Feeding the growth of Asia: Emerging sources of manganese ore

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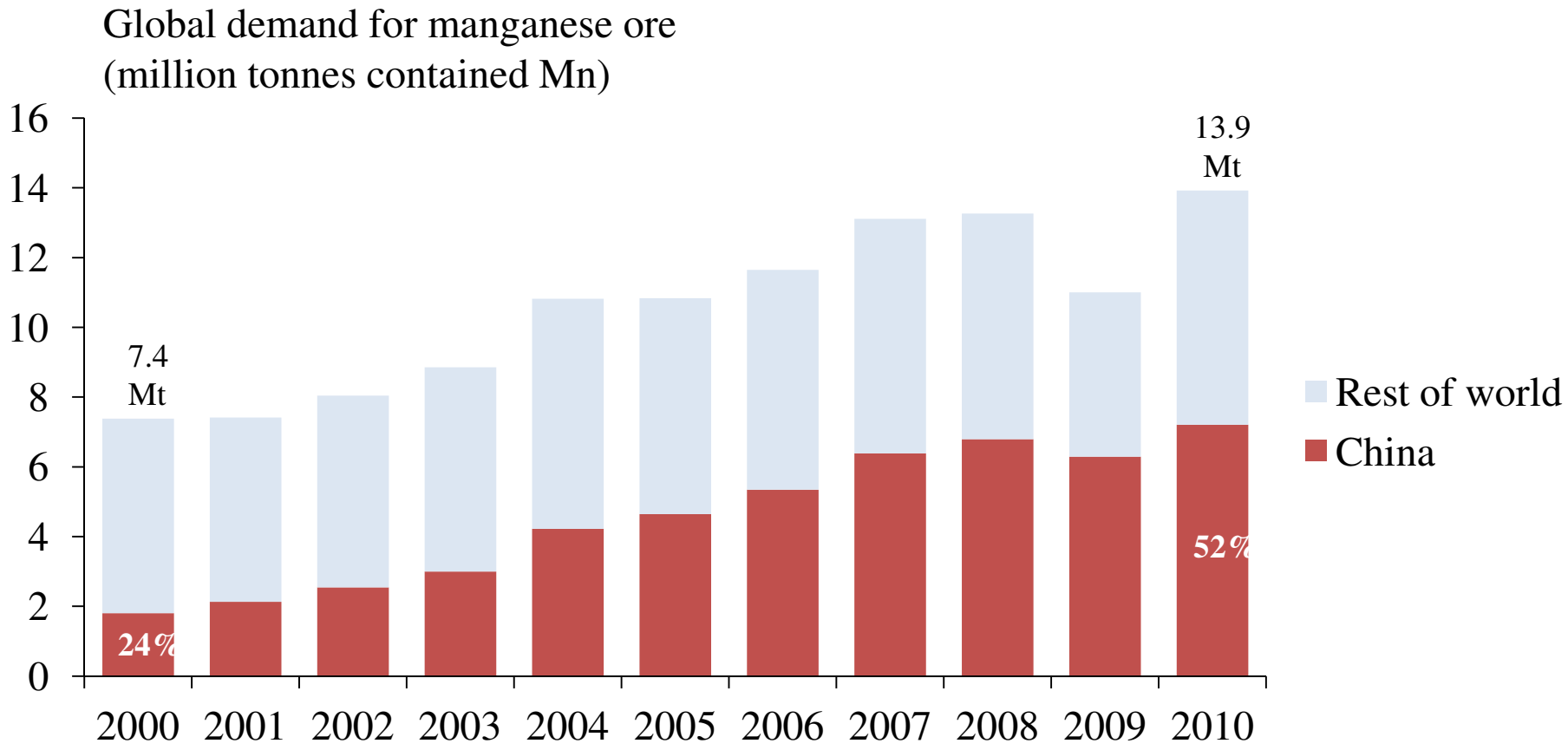
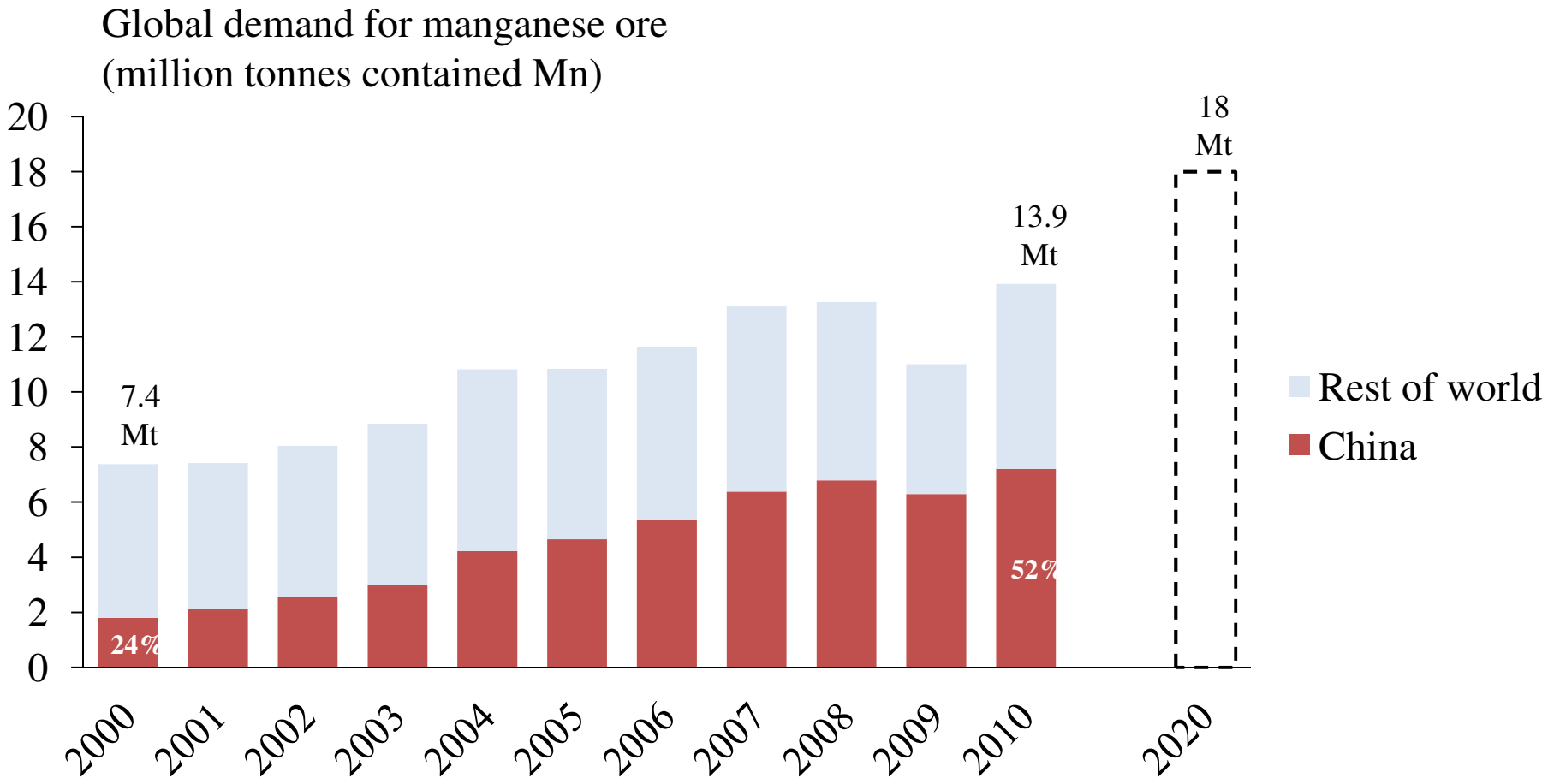
Global demand for Mn ore has doubled in the last 10 years; Chinese share of demand has more than doubled



