The Role of Recycling in Feeding the Chinese Demand for Copper

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ICSG Membership

- Membership open to countries involved in copper production, use or international trade of copper raw materials and products.
- 23 member countries + the EU in 2012. 4 recent member states.
- Non-member countries can attend as observers.

Australia  Belgium  China
French Community  Finland
France  Germany  Greece
India  Italy  Iran
Japan

Luxembourg  Mexico  Peru
Poland  Portugal  Russian Federation
Sweden

Serbia  Spain  United States  Zambia 2012
The Role of Recycling in Feeding the Chinese Demand for Copper

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1. Copper and Copper Alloy Scrap Trade: How the Shortage of Scrap Impacts the Chinese Copper Market?
The copper supply response, mainly from miners but also from recyclers, has kept the global refined copper market in balance with the Chinese demand.

Refined copper demand per capita growing, but still below world population growth!
In consequence the tight global refined copper balance explains most of the volatility in the refined copper price.
In 2012 the global copper mine production increased >624 Kt driven by more use in mine capacity. The consequence record refined copper production in China, but rest of the world produced less!

"Is time to stop building" Ivan Glassenberg CEO Glencore Intl. High cost projects cancelled: tight beyond 2015.
The domestic oversupply in China made copper prices to fall 10% in 2012 ... but the oversupply was just < 15% of China copper industrial use/year.

### Copper Availability in China 2011-2012

All in Copper Content, based in ICSG Statistics

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine Production &quot;Made in China&quot;</td>
<td>1,299</td>
<td>1,490</td>
</tr>
<tr>
<td>Domestic Recycling in China</td>
<td>1,093</td>
<td>1,166</td>
</tr>
<tr>
<td>Scrap Imports</td>
<td>1,640</td>
<td>1,984</td>
</tr>
<tr>
<td>Refined Imports</td>
<td>2,835</td>
<td>3,402</td>
</tr>
<tr>
<td>Concentrate Imports</td>
<td>1,795</td>
<td>2,192</td>
</tr>
<tr>
<td>Semis Imports</td>
<td>636</td>
<td>543</td>
</tr>
<tr>
<td>Blister/Anode Imports</td>
<td>396</td>
<td>496</td>
</tr>
<tr>
<td>Alloy/Ingots</td>
<td>31</td>
<td>43</td>
</tr>
<tr>
<td>Scrap Exports</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Refined Exports</td>
<td>156</td>
<td>274</td>
</tr>
<tr>
<td>Concentrate Exports</td>
<td>0.02</td>
<td>0.20</td>
</tr>
<tr>
<td>Semis Exports</td>
<td>331</td>
<td>323</td>
</tr>
<tr>
<td>Blister/Anode Exports</td>
<td>0.02</td>
<td>0.04</td>
</tr>
<tr>
<td>Alloy/Ingots Exports</td>
<td>0.28</td>
<td>0.02</td>
</tr>
<tr>
<td>Copper Available in China (a)</td>
<td>9,237</td>
<td>10,718</td>
</tr>
<tr>
<td>Industrial Use of Copper (b)</td>
<td>9050</td>
<td>9,197</td>
</tr>
<tr>
<td>Additional Copper Oversupply (a-b)</td>
<td>187</td>
<td>1,521</td>
</tr>
<tr>
<td>Accumulated Oversupply Since 2009</td>
<td>1,998</td>
<td>3,519</td>
</tr>
</tbody>
</table>

Source: ICSG and UN COMTRADE Trade Values
With copper prices down 10% in 2012, China imported >20% more refined and concentrates and no much copper and copper alloy scrap in 2012. Scrap imports value down in proportion to the refined price fall.

ICSG Reported World Stocks of Refined Copper

With 2011-2012 Chinese re-stocking completed, reported global stocks of refined copper recovered.
Global copper and alloy scrap export flows in 2012: down just -1.2%. Scrap exports growing fast in crisis-hit Spain and Japan. Down in UK, USA and Germany.

- **2010-2012 Exports of Copper Scrap and Copper Alloy Scrap**
  - Reported in Kt
  - Graph showing exports from various countries.

