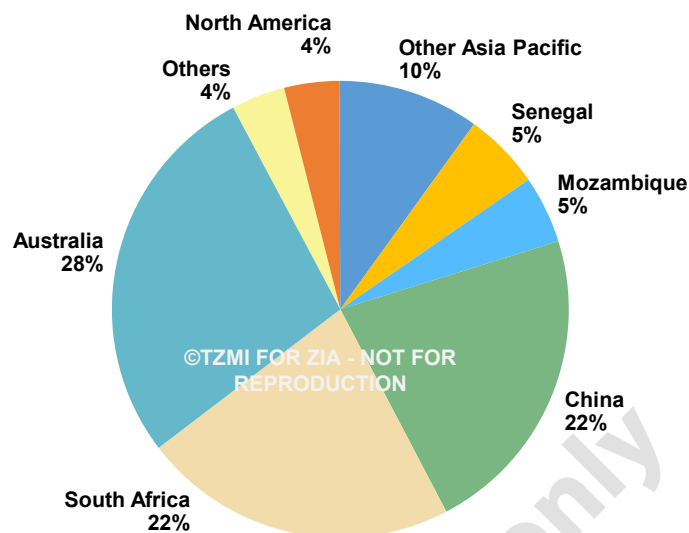
Vesuvius reports full year results

Vesuvius' steel division, which includes flow control, advanced refractories and steel sensors and probes business units, reported an underlying full year 2021 sales growth of 17% over 2020 levels as it benefited from strong growth conditions in South America, India, Vietnam and EMEA.

In its foundry division, it reported a 20% full year 2021 underlying sales growth over 2020. Strong growth was reported in the mining and construction and general engineering end-markets but growth in these markets were partially offset by weak growth in the automotive end-use segment.

SUPPLY

Global zircon supply 2021



Source: TZMI February 2022 estimates

TZMI estimates global zircon output for 2021 at 1.18 million tonnes, up 15% from 2020. Australia was a key contributor to the year-on-year volume growth, accounting for 60% of the volume increase.

Zircon output from Iluka Resources' Australian operations, which constituted approximately 74% of total Australian 2021 zircon production, grew significantly reflecting the ramp up of production from the Jacinth-Ambrosia mine following the company's decision to temporarily shut down its Narngulu MSP in 2020 in response to COVID-19. Iluka's 2021 Australian zircon output was relatively flat compared to its output in 2019.

China's zircon output in 2021 is estimated at 260,000 tonnes, a year-on-year growth of 34%. The uptick in Chinese output is underpinned by increased zircon concentrate imports given the favourable demand and strong pricing backdrop. Total zircon concentrate imports into China amounted to 905,000 tonnes, an increase of 27% from 2020 levels.

Supply from Mozambique, a key growth contributor for the African region during 2021, increased moderately after record HMC production at the Kenmare Resources' Moma operations. The Moma operations benefitted from increased tonnes mined and higher ore grades following the move of its WCP B to the higher grade Pilivilo ore zone.