Manganese demand will grow in line with steel output, possibly faster

- All steel contains manganese – there is no effective substitute for its role in de-sulphurising steel
- Manganese has become increasingly important for its alloying properties
- Key trends in both developing and developed world have been positive for consumption of manganese per tonne of steel:
  - Steel demand growth in China has been infrastructure / construction-led, hence based on structural steels which are generally high in Mn
  - Trends towards higher strength flat steels in the automotive sector has increased Mn consumption per tonne of steel in Europe, USA, Japan
- Average Mn content of steel has risen from 0.70% in 2000 to 0.77% in 2010

Base case scenarios for steel consumption growth indicate demand for 18 million tpy of Mn ore by 2020



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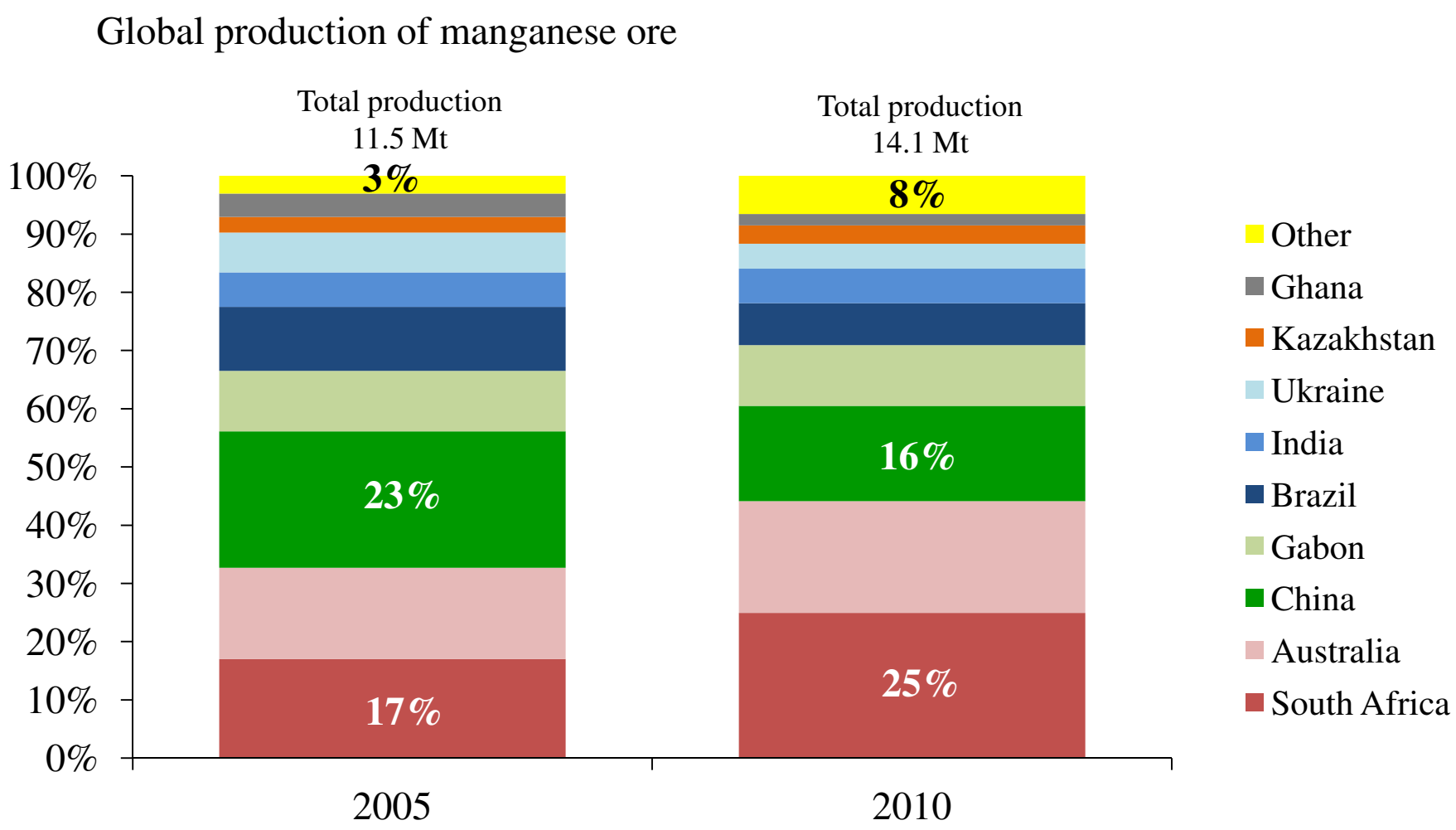
There has been a significant shift in manganese ore supply structure, in response to the growth of demand



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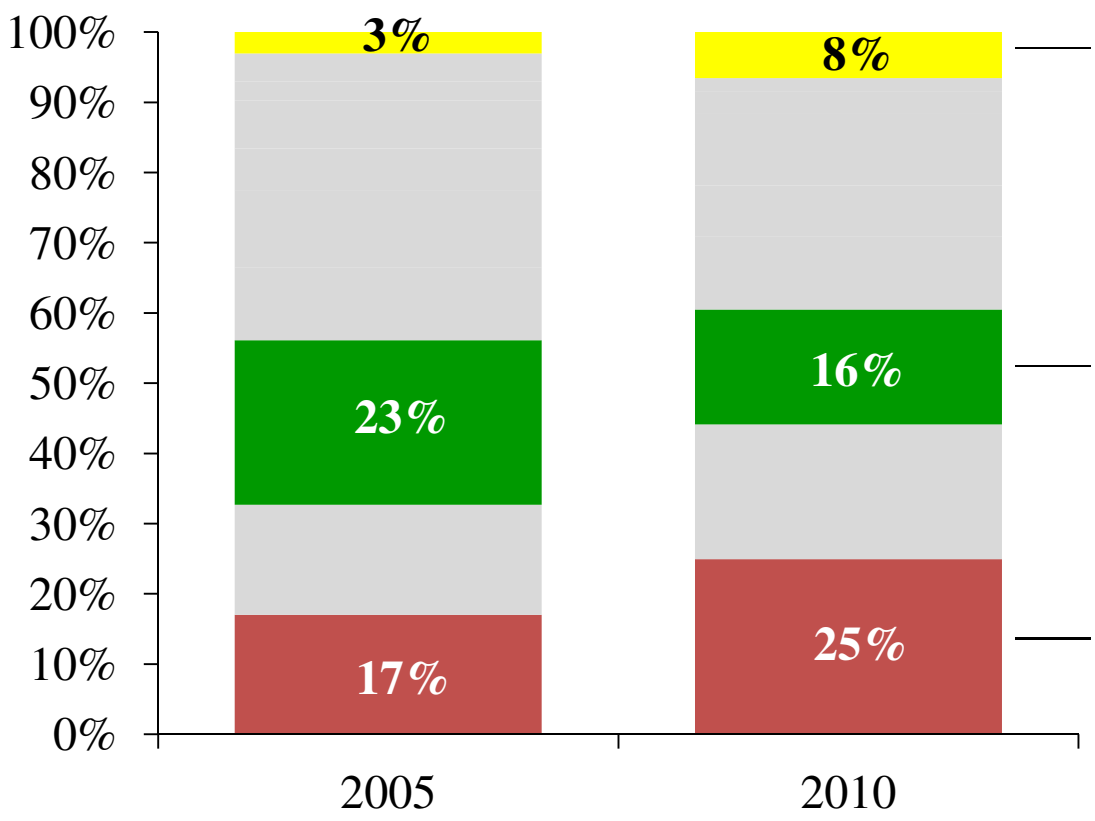
Global production of manganese ore



