Manganese ore: Where is the recovery?

Kevin Fowkes
Ferroalloy Industry Consultant

www.kevinfowkes.com

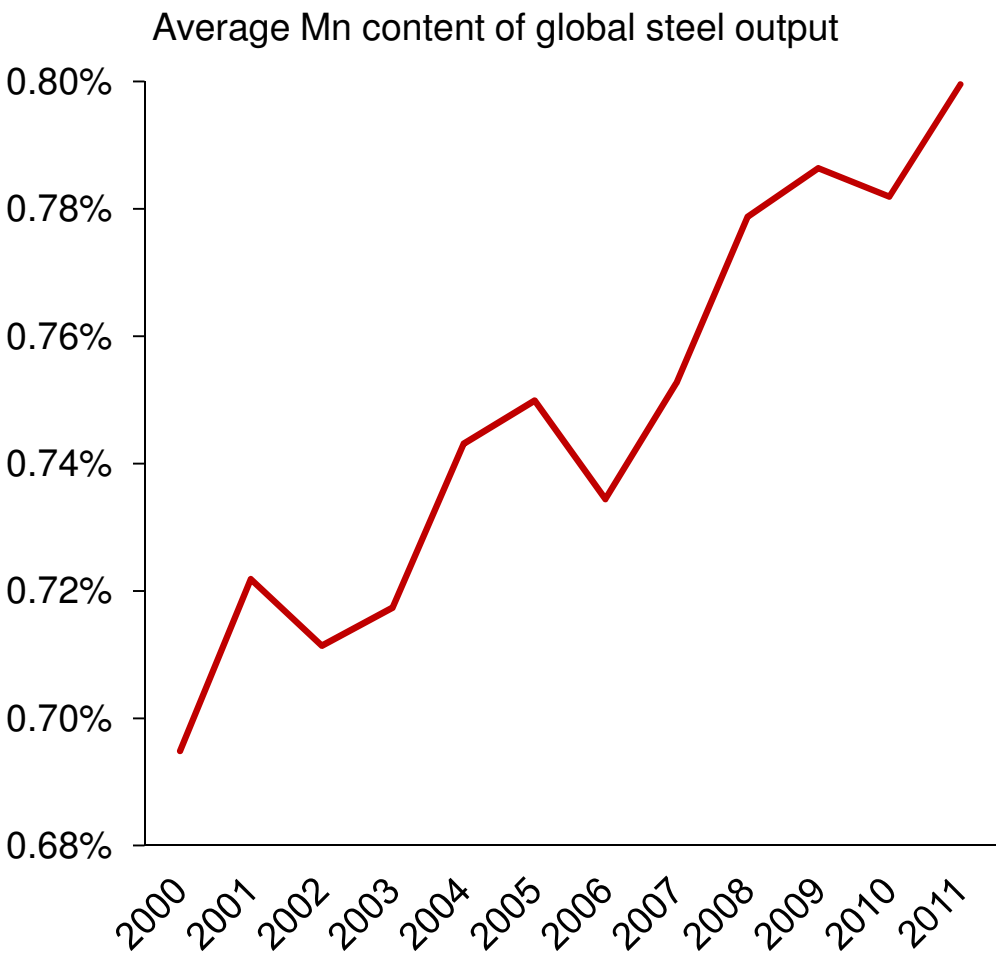
29th March, 2012

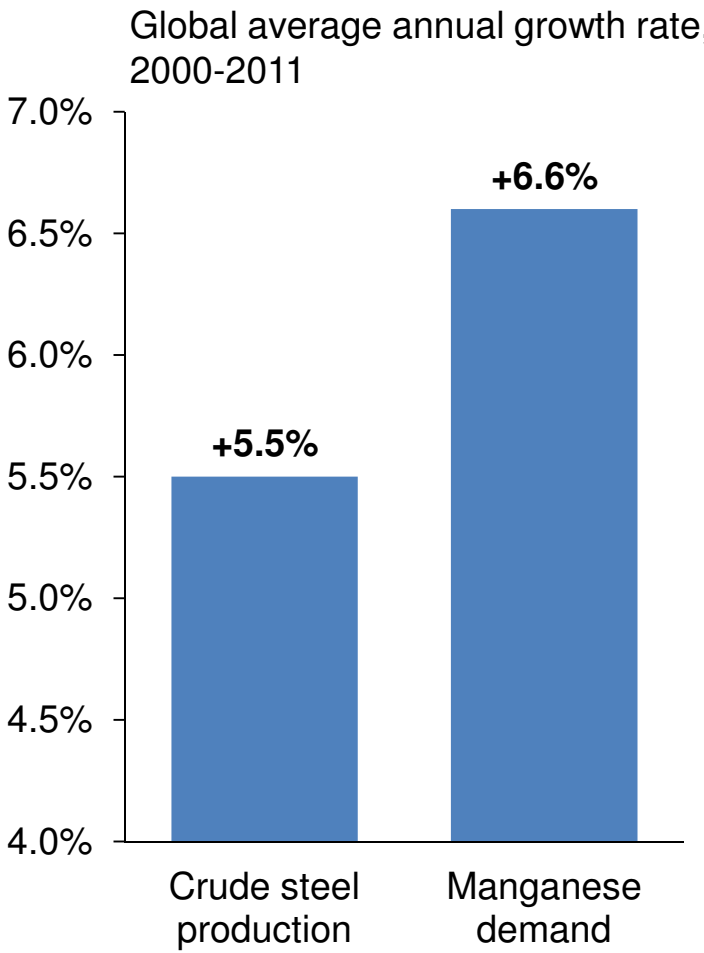
What is manganese?

- Manganese is the world's fourth most heavily consumed metal
- Global mine output of 15 million tonnes in 2011 – over 90% goes into steel
- All steels contain manganese
- Manganese is used to remove sulphur from liquid steel (sulphur causes steel to crack)
- There is no viable substitute for manganese as a de-sulphiriser
- Manganese is also used to improve the strength of certain steels (structural steels, high strength flat steels)
- Non-steel consumption of manganese includes de-polarisation of dry-cell batteries, and as an additive in certain aluminium and copper alloys

Manganese demand – a success story:

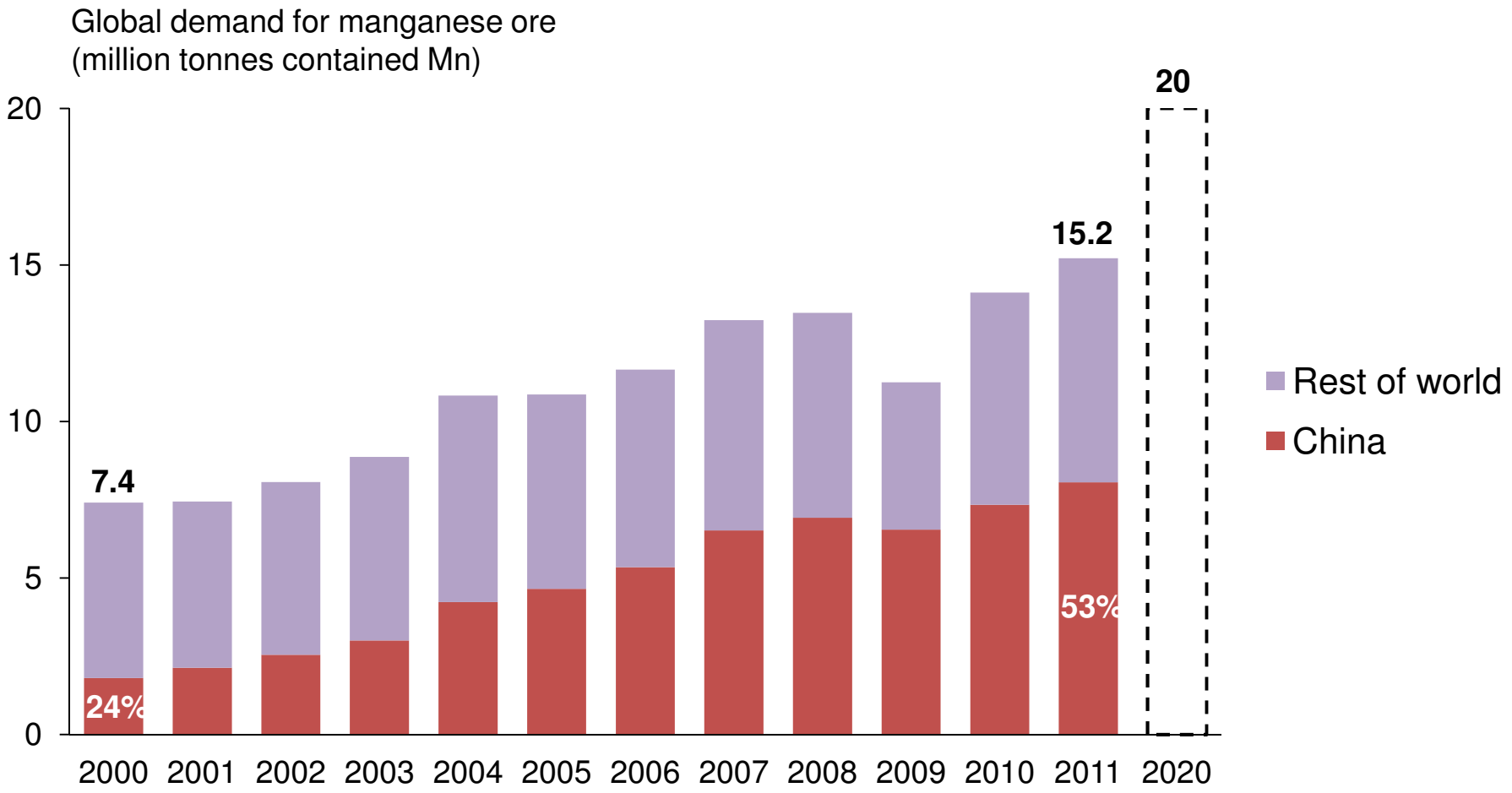
(2) Average Mn content per tonne of steel is rising



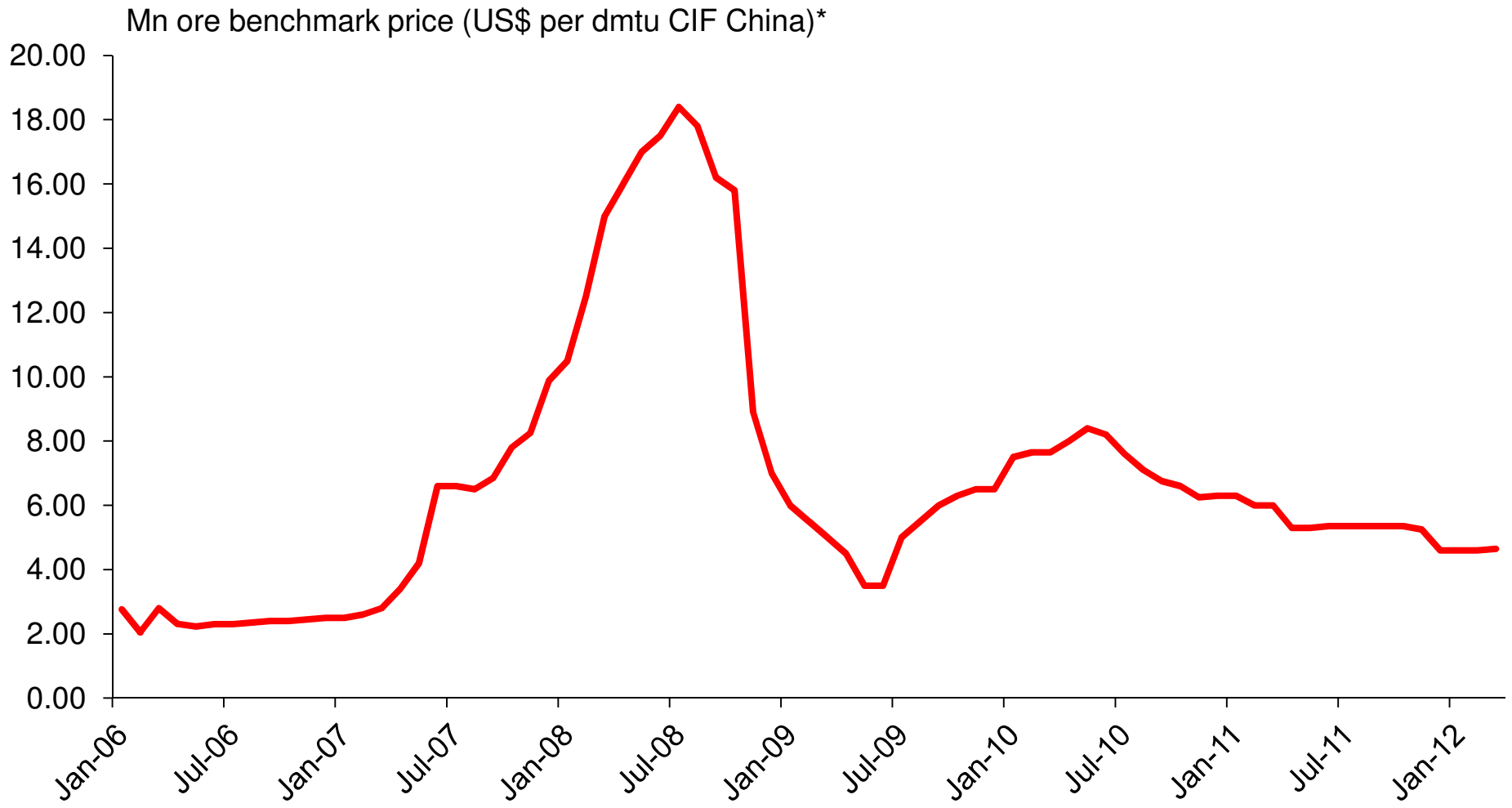


Manganese demand – a success story:

(3) Expect demand growth of 33% (5Mt) by 2020

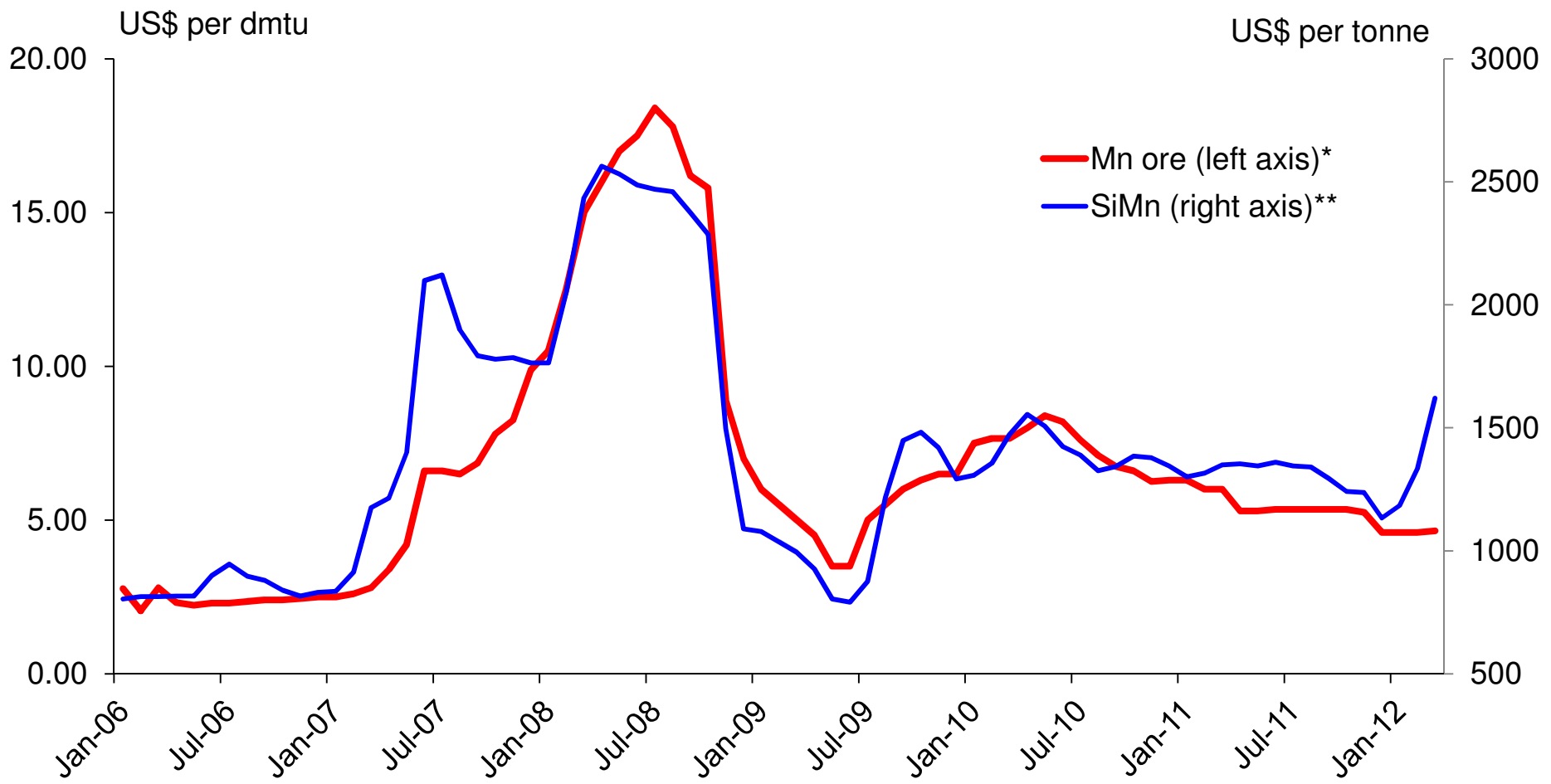


Yet, Mn ore prices have become particularly depressed



*Benchmark price for Australian 44/45% lumpy ore on a CIF China basis, as reported in various sources

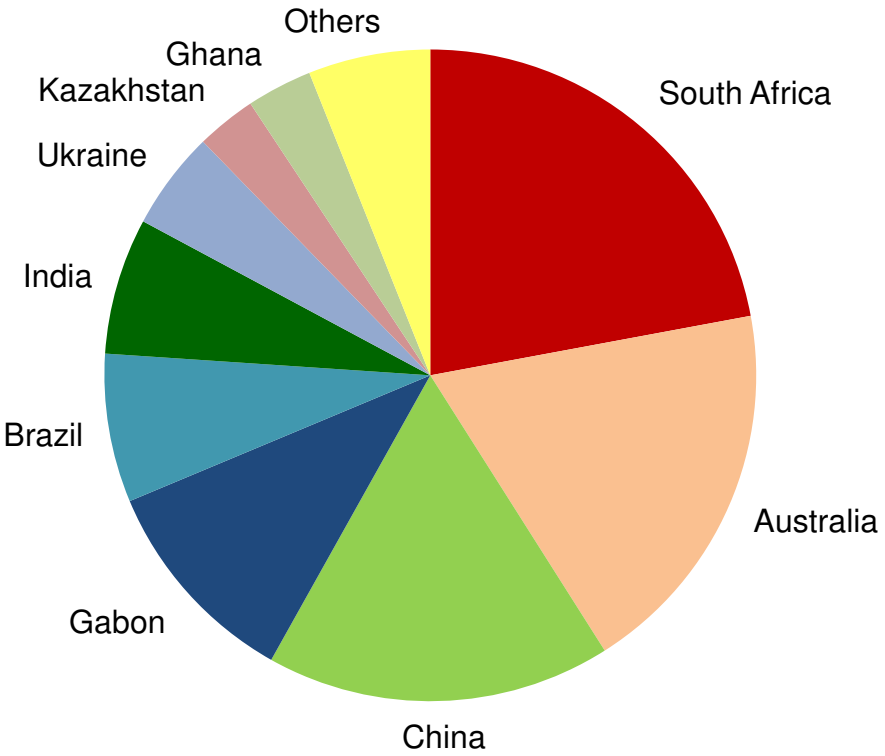
Mn ore prices have not yet showed the signs of price recovery that are visible in Mn alloy markets



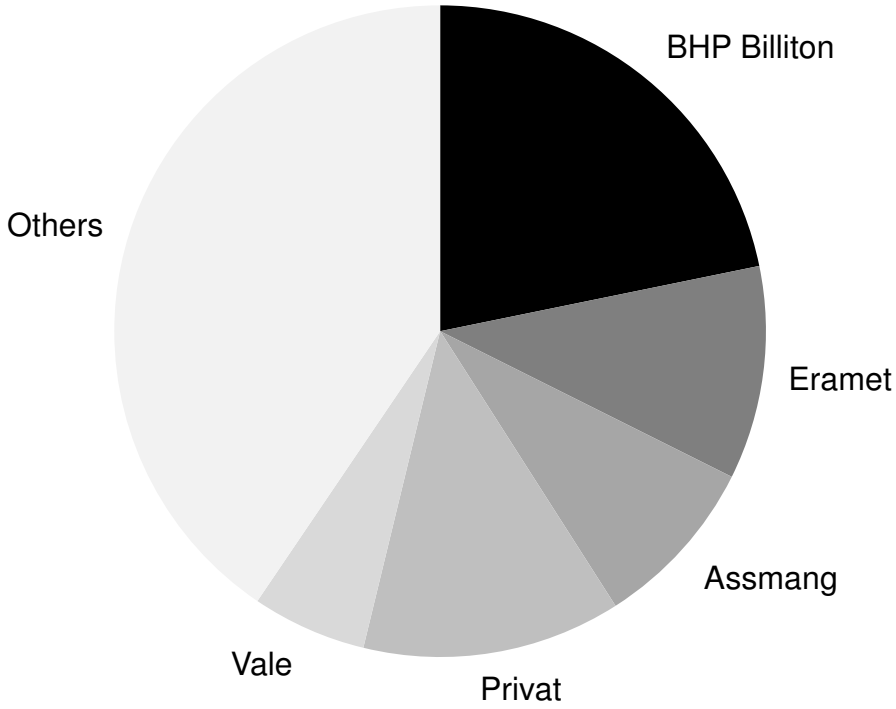
*Benchmark price for Australian 44/45% lumpy ore on a CIF China basis, as reported in various sources
**US spot price for silicomanganese, delivered to warehouse

Mn ore production is relatively concentrated, both geographically and in terms of number of producers

