

Zircon (ZrSiO₄)

Demand growing, Supply struggling

Ceramics and Sanitary ware, driven by China's urbanisation

Important: Intersuisse was the underwriter to the Diatreme Rights Issue which closed in March 2011 and received fees. Since October 2009, Intersuisse and an associate company, Phillip Capital Pty Ltd, has provided and continues to provide capital markets, corporate advisory and capital raising services for Diatreme and receives fees. For Disclosures, refer to the back page under "Important Information".

Recommendation

Bullish

Price

\$1,500/t and rising

Equity Exposures

ILU, DRX

Secondary exposures

MDL, BSE, GUN (??)

- **DRX announced a JORC Resources for their Cyclone deposit of 123Mt, grading 2.3% Heavy Minerals for 998kt zircon, in the Eucla Basin.**
- **This makes Cyclone a globally significant source of zircon.**
- **Zircon is the ONLY commodity on which Intersuisse is bullish over the medium to longer term, as it is severely supply constrained while there is limited substitution potential.**

Snapshot

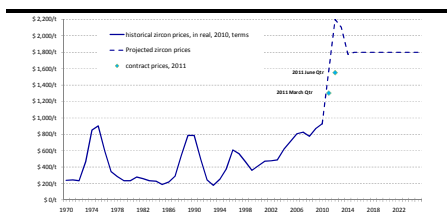
Global Supply 1.2Mt/yr (2010)
Demand growth. about 4% annually
Major Supplier Iluka (LIU)
About 500kt/yr
Prices \$1,300/t, 2011 Q1
\$1,050/t 2010 av.

Zircon Highlights

Zircon is the ONLY commodity for which Intersuisse has a bullish view over the medium to longer term due to its constrained supply, and growing demand with limited potential for substitution as the raw material is only a small part of the total cost.

The Iluka share price has risen from below \$3.00 in mid 2009 to nearly \$14.00. Some of this price rise has been due to the rise in zircon prices, while some is due to ILU's successful commissioning of its Jacinth-Ambrosia project.

Price Chart



Zircon prices have increased strongly, and are projected to increase more.

At least some of this increase is due to the major player, Iluka, focussing on return on capital.

There are few zircon rich deposits in the world, with the recently discovered Eucla Basin being the only predominantly zircon deposit.

All other deposits are rich in titaniferous feedstocks.

Zircon demand is being driven by the need for ceramics in China's urbanisation, with a commitment for 36m new social housing units in the new 5 year plan

Analyst: Pieter Bruinstroop :

Uses

About 55% of zircon demand is for ceramics, including wall and floor tiles and sanitary ware and some kitchen ware, as well as electronics. This demand is growing about 4% a year.

Zirconia and chemicals accounts for about 18% of demand and is growing at about 11% a year.

Refractory and foundry uses account for 22% of demand, but this use is not growing as demand is being substituted to lower cost alternatives.

The remaining 5% of demand is for glass used in cathode ray tubes and this demand is falling.

Supply

Iluka is the major supplier. It has stated that it needs high prices to consider further investment in its lower grade resources.

New sources of supply include 80kt/yr from MDL's Grand Cote, Senegal and 40kt/yr from BSE's Kwale, Kenya, with possible supply from ILU's Cataby, WA, and Donald, Murray Basin, as well a range of small possibilities. However, this supply barely satisfies the projected demand growth by the time the supply becomes available.

Mineral Sands

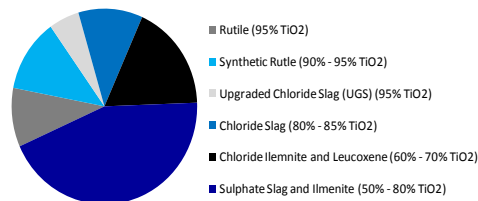
Mineral sands can be divided into 2 broad categories :

- titaniferous feedstocks; and
- zircon.

Titaniferous Feedstocks - description

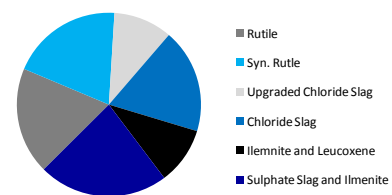
Titaniferous feedstocks cover a range of minerals and products that contain Titanium Dioxide (TiO₂). The total market, in terms of TiO₂ units, was 6.0Mt in 2008 (demand fell about 20% in 2009 and has re-bounded in 2010). Figure 1 shows this range of minerals and products by the proportion of TiO₂ units, while Figure 2 shows similar information, but according to the value of the products.

