

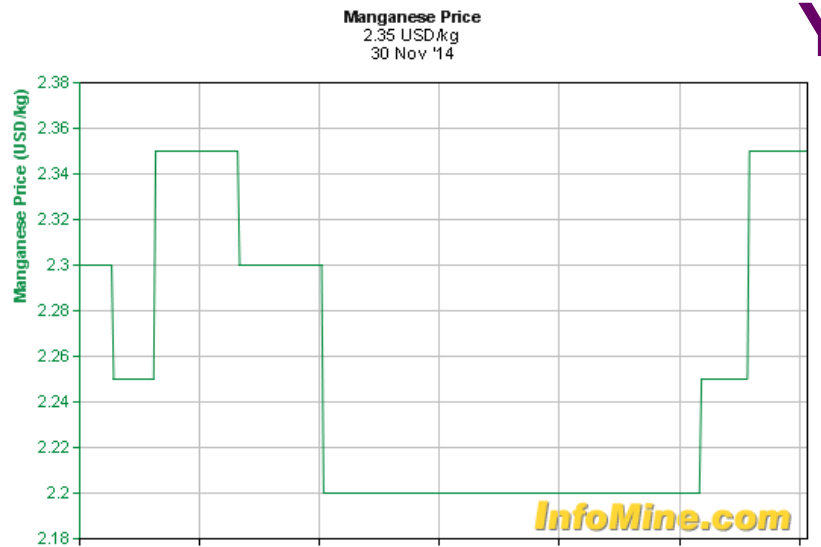


THE MANGANESE MARKET | USES

The Manganese Market | Uses

- ✧ Manganese (Mn) is an essential industrial metal used as an additive in a wide range of steels, non-ferrous alloys, and electronic components
- ✧ In the steel manufacturing process, the addition of Mn removes impurities such as sulfur and oxygen
- ✧ Mn optimizes the physical properties of steel by improving its strength, hardness, and abrasion resistance. It takes 10kg of manganese alloy to produce 1t of carbon steel
- ✧ Annual manganese production consists of:
 - ✧ 14mt of manganese ferro-alloys – used to make carbon steel
 - ✧ 1mt of manganese metal – used to make stainless steel and specialty steels
- ✧ Mn also has a minor (2%) use in specialty chemical applications e.g. batteries.

HISTORICAL MANGANESE PRICES – 1 YEAR

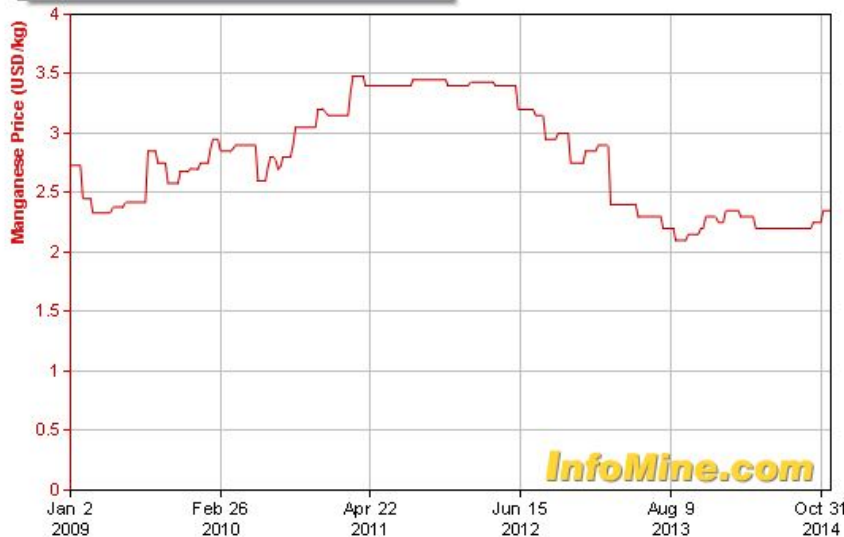


- Over the past year, the manganese prices have been fairly constant with only a 7% volatility.
- This is in contrast with the steel industry where the price of iron ore fines has dropped rapidly over the same period.
- The iron ore industry moved rapidly into an over-supply situation when demand from China and the rest of the world dropped over the last year.
- The manganese supply situation is far more restricted and as a consequence the pricing is more stable.

