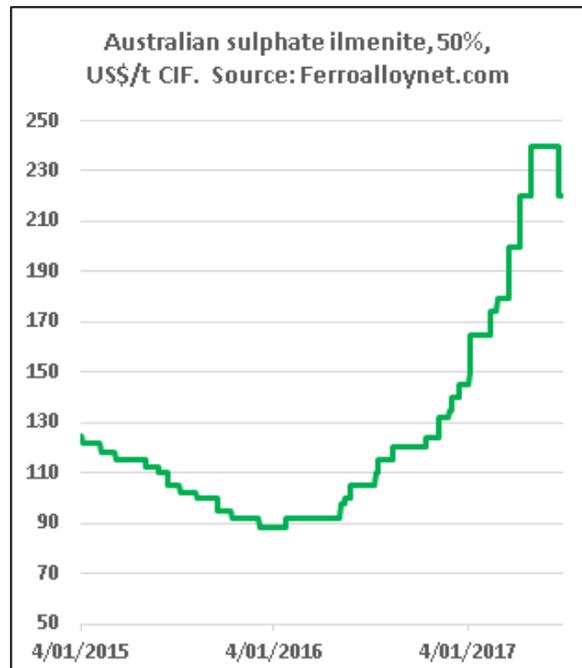
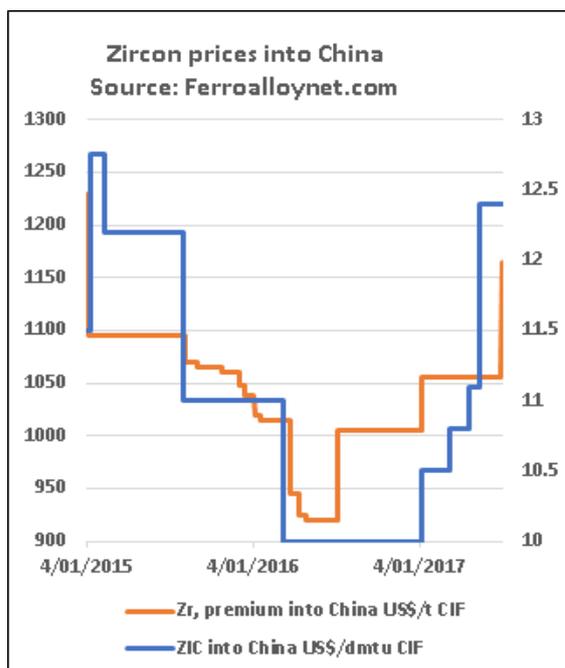


Sheffield Resources Ltd (SFX AU, \$0.54)

Commodity prices provide a strong tailwind for Thunderbird, the next world-scale mineral sands project

- Mineral sand commodities, ilmenite and zircon in particular, have demonstrated strong price performance over the past 6 to 12 months.
- Strong demand for titanium-bearing feedstock (sulphate ilmenite) by the Chinese pigment industry has seen a strong price improvement from under US\$100/t in early 2016. Prices now seem to be settling in the US\$200-250/t range.
- Zircon had been a laggard with the global ceramics industry supplied from inventory held by RIO's subsidiary, RBM and Iluka. With the progressive unwind of these inventory positions, Iluka (and others) have been able to secure a recent US\$130/t headline price increase. We understand that the market continues to be very tight so price increases seem likely to stick.
- Zircon is also exported to China in concentrate form ("ZIC"). Here prices have been remarkably strong, up 24% YTD, likely pre-empting another rise in premium zircon prices. We have not moved our zircon price assumptions (US\$1250/t for premium zircon), but consider the risk is on the upside. As in past cycles there is a very real risk that zircon prices could overshoot realistic forecasts especially in the event of any supply disruptions.
- Our NPV for the Thunderbird project remains A\$793m (post tax), which, based on our financing assumptions, delivers a company NAV of A\$594m (equivalent to \$1.56/share fully diluted).



Commodity overview

- Several years of underspend by the global mineral sands sector has resulted in declining reserves and production by the key players. In a segment where demand is closely tied to global GDP, this has led to a significant recent price response.
 - Pricing of sulphate-grade **ilmenite** is now in new territory. Premium Indian ilmenite has traded as high as US\$300/t (CIF). Ilmenite prices were under US\$100/t 18 months ago.
 - We will maintain our US\$220/t forecasts and believe \$200-220/t to be a price base. In the event Chinese demand for sulphate ilmenite grows more strongly – and the Chinese pigment producers do seem to be increasing global market share - prices could be higher.
-
- There are few new **zircon** projects available to fill a forecast zircon deficit. Prices bottomed in 2016. Iluka have recently pushed through a \$130/t price increase from 1 July 2017.
 - A depletion of stocks and an improvement in zircon price has seen Iluka take a decision to restart its Jacinth-Ambrosia (J-A) zircon-dominated mine from 2018. We believe that the stocks held by Richards Bay Minerals in South Africa are also substantially depleted. Chinese port stocks continue to decline; anecdotal evidence would point to a current market shortage of zircon, particularly in the Asian region.
 - Industry commentators (Ferroalloy.net and Industrial Minerals) comment on the tight supply/demand outlook for zircon currently and report increasing prices out of Indonesia.
 - Pricing of zircon in concentrate (ZIC) – where prices are up 24% since the start of the year - may foreshadow further strength in the Iluka reference price.
 - We have maintained our premium zircon price assumptions at \$1,250/t (CIF) but see the likelihood that prices may extend toward the US\$1387/t forecast by TZMI in the BFS. A price over US\$1500/t in the next 3 to 6 months would come as no surprise, especially if there are any production interruptions.
 - We note with interest that as this report is being prepared, Iluka report troubles at the export port for the soon-to-be-recommissioned J-A mine in South Australia.