Figure 1 : TiO₂ supply by product



Source : Iluka presentation, November 2010, Intersuisse

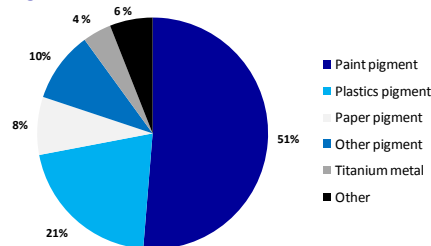
Figure 2 : TiO₂ supply by value



Source : ILU, November 2010, Intersuisse

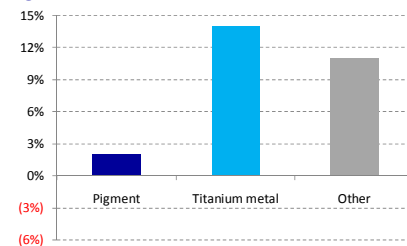
Figure 3 shows that the dominant demand for titaniferous feedstocks is for the manufacture of pigments for use in paints, paper coatings, as a filler in paper manufacture and also in plastic products. Figure 4 shows that the compound annual growth rate over the period 2000 to 2008 was 3% a year.

Figure 3 : End uses of TiO₂



Source : Iluka presentation, November 2010, Intersuisse

Figure 4 : CAGR in TiO₂ end uses



Source : ILU, November 2010, Intersuisse

The main attractions of TiO₂ are whiteness and brightness and also chemical inertness and resistance to degradation by ultra-violet light.

Titanium metal is very strong and corrosion resistant

The main growth in TiO₂ demand has come from the substitution away from white lead as the pigment base in paints. There are no major substitutes. The value of the TiO₂ feedstock is about 5% - 10% of the value of the paint, depending on which feedstock is used, the paint application, quality and colour.

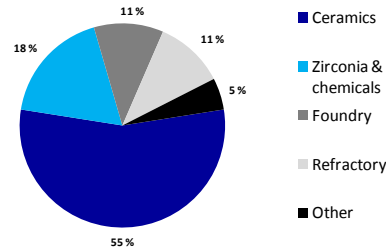
Higher grade feedstocks can be used in the manufacture of titanium sponge, which is the material from which titanium metal is manufactured.

Rutile can also be used in the manufacture of welding rods.

Zircon - description

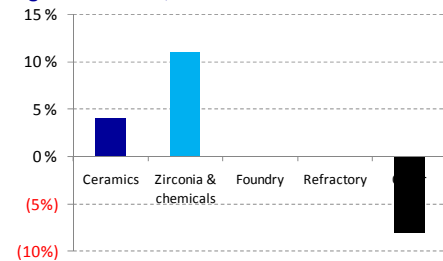
Zircon (ZrSiO₄) is a colourless to grey-brown mineral. It is non-magnetic and is not electrically conductive. Figure 5 shows that ceramics for tiles, sanitary ware and kitchen applications is the dominant end use. Figure 6 shows that this demand has been growing around 4% a year, with zircon and chemical use growing 18% a year to be the second largest end use. Other uses, including refractory and foundry use, and glass for cathode ray tubes are, at best, stagnant.

Figure 5 : Zircon end use



Source : Iluka presentation, November 2010

Figure 6 : CAGR, 2000 - 2008



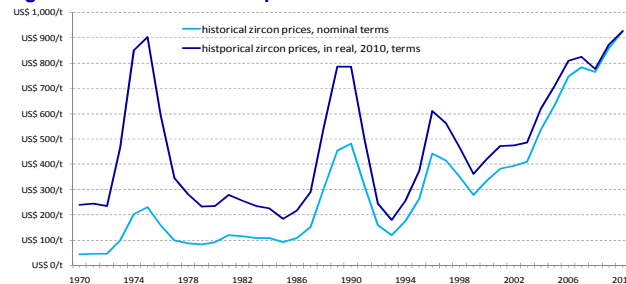
Source : Iluka presentation, November 2010

Other points about zircon include :

- Its main attributes are its opacity (ie absorbs light), whiteness, abrasion resistance, temperature resistance and inertness;
- The potential substitutes, in ceramics, are white clays, kaolin and feldspar; and
- The value of zircon in the cost of a tile is about 5% - 10%, depending on the tile type, quality and colour.