- **Scrap Exports 2012 Annual Growth in Volumes Kt**
  - Graph showing annual growth in volumes from various countries.
China continued importing most of its scrap from EU-27. EU exports of copper and alloy scrap to China: > 1 million tonnes in 2011...

-Gross Weight-

China Gets 75% of Total EU-27 Copper Scrap Exports

COPPER SCRAP GROSS EXPORTS FROM EU-27 TO WORLD 2011
TOTAL: 1.352.931 TONS

COPPER SCRAP GROSS IMPORTS TO EU-27 FROM WORLD 2011
TOTAL: 491.290 TONS*

Source: EUROSTAT (HS Code 7404 Copper waste and scrap), all countries contributing more than 1% to either export or import volume
In 2012 EU-27 scrap exports to China mainly copper alloys, still very high scrap export volumes to China: ~989 Kt.

~2.5 Bn Euro in gross revenues to EU-27 scrap exporters last year.
Less copper scrap available across different regions of the world in 2011-2013:
= less scrap direct melt scrap use in Chinese brass mills and wire rod plants.

China 2012: Copper in Scrap Use 3.02 Mt-Cu Copper Content

Copper Content Kt-Cu

- Cathode from Scrap Official ICSG: 1,870
- Scrap in Wire Rod ICSG Survey: 400
- Scrap in Brass Mills - BGRIMM: 750
- Copper in China Scrap Use: 3,020

Spreads Nr.2 Copper Scrap by Region 2011 to 2013
US Dollars per Tonne.

- EU-27
- Imported in China
- Domestic in China
- North America
The Chinese copper scrap balance remains very tight... scrap is expensive versus copper refined prices in China + refined oversupply = small spreads.

Chinese scrap smelters and refineries hardly profitable in this environment. Closures in 2013: Yunnan Copper, Jiangxi Copper, Jinchuan Group.
Domestic old scrap recycling growing slowly in China...
slow GDP 2011-2012, lower refined prices, and low historic stock of copper.

...and refined output from scrap constrained by Chinese imports restrictions.
April 2013: with refined copper prices falling sharply, the scrap flow into China stopped.
So cheaper cathode is replacing expensive direct melt scrap in copper fabrication.

In 2012 the scrap directly melted by Chinese fabricators fell 11% in a year!
With enough refined stocks, refined imports contracted in Q1-2003. More world mine supply, = China importing more ores and concentrates in 2013.

China: % Annual Imports Growth:
Copper Scrap, Concentrate and Refined
January-March 2013/2012

Copper Scrap Imports January-April 2013 = 1.4 Mt = - 4.6% YoY.
“Operation Green Fence” + refined oversupply+ less alloy scrap use in brass mills?
Official Chinese statistics reporting more scrap refined in China in 2013. The domestic scrap recycled is up or blister imports are reported as “secondary refined output”?

China Copper Secondary Refined Production
= Cathode from Scrap, in Kt-Cu, Monthly Data 2012 - 2013

- January 2012: 178.10
- February 2012: 149.40
- March 2012: -
- April 2012: 197.60
- May 2012: 195.90
- June 2012: -
- July 2012: -
- August 2012: -
- September 2012: -
- October 2012: -
- November 2012: -
- December 2012: -

- January 2013: -
- February 2013: -
- March 2013: -
- April 2013: -
- May 2013: -
- June 2013: -
- July 2013: -
- August 2013: -
- September 2013: -
- October 2013: -
- November 2013: -
- December 2013: -
2. How Much Industrial Use of Scrap and Refined in China and in the Rest of the World?
Industrial use of copper 2007-2012: growing in China and in a few oil producing economies. Industrial copper and alloys fabrication reported by ICSG ex-China: down 27%.

