Overview of the Manganese Market

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Photo: Pertama Ferroalloys, Malaysia
Outline

1 – China continues driving steel production growth, but for how long?

2 – Mn alloy market more balanced in 2019, but slowing growth expected

3 – Mn ore supply driven by China’s needs for imported material
Global steel output: a new record high driven by China

- World steel output up for 3rd consecutive year in 2018: +2.3% (or 40 mln mt) to 1.77 biln. mt; A new record high, slightly above 2014 output (1.76 billion mt)

- China, India and the USA accounted for most of the extra production (India overtook Japan as 2nd biggest prod.)

- In the ROW, Egypt (+0.9 M mt) and Vietnam (+3.8 M mt) registered the biggest production increases in 2018

- In Q1 2019, steel prod. +3% YoY
Steel production in China: a persistent rise

- Crude steel output increased in China in 2018 by 2.4% (or 21 million mt) to 893 million mt (50% of global)

- Increase mostly materialized in Q4 2018, as heating season restrictions were less severe than in 2017

- Q1 2019 production +7% YoY

- China steel prod. will rise by 1 - 2% in 2019 (worldsteel 1%, Roskill 1.5%)

- China steel production will be stable for a couple of years, before slowly declining in 2025-2030 (Roskill)
China steel industry turning to EAF

- More blast furnaces in China than in the ROW (94% vs 54%) because of lower steel scrap supply (can be used in EAFs) in China than in the Western world, and lower quality steel produced in China (mostly long prod.)

- But this will change as China is currently building many new electric arc furnaces (EAFs), and want to increase scrap use in blast furnaces

- EAFs consume less Mn units/mt of steel than blast furnaces (because EAFs use more steel scrap), so China Mn unit consumption will progressively align with ROW
China steel exports on the rise again

- China steel exports -15% per year between 2015 and 2018, to 70 million tons in 2018:
  - reform of overcapacity industries including steel improved domestic steel prices
  - anti-dumping cases in the ROW reduced competitiveness of China steel exports
- Q1 2019 China steel exports + 12% from Q1 2018, because of government stimulus for infrastructure: steel prices recovering, inventories falling and profitability increasing (despite higher iron prices)

Steel exports from China 2012 - 2019

Source: China Customs, IMnl
Steel production in the rest of the world rising

- Steel mills benefitted from higher domestic demand & lower imports from China in 2015-2018: +2.4% CAGR in world exc. China production

- In 2018, ROW steel prod +2.3% to 875 million mt (new record high);

- North America +4%; South America +1%; Asia ex. China +3%; Oceania & Africa & M. East +9%; Europe -0.3%

- Trend reverted in Q1 2019 (ROW production -1% YoY), on higher China exports and slowing demand
Slowing growth expected for the steel industry in 2019 & 2020

- Worldsteel forecasts global steel demand to rise by 1.3% in 2019 (reaching 1,735 Mt) and 1.0% in 2020 (to 1,752 Mt)

- Asia consumption growth expected to slow: +1.7% in 2019, +0.4% in 2020

- New capacity coming on line, as countries relying on imports seek self-sufficiency (like the USA with trade tariffs)

- Additional demand is too slow to absorb extra capacity, so overcapacity issue will remain, putting pressure on steel prices
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Mn alloy supply growth driven by China

- Mn alloy output rose in 2018 for the 3rd consecutive year, to 21.9 million mt, +2.1 million mt = +10% from 2017, reaching a new record high

- Growth driven by China (+16% from 2017; ROW +4%), on steel mills restocking & higher SiMn consumption in steel

- Same rising trend in Q1 2019: +6% from Q1 2018, but only in China (+14% YoY), while prod. in the ROW -4% YoY, affected by lower steel demand, especially in Africa & Europe
Mn alloy excess supply reducing

- Rising Mn alloy demand in 2018 (+11%) absorbed extra supply (+10%), but the S/D balance remained in surplus, mostly outside China
- In Q1 2019, demand increased faster than supply, causing excess supply to reduce

Source: CNFEOL, IMnl
Smelters destocked in 2018

- Stocks of Mn alloy outside China dropped by 6% in 2018 on destocking after smelters increased inventory in 2017, based on inventory figures reported by IMnI Members in Africa, North & South America, Asia, Australia.