Zircon Prices

Figure 7 : Historical zircon prices



Sources : Bloomberg, TZMI, Intersuisse

Figure 7 shows historical zircon prices, in both nominal, or dollars of the day, terms and in real, or inflation adjusted, terms.

The price point is the average for each year and for 2010 this is assumed to be \$925/t, which is a new record high price.

Iluka Resources Limited (ILU.ASX) is the world's largest supplier of zircon, supplying around 40% of global demand. In their 9 November 2010 presentation, "Mineral Sands Marketing Briefing Session", ILU stated :

- The total global market for zircon, in 2008, was 1.2Mt (demand fell 25% in 2009 due to the GFC and rebounded during 2010);
- Compound annual average growth in demand from 2000 to 2008 was 4.1%/year;
- China is 40% of the demand, with Europe and Asia ex China each being a further 20%; and
- Pricing at the beginning of 2010 was US\$ 800/t and at the end of 2010 it was over US\$ 1,000/t.

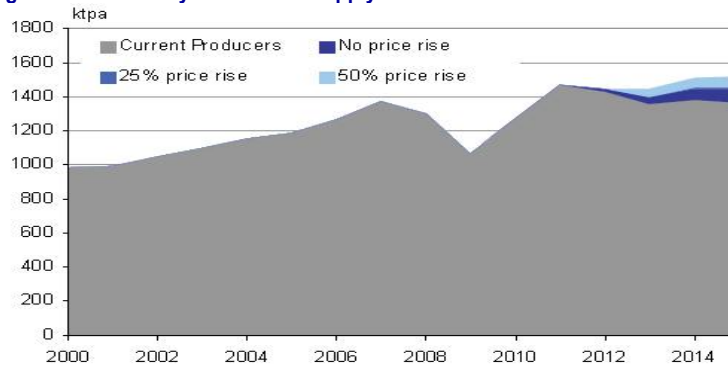
ILU further stated :

- China and other developing economies drive demand (urbanisation);
- There is a global supply deficit and material price increases are required to rationally induce new supply, but due to project lead times, new supply unlikely to make a major contribution until at least 2015; and
- As a result, higher prices likely to be sustained, with further price increases possible for about 5 more years.

Intersuisse understands that the current "spot" price for zircon is about US\$ 1,550/t.

The supply of zircon is constrained as there are few zircon rich deposits globally, with the Eucla Basis being about the only one. Figure 8 shows this lack of supply.

Figure 8 : ILU's analysis of zircon supply



Source : "Key Physical & Financial Trends in Iluka Business 2011-13 vs. 2006-2008", June 2010

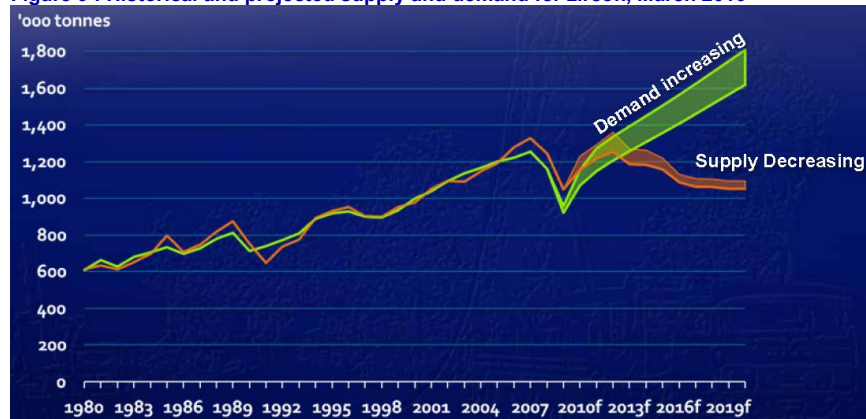
In Figure 8, Iluka, the world's largest producer of zircon, shows that in the absence of significant price increases, from the average 2008 price, zircon supply will decline.

Note that, as shown in Figure 7 and the discussion around Figure 7, present prices are nearly double the average 2008 price.

Even so, Figure 8 shows that, with rising demand, zircon supply will, at best remain flat over the next few years.

Figure 9 shows the projected gap between supply and demand, according to TZMI (Titanium and Zircon Minerals Institute), the industry experts.