Key changes:

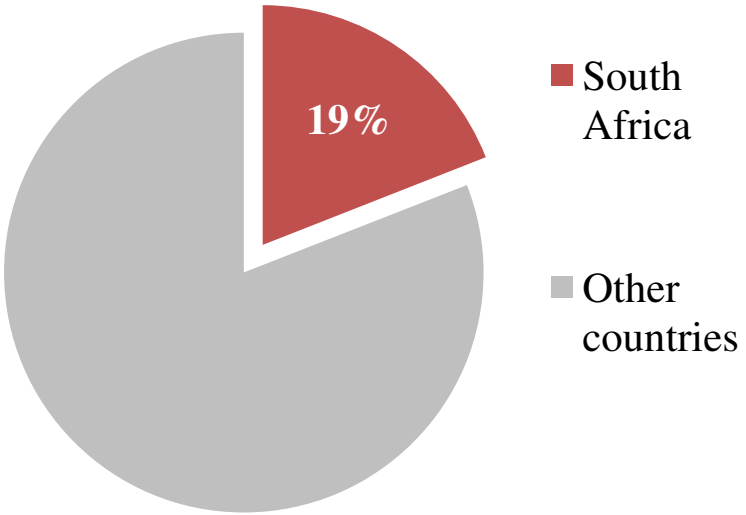
Big increase in supply from non-traditional sources

Supply of ore from Chinese mines is diminishing

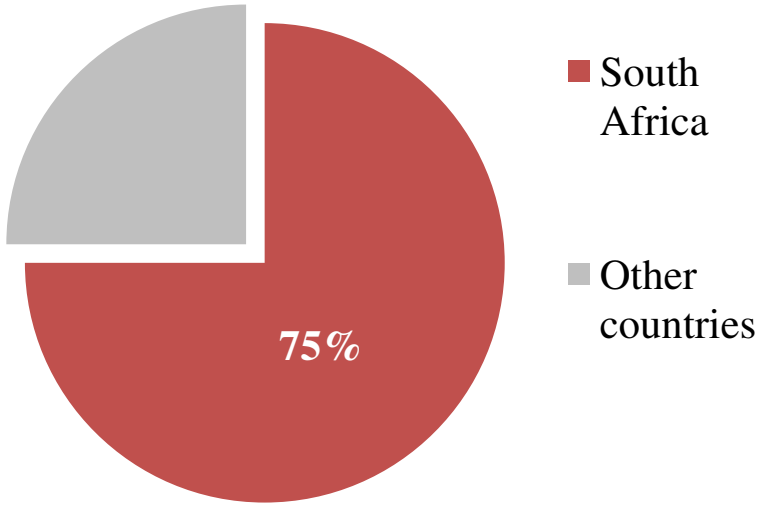
Significant increase in supply from South Africa

