Globalisation and World Copper Demand
- The 2004 Pivot Point for Copper -
- Current Evidence and Future Predictions -

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Lisbon, Portugal, 1st October 2007

Jon Barnes
Principal Consultant, Copper Fabricating, CRU
Presentation structure

1. Copper Demand Overview
2. Globalisation
3. Copper demand trends – the evidence
4. Copper demand trends – the future?
5. Conclusions
2006: Refined and Direct Scrap Copper Use by Region (22.3m tonnes)

- Western Europe: 27%
- Developing Asia: 28%
- North America: 16%
- Rest of the World: 6%
- E&C Europe: 7%
- North East Asia: 16%
2006 Copper Demand Structure by Property

- **Electrical**
  - A: Building wire
  - B: Sheet, strip and foil
  - C: Ind. power cables
  - D: Magnet wire
  - E: Other LV cables
  - F: Auto wiring harness
  - G: Utility power cable
  - H: Copper rod & bar
  - I: Other winding strip
  - J: Commercial tube
  - K: Alloy tube
  - L: Auto heat exchanger strip
  - M: Telecom cable
  - N: Electronic wire & cable
  - O: LAN cables
  - P: Alloy rod & bar
  - Q: Plumbing tube
  - R: Alloy wire
  - S: Roofing/guttering strip
  - T: Ammunition strip
  - U: Coinage strip

**Heat transfer**
- J
- K
- L = 2.1mt

**Signal Transfer**
- M
- N
- O = 1.5mt

**Malleable/Aesthetics**
- P
- Q
- R
- S = 3.8mt

**All Others**
- 0
- 2
- 4
- 6
- 8
- 10
- 12
- 14

Million tonnes

Total demand = 12.7mt

Data: CRU Analysis
Key trends and themes in copper consumption

Fundamental Demand Drivers
- Electrical Properties
- Electricity Generation Outlook
- Impact of Megatrends
- China
- Gulf Region
- Location of New Copper Semis Plants
- Economic & Political Risk

Impact of High Prices / Scarcity
- Economisation
- Scrap Use
- Recycling
- Theft
- Substitution
Presentation structure

1. Copper Demand Overview

2. Globalisation
   “Increasing interdependence, integration & interaction among individuals, companies, corporations in disparate locations around the world”.
   ...and reliant upon three forces for development...
   “Human migration, international trade and rapid movement of capital and the integration of financial markets”.

3. Copper demand trends – the evidence

4. Copper demand trends – the future?

5. Conclusions
But don’t just take his word for it! …all the following offer a wide spectrum of viewpoints and opinions

“Why Globalization Works”
Martin Wolf

“In Defense of Globalization”
Jagdish Bhagwati

“The Chinese Century”
Oded Shenkar

“Mapping the Global Future”
The US National Intelligence Council’s 2020 Project Report

The latter concluded, “We see globalization as an overarching mega-trend, a force so ubiquitous that it will shape all of the other major trends of the world of 2020.”
...in Friedman’s flat ("level") world

1. Globalisation 1.0 : 1492-1800 (Countries)
2. Globalisation 2.0 : 1801-2000 (Companies)
3. Globalisation 3.0 : 2001- XXXX (Individuals)

His 10 flatteners (which are creating a more level playing field)

1. Berlin wall / Windows 95
2. Connectivity
3. Workflow software
4. Uploading
5. Outsourcing
6. Offshoring
7. Supply chaining
8. Insourcing
9. Informing
10. “The steroids”...
   digital, mobile, personal and virtual
Molex’s View on Globalisation – “The world’s getting smaller”

One world, one company

Designed in Japan

Tooled in India

Shipped to Slovakia

Made in the USA
Molex in China – 4 sites, 10 operations…latest in Chengdu

Molex Chengdu Plant Profile

A $100 million investment

Molex Interconnect (Chengdu) Co Ltd is the fourth Molex factory in China and the operations started in early 2005. Currently there are three business units housed in two temporary 2-storey buildings in the Export Processing Zone in Chengdu, located about 25 km from the city. These units are the GC Automotive, the Chengdu Toolroom and the ICM unit. The plan is to move to a nearby permanent site in the same zone in January 2008, and along with other added product divisions, the new facility will be the largest manufacturing campus in Molex.
Supply chains in auto components

- A global Tier 1 auto supplier with 116 companies in 32 countries.