Update on Sheffield's Thunderbird project

- The recently released Thunderbird Bankable Feasibility Study confirms our view that the project is of Tier 1 quality offering strong project economics. The project is dominated by zircon (appr. 54% of total revenues in the first 10 years, 35% sulphate ilmenite and 11% HiTi and titanomagnetite, based on our commodity price assumptions).
- At peak capacity, Thunderbird will produce approximately 7% and 3% respectively of the world's zircon and ilmenite.
- Our valuation of Thunderbird is A\$793m (pre tax) with an estimated IRR of 26%, (vs BFS of 25%), largely a result of different underlying commodity price assumptions. We have assumed a zircon price of US\$1250 going forward (vs the BFS \$1387/t long term), and US\$220/t for sulphate ilmenite (vs BFS of \$183/t).

Snapshot of the Thunderbird project BFS

Pricing, long term		
Premium zircon	US\$/t	1387
Zircon concentrate	US\$/t	677
Ilmenite	US\$/t	183
Hi Ti 88	US\$/t	500
Titanomagnetite	US\$/t	48
A\$/US\$		
Production (LOM, average)		
Premium zircon	ktpa	76.1
Zircon concentrate	ktpa	68.5
Ilmenite	ktpa	387.8
Hi Ti 88	ktpa	20.3
Titanomagnetite	ktpa	229.8
Mine life		
	Years	42
Pre-production capital		
	A\$m	348
LOM capital (excl. sustaining)	A\$m	543
LOM unit revenue		
	A\$/t	19.9
LOM site costs (ex G&A)		
	A\$/t	11.4
LOM zircon equivalent basis		
	A\$/t zircon	1053
Revenue to cost ratio (years 1-10)		
		2.0
NPV/IRR (pre-tax)		
		A\$676m/25%

Source: Sheffield Resources BFS

Note zircon in concentrate contains approximately 44% zircon.

Note also that the SFX NPV and IRR differs from Pulse estimates, mainly due to differing commodity price assumptions.

Update on Thunderbird's progress to production

Attention is drawn to our April report which summarises the results of the Thunderbird BFS.

Product offtake. With the current shortage in the global supply of zircon it comes as no surprise that offtake MOU's with potential customers have been readily obtained. Around 70% of premium zircon product and 45% zircon in concentrate (ZIC) are now committed under non-binding agreements. India's ceramic industry is now one of the fastest growing globally. Two Indian groups now make up a large proportion of the negotiated offtake.

Given the high quality of the ilmenite co-product, we see little problem in Sheffield locking in offtake agreements.

Permitting. Environmental permitting is conducted on a rigid schedule that commenced in January 2016. SFX is now at the final stages of this process and expect the approvals to be given this quarter as reported by the company.

With regard to Native Title, the National Native Title Tribunal (NNTT) determined the Mining Lease (ML) can be granted on 14 May 2017 and there the Native Title Party (NTP) elected not to submit any contentions opposing the ML grant in this process. This determination followed the positive finding that SFX had acted in good faith during negotiations. The appeal launched by the NTP on the good faith finding is based on a narrow point of law and directions are expected to be heard on 14 July 2017. The company does not see this as a drawn-out process.

Financing. Azure Capital has been appointed to co-ordinate and lead funding discussions for the Thunderbird project. The company has a number of options, greatly assisted by the quality of the project and its +40 year mine life. These options include:

- Debt. We believe there is a deal of interest from global banks and EPCM/construction groups. We have assumed a project level debt/equity ratio of 50%.
- Offtake financing. We have not incorporated any offtake financing into our valuation of SFX.
- Partial sale or JV of the project. We have assumed a 20% selldown of the project to an enduser, at a 50% discount to NPV.
- Equity.

Our forecasts and valuation

Our valuation is based on capital, cost and production profiles provided in the BFS. The first 10 years is presented in Appendix 1:

Our company valuation is premised on the following assumptions, flat in real terms going forward:

Zircon US\$1250/t. ZIC US\$625/t.

Ilmenite US\$220/t. HiTi US\$650/t. Titanomagnetite US\$48/t

AUD/USD 0.75

This generates the following project-level NPVs and IRRs.

