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Globalisation and World Copper Demand

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

International Copper Study Group Meeting
Lisbon, Portugal, 1st October 2007

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LONDON | BEIJING | PHILADELPHIA | WASHINGTON

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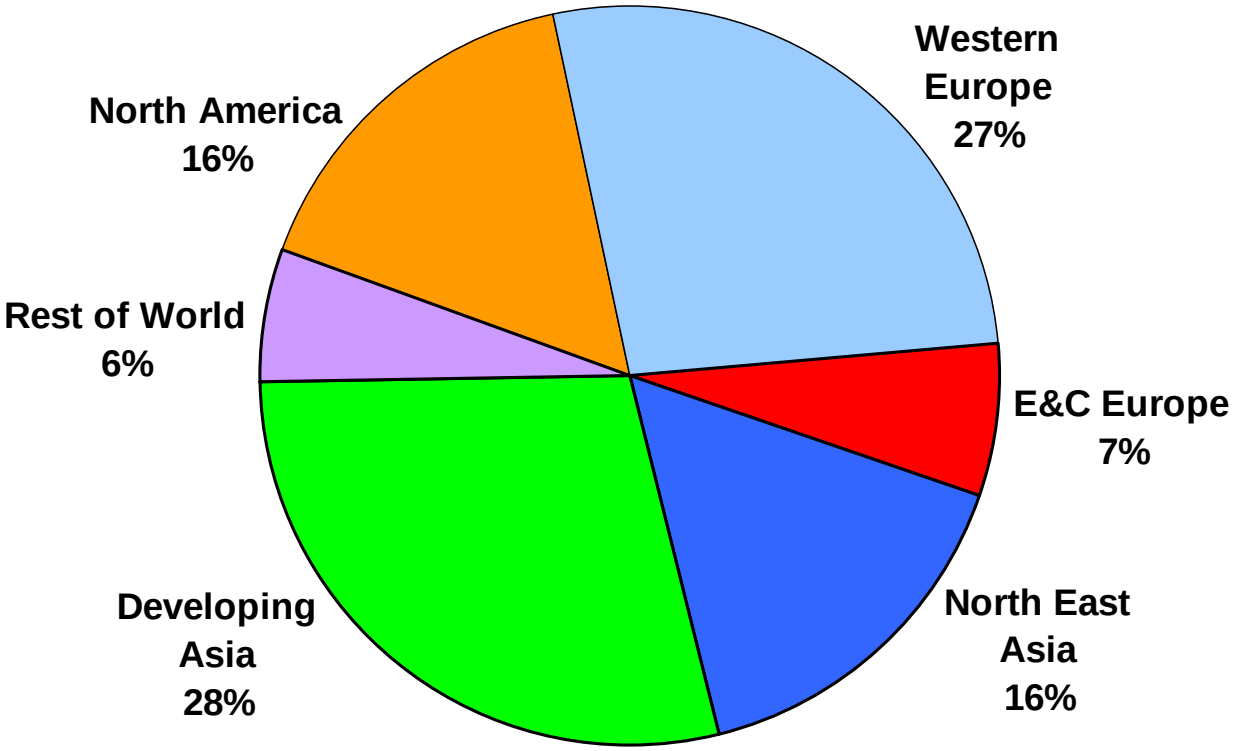
Presentation structure

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)



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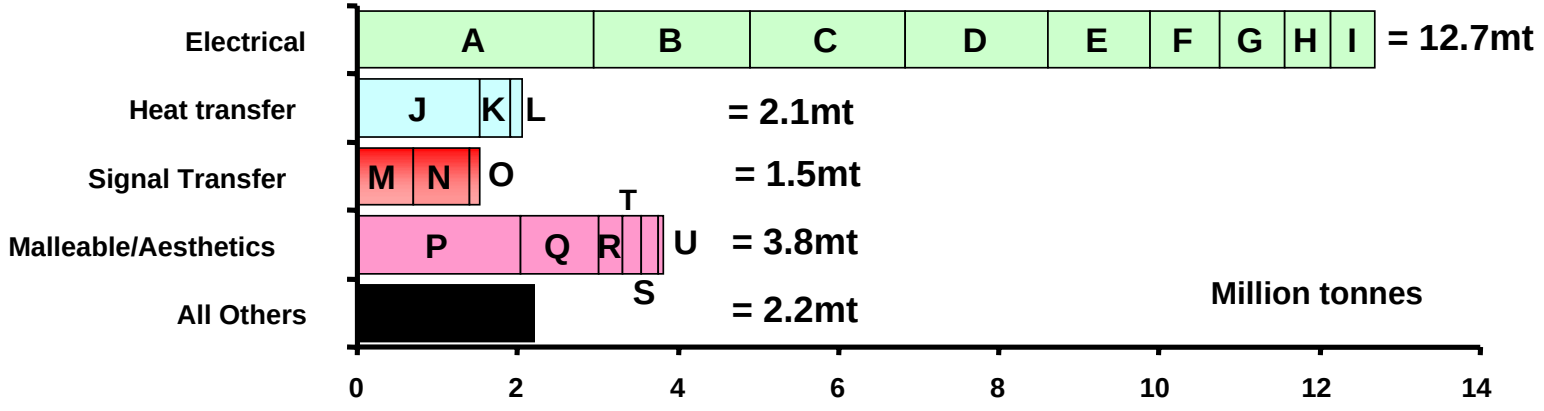
2006 Copper Demand Structure by Property



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

Data: CRU Analysis

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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".