- In Q1 2019, smelters increased inventory by 21% on average, because of higher supply than demand.

![Mn Alloys Inventory Change outside China 2012 - 2019](source: IMnI)
China SiMn production in 2018 +18% YoY to 10.2 million mt

- rising steel output in China (+2.4%)
- restocking by Chinese steel mills
- higher quality steel produced → higher SiMn consumption / ton of steel
  - replacement of induction furnaces by blast furnaces, consuming more Mn;
  - some producers switched from producing flats to rebar in H2 2018 due to higher profitability
  - new “reinforcement bar” (= rebar) standard in 2018 in China: rebar steel must contain at least 1.5%Mn (vs 1.2% before)
South Africa’s Mn alloy production contracting fast

- 3 Mn alloy producers in RSA, with combined production capacity of 870,000 mt per year
- Some consider stopping their furnaces, because of:
  - electricity prices high and rising (+523% since 2006 for industrial users, and potentially +30% over the next 3 years, according to South Africa Minerals Council)
  - rising Mn alloy production in China & India to supply domestic steel mills
  - competition with new Mn alloy smelters in Malaysia
- A major Mn alloy producer in RSA to announce final decision by Oct. 2019
Production by Malaysian smelters stopped rising in 2019

- 3 Mn alloy producers in Malaysia, with combined production capacity of 605,000 mt per year
- Production increased from 80,000 mt in 2016 to 598,000 in 2018
- Capacity utilisation ratio 99% in 2018
- Malaysian smelters benefit from:
  - competitive power prices
  - proximity with major steelmakers in Asia
- Malaysia’s HC FeMn production declined in Q1 2019, not entirely offset by rising SiMn production
Mn alloy demand to increase by 0.8% / year in 2018 - 2023

- Most of this rise in consumption would come from the Africa & Australia region (+2.2% CAGR), followed by the CIS (+2% CAGR)

- Asia shows the smallest increase in Mn alloy demand in the coming 5 years (+0.6% CAGR)

Source: Fastmarkets MB Research
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Rising global Mn ore production masks falling China’s output

- Mn ore output +4% in 2018 to 20.1 million dry mt, new record high
- Lower output in China mostly because of reducing reserves, falling quality, and safety restrictions
- Compensated by rising production in the rest of the world (but South Africa -2% in 2018), driven by China’s demand
- Q1 2019 production +5% from Q1 2018, driven by ROW (RSA & China lower)
Miners outside China restocked in 2018

- Miners outside China increased stocks in 2018 by 7% on average
- While China’s port stocks skyrocketed (+71% in 2018), driven by smelters restocking and higher dependence on imported material
- Stock for the world’s biggest Mn ore miners contracted by 2% in Q1 2019
- And China’s port inventory continued rising in Jan-May 2019
China even more dependent on imports

- Mn ore imports into China reached a new record high in 2018, 27.6 million wet mt, +30% from 2017, on rising demand from Chinese smelters and lower domestic ore production.

- South Africa exported 11.3 million wet mt to China (+22% YoY) = 41% of China’s imports.

- In Q1 2019, China imported 8.02 mln wet mt of ore, +32% from Q1 2018 (but -5% from the record high of Q4 2018)

Source: TDM, IMnl
Rising imports into China weigh on prices

- Mn ore stocks at China’s ports continued increasing in Q1 & Q2 2019, peaking at 4.2 million wet mt at the end of May.

- Stocks are now sufficient for 1.9 month of consumption (record high since May 2017), compared to only 1.1 month of reserves in January, and 1.3 month on average in 2018.

- Rising reserves weighed on prices, which contracted over the last few months.