MANGANESE ECONOMICS – 5 YEARS

Manganese Price
2.35 USD/kg

5 Year Manganese Prices - Manganese Price Chart



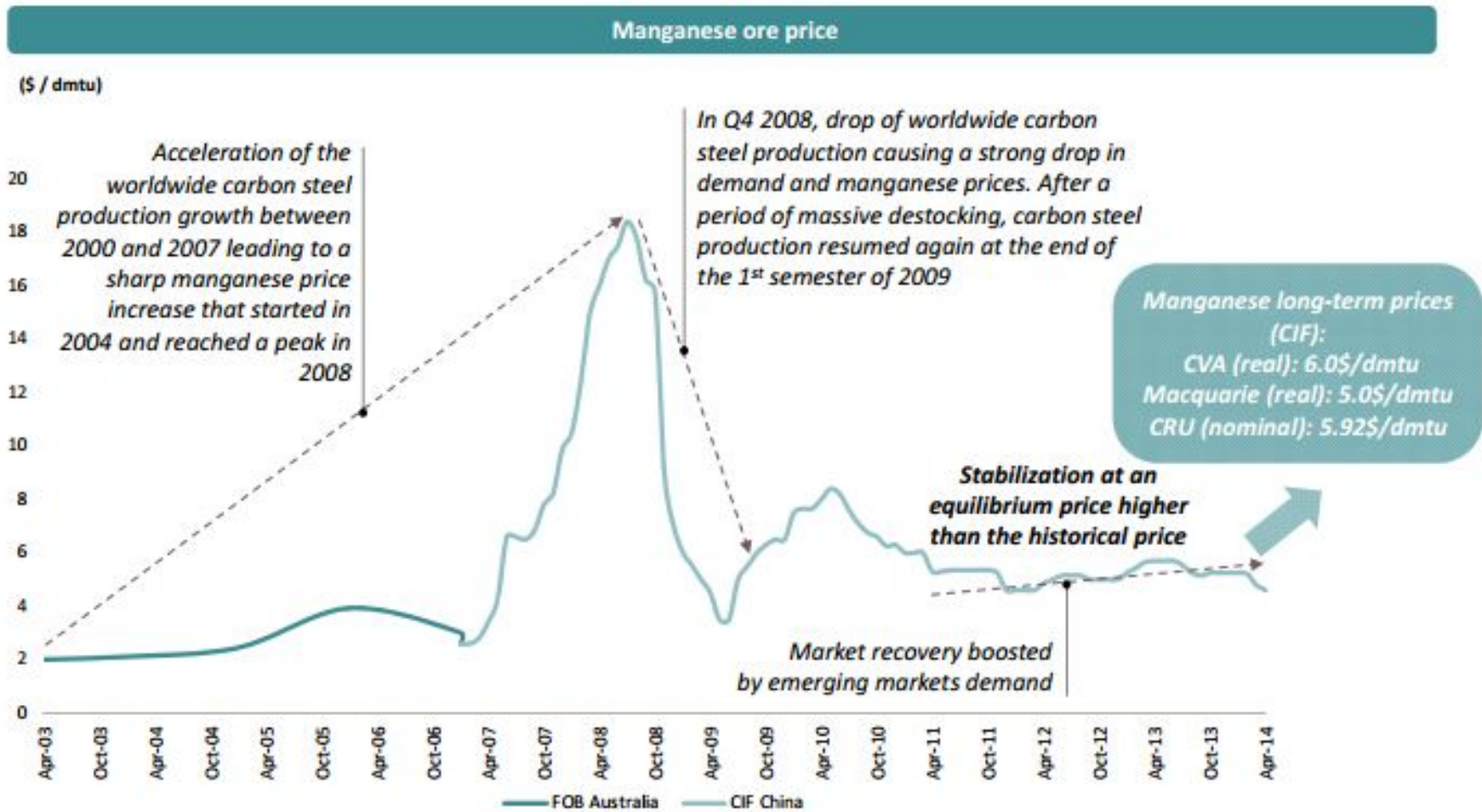
Iron Ore Fines Price
73.59 USD/t
30 Nov '14



- On the long term graph, manganese prices have been fairly stable since the wild volatility of 2008. The key feature is the lower volatility of manganese prices (40%) compared to steel prices (60%) and the smoother price curve.
- Prices are currently rising slowly from a gentle trough
- The manganese market has few major suppliers.