### Fabrication of Copper and Copper Alloyed Products: 2012 Versus 2007

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mt</td>
<td>Mt</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>6.3</td>
<td>11.31</td>
<td>79.5%</td>
<td>ICSG</td>
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<tr>
<td>United States</td>
<td>2.94</td>
<td>2.17</td>
<td>-26.0%</td>
<td>ICSG</td>
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<td>Germany</td>
<td>1.85</td>
<td>1.52</td>
<td>-17.7%</td>
<td>ICSG</td>
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<td>Japan</td>
<td>1.75</td>
<td>1.33</td>
<td>-23.9%</td>
<td>ICSG</td>
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<td>Korean Republic</td>
<td>1.33</td>
<td>1.06</td>
<td>-20.2%</td>
<td>ICSG</td>
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<tr>
<td>Italy</td>
<td>1.75</td>
<td>1.03</td>
<td>-41.2%</td>
<td>ICSG</td>
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<tr>
<td>Taiwan (China)</td>
<td>0.85</td>
<td>0.71</td>
<td>-16.4%</td>
<td>ICSG</td>
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<td>Spain</td>
<td>0.34</td>
<td>0.32</td>
<td>-4.7%</td>
<td>ICSG</td>
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<td>Poland</td>
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<td>0.23</td>
<td>-31.4%</td>
<td>ICSG</td>
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<td>France</td>
<td>0.54</td>
<td>0.19</td>
<td>-64.5%</td>
<td>ICSG</td>
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<td>Slovak Republic</td>
<td>0.02</td>
<td></td>
<td></td>
<td>ICSG</td>
</tr>
<tr>
<td>India</td>
<td>0.71</td>
<td>0.64</td>
<td>-9.6%</td>
<td>Industry</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>0.80</td>
<td>0.56</td>
<td>-30.2%</td>
<td>Industry</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.41</td>
<td>0.27</td>
<td>-34.0%</td>
<td>Industry</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.29</td>
<td>0.27</td>
<td>-5.6%</td>
<td>Industry</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.37</td>
<td>0.23</td>
<td>-38.4%</td>
<td>Industry</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.20</td>
<td>0.22</td>
<td>8.5%</td>
<td>Industry</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>0.00</td>
<td>0.21</td>
<td>100%</td>
<td>Industry</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>0.19</td>
<td>0.21</td>
<td>8.4%</td>
<td>Industry</td>
</tr>
<tr>
<td>Iran</td>
<td>0.19</td>
<td>0.20</td>
<td>7.5%</td>
<td>Industry</td>
</tr>
<tr>
<td>Sample of Countries</td>
<td>21.1</td>
<td>22.7</td>
<td>7.4%</td>
<td></td>
</tr>
</tbody>
</table>

* 12 months before November 2012
2008-2012 Change in Refined Copper Demand in Tonnes.

Countries With Growing Demand

- China
- United Arab
- Turkey
- Brazil
- Indonesia
- North Korea
- Others
- Malaysia
- Poland
- Philippines
- Peru
- Rest of the World

Record expansion in Chinese refined copper demand in 2008-2012!

Record contraction in Germany refined copper demand in 2008-2012!
# 2012-2011 Growth in Copper Demand and Industry Use