South Africa accounts for 75% of identified global resources of manganese ore

World Mn ore reserves

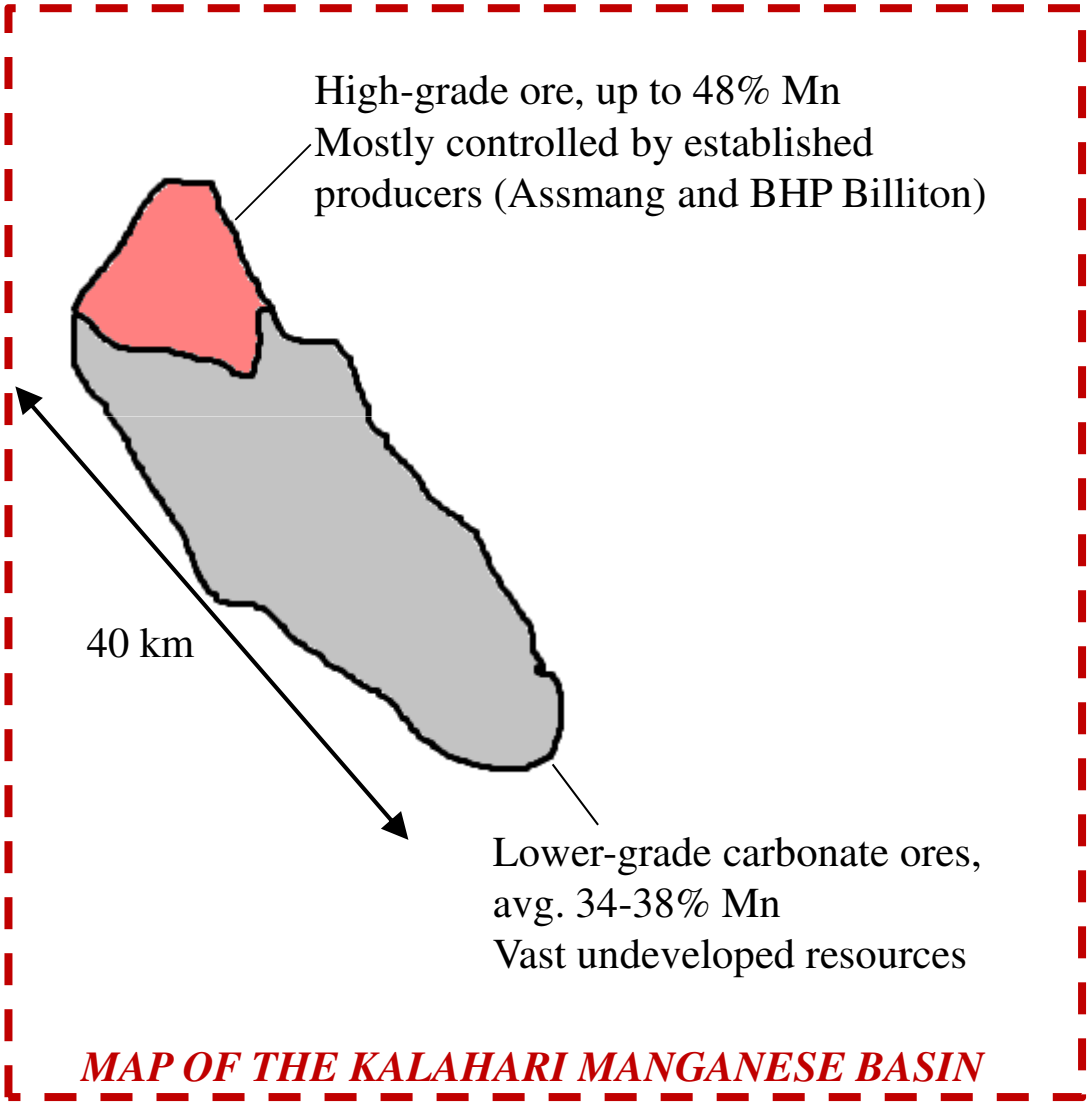


World Mn ore resources



Source: USGS