- Combined with its owner Sumitomo Electric Industries it is the world’s #2 auto wire and wiring harness supplier. The world #1 is Yazaki.

- Harness assembly is very labour intensive, so globalisation means a shift to low labour cost nations. Also aggressive acquisitions.

- From a 12% global market share in 2002, it achieved its stated target of 20% market share by 2010 in 2006!

- Its new target is 25% market share by 2012 – and to be world #1.
It plans to have 18 harness plants in China! Expanding Vietnamese capacity by 60%
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The 1980s – Distribution of copper consumption growth

- Blue: Refined copper consumption increasing
- Green: No change / decline / negligible consumption
The 1990s – Distribution of copper consumption growth

Refined copper consumption increasing
No change / decline / negligible consumption
Auto wiring harnesses – global supply chain in motion

It’s 1980!
1 new auto in the US, e.g a GM.
Auto wire - Delphi - USA
Harness - Delphi – Mexico
Connector strip – Olin – USA
Electric motor – Delphi – USA
Magnet wire – Phelps Dodge MW - USA
It’s good news for US copper consumption

Now it’s today (October 1st 2007)
1 new US auto, it’s a Toyota Prius transplant!
Auto wire – SEI – China
Harness – SWS – China
Coil – Dowa – Japan
Connector strip – Dowa – China
Electric motor – SEI – China
Magnet wire – SEI Wintec - Japan
Good news for consumption in China, Japan!
• In Feb. ‘07 Mitsui sold Eurocel (Fr) to an investor group. It said, “The electronic components market is increasingly centering round Asia so we need to follow.”

• In the 1980s & 90s major ED foilmakers maintained a production base in each of the major regions (USA, Europe & Asia)

• But the growth & concentration of PCB assembly in Asia in the last decade has changed this. US & European customers relocated, offshored or outsourced…

• ...as a result ED foilmakers have closed their plants in Europe & US at the same time as they are adding extra capacity in Asia to meet a surge in demand (>supply)

• In Feb. ‘07 Mitsui sold Eurocel (Fr) to an investor group. It said, "The electronic components market is increasingly centering round Asia so we need to follow.”
Let me bore you with some definitions

• Refined copper consumption (for country A,B,C…)
  Point of first use of refined copper at mills (trend = competitiveness)

• Net copper demand [expanded] (for country A,B,C…)
  Refined copper consumption
  + Direct scrap use by mills
  + Net imports of copper wirerod, brass mills, wire & cable (cu content)
  = Net copper demand

Broader, more inclusive, and greater visibility of downstream trends,
= more accurate predictor of refined consumption (argues Jon)
China - The world’s workshop….the dawn of “the Pacific century”

Since 2003 the major driver (39%) of rising refined copper consumption:

Falling net imports of copper semis and increasing net exports of wire and cable

<table>
<thead>
<tr>
<th>CHINA</th>
<th>Change ’03-’06 (’000 Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cu Demand</td>
<td>+1423</td>
</tr>
<tr>
<td>Direct Scrap Use</td>
<td>+854</td>
</tr>
<tr>
<td>Net Imports of Cu Semis &amp; W&amp;C</td>
<td>-365</td>
</tr>
<tr>
<td>Refined Cu Cons.</td>
<td>+934</td>
</tr>
</tbody>
</table>
Chinese trade in Cu wirerod, brass mill products, wire & cable

Export growth... import substitution...and a rapidly shrinking trade deficit

**Exports**
- Wire & cable
- Brass mill products
- Cu wirerod & wire

**Imports**

**Net Trade**
- Net exports
- Total net imports

Export growth... import substitution...and a rapidly shrinking trade deficit
South Korea – Tiger, Tiger burning out…

The main reason for the slump in refined Cu consumption since 2004:

Fast declining net exports of Cu wirerod, brass mill products and wire & cable

<table>
<thead>
<tr>
<th>SOUTH KOREA</th>
<th>Change ’04-’06 (`000 Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cu Demand</td>
<td>+41</td>
</tr>
<tr>
<td>Direct Scrap Use</td>
<td>+43</td>
</tr>
<tr>
<td>Net Exports of Cu Semis &amp; W&amp;C</td>
<td>-133</td>
</tr>
<tr>
<td>Refined Cu Cons.</td>
<td>-135</td>
</tr>
</tbody>
</table>
USA - The old workshop…the end of “the American century”

The weak dollar has been the most important defender of US refined copper consumption, but even so...