MANGANESE DEMAND & PRICING

Manganese prices will remain attractive, driven by growth of world carbon steel demand and balanced offer-demand manganese market



Source CRU



MANGANESE PRICING- CURRENT & FORECAST

MANGANESE

(Nominal, Quarterly Averages)

US\$/metric tonne unit	Consensus (Mean)	% change from spot	Forecast Range	
			High	Low
Spot price	5.140			
Dec 2013	5.158	0.4%	5.500	4.600
Mar 2014	5.322	3.5%	5.500	5.000
Jun 2014	5.282	2.8%	5.500	4.800
Sep 2014	5.342	3.9%	6.000	4.600
Dec 2014	5.342	3.9%	6.000	4.600
Mar 2015	5.682	10.5%	6.500	4.600
Jun 2015	5.732	11.5%	6.750	4.600
Sep 2015	5.732	11.5%	6.750	4.600
Dec 2015	5.732	11.5%	6.750	4.600
Mar 2016	5.750	11.9%	6.500	4.500



Manganese is not exchange-traded so prices are established by negotiation between buyers and sellers. Negotiations occur in line with the beginning of the Japanese fiscal year in April. Following the setting of prices with Japanese manufacturing companies, similar settlement prices are set worldwide.

The price is based upon a benchmark ore of 44% manganese content, Cif, Tianjin, China.

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- Consensus Economics predicts that manganese ore spot prices will increase steadily into 2016
- Their prediction for Dec 2014 was US\$5.34 metric ton unit (mtu)
- The actual price at Dec is RMB33.5 – equating to US \$5.36/mtu, down from a high of US\$5.84 at mid year. [DEQ is “Delivered Ex Quay – China”]
[CIF is “Cost, Insurance and Freight – China”]