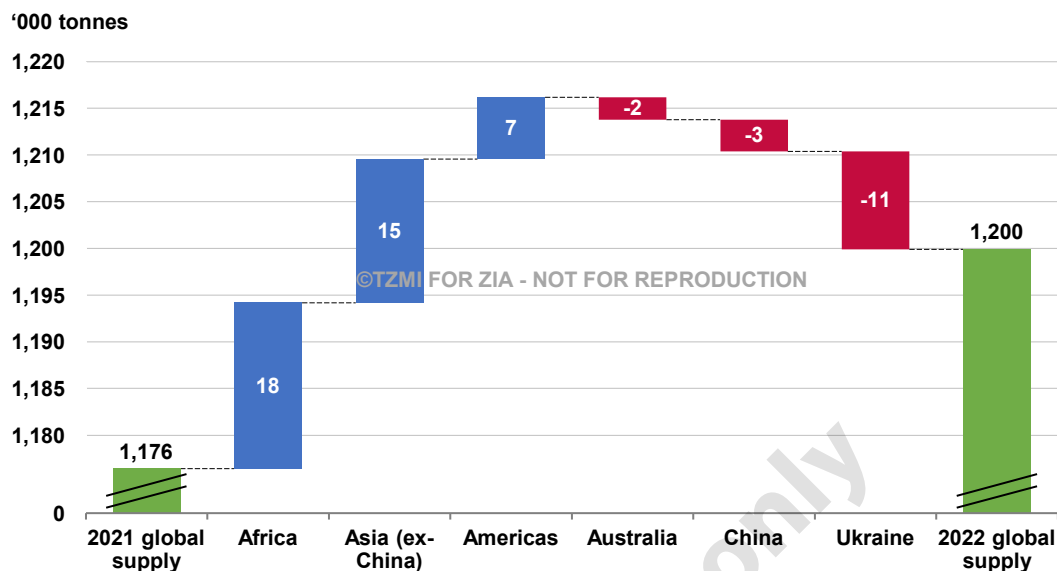
Offsetting the supply growth was lower zircon output from South Africa and Indonesia (reflected in Other Asia-pacific region of the pie chart), down 8% and 37% year-on-year respectively. South Africa's zircon output declined due to the temporary curtailment of Richards Bay Minerals (RBM) operations during Q3 as a result of civil unrest in the area, while Indonesian zircon output was negatively impacted by COVID and flooding events in Kalimantan in Q4.

Based on TZMI's estimated global demand of 1.21 million tonnes, the estimated 2021 global zircon supply of 1.18 million tonnes appeared to be insufficient to match demand. Commentaries and feedback from various industry participants, both upstream and downstream, were consistent throughout the year in that demand exceeded the suppliers' ability to supply.

Inventories at zircon producers have been worked through and are now below normal levels, meaning supply availability is expected to tighten with zircon producers only able to meet near-term sales based on available production.

SUPPLY OUTLOOK

Global zircon supply outlook 2022



Source: TZMI February 2022 estimates

The issues impacting South Africa and Indonesia's output in 2021 are not anticipated to repeat and therefore TZMI's expectation is output from these regions should normalise in 2022. The normalisation of operations in those two countries are key drivers to TZMI's forecast 2% year-on-year global supply growth for 2022.

In addition, growth in 2022 includes new supply that is anticipated to commence operations during the year, with most of it expected to come on stream in 2H 2022. TZMI anticipates the following operations to commence production this year:

- Tronox's Atlas-Campaspe project in NSW, Australia;
- Iluka's Eneabba Phase 2 project in Western Australia;
- Doral's Yalyalup project in Western Australia;
- Maiden production from the Egyptian Black Sands Company's El-Burullus project in Egypt; and
- Chemours' Trail Ridge South project in the US.

However, lower zircon output can be expected from several existing operations. Recent production guidance released by Iluka Resources indicates lower zircon production in 2022 (by 40,000 tonnes inclusive of ZIC) from its Australian operations.

Moderately lower zircon output is also anticipated for Tronox's Snapper mine as the orebody approaches its end of mine life.

Output from China, Kenya and Senegal is anticipated to be flat to moderately down year-on-year, with Eramet guiding to lower HMC production at its Grande Côte operations due to lower ore grade in the planned mining area in 2022.