Global Mn ore production by country, 2011



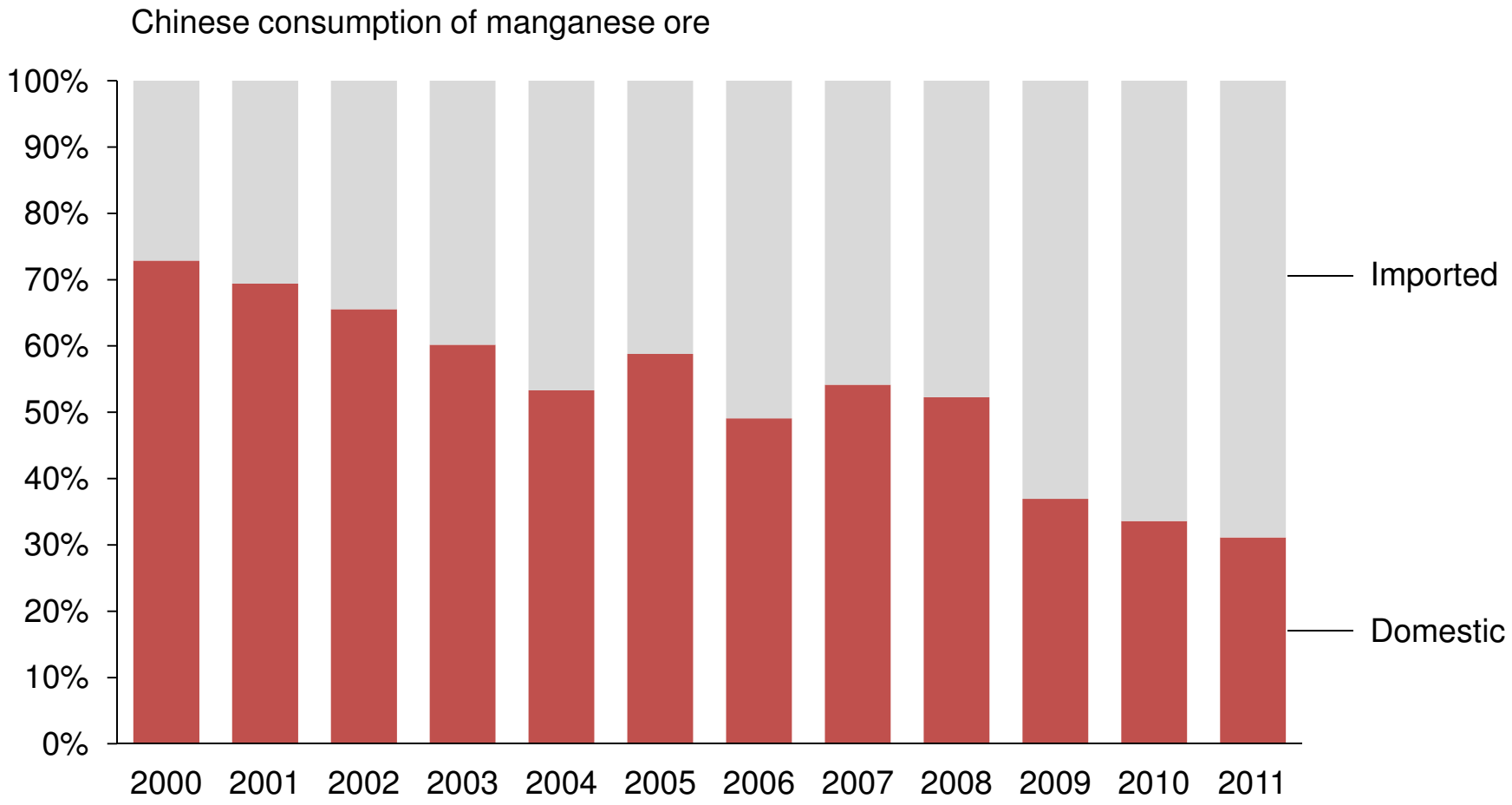
Global Mn ore production by company, 2011