China's Mn ore port stock (in months of demand) & price 2016 - 2019

Source: Mysteel, Fastmarkets, Trade Data Monitor, IMnI
China Mn industry: a summary

- Imported material represented 79% of China's consumption in 2018 (vs 59% in 2017)

- Ghana exported 3.46 million wet mt to China in 2018, more than the 2.6 million mt required by TMI for EMM production

- China's Mn ore consumption in 2018 was 34.8 million wet mt, including 24.3 million wet mt for Mn alloys (70%)

**Imported ore**

<table>
<thead>
<tr>
<th>Type</th>
<th>Wet Mt</th>
<th>Mn%</th>
<th>Mt Mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonate</td>
<td>3.5</td>
<td>28%</td>
<td>0.96</td>
</tr>
<tr>
<td>Oxide &amp; semi-carbonate</td>
<td>24.1</td>
<td>39%</td>
<td>9.3</td>
</tr>
</tbody>
</table>

**Domestic ore**

<table>
<thead>
<tr>
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<th>Wet Mt</th>
<th>Mn%</th>
<th>Mt Mn</th>
</tr>
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<tbody>
<tr>
<td>Carbonate</td>
<td>7</td>
<td>15%</td>
<td>1.2</td>
</tr>
</tbody>
</table>

**Mn metal (EMM)**

- 1.46 Mt produced @ 99.7%Mn
- 5 kt produced @ 99.9%Mn
- 6.3 Mt wet @ 15%Mn = 0.93 Mt Mn
- High Fe Gabonese ore 100 kt @ 45%Mn = 45 kt Mn
- 409 kt @ 22%Mn = 90 kt Mn
- Gabonese ore 40 kt @ 48%Mn = 19 kt Mn

**Mn sulphate (MnSO4)**

- 230 kt produced @ 62%Mn

**Mn alloys**

- SiMn 10.17 Mt @ 64%Mn
- HC FeMn 1.62 Mt @ 67%Mn
- Ref FeMn 0.77 Mt @ 78%Mn

- 845 kt Mt wet @ 28%Mn = 235 kt Mn
- 318 kt wet @ 22%Mn = 70 kt Mn
- 2.6 Mt wet @ 28%Mn = 728 kt Mn
- 6.3 Mt wet @ 15%Mn = 0.93 Mt Mn
- 210 kt Mn consumed
- 49 active plants
- Capacity utilisation 67%

**Mn dioxide (EMD)**

- 300 kt produced @ 62%Mn
- 210 kt Mn consumed
- 11 active plants
- Capacity utilisation 86%

**Mn metal (EMM)**

- 3.46 million wet mt to China in 2018

**Source:** CITIC Dameng, IMnI

Mt = Million metric tons
kt = '000 metric tons
8.3 million wet mtpy of additional Mn ore capacity announced

• Around 8.3 million wet mt per year of additional Mn ore capacity announced to be commissioned in the near future (excluding sinter plants)

• most of it in Gabon, South Africa, India, Australia and Brazil
Mn ore demand to increase by 2.1% / year in 2018 - 2023

- Most of this rise in consumption would come from Asia (+2.6% CAGR), followed by the Africa & Australia region (+1.8% CAGR)

- The CIS shows the smallest increase in Mn ore demand in the coming 5 years (+0.6% CAGR)

Source: Fastmarkets MB Research
Conclusion: short term outlook for Mn ore

<table>
<thead>
<tr>
<th>+ Factor supporting Mn ore prices +</th>
<th>+ Factor putting pressure on Mn ore prices +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel production rising sharply in China so far in 2019</td>
<td>China steel production expected to slow in 2019 &amp; 2020</td>
</tr>
<tr>
<td>Global Mn alloy excess supply reducing in Q1 2019</td>
<td>Steel production slowing outside China so far in Q1 2019</td>
</tr>
<tr>
<td>China’s declining domestic ore supply and increasing dependence on imports</td>
<td>Mn alloy production contracting in Q1 2019 in all regions except Asia</td>
</tr>
<tr>
<td>Mn ore demand to increase by 2.1% / year in 2018 - 2023</td>
<td>Rising Mn ore inventory in China</td>
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<td>8.3 million wet mt per year of extra capacity announced in the short term</td>
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All data in this report available to IMnI Members

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