<table>
<thead>
<tr>
<th></th>
<th>Refined Demand Kt-Cu</th>
<th>Semis Output Kt</th>
<th>Copper in All Products Kt-Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>959.44</td>
<td>1,247.91</td>
<td>1,284.33</td>
</tr>
<tr>
<td>Indonesia</td>
<td>29.01</td>
<td>26.74</td>
<td>26.59</td>
</tr>
<tr>
<td>Brazil</td>
<td>20.41</td>
<td>20.49</td>
<td>19.85</td>
</tr>
<tr>
<td>Thailand</td>
<td>14.74</td>
<td>15.05</td>
<td>17.01</td>
</tr>
<tr>
<td>Sweden</td>
<td>-</td>
<td>18.71</td>
<td>16.46</td>
</tr>
<tr>
<td>Others *</td>
<td>10.79</td>
<td>10.79</td>
<td>10.79</td>
</tr>
<tr>
<td>Canada</td>
<td>9.39</td>
<td>9.45</td>
<td>10.21</td>
</tr>
<tr>
<td>Mexico</td>
<td>8.13</td>
<td>5.74</td>
<td>8.57</td>
</tr>
<tr>
<td>South Africa</td>
<td>-</td>
<td>16.50</td>
<td>5.70</td>
</tr>
<tr>
<td>Rest of the World *</td>
<td>0.02</td>
<td>-</td>
<td>16.51</td>
</tr>
<tr>
<td>Finland</td>
<td>-</td>
<td>10.84</td>
<td>5.29</td>
</tr>
<tr>
<td>Slovakia</td>
<td>-</td>
<td>5.00</td>
<td>5.35</td>
</tr>
<tr>
<td>Poland</td>
<td>-</td>
<td>3.79</td>
<td>5.80</td>
</tr>
<tr>
<td>Vietnam</td>
<td>-</td>
<td>8.99</td>
<td>9.26</td>
</tr>
<tr>
<td>Egypt</td>
<td>-</td>
<td>13.88</td>
<td>13.92</td>
</tr>
<tr>
<td>France</td>
<td>-</td>
<td>14.96</td>
<td>14.81</td>
</tr>
<tr>
<td>United States</td>
<td>-</td>
<td>2.00</td>
<td>19.89</td>
</tr>
<tr>
<td>Italy</td>
<td>-</td>
<td>39.51</td>
<td>30.21</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-</td>
<td>18.98</td>
<td>32.85</td>
</tr>
<tr>
<td>Taiwan</td>
<td>-</td>
<td>24.71</td>
<td>49.12</td>
</tr>
<tr>
<td>Japan</td>
<td>-</td>
<td>18.30</td>
<td>62.58</td>
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<tr>
<td>Belgium</td>
<td>-</td>
<td>46.37</td>
<td>70.55</td>
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<tr>
<td>Korean Rep.</td>
<td>-</td>
<td>31.60</td>
<td>81.21</td>
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<tr>
<td>Russian Fed. *</td>
<td>-</td>
<td>62.59</td>
<td>112.80</td>
</tr>
<tr>
<td>Germany</td>
<td>-</td>
<td>140.83</td>
<td>129.89</td>
</tr>
<tr>
<td><strong>Net Change</strong></td>
<td><strong>616.32</strong></td>
<td><strong>711.04</strong></td>
<td><strong>739.45</strong></td>
</tr>
</tbody>
</table>

## The Short Term Dynamics of Copper Use in 2013.

In 2012 both the world industrial use of copper and the world demand for refined copper increased...

...but demand for refined copper and industrial use falling in most of the economies...

...mainly in Europe and in North East Asia ex-China.
In 2013 we continue waiting for the recovery in the industrial use of copper in North America. Only in Mexico copper use is growing.
In Europe both copper and copper alloy fabrication much more volatile and down in 2012.
EU-27 Refined Copper Demand 2012/2011 = -7%.
EU-27 Refined Copper Imports 2012/2011 = -11.8 %
Copper-only semifabricated output growth remains strong in China, but the Chinese industrial copper-alloy output is slowing.

Official fabrication output growing fast in China, but copper content estimates showing low growth.
In 2012 slow growth of wire rod and alloy output in China, output of copper-only rod/tube/plates down. Meanwhile the Chinese refined demand including stocks increased > 12.1% = ~ 958 Kt in 2012. Why?

### Annual Growth Fabrication of Copper and Copper Alloy Products in China %

- Copper Products
- Copper Alloy Products
- Copper Wire Rod

<table>
<thead>
<tr>
<th>Year</th>
<th>Copper Products</th>
<th>Copper Alloy Products</th>
<th>Copper Wire Rod</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>-10%</td>
<td>-5%</td>
<td>0%</td>
</tr>
<tr>
<td>2012</td>
<td>-5%</td>
<td>0%</td>
<td>5%</td>
</tr>
</tbody>
</table>

### Apparent Refined Copper Use (Demand) in China and Rest of the World Kt

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>Rest of the World</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>7,888</td>
<td>11,945</td>
</tr>
<tr>
<td>2012</td>
<td>8,846</td>
<td>11,666</td>
</tr>
</tbody>
</table>
Increased bonded warehouse inventories of refined copper in Shanghai: capital inflows in 2012

Average Shanghai port bonded stocks up by around 585 Kt last year. Down to just < 500 Kt by April 2013.
3. How Much Copper in Scrap Direct Melt is Being Used by Chinese Wire Rod Plants?
China produced 5.8 Mt-Cu of copper wire rod in 2012. Another 3.3 Mt-Cu used in copper semis, copper alloys and castings.