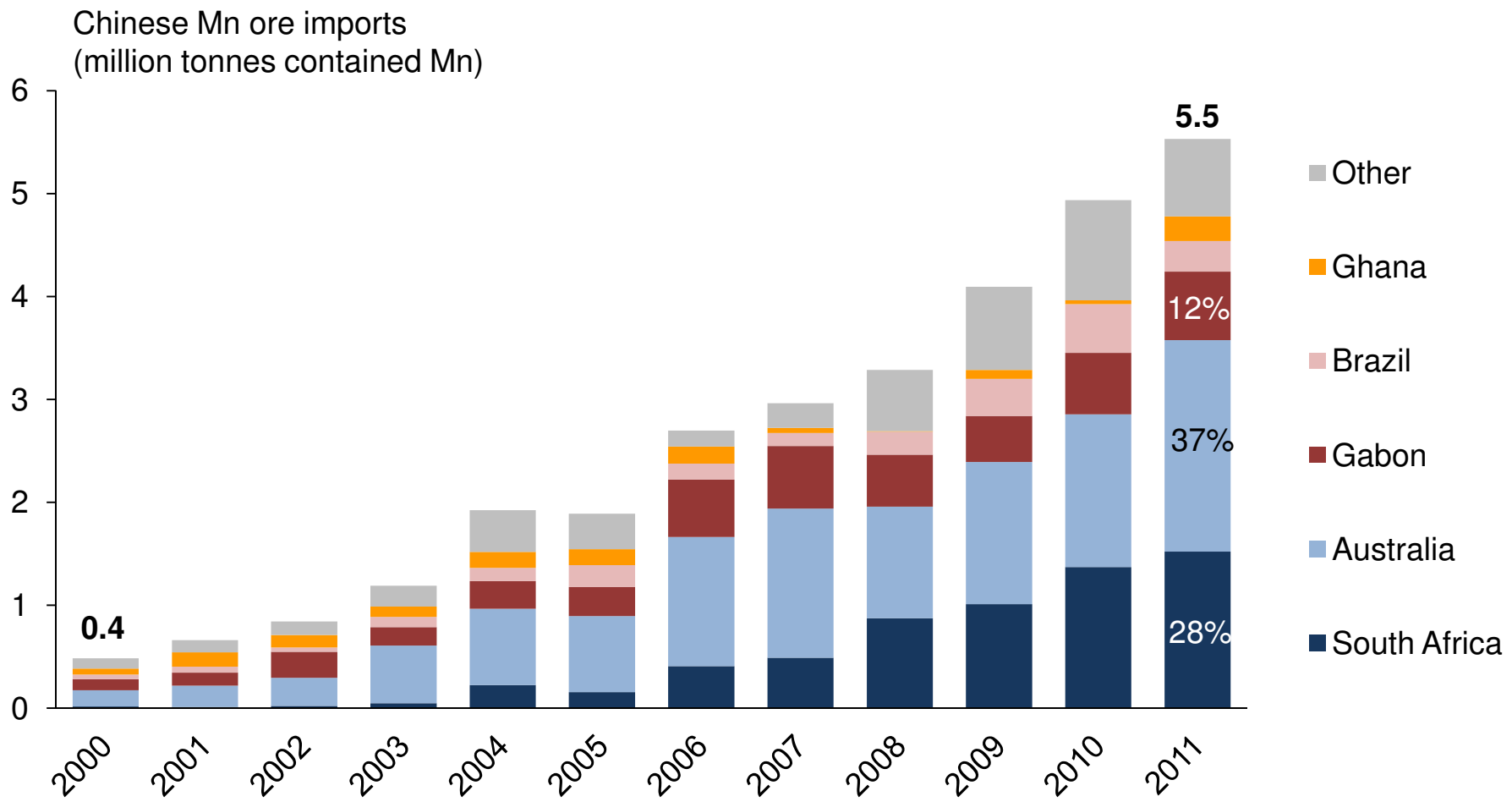
Total: 15 million tonnes

Data shown on a contained Mn basis

The tremendous growth in Chinese Mn ore consumption is being fuelled by imports

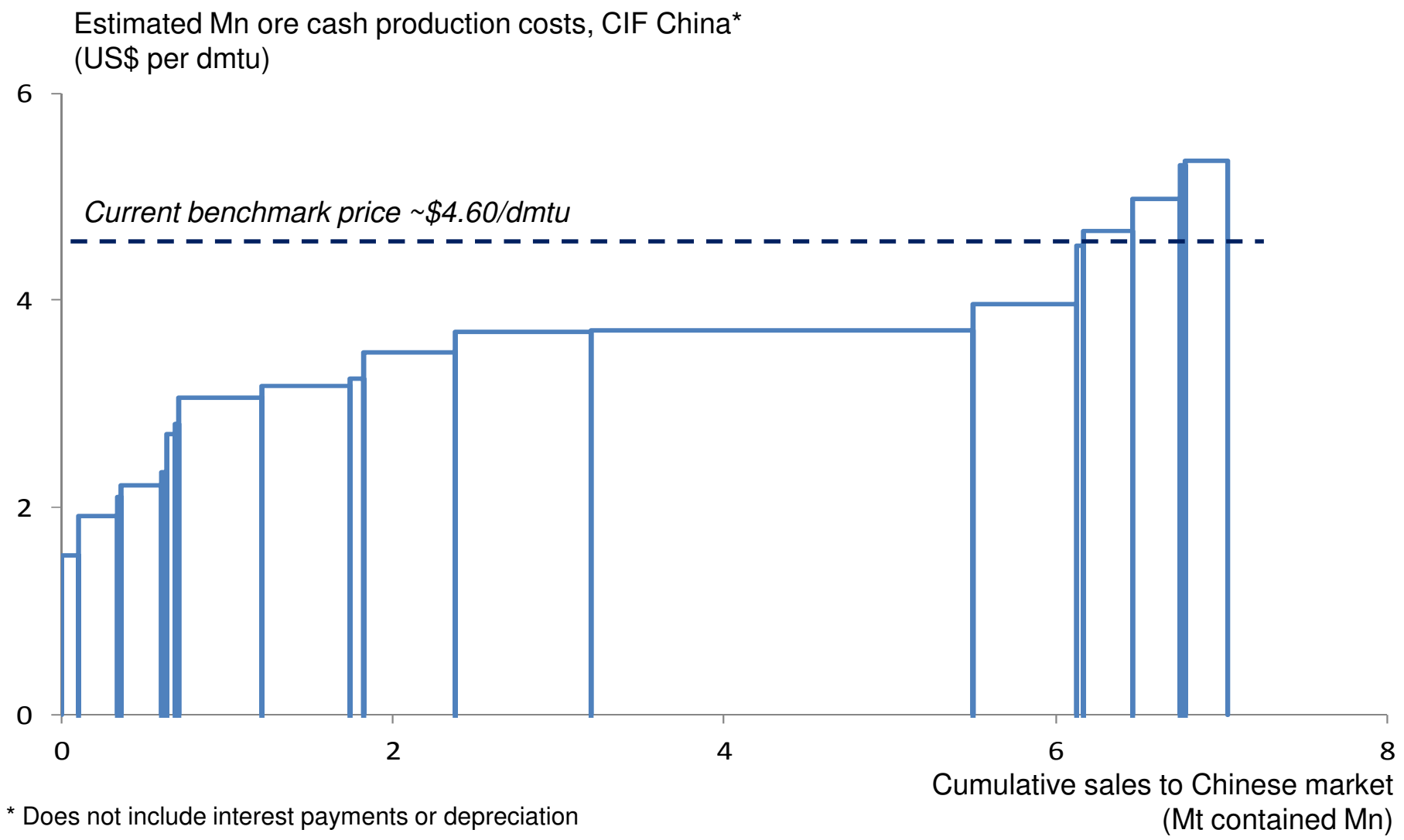


Chinese Mn ore imports reached 5.5Mt in 2011. Australia, S.Africa and Gabon account for 77%



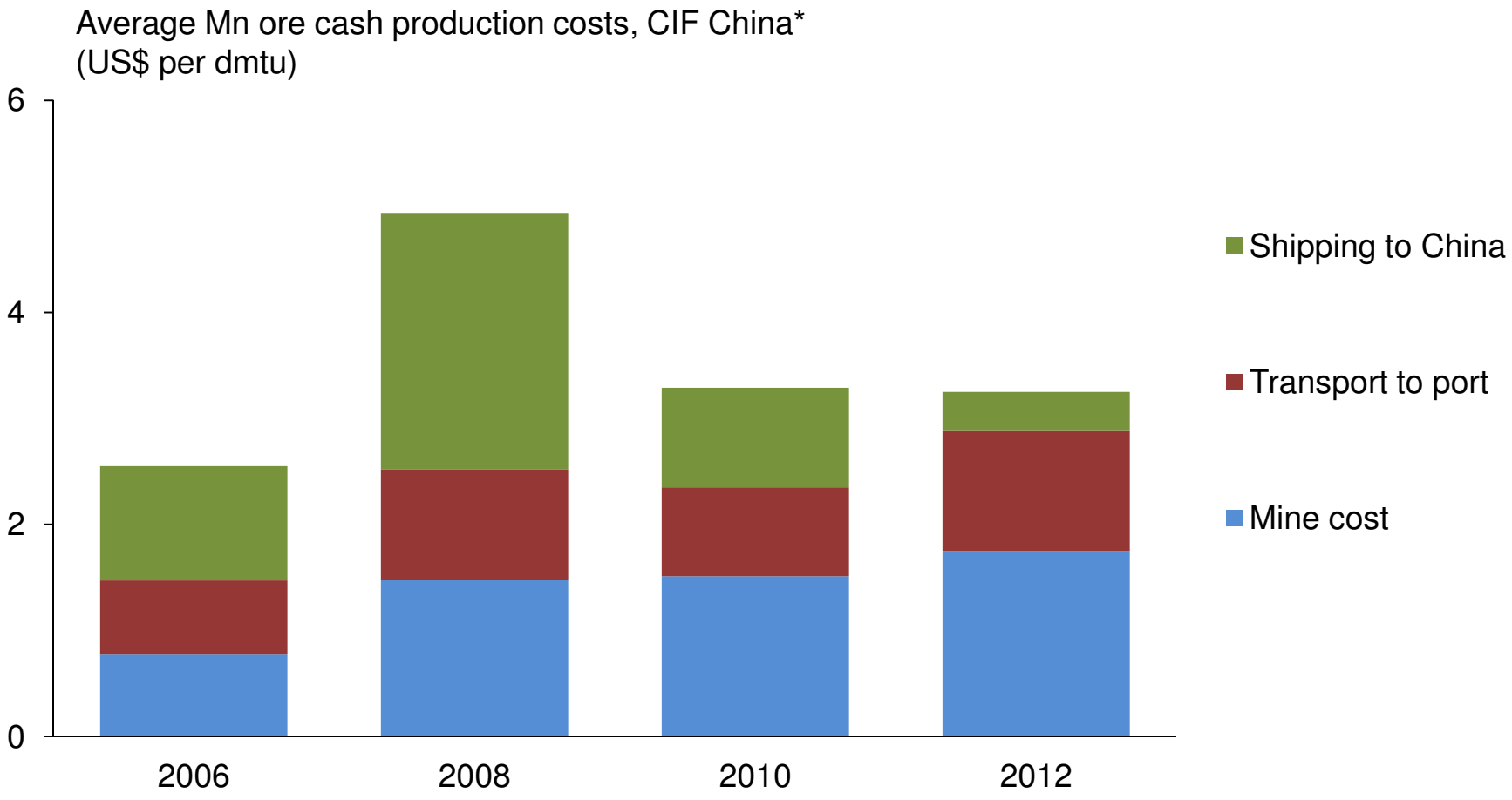
www.kevinfowkes.com

Around 85% of Mn ore supply to China breaks even below current benchmark price levels on a cash basis