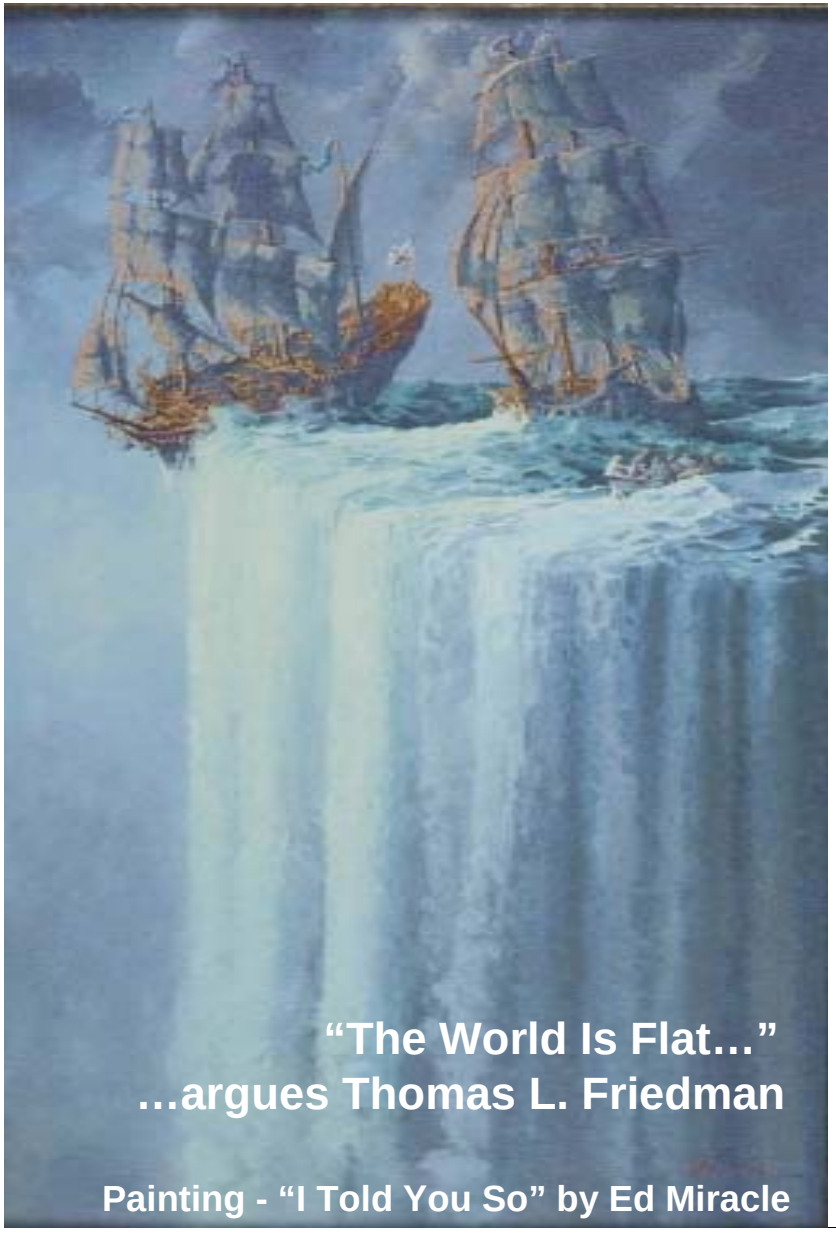
…and reliant upon three forces for development...

"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



“The World Is Flat…”
…argues Thomas L. Friedman

Painting - “I Told You So” by Ed Miracle

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*"

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 2006. 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.

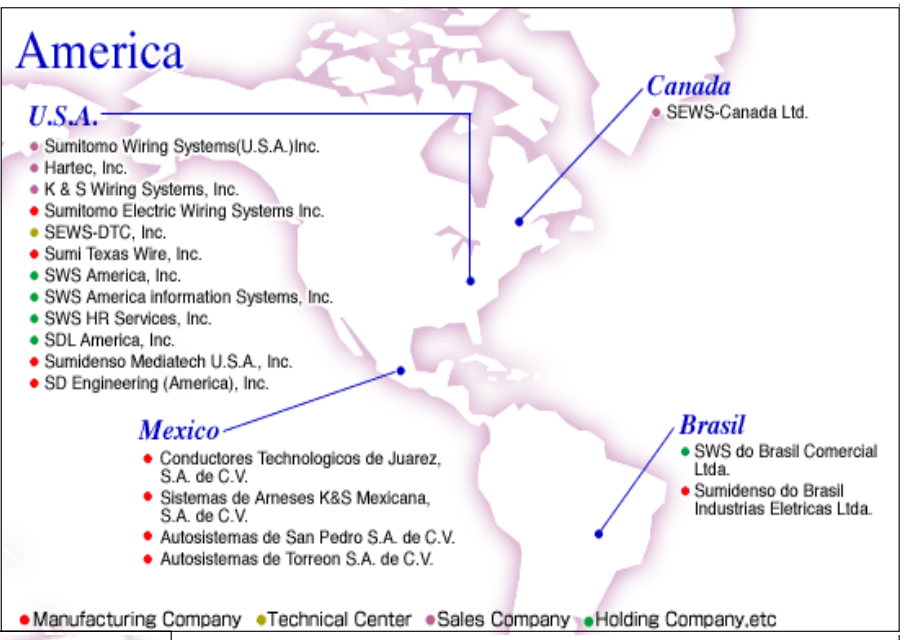
The plan is to move to a nearby permanent site in the same zone in January 2008, and along with other added product divisions, the new facility will be the largest manufacturing campus in Molex.