Chinese wire rod capacity utilization ~ 50%!

Copper alloys output in China ~ 15% of all copper use!
ICSG Survey to Copper Wire Rod Plants in China.
60 plants surveyed directly + 160 via phone/email: information on 220 plants. 128 plants reporting.

China Wire Rod Output 2012: 5.8 Mt.
Less direct melt scrap use observed in Chinese wire rod plants = new technology, quality control and inexpensive cathode.

Copper direct melt from scrap: a falling share of all Chinese wire rod output...
The direct scrap use in Chinese wire rod plants is expected to fall 4% in 2013.

Imported wire rod production lines using only refined copper in China and gaining market share from domestic production lines.
Copper Wire Rod Plants capacity Survey: 9.2 Mt Capacity in 2012. 16 plants under construction in 2012 may add 3.8 Mt in 2013-2015.

### New Wire Rod Plants Pipeline 2013-2014

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Capacity</th>
<th>Company Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dongying, Shandong</td>
<td>2013</td>
<td>170</td>
<td>Hengyuan - Baichuan Group</td>
</tr>
<tr>
<td>Fuyang, Zhejiang</td>
<td>2013</td>
<td>30</td>
<td>SWCC Showa Cable Systems</td>
</tr>
<tr>
<td>Wuhu, Anhui</td>
<td>2013</td>
<td>150</td>
<td>Xinke Materials</td>
</tr>
<tr>
<td>Tongling, Anhui</td>
<td>2013</td>
<td>250</td>
<td>Tangling Nonferrous</td>
</tr>
<tr>
<td>Baoying, Jiangsu</td>
<td>2013</td>
<td>300</td>
<td>Hanjin Futai Copper - Jiaxin International</td>
</tr>
<tr>
<td>Bengbu city, Anhui prov</td>
<td>2013</td>
<td>120</td>
<td>Wuxi Lineo</td>
</tr>
<tr>
<td>Yingkou, Liaoning</td>
<td>2013</td>
<td>250</td>
<td>Amer</td>
</tr>
<tr>
<td>Huangshi, Hubei</td>
<td>2013</td>
<td>300</td>
<td>Daye</td>
</tr>
<tr>
<td>Baoying, Jiangsu</td>
<td>2013</td>
<td>300</td>
<td>Baosheng</td>
</tr>
<tr>
<td>Wuxi, Jiangsu</td>
<td>2013</td>
<td>320</td>
<td>Wuxi Lingfeng</td>
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<tr>
<td>Zhangmutou, Guangdong</td>
<td>2013</td>
<td>500</td>
<td>Amer</td>
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<tr>
<td>Jinzhou, Liaoning</td>
<td>2014</td>
<td>100</td>
<td>Huameida</td>
</tr>
<tr>
<td>Jinchang, Gansu</td>
<td>2014</td>
<td>300</td>
<td>Jinchuan</td>
</tr>
<tr>
<td>Changzhou, Jiangsu</td>
<td>2014</td>
<td>230</td>
<td>Jiangsu Newtimes</td>
</tr>
<tr>
<td>Ningbo, Zhejiang</td>
<td>2014</td>
<td>220</td>
<td>Ningbo Shimao Copper</td>
</tr>
<tr>
<td>Yixing, Jiangsu</td>
<td>2014</td>
<td>250</td>
<td>Jiangrun Copper</td>
</tr>
</tbody>
</table>

New Capacity End 2014 3790

Foreign technology capacity ~6 Mt in early 2013 = 2.7 t Southwire CR+1.9 Mt CONTIROD+1.4 Mt in expansions.
Over 1 Mt of Chinese wire rod production capacity closed in recent years:
mainly up-casting and CCC local Chinese technology.