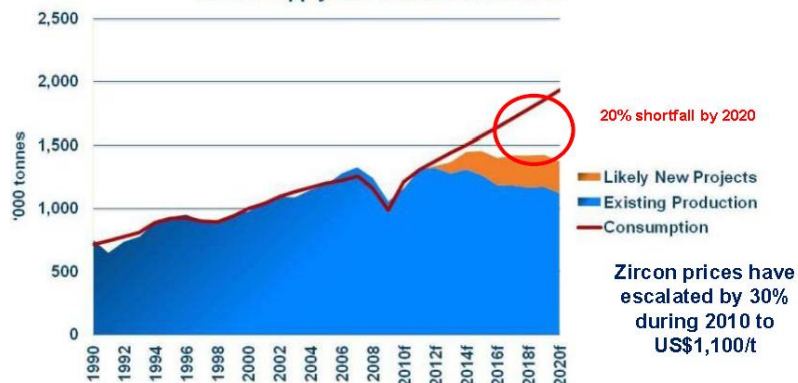
Figure 9 : Historical and projected supply and demand for zircon, March 2010



Source : TZMI, March 2010, Diatreme presentation

Figure 10, which is more recent than Figure A9, suggests an even more robust future for zircon prices.

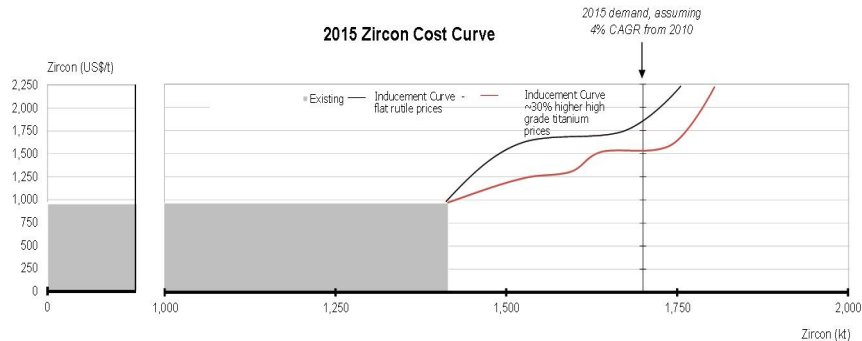
Figure 10 : Historical and projected supply and demand for zircon, November 2010
Zircon supply and demand: 1990-2020f



Source : Alkane November 2010 Presentation

Figure 11 shows an industry cost curve estimated by ILU. Such analyses need to be treated with caution as they make significant assumptions on co-product volumes and prices for titaniferous feedstocks

Figure 11 : ILU's Zircon cost curve



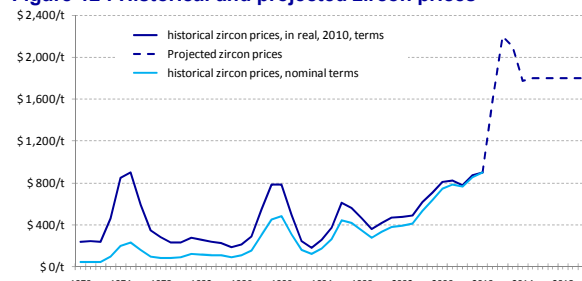
Source : Iluka presentation, November 2010

In simplistic terms, Intersuisse's analysis is :

- The market is presently short, otherwise prices would not have risen as strongly;
- Generally, working capital finance is tight in China, so current Chinese buying is due to physical demand;
- The market is growing by about 60kt – 80kt a year, driven by the Chinese program to build 35m new units of social housing over a 5 year period, while simultaneously reducing the demand for high end apartments;
- Other the impact of RBM, there is no significant new supply expected before 2014, when the following zircon supply is expected
 - 40kt/yr from Base Resources' Kwale project, easing back after 4 years
 - 80kt/yr from Mineral Deposits' Grand Cote project; and
 - 65kt/yr from DRX's Cyclone project.
- Also, Gunson Resources' Coburn could be in production, but after announcing the results of its Definitive Feasibility Study in January 2010, and stating that it was seeking a partner, GUN does not appear to have made any further progress
 - If GUN is able to overcome this hurdle soon, it could produce 40kr/yr from 2014
- Iluka has 2 possible projects that require prices at current levels, being Donald and Cataby, but these will take time to bring into production
- Richards Bay Minerals (RIO-BHP) has announced that it will increase its zircon supply by up to 100kt/yr,
 - some of this increase is expected from re-treatment of tailings, but also expansion of titaniferous capacity, though the market is sceptical on the amount of material that will need to be processed

Figure 12 shows Intersuisse's projected zircon prices.

Figure 12 : Historical and projected zircon prices



Sources : Bloomberg, TZMI, Intersuisse projections.