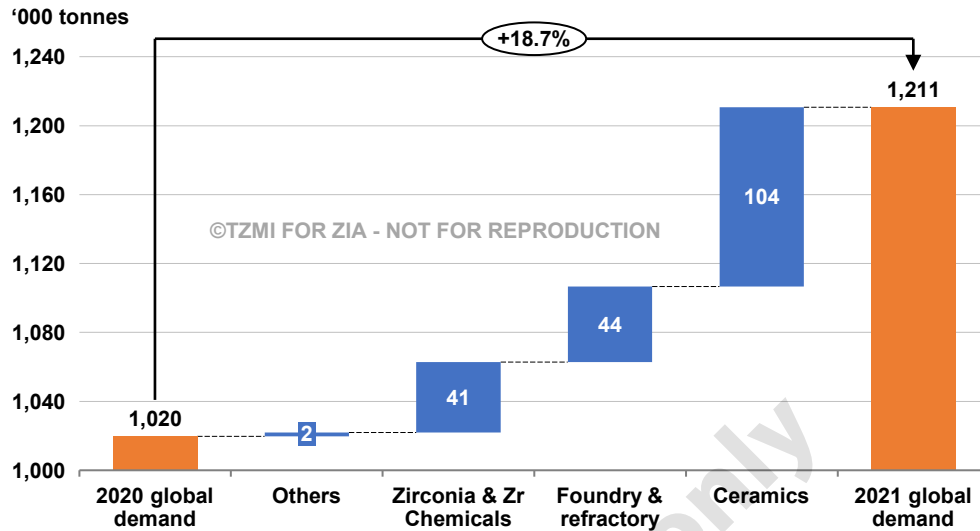
Another factor influencing TZMI's supply forecast for 2022 is the impact of the Ukrainian conflict, with anticipated supply disruptions set to occur during the course of the year. At this stage, TZMI has made provision for a six-month outage for supply originating from Ukraine, with zircon output forecast at 7,500 tonnes for the year, down from the 18,000 tonnes estimated in 2021. Given the fluidity of the Ukrainian situation, the accuracy of the supply forecast from this region remains uncertain.

With inventory at producers largely exhausted and the fact that new supply sources are only scheduled to come online in the second half of the year, the zircon market is expected to be extremely tight during 1H 2022 in the absence of any unforeseen negative demand impact amid the rapidly evolving situation in Ukraine.

TZMI anticipates global zircon supply from existing operations will peak in 2023 with the onset of new supply from Strandline Resources' Coburn project, before declining progressively due to several existing mines in Africa and Australia approaching their end of mine life.

DEMAND

Global zircon demand changes: 2020 – 2021



Source: TZMI February 2022 estimates

LATEST ZIRCON DEMAND DEVELOPMENTS

TZMI estimates global zircon demand in 2021 had rebounded by 19% year-on-year to 1.21 million tonnes, led by growth in India, Europe and China, although the Chinese overall zircon growth was somewhat more moderated at only 10% year-on-year compared to the markets in India and Europe, which have experienced high double-digit growth.

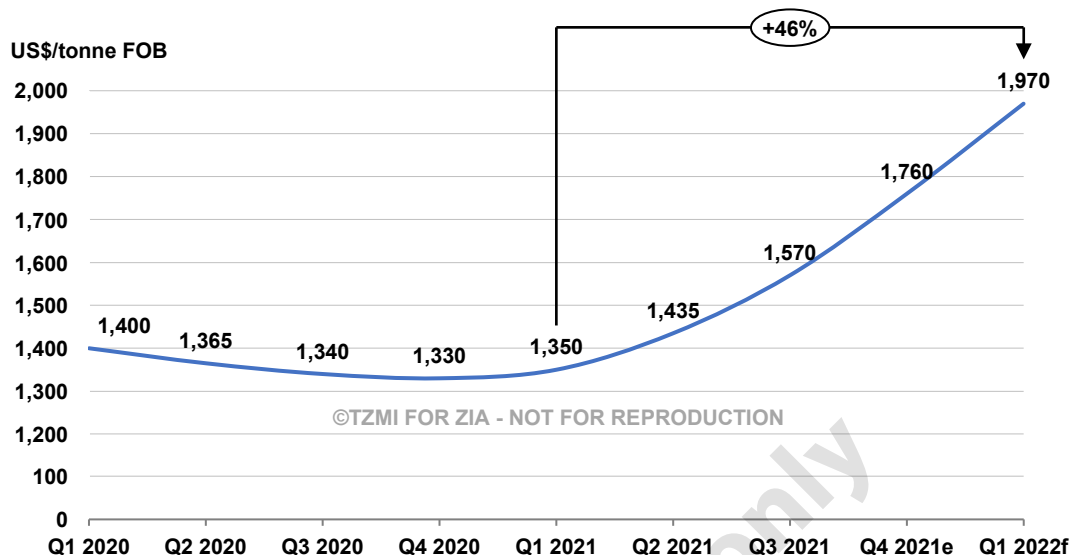
Global zircon demand for 2021, however, is estimated to be only 3% above the 2019 pre-pandemic demand levels.