China Wire Rod Plant Capacity: Closures pre-2013
Survey = 35 plants closed + 40 missing plants.
Recent ICSG copper and copper alloy industry surveys in China: slow copper use growth in 2012, plant managers expecting more fabrication in 2013 and 2014.
4. How Much Copper Scrap is Being Used in Chinese Secondary Smelters and Refineries?
ICSG Survey to Chinese Copper Scrap Smelters and Refineries: 2012

Survey: Capacity Utilization 2012

Smelters: 53.0%
Refineries: 61.4%

Scrap Smelting Capacity

2012 Scrap Smelter Output

2012 Scrap Refining Capacity

2012 Scrap Refinery Output

Jiangxi Copper
Guangxi Nonferrous
Tianyuan Copper
Daye Non-ferrous
Qingyuan Yuntong
Ningbo Jintian_yingtan
Shanghai Dachang
Dongying Jinxin
Daye Dajiang Copper
Luoyang Copper

Tongling Group
Hebei Jiangchang Copper
Ningbo Jintian
Hefeng Copper
Qingyuan Smelter of JCC
Lanxi Zili Copper
Jiangxi Jinhui
Wuhu Hengxin Group
Tonglu Hengxin

Shandong Dongying Fangyuan
Shandong Jinsheng
Jinchuan
Xiangguang
Shengzhou
Yunnan Copper
Shanghai Xinye
Guangzhou Zhujiang Copper
Guangzhou Zhujiang Copper
Tianjin Datong
ICSG survey covered ~90% of China scrap smelter output.

- 28 smelters: ~3.1 Mt/year capacity
- 24 refineries: >2.8 Mt/year capacity.
- 24 scrap smelters integrated with refineries.
- 4 smelters send blister/anode to others for refining
- 13 smelters are State Owned or SOE majority owned.

### China Recent New Scrap Smelt/Refinery Capacity

<table>
<thead>
<tr>
<th>Company and Location</th>
<th>Kt-Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jinchuan Nonferrous Metal Group, Gansu</td>
<td>200</td>
</tr>
<tr>
<td>Guangxi Nonferrous Phase II, Guangxi</td>
<td>200</td>
</tr>
<tr>
<td>Yunnan Copper, Guangdong</td>
<td>100</td>
</tr>
<tr>
<td>Xiangguang Copper, Shandong</td>
<td>100</td>
</tr>
<tr>
<td>Jinsheng, Shandong</td>
<td>100</td>
</tr>
<tr>
<td>Guangxi Nonferrous Phase I, Guangxi</td>
<td>100</td>
</tr>
<tr>
<td>Jiangxi Copper, Guangdong</td>
<td>70</td>
</tr>
</tbody>
</table>

New Scrap Smelt/Refinery Operational: 870 Kt-Cu
Selected Survey Findings:

- Main reason to invest: EIA approval easier vs. mine smelters.
- Chinese scrap smelters/refineries capacity utilization is falling.
- No more “Levy First and Refund Later”: higher scrap prices 2011-2012.
- New Encouragement: 50% VAT refunds to plants with 90% feed scrap.
- Expensive scrap = smelters/refineries profit margins squeezed.
- Small private smelters not profitable: output down -160 Kt in 2012
- More imports requirements: import license for scrap,
  supplier registration, pre-shipment inspection certificate.
- Slow port clearance for imported scrap = capital costs up.
- New scrap smelters close to disassembling yards and ports.
- Growing dependency to scrap imports. Mainly old scrap used.
- Mean %Cu in scrap = 90-94%. (EU-27 EoW = 98%)

China Copper Scrap Smelters Pipeline 2013-2015

<table>
<thead>
<tr>
<th>Plant, Location &amp; Technology</th>
<th>Capacity kt/a</th>
<th>Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jinsheng Copper, Shandong NGL</td>
<td>100</td>
<td>2013</td>
</tr>
<tr>
<td>Shandong Dahai NA</td>
<td>200</td>
<td>2013</td>
</tr>
<tr>
<td>Shandong Xinze Smalter &amp; Refinery</td>
<td>200</td>
<td>2013</td>
</tr>
<tr>
<td>Tongling Group NGL</td>
<td>120</td>
<td>2014</td>
</tr>
<tr>
<td>Jinchian, Fangchenggang, Guangxi AUSMELT</td>
<td>200</td>
<td>2014</td>
</tr>
<tr>
<td>Yantai Humon, Shandong NGL</td>
<td>200</td>
<td>2014</td>
</tr>
<tr>
<td>Tianjing Datong Austmelt</td>
<td>200</td>
<td>2015</td>
</tr>
</tbody>
</table>