Intersuisse projects a Long-Run price of \$1,800/t.

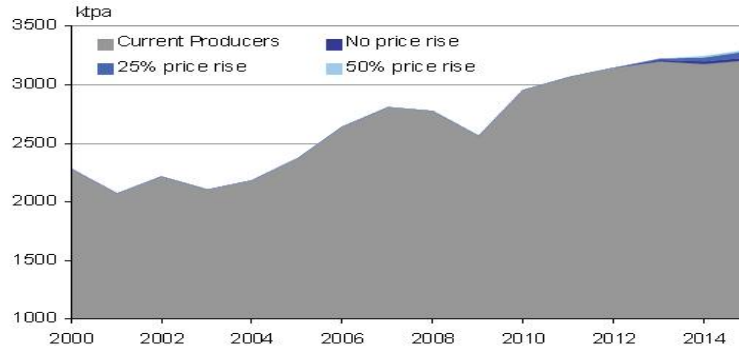
In Intersuisse's view, this price is needed to induce supply from RBM and also other possible supply sources, such as the ;low grades, high iron, resources at ILU's old Eneabba deposit

Titaniferous Prices

There is a range of titaniferous products, which are generally distinguished by their TiO₂ content. Also, there are Titaniferous feedstocks that are manufactured products, such as ILU's Synthetic Rutile and Rio Tinto's slag and Up-Graded Slag. The lowest value product is ilmenite, with about 50% TiO₂, then altered ilmenite (say 60%), Leucoxene, Hi-Ti and Rutile (over 90%).

Figure 13 shows that Iluka expects that supply of titaniferous feedstocks will grow, if there is a price increase.

Figure 13 : Iluka's projection of Titaniferous feedstock supply



This is in contrast to zircon as most mineral sands projects have a greater proportion of titaniferous feedstocks than zircon, as shown in Figure 14.

Source : "Key Physical & Financial Trends in Iluka Business 2011-13 vs. 2006-2008"

Figure 14 : Mineral sands mines and projects

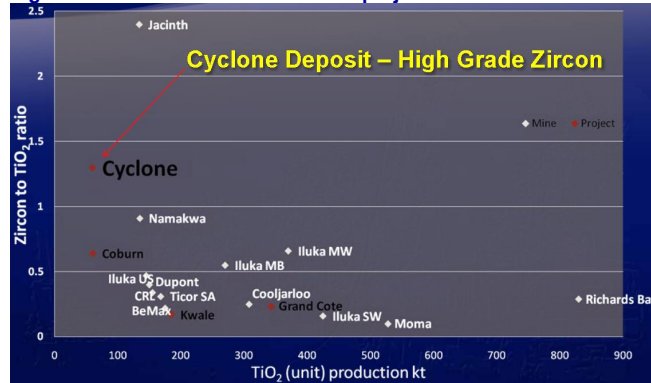


Figure 14 also shows that Iluka's Jacinth project, in the Eucla Basin, is very high in zircon, while DRX's Cyclone deposit is higher in zircon than all the other projects shown.

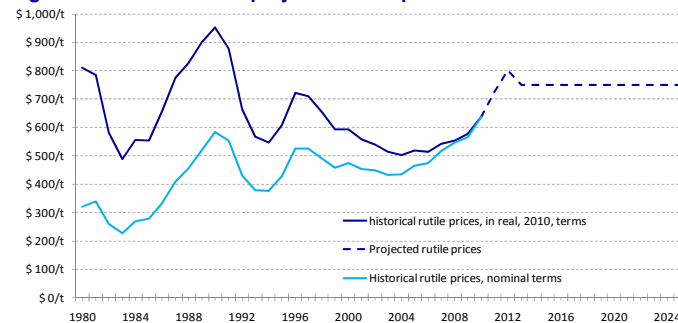
Also, Figure 14 shows that many moderately zircon rich mines, including some Iluka operations, have either ceased production or are expected to do soon.

Source : DRX Presentation, October 2010

This reinforces the strong fundamentals for zircon.

Figure 15 shows historical rutile prices, in both nominal (dollars of the day) and in real, 2010 terms (ie. inflation adjusted) and also Intersuisse's projections.

Figure 15: Historical and projected rutile prices



Sources : Bloomberg, TZMI, Intersuisse projections.

Intersuisse has projected rutile prices that are firm, and high in nominal terms, but in real terms rutile prices have been much higher.

This subdued outlook reflects the number of projects that are being reviewed for development.

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