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

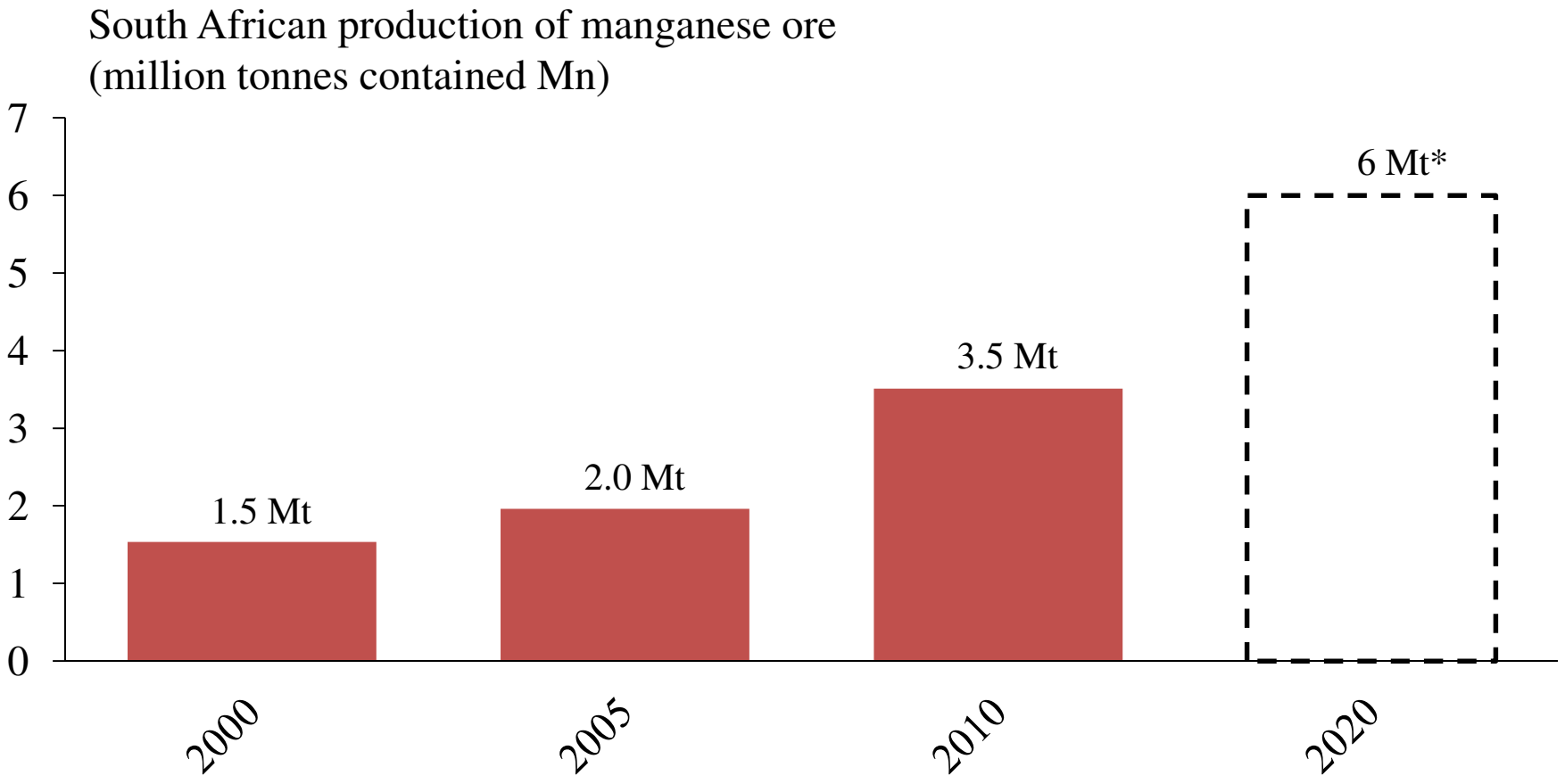


Many of the new South African Mn ore entrants are backed by leading Mn and steel industry groups