Total 1,220 3 Years
The Plan:
“Development Plan for Renewable Nonferrous Metal Industry”

- By 2015, copper scrap to be 40% of China refined production.
- Top 10 cu scrap smelter output = 50% of China scrap smelter output.
- Cu scrap smelter capacity = 80% in major industrial zones.
- 6-8 new/expansions cu scrap smelters with 200 kt/y capacity each
- 10 scrap smelters 50-100kt/y each in north, northeast, center and Yellow River Delta
- 2 projects with capacity of 50kt/y each in Northwest China.
- Small blast <50t fixed reverberatory furnaces to be “rejected shortly”.
- Advanced inspection technology and equipment.
Small fabricators and smelters using copper and alloy scrap must close in 2015. MIIT China, March 2013

Plants Affected: Scrap Smelters With Capacity <50 Kt and Direct Melt Scrap Capacity <20kt.

Chinese Secondary Smelters With 50 Kt/year or Less Capacity

- Hefeng Copper
- Ningbo Jintian_yingtan
- Lanxi Zili Copper
- Dongying Jinxi
- Jiangxi Jinhui
- Guangzhou Zhujiang Copper
- Luoyang Copper
- Tonglu Hengxin

Survey: Chinese Wire Rod Plants With < 20 Kt/Y Capacity

- Wire Rod Capacity < 20 Kt./Year Surveyed
- Wire Rod Output < 20 Kt./Year Surveyed
- Direct Melt Scrap Use Surveyed in Plants < 20 Kt

No significant impact to the Chinese demand for copper scrap and copper alloy scraps.
5. Drivers of Current and Future Copper and Alloy Scrap Markets
Most of LME refined stocks worldwide in hands of large trader owned warehouses at the end of Q1-2013.

In the Short Term Copper Traders Positions and Control of Refined Stocks Impact the Scrap Market via Short Copper Price Movements

Source: Bloomberg and Hedge Funds Analysis
Stronger Chinese currency 2013= copper imports less expensive in CNY.

“Leveraged Chinese copper financing deals sustaining $35-40 billions of $384 billions China total short-term FX lending at April 2013”

Goldman Sachs.

Identifying activities with FX inflows above normal export/import activities

- May 10:
  - SAFE request balance sheets and trading records,
  - A-list or B-list firms by June 1, 2013.
  - B-list firms to reduce balance sheet
  - by cutting any capital inflow related trade activities.

Directly reduce scale of China’s FX loans

- reducing the scale of letter of credit financing (bank loans),
- reducing the volume of funding available for copper financing

Raise banks’ FX net open positions

- raising LC financing costs of funding copper financing
- aims bank loan/deposit ratio of 75%-100%,
- existing ratio >150%.

To avoid being categorized as a B-list firm by SAFE

- ‘trade firms’ may reduce their USD LC liabilities
- in the near term,
- with copper financing likely impacted.

China SAFE: regulations on border transactions, to be implemented in June 2013.
ICSG Refined Copper Market Forecasts 2013-2014

- “Those who have knowledge don’t predict. Those who predict don’t have knowledge”. Lao Tzu

- Forecast Risks!

- Scrap/Mine/Smelter Supply Constraints
  - ICSG copper mine “disruptions allowance” =
  - 520 Kt-Cu in 2013, 681 Kt-Cu in 2014
  - Bingham Canyon and Grasberg Mines Closed (May).
  - India smelters output slow: pollution and maintenance.
  - Tighter AS, SO2 emission controls in Chile Smelters.

- Demand Uncertainty in 2013-2014
  - Lower industrial output growth in China?
  - Will China financial rule affect bonded stocks?
  - Falling copper end use? Substitution to aluminum?
  - China SRB and Other Govs market interventions?

ICSG World Copper Mine Production
- 5.2% in 2013
- 5.6% in 2014.

ICSG World Refined Copper Production
- 4.3% in 2013
- 5.1% in 2014.

ICSG World Refined Copper Apparent Demand
- 0.3% in 2013 (industrial use up >3%? China up 5%?)
- 3.9% recovery in 2014

ICSG Surplus 2013: 417 Kt-Cu
ICSG Surplus 2014: 681 Kt-Cu
China ongoing copper industry integration expected to affect the scrap market.