Rising net imports of cu wirerod, brass mill products and wire & cable

<table>
<thead>
<tr>
<th>UNITED STATES OF AMERICA</th>
<th>Change ’95-’06 (‘000 Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cu Demand</td>
<td>+94</td>
</tr>
<tr>
<td>Direct Scrap Use</td>
<td>-83</td>
</tr>
<tr>
<td>Net Imports of Cu Semis &amp; W&amp;C</td>
<td>+427</td>
</tr>
<tr>
<td>Refined Cu Cons.</td>
<td>-250</td>
</tr>
</tbody>
</table>
Germany – At the centre of a united and enlarged Europe

The leading driver of *increasing* refined copper consumption:

Rising net exports of copper semis and declining net imports of wire & cable

<table>
<thead>
<tr>
<th></th>
<th>Change ’95-’06 (’000 Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cu Demand</td>
<td>-140</td>
</tr>
<tr>
<td>Direct Scrap Use</td>
<td>+174</td>
</tr>
<tr>
<td>Net Exports of Cu Semis &amp; W&amp;C</td>
<td>+524</td>
</tr>
<tr>
<td>Refined Cu Cons.</td>
<td>+210</td>
</tr>
</tbody>
</table>
The UK – A declining regional power…and fading fast

The key driver of the long term erosion in the UK’s refined copper consumption:

Falling net exports of copper wirerod and rising net imports of brass mill products and wire & cable (from China!)

UNITED KINGDOM  Change ’95-’07 (’000 Tonnes)

<table>
<thead>
<tr>
<th>Description</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Cu Demand</td>
<td>-121</td>
</tr>
<tr>
<td>Direct Scrap Use</td>
<td>-75</td>
</tr>
<tr>
<td>Net Imports of Cu Semis &amp; W&amp;C</td>
<td>+273</td>
</tr>
<tr>
<td>Refined Cu Cons.</td>
<td>-333</td>
</tr>
</tbody>
</table>
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## Globalisation touches everything!

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<tr>
<th>End Use Segment</th>
<th>Copper Products</th>
<th>Globalisation Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Products</td>
<td>Building wire, plumbing tube, pipe fittings and fixtures, lighting products</td>
<td>Taps, plumbing goods, lock sets, lighting – all exported in huge quantities from China</td>
</tr>
<tr>
<td>Utility / Network Products</td>
<td>Power cable, telecom cable, LAN cable, desal. tube, transformers, generators</td>
<td>EHV power cable market is global. LAN cable is routinely “rebadged” in China for US</td>
</tr>
</tbody>
</table>
Where next for copper consumption growth?

Current projects from copper mill equipment suppliers

<table>
<thead>
<tr>
<th>Product Segments</th>
<th>New Capacity Investment Hotspots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper Wirerod</td>
<td>China, United Arab Emirates, Saudi Arabia, Egypt, Turkey, Spain, Russia, Bulgaria*</td>
</tr>
<tr>
<td>Sheet and Strip</td>
<td>China, India, Bulgaria, Japan</td>
</tr>
<tr>
<td>Tube and Pipe</td>
<td>China, Mexico, USA, Iran, Thailand, Vietnam*</td>
</tr>
<tr>
<td>Rod and Bar</td>
<td>China, Bulgaria</td>
</tr>
</tbody>
</table>
2000-2020 - Distribution of copper consumption growth!

- Red: No refined copper consumption long before 2020
- Orange: Major decline in refined copper consumption by 2020
Conclusions

- Globalisation is *the* “mega-trend”… it’s irreversible … it’s accelerating.
- It’s impact on copper demand can be seen. It will be more visible.
- Its influence will ultimately spread beyond OEMs, ODMs, OBM and EMS into construction and utility products.
- The copper industry will be “winners”, but there will also be “losers”.
- “*There are certain pivot points in history that are greater than others because the changes they produced were so sweeping, multifaceted, and hard to predict at the time*” (Rothkopf). 2004 was the pivot for copper.
- Before 2004, Chinese copper demand growth was complimentary; But since then its demand growth has been partly at the expense of others.
- “Globalisation” *means* “polarisation” in copper demand growth.
- **Hugely positive for copper consumption in China, India & some other industrialising nations** - but uncertain for others, and **negative for many.**
Thank You!

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