Copper: Five things to look for in 2017

International Copper Study Group
Industry Advisory Panel
Thursday 27 April 2017
Lisbon, Portugal
Copper: Five things to look for in 2017

- Introduction
- Global macro economic outlook
- Trump or China? What will drive demand in 2017?
- The changing supply story
- Copper on the turn in 2017
- Where now for copper costs and margins?
Global economic growth rebounding from 2016 low

Commodity recovery and strong US consumption drive improved outlook, but European fragility remains a concern

Source: Wood Mackenzie, World Bank
Global risks weighted to the downside

- Automation and robotics drive productivity surge
- European fragmentation
- The rise of the autocrat and increased nationalism
- Protectionism leads to trade wars
- China leadership reshuffle
- OPEC behaviour
- Radical policy reform

Source: Wood Mackenzie
Refined copper consumption

China surprises in 2016 but will be hard to repeat...

Outlook for first use refined consumption to 2020

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>World</td>
<td>4.6%</td>
<td>1.5%</td>
<td>2.2%</td>
<td>1.8%</td>
<td>1.8%</td>
</tr>
<tr>
<td>China</td>
<td>7.3%</td>
<td>3.7%</td>
<td>4.6%</td>
<td>2.2%</td>
<td>1.9%</td>
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<tr>
<td>World Ex-China</td>
<td>2.4%</td>
<td>-0.4%</td>
<td>0.1%</td>
<td>1.4%</td>
<td>1.7%</td>
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</table>

Source: Wood Mackenzie
China construction will struggle to regain its 2015 peak

Copper demand in the construction sector

Peak copper use in construction

Source: CEIC, Wood Mackenzie

Residential building completion and policy timeline

March 2017: More stringent policies released for tier 1, tier 2, tier 3 and tier 4 cities

“Housing 930” 2016: more than 30 cities (mostly tier 1 and tier 2) in China released new policies to curb investment demand

Source: CEIC, Wood Mackenzie
Auto: copper demand from passenger cars will grow much faster than production growth due to increasing EV penetration.

Source: CEIC, Wood Mackenzie
Trump policies have caused uncertainty over North American demand

Current auto output forecast – US and Mexico

2017 US infrastructure rating - in need of an upgrade

Source: Wood Mackenzie
Despite lower growth, on a tonnage basis, it’s still all about China

Changes in refined copper consumption by region: 2016-2020

<table>
<thead>
<tr>
<th>Region</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
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<tr>
<td>China</td>
<td>22.4</td>
<td>20.5</td>
<td>20.8</td>
<td>21.8</td>
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<tr>
<td>India &amp; Asean</td>
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<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
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<td>North America</td>
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</tbody>
</table>

Source: Wood Mackenzie
Mine production growth set to pause this year

Mine production (forecasts after 5% disruption allowance)

Kamoto/KOV Restart (+365kt/a)
Cobre Panama (+320kt/a)
Escondida 3rd Mill (+250kt/a)
Las Bambas (+100kt/a)
Sentinel (+135kt/a)
Mopani (+100kt/a)
Toquepala Expn (+100kt/a)
Aktogay (+80kt/a)

Source: Wood Mackenzie
Requirement for additional mine supply from 2020 peak

Mine production (forecasts after 5% disruption allowance)

- **mine supply growth to pause**
- **base case mine supply to peak**
- **additional supply required**

**Mine supply (Mt copper)**

- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022

- **Probable Projects**
- **Highly Probable Projects**
- **Existing supply**
Copper prices recover on the back of supply disruptions and higher demand

The influence of macro and other events on copper prices

- Greek debt crisis
- Glencore announces cuts at Katanga and Mopani
- Copper sell-off by US/Chinese funds
- Fresh Chinese stimulus package
- Weak China PMI
- Brexit vote
- Trump stimulus; Production losses and Upgraded Chinese demand
- Large deliveries into Asian LME warehouses
- Escondida strike; Grasberg closure

Source: Wood Mackenzie, LME, Thompson Reuters Datastream
Annual average copper price set to recover

Global stocks of refined copper and annual average copper price

Average stocks

Source: Wood Mackenzie, LME, Comex, SHFE

Source: Wood Mackenzie
Where now for copper costs and margins?

Global residual cash flow for primary copper mines

Source: Wood Mackenzie Q1 2017
Key conclusions

Global growth has improved from a year ago. The short-term outlook is relatively positive, owing to a stronger US economy and a recovery in commodities, but Europe remains a cause for concern.

Demand growth in the world ex-China should improve on 2016. Overall refined demand will remain subdued, in part reflecting a stronger contribution from scrap, yet China is still the main driver for growth.

Mine supply forecast to pause during 2017 before recovering to peak in 2020. Additional mine production capability is required from ~2020. There is a lack of advanced development stage projects to meet this need.

The combination of slower supply growth and moderate demand growth will push the refined market into deficit this year. With global stocks set to decline, we would expect annual average prices to trend higher.

Prices have been lower, but so has opex and capex. As prices improve from 2017, we would expect healthier margins. This should support a new cycle of investment.

Source: Wood Mackenzie
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