- ***United Manganese of Kalahari – already in production***
  Part owned by Renova, which owns Transalloys smelter
  In production since 2008, now producing at close to full capacity
- ***Kalagadi Manganese – in development***
  Part owned by ArcelorMittal
  Underground mine in Kalahari plus smelter in Coega
- ***Asia Minerals – in development***
  Existing smelters in China
- ***Tsipi – in development***
  Shareholders include Privat, OM Holdings and Pallinghurst
- ***Amari – in development***
  Supported by Sinosteel

The leading new entants all aim to begin production between 2011-2013

If the majority of planned projects go ahead, South African manganese ore output could double by 2020...



* equates to around 15 million tonnes on a gross wet tonne basis

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

- Manganese ore for export from the Kalahari mines travels to Port Elizabeth down a rail line that is at full capacity. The manganese export terminal at the port is also capacity constrained

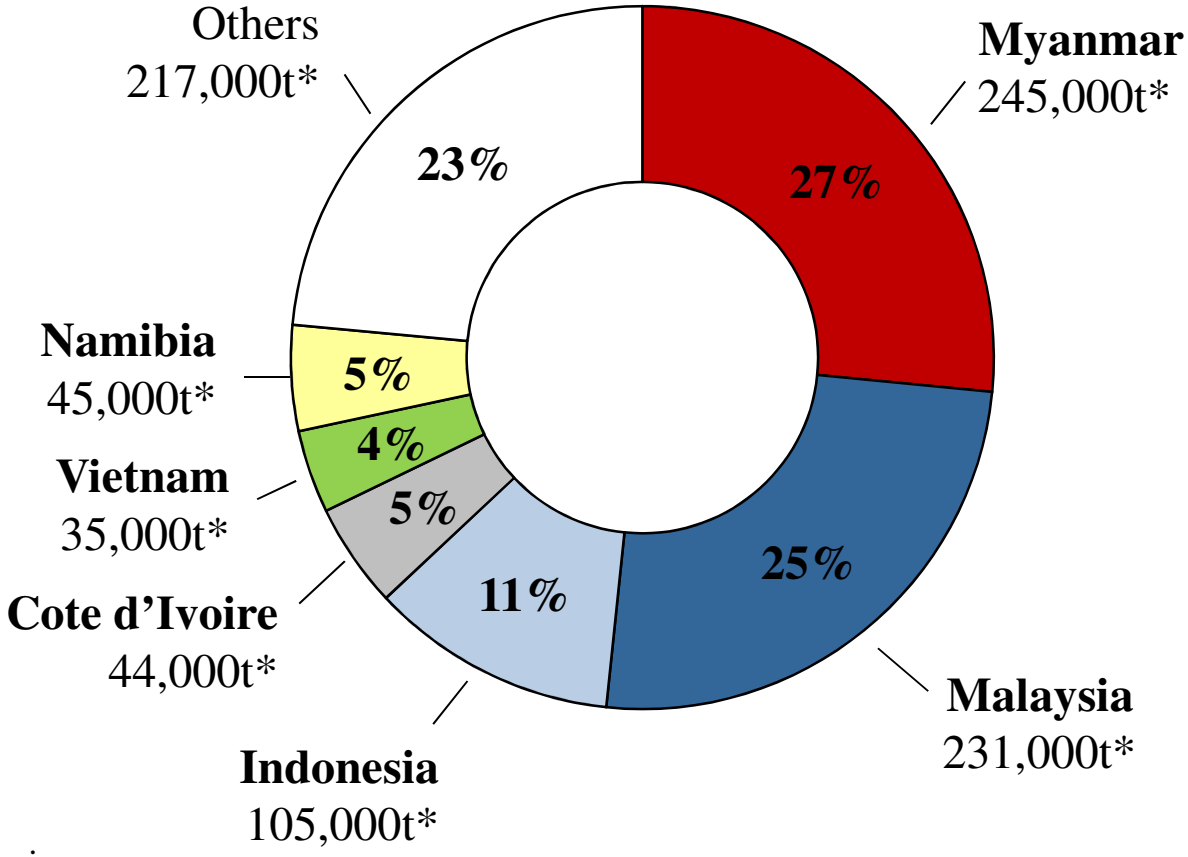
- This has already leading to rationing of rail paths between producers, with increasing pressure from the new mines coming on-stream

- Current plans propose a new rail link and port terminal by ~2017. This may make it challenging for new entrants to ramp up as planned from 2011-13

- Trucking of Mn ore from the Kalahari has risen substantially and will inevitably increase further. This comes with its own constraints in terms of cost, road/truck capacity and environmental/safety pressures