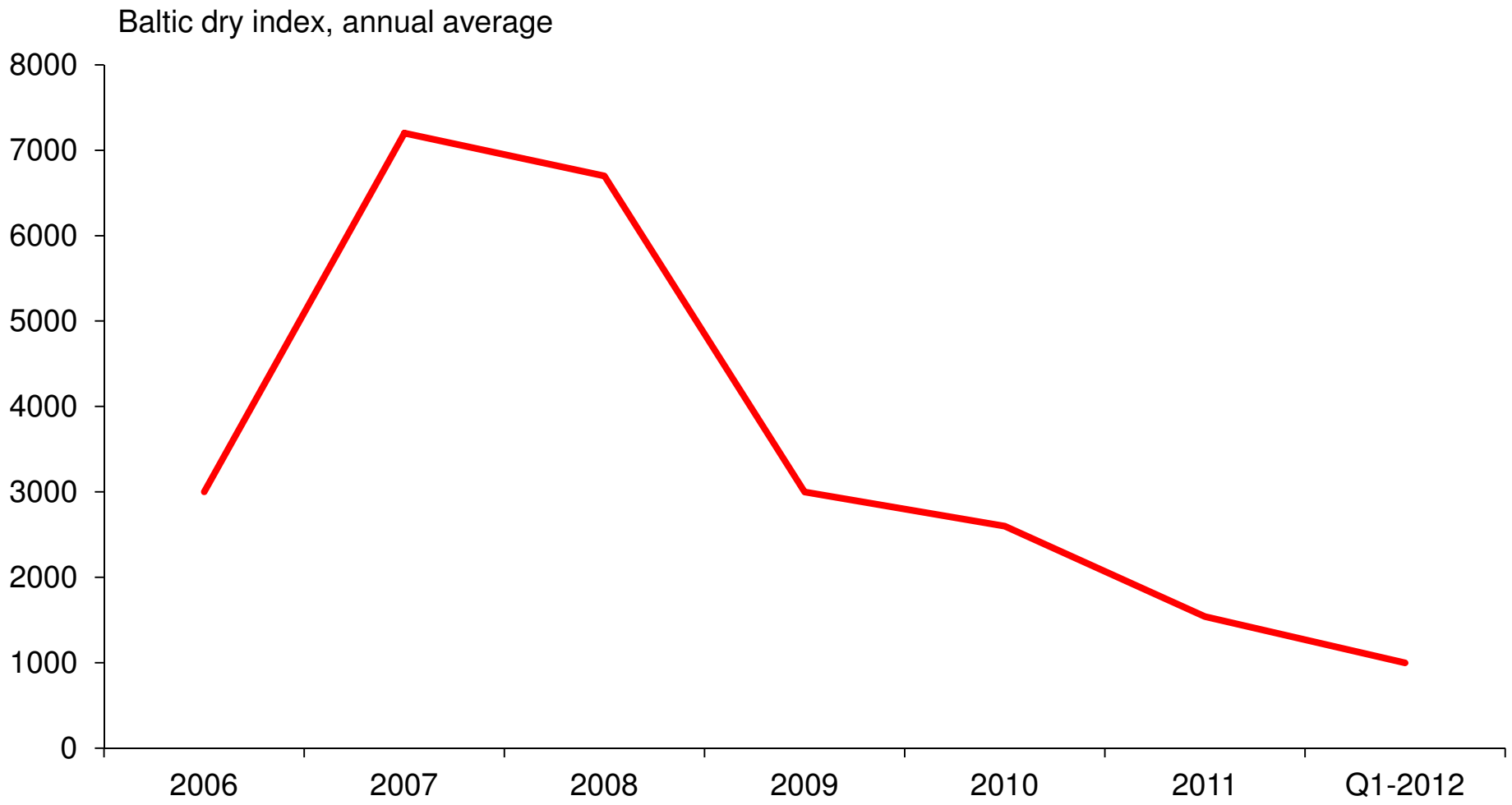
* Does not include interest payments or depreciation

Rising underlying Mn ore mining costs are being hidden by abnormally low shipping rates

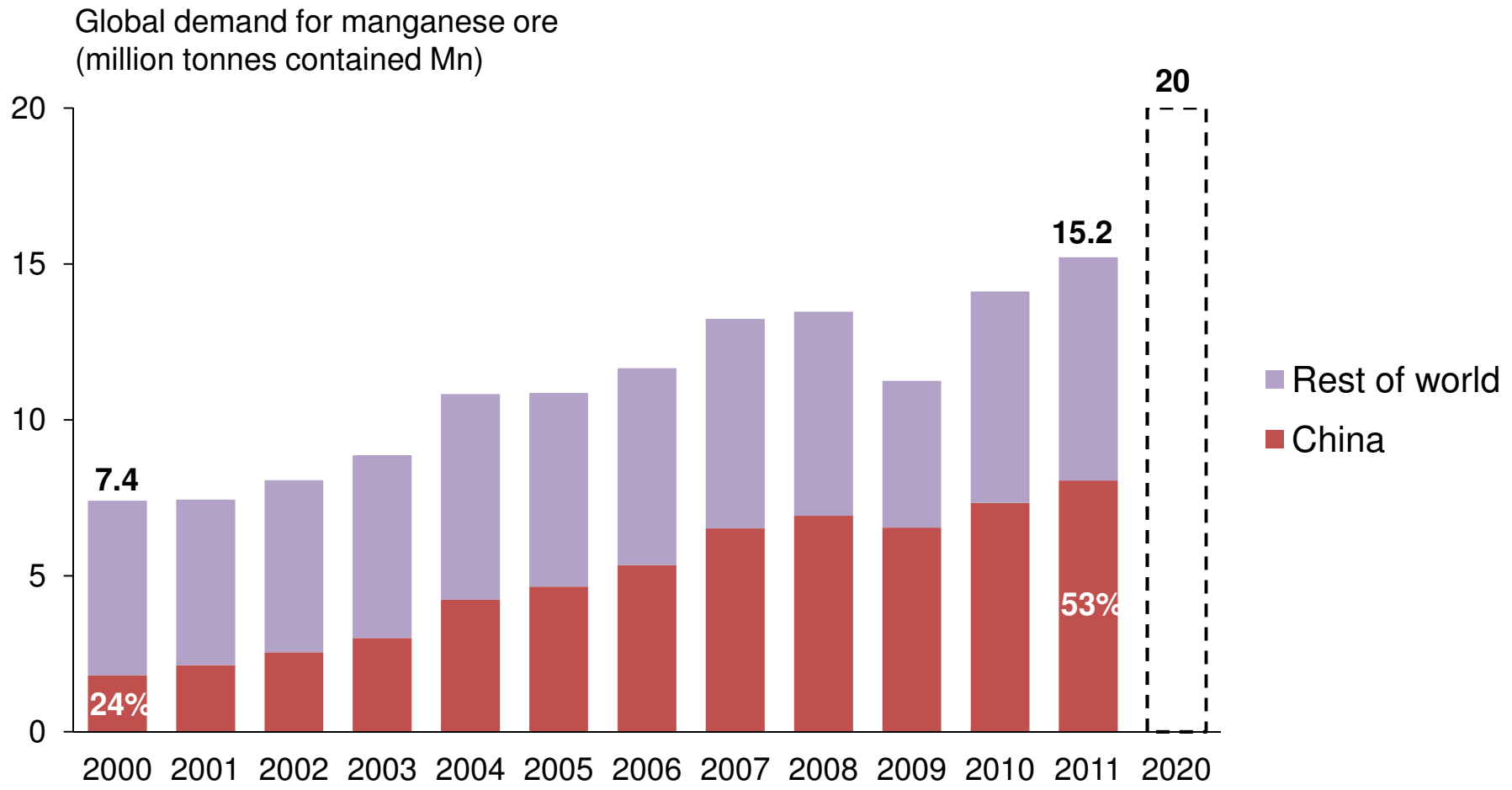


* Does not include royalties, commissions, interest payments or depreciation

Shipping rates fell drastically in 2009 following the global financial crisis, and have continued to decline



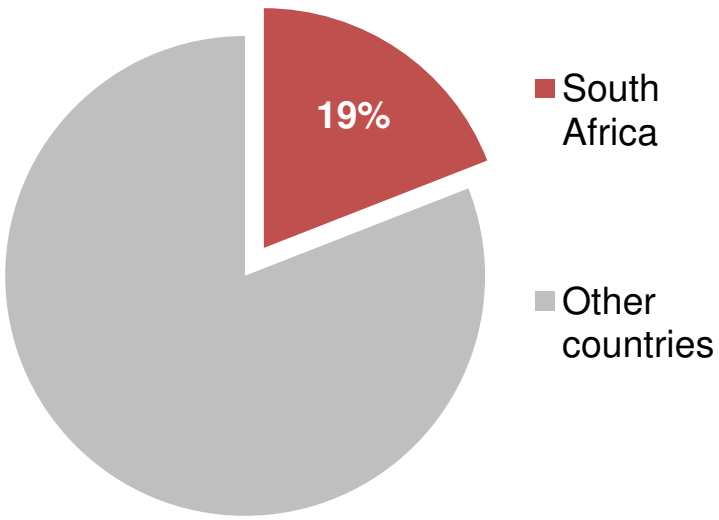
Mn ore demand will rise by 33% by 2020….
where will this be supplied from?