Wire rod and brass mills consolidation = less and bigger plants.

Less companies controlling plants and fabricators.

More centralized scrap purchase systems?

China Copper Industry: Number of Companies in 2012
Source: ICSG based in NBS and Antaike 2013

- Copper Fabricators, 1,312, 47.7%
- Copper Alloy Fabricators, 731, 26.6%
- Copper Smelting & Refining, 313, 11.4%
- Casting Foundries, 101, 3.7%
- Copper Mining Companies, 293, 10.7%
OECD got rich and now is getting old. Will China get old before it gets rich? Economic, demographic, electrification trends will shape copper and scrap demand.

Less OECD people working or looking for work.

China’s strong demographic headwinds

Chinese 15-60 years old population fell -0.6%/year in 2012. NBS

China power grid plan: One Asia = + copper use
In 2012 urbanization in China only 53% of population = USA 1920, Japan 1950

Population Without Electricity in the Developing World, Millions
Source: International Energy Agency 2009

Rural population in China
> 600 million people

India/Bangladesh/Pakistan, Nigeria, Indonesia, Philippines, Malaysia, Thailand
to increase copper use in the medium term ... or before.
2012 Chinese copper smelter investments = -30%!
World mine capacity plans delayed in 2012 = 4 Mt.

Will copper miners deliver 2 Mt more mine capacity in 2013-14?
Will China continue expanding smelting/refining capacity in 2013-2015?
~ 500 Kt old copper mine capacity in need of replacement by new capacity in 2011-2015. Big hopes in new mine capacity mainly from small mines, but CAPEX not there yet!

Copper Mines in End of Life Capacity 2011-2016

Additional Copper Mine Capacity in Plans by Country 2012-2014 Kt

World Copper Mine Capacity Plans 2012-2014 by Mine Size Kt-Cu.
### ICSG Survey on Wire Rod Plants and Scrap Smelters in China

**Wire Rod and Brass Mills**
- Copper wire rod output in China > 6Mt in 2013, ~93% refined copper. Falling direct melt scrap in wire rod and brass mills output.
- Copper wire rod overcapacity now, more in 2014-2015.

**Scrap Smelters**
- Overcapacity in scrap smelters/refineries, more to come.
- Copper scrap smelters hardly profitable by small spreads.
- Imported copper scrap shortage 2008-2012 to continue.
- Slow growth in copper refined from scrap in China.
- China more dependent than ever on imported scrap.
- Chinese old scrap availability remains constrained.

### Role of China in the Global Copper Balance

- Tight global refined balance driving price volatility.
- China credit shortage = cathode use as collateral in Shanghai.
- Refined copper market in effective surplus in 2012.
- More mine supply boost global refined output (>20 Mt), but limited by shortage in scrap recycling and trade.

- China “Green Fence” affects availability.
- Scrap smelter capacity utilization may not grow.
- Chinese brass mills output fall = less alloy scrap demand.
- Limited alloy scrap use by scrap smelters and refineries.

- Slower investment flow to new Chinese smelters in 2012
  - but more capital to copper alloy plants capacity.

### Outlook 2013-2015

- Chinese smelters and semis shortage of scrap to evolve with refined price and customs efficiency.
  - New Chinese wire rod capacity in sight, but utilization rate not secured.
- Will mine supply deliver the additional 2 Mt in 2013-2014 if the price environment is less dynamic?
- Will Chinese smelting/refining capacity grow fast enough to match + 2 Mt of new global mine capacity?
  - A recovery in fabrication in a industrial economy ex-China may tight the market, but where?
- Chinese investments in alloys plants instead of smelters: scrap availability a serious concern.
- Beyond 2015 the market to tight as mine investments are cooling now. Scrap traders to benefit.
Next ICSG Member Countries Meeting, Copper Market Research Advances and Refined Copper Market Forecast

To be held in Lisbon on 1-2 October 2013 in conjunction with the meetings of the Nickel, Lead and Zinc Study Groups.

www.icsg.org
risopatron@icsg.org

• Copper Wire Rod Plants and Secondary Smelters and Refineries Survey in China- 2013.
• mail@icsg.org