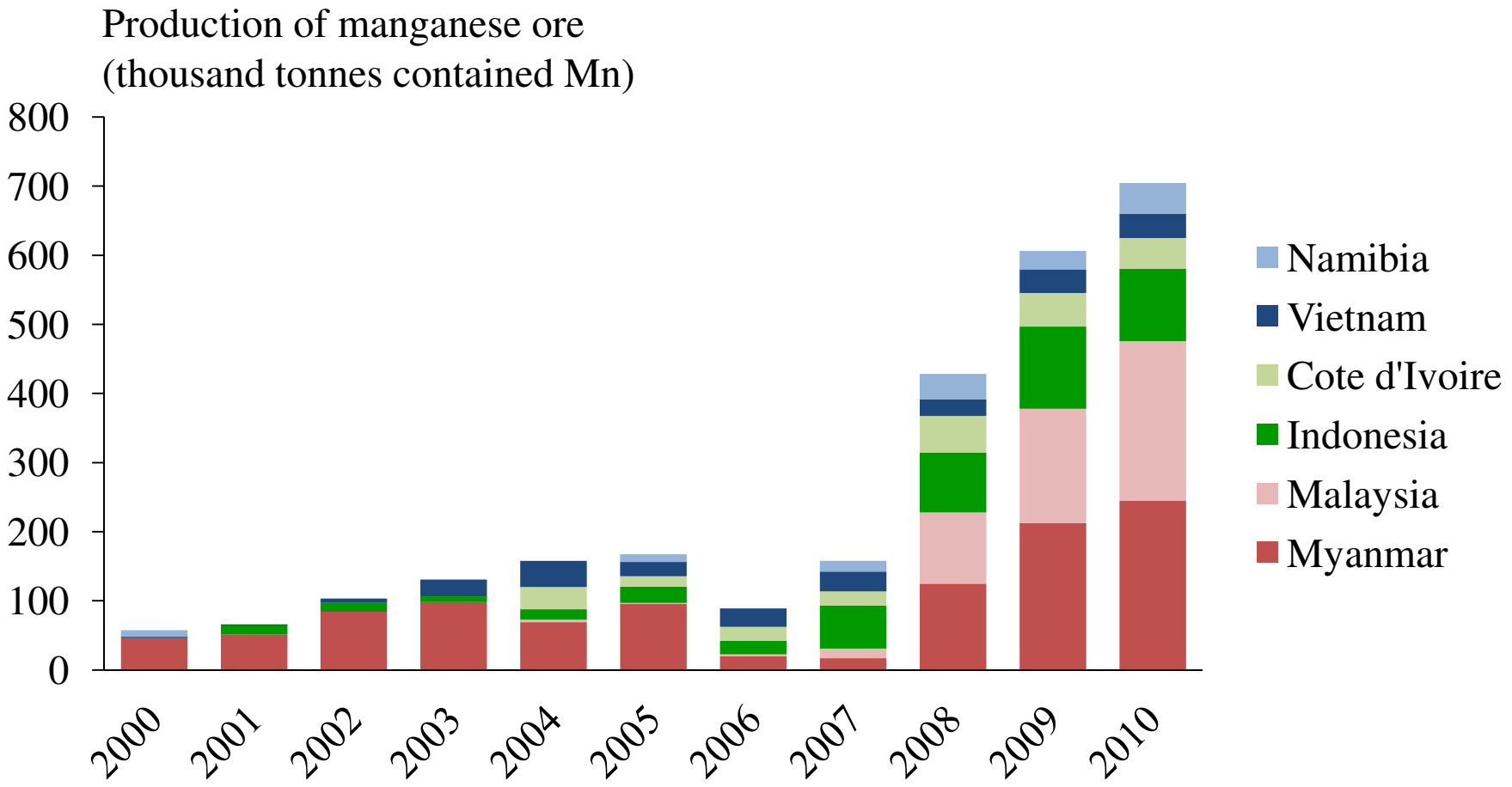
"Other" sources now make up 8% of Mn ore output. 75% of this came from six particular countries

"Other" sources of Mn ore, 2010:



*contained Mn basis

These six countries have increased output by 600,000 tonnes since 2006



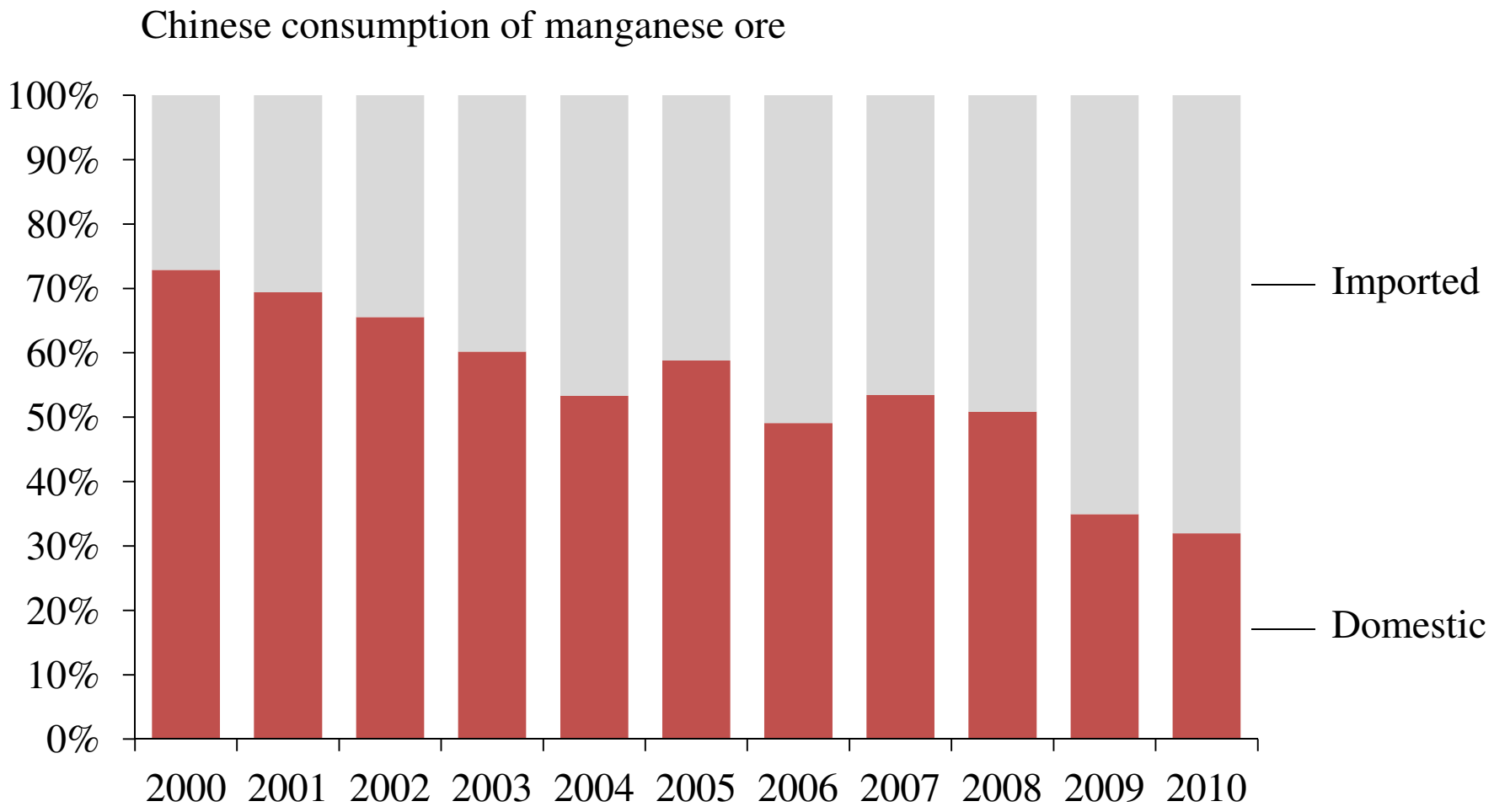
Observations on emerging Mn producing countries

- Key suppliers have so far been Myanmar and Malaysia. This is low grade ore <35% Mn – a relatively cheap direct replacement for depleting Chinese domestic ores. Vietnam ore similar to this
- Namibia, Cote d'Ivoire and Indonesia – higher grade ore
- Typically open pit, very small scale operations, low mining cost
- Transportation is the largest cost element
- Myanmar and Vietnam truck ore into China
- Cote d'Ivoire, Namibia, Malaysia and Indonesia – many operations becoming large enough to use bulk shipping

Will Mn ore production in these emerging countries continue to increase? Most likely yes

- Many producers are actively supported by consumers in China, who are eager to find competitive replacement for low-grade Chinese domestic ore
- Production costs are low
- Most deposits have not been properly explored
- Partners may invest in exploration, expanding production and overcoming logistical problems
- Operations subject to external/political factors in unstable countries
- Look out for more new entrants, especially in Africa – eg Zambia, Burkina Faso, D.R.Congo

China got 70% of its Mn ore from imports in 2010, compared with 30% ten years ago



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- Chinese Mn ore remains plentiful, but grades and quality have declined sharply
- Usefulness of Chinese domestic ore in ferroalloy production becoming increasingly limited – much is now only suitable for producing Mn metal
- Import penetration will continue to increase – high grade ores from established sources, lower grade ores from emerging sources
- Expect MRS production to increase in China – a way of utilising poor domestic ores for ferroalloy production

There is much potential for increasing Mn ore output by increasing recoveries

- Many mines have stockpiles of “fines” or “low grade” product which they have considered unprofitable or unmarketable
- Sintering of fines at the mine site – needs capital investment and carbon
- Some low grade ores can be jigged up to a marketable quality
- MRS could be a solution for high Fe ores – but need a smelter close by
- Transportation cost is the key

To conclude...
How will Mn ore supply meet increasing demand?

- South Africa has 75% of known global manganese resources – it will have to play a big part in meeting increased global manganese demand
- New entrants in South Africa coming on stream but will likely be constrained in the medium term by logistical bottlenecks
- Supply of ore from non-traditional producing countries likely to continue to increase
- Most new entrants will supply lower grade – future high grade supply largely dependent on ability of established producers to expand
- Potential for increased recoveries and MRS – especially if prices rise

Thank you for your attention today