Demand growth during the year was skewed to the first half as growth started to taper off in the second half, particularly in China and Europe. Energy cost escalations have had an impact on ceramics plants' operating rates in those regions in 2H 2021, with some tile producers opting to scale back production given the speed of the cost increase surpassed their ability to timely pass on the impost to customers.

Zircon demand growth is forecast at close to 4% year-on-year, with demand in India, China and North America set to increase further and more than offset the uncertainties in the demand outlook for Europe due to the high energy costs and the impact of the Russia-Ukraine conflict.

PRICING

Quarterly weighted average price for premium zircon



Source: TZMI February 2022 estimates

Tight global zircon supply and strengthening demand pushed zircon prices to a 10-year high in 2021, with the weighted average price for premium zircon in Q4 2021 estimated to have reached US\$1,760 per tonne FOB, bringing the full-year price to US\$1,520 per tonne FOB, up approximately 12% compared to the weighted average price in 2020.

The price jump was supported by rising Chinese zircon domestic prices, which have witnessed a sharp increase from close to RMB10,000 per tonne inclusive of VAT for high-quality standard-grade zircon at the start of 2021 to as high as RMB18,000 per tonne inclusive of VAT in August before experiencing a brief period of pricing weakness which saw prices retreating back to RMB16,550 per tonne inclusive of VAT by the end of the year.

Western zircon producers, on the other hand, have announced sequential price adjustments in an attempt to close the growing price gap between western zircon and domestic Chinese spot prices. At the height of domestic Chinese spot pricing in August 2021, the price gap between western zircon imports and domestic spot prices was as high as US\$800-900 per tonne CIF.

The positive pricing momentum is expected to continue in 2022, with the Q1 2022 global weighted average price set to reach US\$1,970 per tonne FOB. The forecast is supported by price hikes already announced by various zircon producers for the March quarter, as well as continued recovery in the Chinese domestic zircon prices since the start of 2022.

Recent conversations with industry participants indicate that supply remains tight and it is increasingly difficult to secure volume from zircon producers.