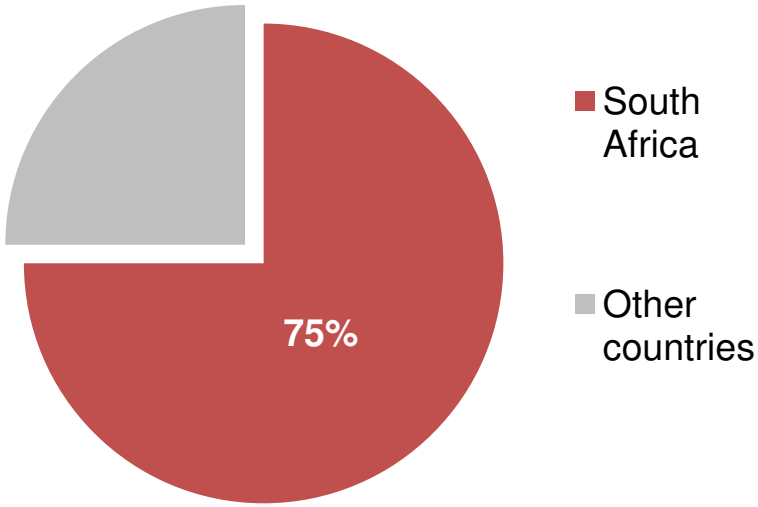
Mn ore demand will rise by 33% by 2020…. where will this be supplied from?

- Most extra demand in the past decade has been met by brownfield expansion, but for demand growth on this scale, new greenfield capacity will be essential
- South Africa will need to be the focal point of large-scale greenfield projects

World Mn ore reserves

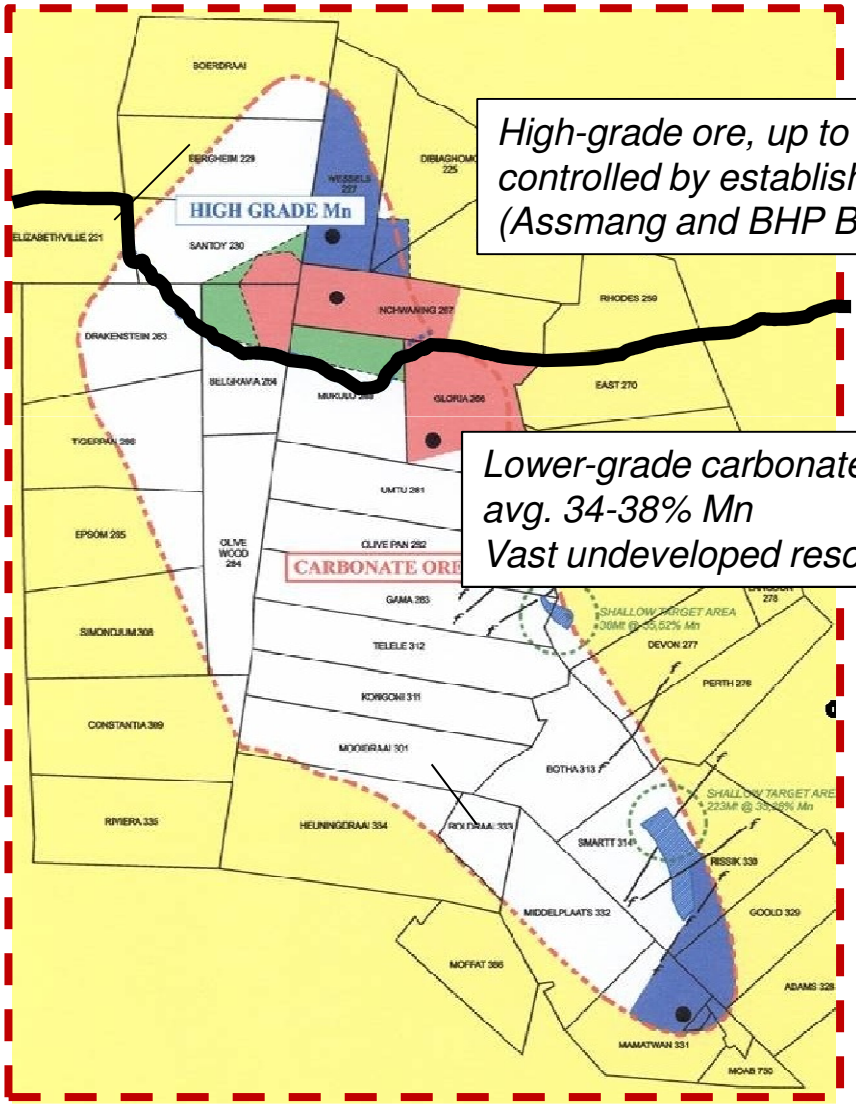


World Mn ore resources



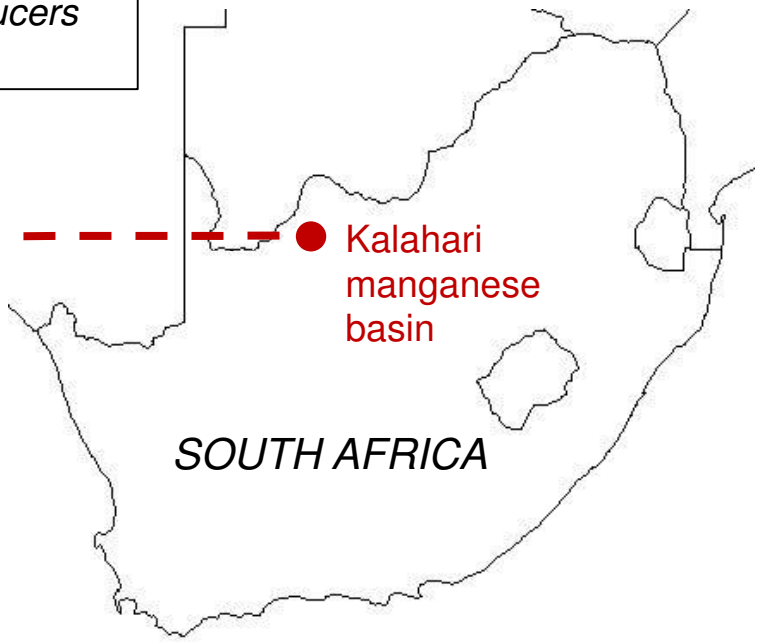
Source: USGS

Most Mn ore in S.Africa is in the Kalahari basin. New operations will be based on lower grade carbonate ore



High-grade ore, up to 48% Mn. Mostly controlled by established producers (Assmang and BHP Billiton)