Pre tax		
NPV10	A\$m	\$ 793
NPV8	A\$m	\$1,130
NPV5	A\$m	\$2,005
NPV0	A\$m	\$6,280
IRR	%	26.2%
Post tax		
NPV10	A\$m	\$501
NPV8	A\$m	\$745
NPV5	A\$m	\$1,379
NPV0	A\$m	\$4,497
IRR	%	21.5%

Source: Pulse estimates

Translating this to a valuation requires further assumptions. The following is a conceptual valuation, and assumes a sell-down of 20% of the project at a 50% discount to NAV (raising ca. \$110m and relieving SFX of 20% of the capex). This model assumes 50% debt to equity and a \$120m raise at an assumed \$0.60/share. Clearly this scenario is just one of many which could be considered.

Thunderbird (NPV10), post tax	A\$m	\$ 501.1	
Add back capex	A\$m	\$ 350.0	
Less working capital		-\$ 20.0	
Thunderbird (NPV10)	A\$m	\$ 831.1	Unfunded NPV
Mine site exploration	A\$m	\$ 10.0	Notional
Equity NPV	A\$m	\$ 841.1	
Project debt	A\$m	-\$ 175.0	50% debt/equity
NPV less debt	A\$m	\$ 666.1	
Ownership by SFX	A\$m	80%	Sell down equity in project
Implied SFX equity	A\$m	\$ 532.9	
Cash	A\$m	\$ 11.0	Current
PV of corporate costs	A\$m	-\$ 80.0	Estimate
Other exploration	A\$m	\$ 10.0	Notional
Corporate NAV	A\$m	\$ 473.9	
Number of shares	m	180.5	
New equity, say	A\$m	\$ 120.0	Estimate
Issue price	A\$	\$ 0.60	
Number of new shares	m	200.0	
Total number of shares	m	380.5	
NAV adding new cash	A\$m	\$ 593.9	
NAV/share	A\$	\$ 1.56	

Source: Pulse estimates

Note that the above NAV per share is not a market evaluation, but is determined on an accounting basis.

Sensitivities

<i>Change from base</i>		NPAT (2020e)		Project NPV(10)	
		+10%	-10%	+10%	-10%
Capital costs (pre prod'n)	A\$350m	0%	0%	-4%	4%
Opex	A\$206/t	-10%	10%	-16%	16%
Zircon price	US\$1250/t	11%	-11%	17%	-17%
Ilmenite price	US\$220/t	7%	-7%	11%	-11%
Zircon + ilmenite prices	As above	18%	-18%	28%	-28%

Thunderbird's low leverage to capex is attributable to long mine life and its high cashflow margins.

Appendix 1

Production, revenue, cost and capital assumptions

Thunderbird summary (100% basis)		2017	2018	2019	2020	2021	2022	2023	2024	2025	
Commodity/FX assumptions											
Zircon, premium	US\$/t, CIF	-	-	1250	1250	1250	1250	1250	1250	1250	
Zircon, in cons (1)	US\$/t, CIF	-	-	625	625	625	625	625	625	625	
LTR ilmenite	US\$/t, CIF	-	-	220	220	220	220	220	220	220	
Leucoxene/HiTi	US\$/t, CIF	-	-	850	850	850	850	850	850	850	
Titanomagnetite	US\$/t, CIF	-	-	48	48	48	48	48	48	48	
AUD/USD		-	-	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
Production											
Project stage				Phase 1					Phase 2		
MUP throughput	Mt	-	-	2.0	7.4	8.4	8.7	11.3	18.0	18.0	
Zircon, premium	Kt	-	-	8	40	55	58	70	100	110	
Zircon, in concentrate (1)	Kt	-	-	11	45	50	50	66	95	100	
LTR ilmenite	Kt	-	-	46	230	280	290	350	570	570	
Leucoxene/HiTi	Kt	-	-	2	10	15	17	23	26	21	
Titanomagnetite	Kt	-	-	27	136	165	170	210	335	340	
Total	Kt	-	-	94	461	565	585	719	1126	1141	
Revenue/tonne VHM	A\$/t (2)	-	-	404.1	395.0	408.6	411.7	414.7	391.4	399.2	
Cash costs/tonne VHM	A\$/t (2)	-	-	327.7	232.8	206.7	171.0	168.2	171.0	168.8	
Revenue/cost ratio		-	-	1.23	1.70	1.98	2.41	2.47	2.29	2.36	
Capital (3)	A\$m	-100.0	-250.0	-10.0	-10.0	-1.0	-100.0	-95.0	-2.0	-2.0	
Gross cashflow		-	-	7.2	74.8	114.1	140.8	177.2	248.1	262.9	
EBIT		-	-	-12.8	54.8	94.1	120.8	157.2	228.1	242.9	
NPAT (4)		-	-	-12.8	54.8	94.1	157.1	204.4	296.6	315.7	
Notes											
1. Zircon in concentrate priced at 50% of premium.											
2. Revenue and costs per tonne of valuable heavy mineral.											
3. Estimates in 2019 and 2020 include allowance for build up in working capital and Phase 2 capex in 2022.											
4. Earnings sheltered by prior losses and accelerated depreciation for 2019-2021.											

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