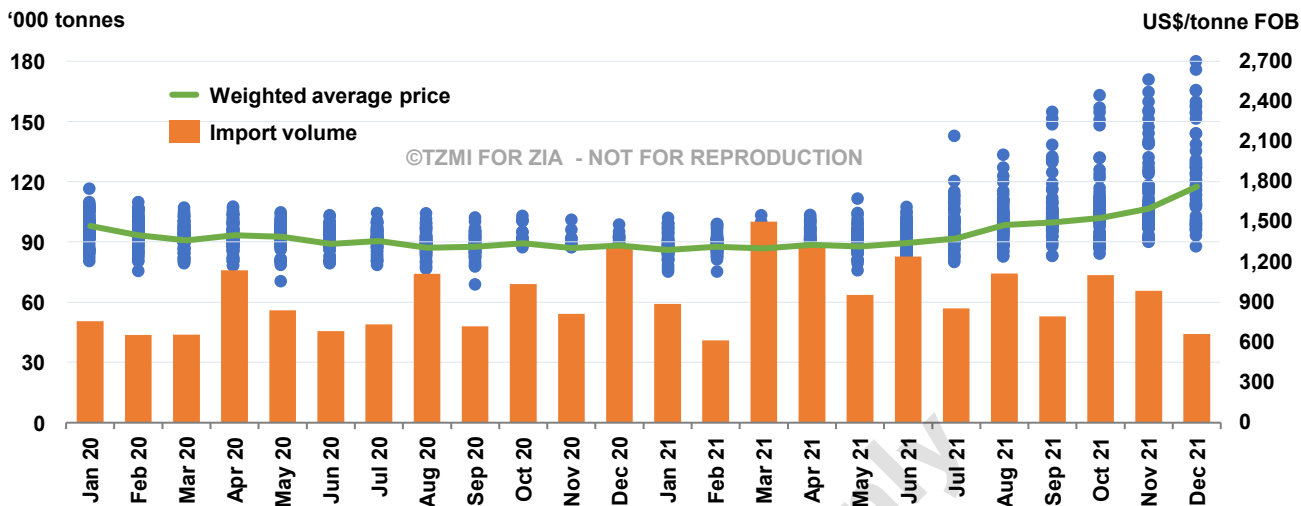
Another important factor fuelling the pricing momentum is surging shipping costs. Freight rates for containers and bulk cargo have skyrocketed during the past 18 months as the COVID-19 pandemic disrupted supply chains and trade channels, driving up CIF prices.

TZMI's latest analysis suggests even with the onset of new supply from several producers in 2022 and 2023, global zircon supply is still anticipated to fall short of demand growth.

As such, the expectation is for prices to continue to strengthen in the coming quarters.

CROSS-BORDER TRADES

Zircon cross-border trade prices: Jan 2020 – Dec 2021



Note: Trade data includes both premium and standard grade zircon

PRICING TABLE

		Last six months						2022 YTD avg	2021 avg	2020 avg
		Jan 22	Dec 21	Nov 21	Oct 21	Sep 21	Aug 21			
Bagged from Australia**	US\$/t FOB	1,759	1,674	1,654	1,572	1,517	1,511	1,759	1,452	1,282
Bulk from Australia (average)	US\$/t FOB	1,854	1,583	1,582	1,550	1,463	1,505	1,854	1,445	1,412
Bulk from Australia (range)	US\$/t FOB	1,710-1,997	1,530-1,615	1,472-1,638	1,476-1,630	1,381-1,585	1,405-1,690	-	-	-
Bulk to China	US\$/t CIF	1,895	1,872	1,720	1,606	1,589	1,539	1,895	1,463	1,397
Bulk to Spain and Italy*	US\$/t CIF	1,868	1,707	1,666	1,549	1,538	1,544	1,868	1,456	1,391
Flour from Europe*	US\$/t FOB	1,703	1,837	1,681	1,677	1,622	1,673	1,703	1,615	1,562
Opacifier from Europe* (range)	US\$/t FOB	2,240-2,647	1,823-2,604	1,825-2,560	1,895-2,438	1,728-2,357	1,733-2,356	-	-	-
Opacifier from Europe* (average)	US\$/t FOB	2,476	2,184	2,047	2,117	1,943	2,010	2,476	1,912	1,702

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* Denotes that European customs data is not yet fully included.

** Denotes data is obtained from Australian Bureau of Statistics (ABS).

Notes: Volumes and prices are as identified from official trade statistics and do not necessarily reflect, particularly in the case of prices, the actual selling price of zircon sand. Trade statistics include a number of transfer pricing trades into bonded warehouses.