Lower-grade carbonate ores, avg. 34-38% Mn
Vast undeveloped resources



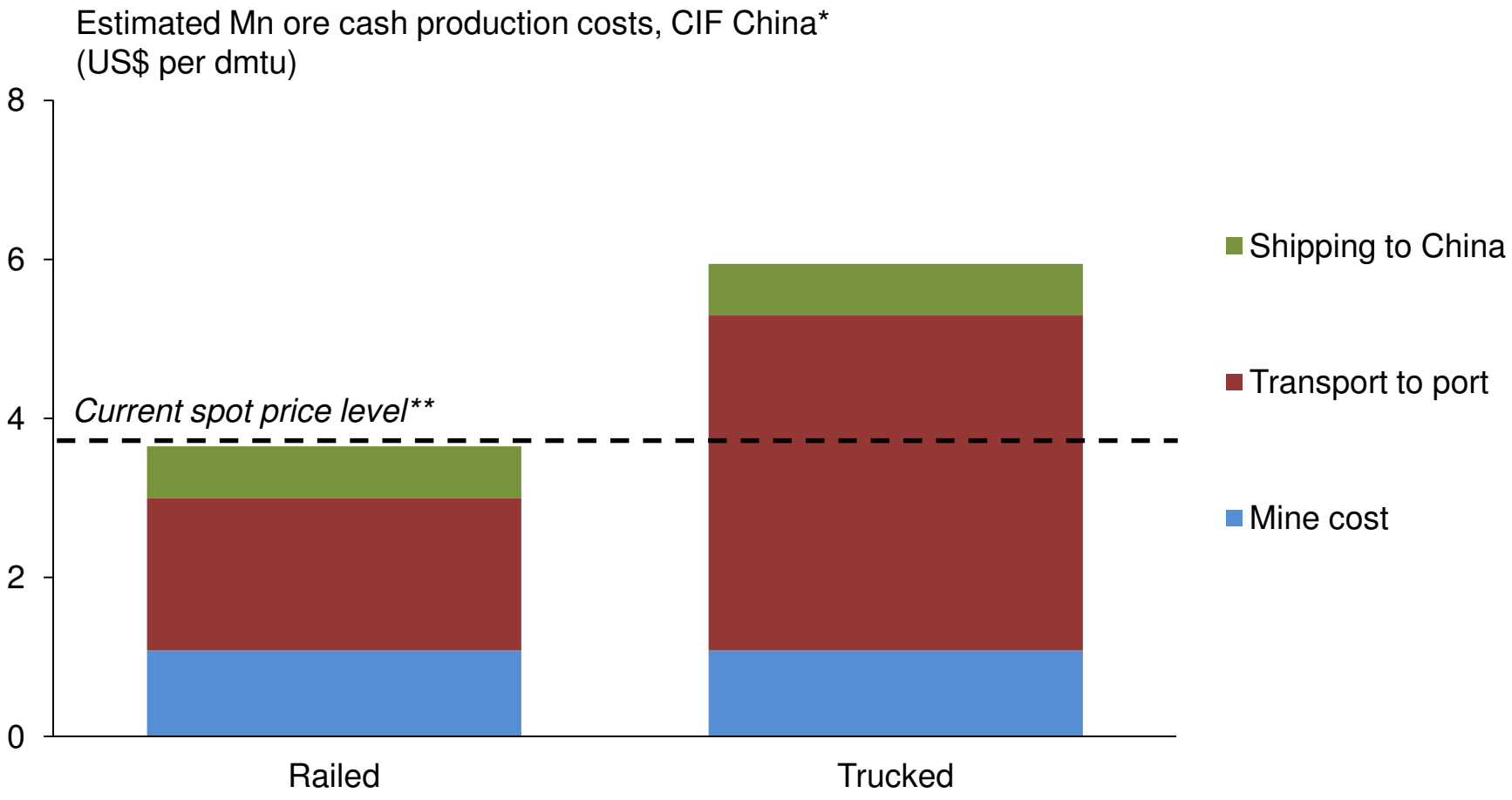
Map of Kalahari manganese basin courtesy of Assmang

www.kevinfowkes.com

Mn ore exports from S.Africa will be constrained by rail and port capacity bottlenecks for the next decade

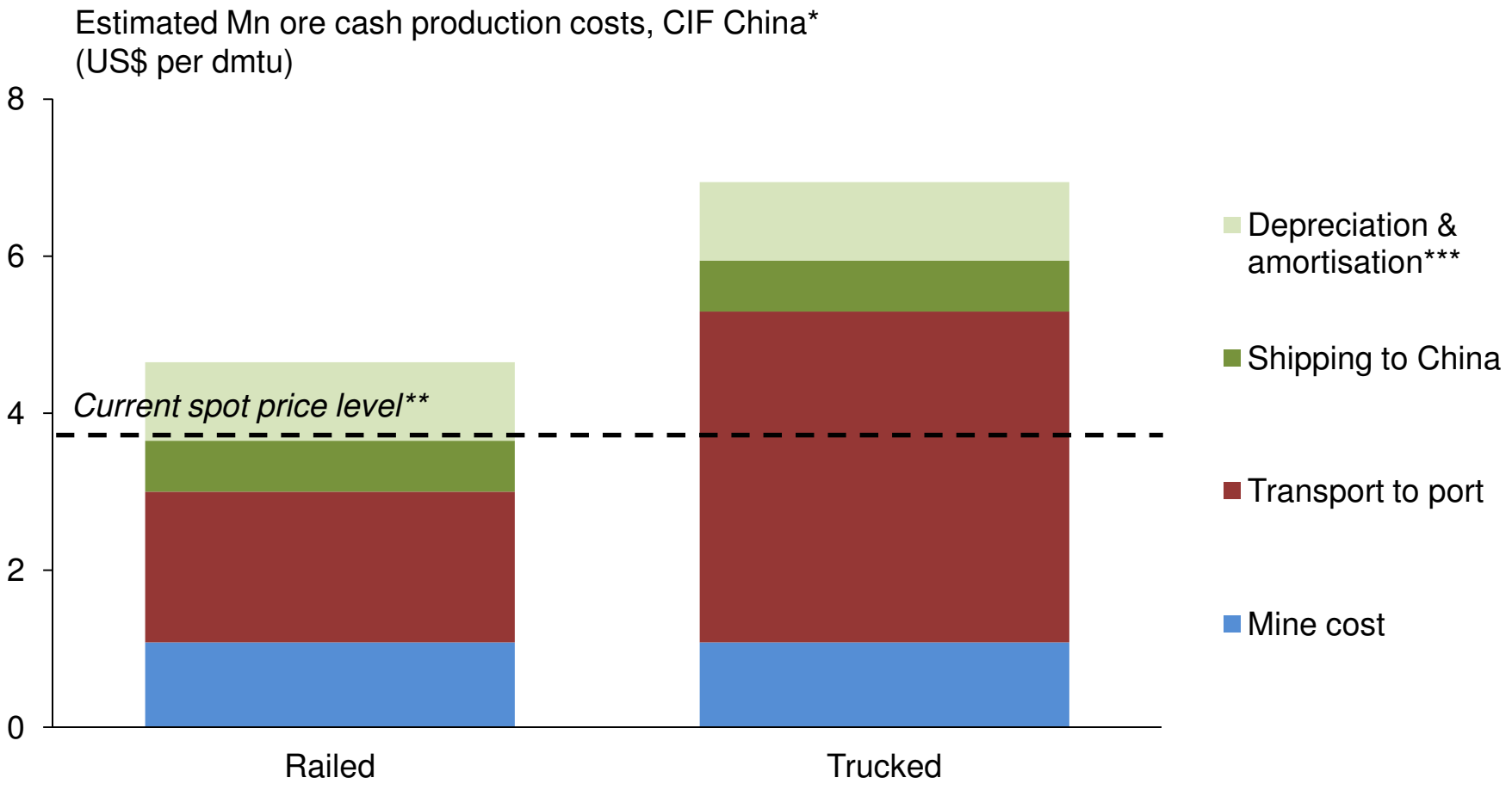
- Manganese ore for export from the Kalahari mines is subject to severe logistical bottlenecks in terms of rail and port capacity
- This has already leading to rationing of rail paths between producers, with increasing pressure from the new mines coming on-stream
- Current plans propose a new rail link and port terminal by earliest 2017. This makes it challenging for new entrants to ramp up as planned from 2012-15
- Trucking of Mn ore from the Kalahari has risen substantially, but comes with its own constraints in terms of cost, road/truck capacity and environmental/safety pressures. Trucking not viable at current prices
- Current low Mn prices reduce business case for infrastructure investment
- Sintering is a potential solution, but expensive

Trucking carbonate ore from the Kalahari is not a viable option at current price levels



* Based on 37% Kalahari ore with no sinter plant; assumes oil prices as of March 2012
** Assumes 20% quality discount to published benchmark Mn ore spot prices

Incorporating payback of investment, trucked Kalahari carbonate ore will require a price of $7/dmtu CIF China



* Based on 37% Kalahari ore with no sinter plant; assumes oil prices as of March 2012
** Assumes 20% quality discount to published benchmark Mn ore spot prices
*** Incorporates estimates for both construction and sustaining capital

In conclusion…

- Manganese demand has experienced strong growth in the past decade, and these positive trends are expected to continue through the next 5-10 years
- Expect demand to grow by one third by 2020
- Currently, rising demand is being satisfied by piecemeal brownfield expansion of low-cost existing mines
- Consequently, prices can persist at relatively low levels and still yield adequate returns for the major producers
- Rising demand will eventually require large-scale greenfield South African capacity to come on-line, much of it initially based on trucking product to port
- There will need to be a step change of prices to >$7/dmtu to attract this production, in order to generate an adequate return for new producers
- However prices unlikely to improve from $4.50-5.50/dmtu range in 2012/13