Manganese ore 44-46% lumpy ore DEQ

Region

Last updated 2014-12-11

Previous Logon or upgrade to see prices

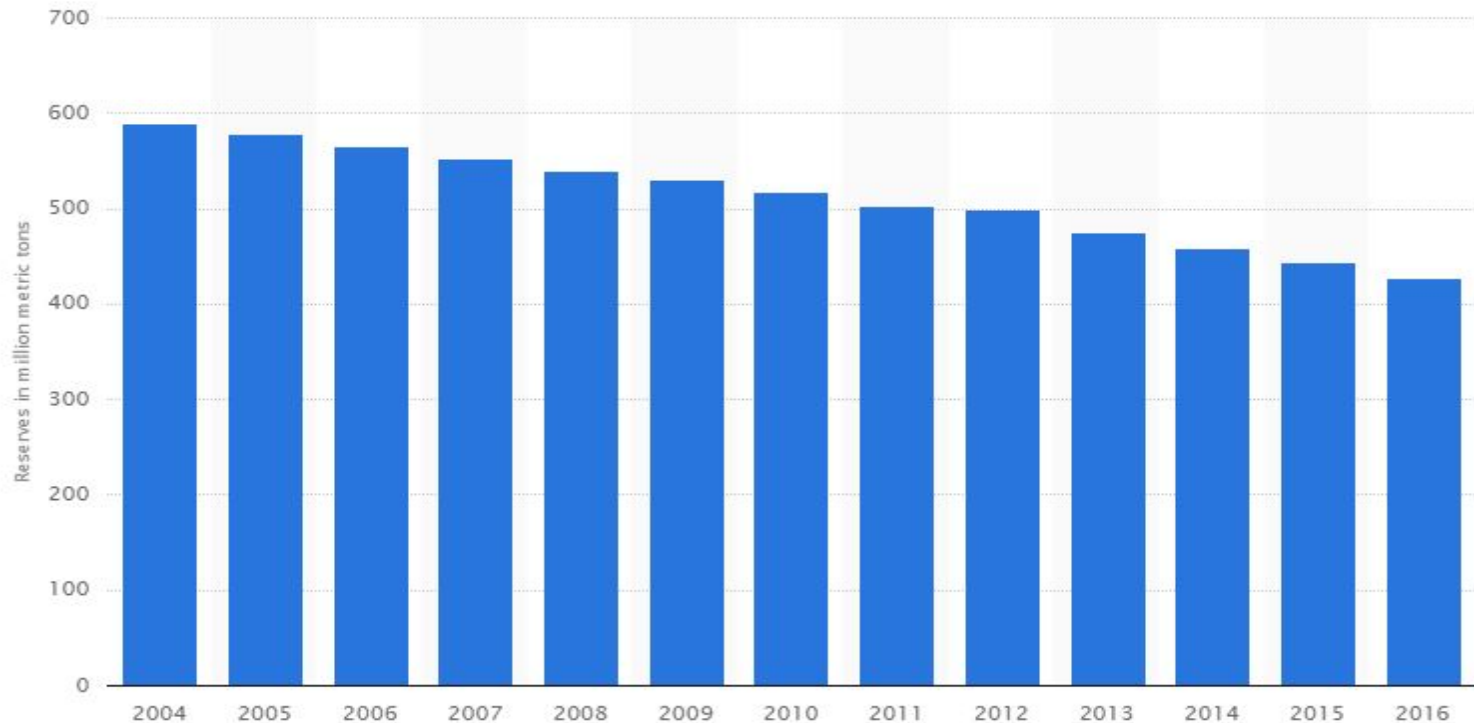
Latest

Change =



MANGANESE RESERVES – HISTORICAL & FORECAST

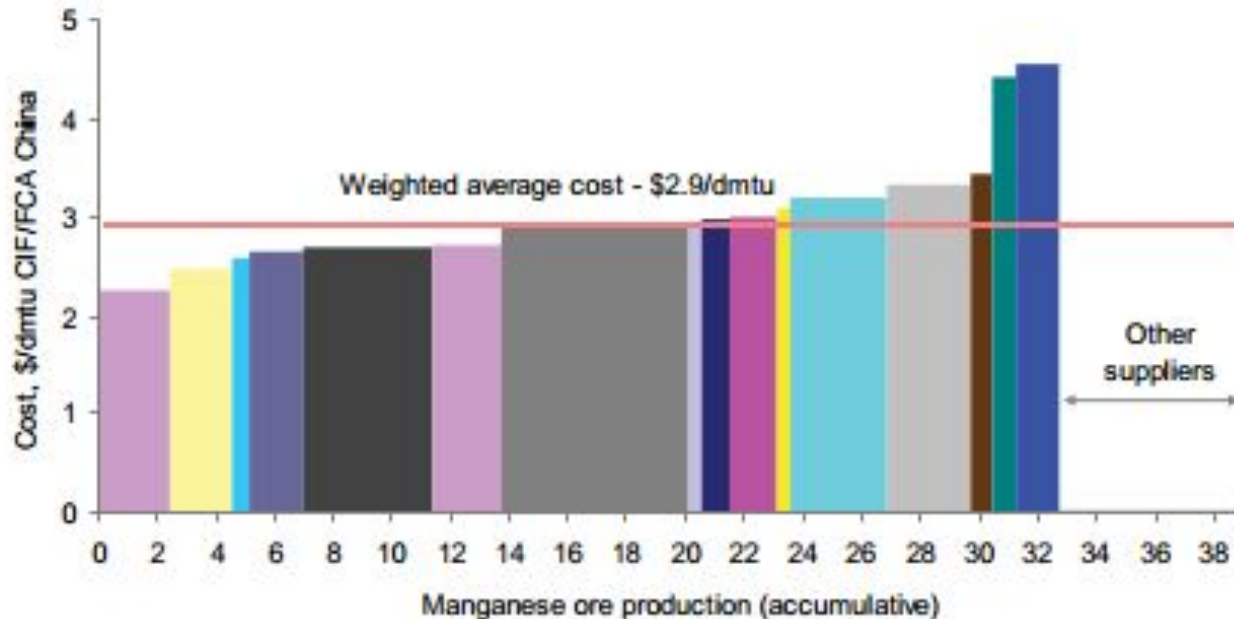
World manganese reserves from 2004 to 2016 (in million metric tons)*



- The above graph is taken from the Statistica website [www.statistica.com].
- This illustrates that many of the worlds larger producers are mature and have large reserves – but are not adding new reserves to their inventory (China and Australia).