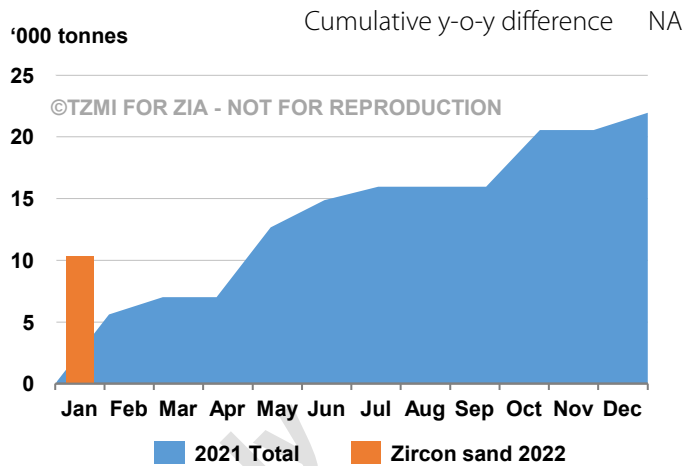
REGIONAL GLOBAL TRADE SUMMARY: JANUARY 2022

US imports

Large quantities of bulk zircon imports into the US were identified during January 2022, with total volume amounting to 10,500 tonnes, almost equivalent to cumulative imports identified during the first five months of 2021.

Year-on-year comparison is not available given that no imports were identified for January 2021.

US cumulative bulk zircon sand imports: 2022 vs 2021

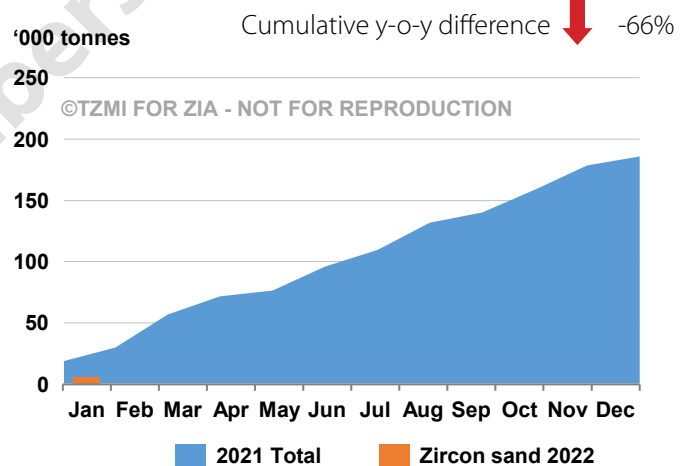


European imports

Only minimal volume has been reported thus far for bulk zircon imports into Europe for January 2022, with volume currently down 66% compared to January 2021 levels.

Delay in custom reporting is likely to be the main factor behind the lower imports reported to date.

Europe cumulative bulk zircon sand imports: 2022 vs 2021



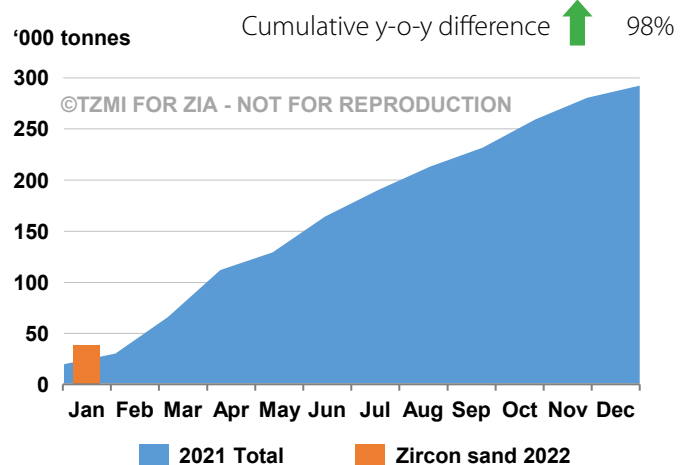
China imports

Bulk zircon imports into China amounted to 38,800 tonnes in January 2022, up 98% year-on-year.

Volume from Australia accounted for more than two-thirds of total imports in January.

Note: TZMI definition of bulk zircon refers to shipments greater than 1,000 tonnes.