MANGANESE RESERVES – COST OF PRODUCTION

- In 2012 global Mn ore price is \$5/dmtu CIF China

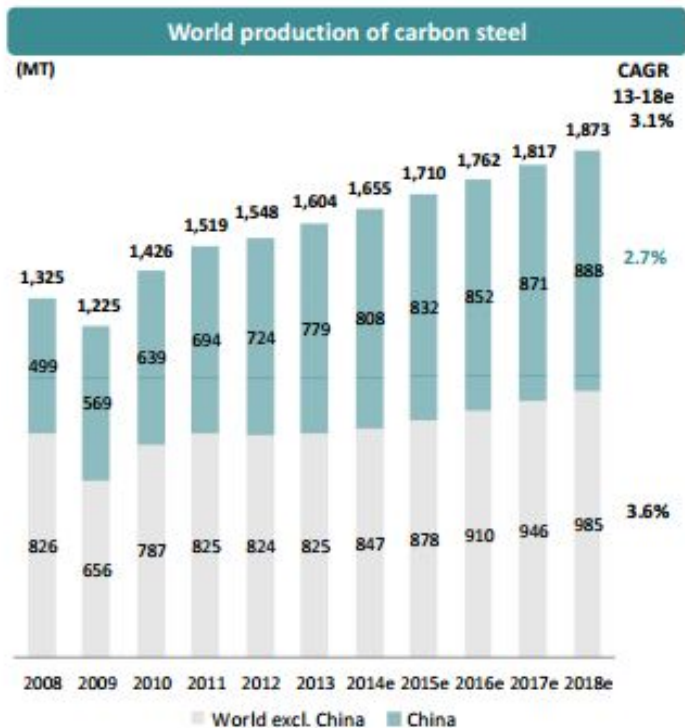


- In 2012 the average cost of Manganese ore production was US\$2.9/mtu and the average price was \$5/mtu CIF China
- The cost of production has since increased particularly in South Africa (serious labour and political issues, poor supply and increasingly expensive power costs) and China (old, deep, low grade mines)
- Moanda in Gabon is one of the cheapest producers in the world with a large scale open cast mine and integrated rail and port facilities

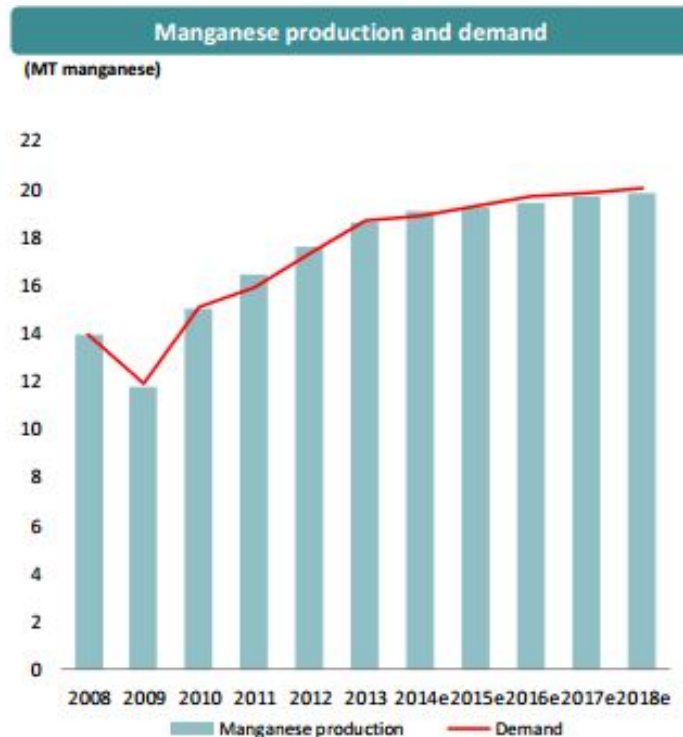
MANGANESE DEMAND & PRODUCTION

Mn

Manganese demand driver: steady growth of world carbon steel production



Source Macquarie Research



Source Macquarie Research

Carbon steel accounts for approximately 70% of ERAMET Manganese revenue
Steady growth of carbon steel production, primarily driven by China, combined with limited new manganese mines entering into production, will support manganese demand and prices





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