China cumulative bulk zircon sand imports: 2022 vs 2021



SHIPMENT PRICING

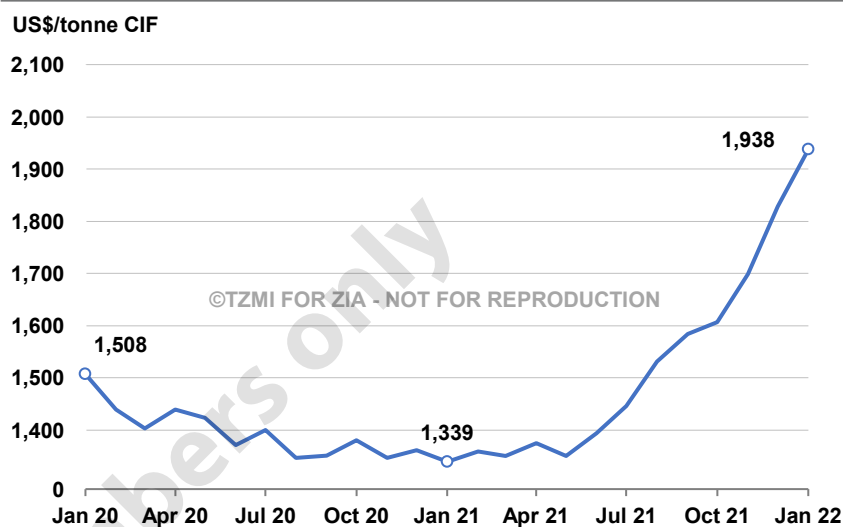
Details of individual shipment data have not been released by China customs since May 2020. Import statistics for China are based on aggregate volumes and prices reported by IHS (GTA).

Overall prices across all zircon products continue to trend higher month-on-month since May 2021, with the exception of November where, for some products, prices declined slightly before regaining upward momentum.

For global zircon sand imports, the weighted average price rose to US\$1,938 per tonne CIF in January 2022, although there remains delay in custom reporting for some parts of Europe. The weighted average price in January 2021 is up 45% from January 2021 levels and up 29% from January 2020 levels.

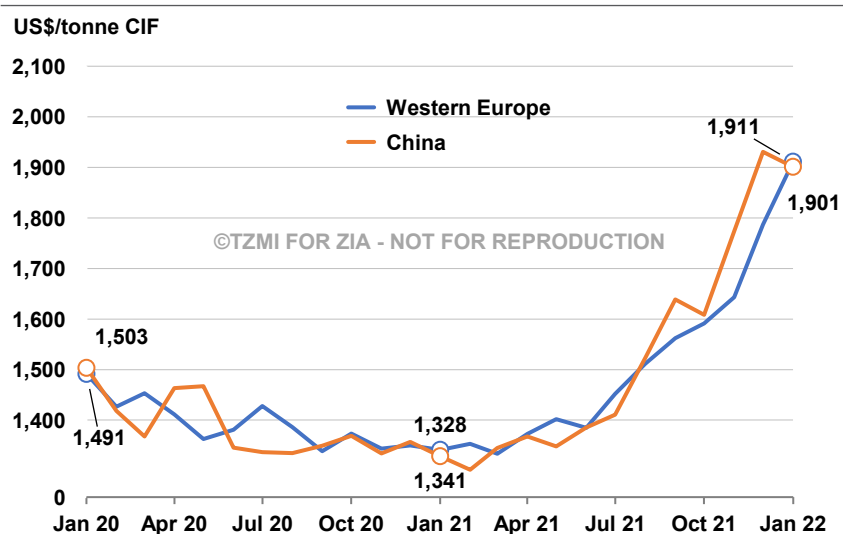
Regionally, the weighted average price of zircon sand imports into China fell to US\$1,901 per tonne CIF in January, reflecting a change in product mix, while the monthly weighted average price into Europe increased to US\$1,911 per tonne CIF.

Landed prices for global zircon sand imports:
January 2020 – January 2022



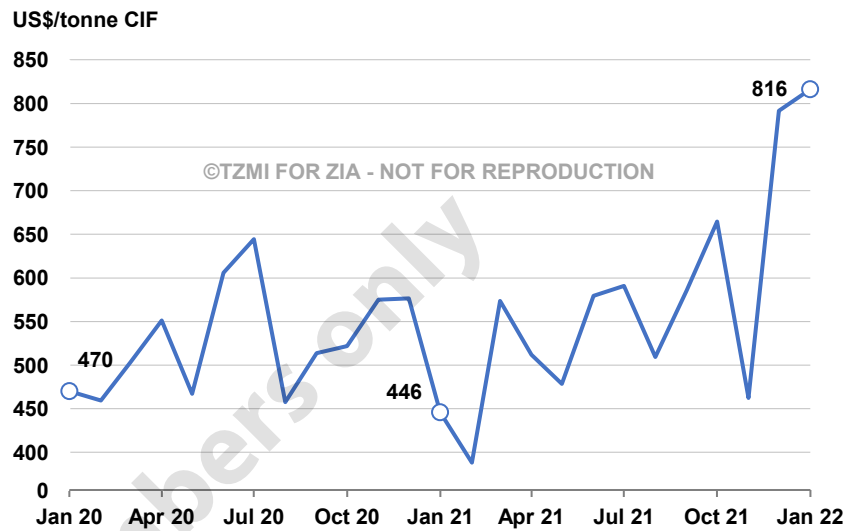
Note: Only limited European import data for for December 2021/January 2022 has been released due to a lag in customs reporting

Average CIF prices for bulk zircon into China and Western Europe:
January 2020 – January 2022



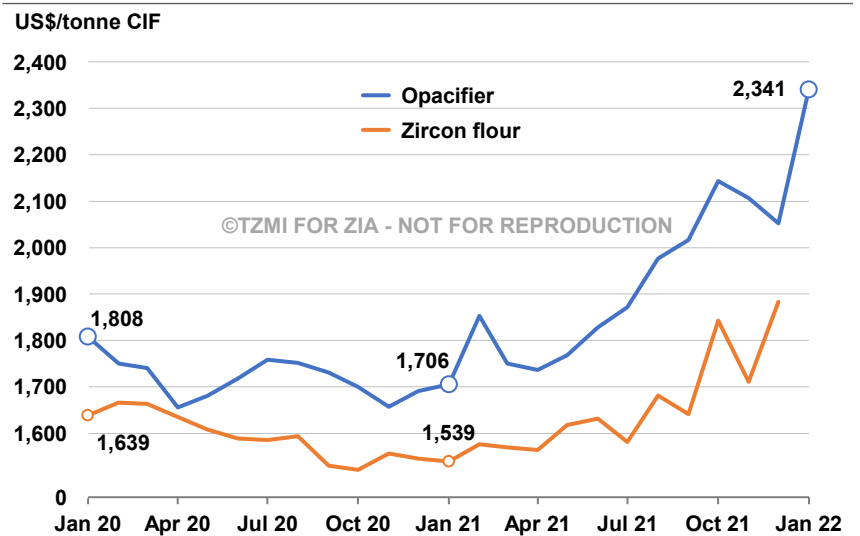
Zircon concentrate, the majority of which is imported into China, had an estimated price of US\$816 per tonne CIF in January 2022, up 83% year-on-year and up 74% from January 2020. The higher weighted average price reflects the increase in prices of the underlying zircon and other minerals, as well as higher freight costs.

Landed prices for global zircon concentrate imports:
January 2020 – January 2022



Milled zircon imports into Europe for January continued to rise in price with the weighted average price for opacifier increasing to US\$2,341 per tonne CIF. At the time of publication there were no reported zircon flour imports.

Weighted average price of milled zircon into Western Europe:
January 2020 – January 2022





ZIRCON INDUSTRY AND MARKET TRENDS REPORT