Artist's Impression of New Molex Chengdu Manufacturing Hub

Sumitomo Wiring Systems, Ltd.

Supply chains in auto components

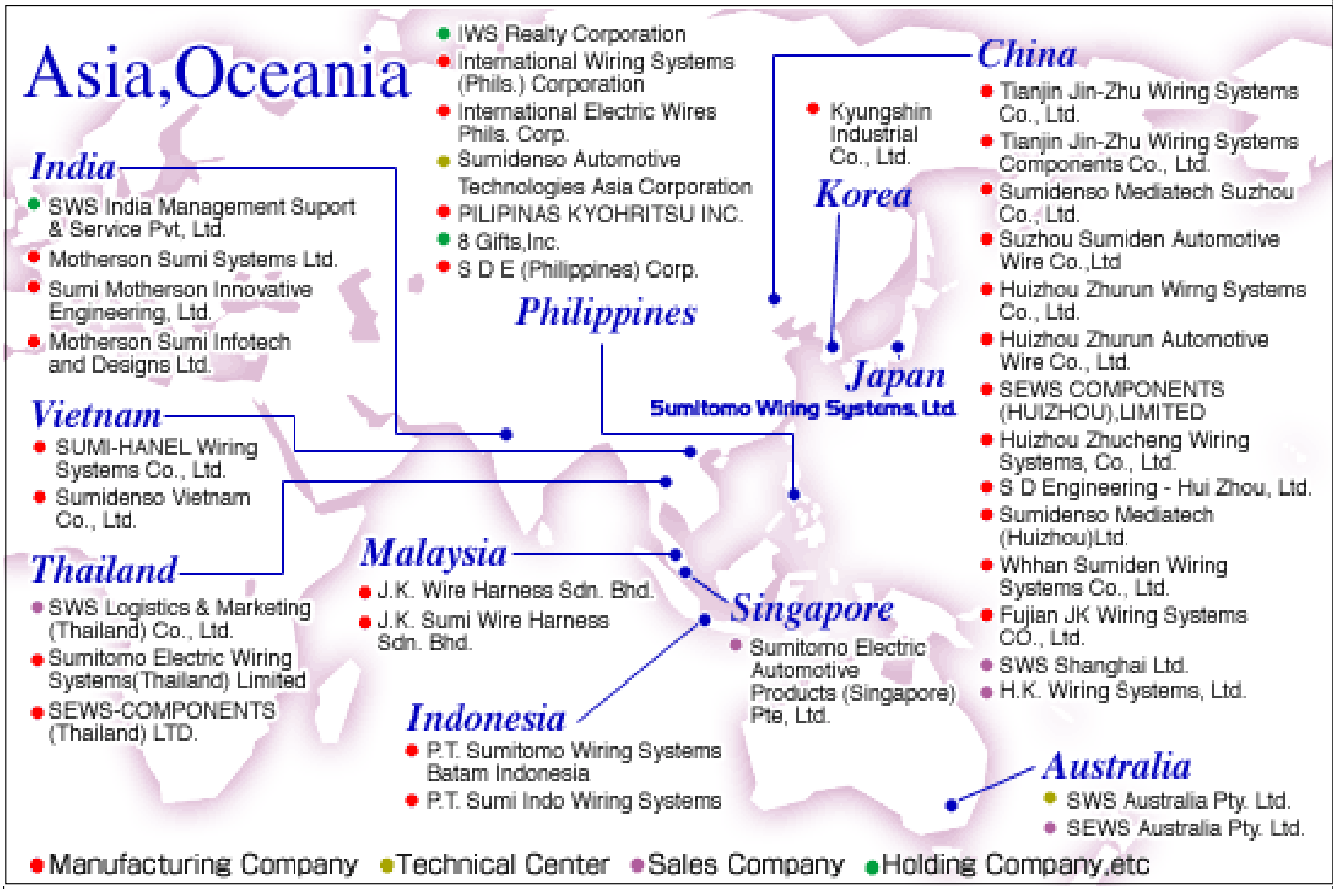
- A global Tier 1 auto supplier with 116 companies in 32 countries.
- Combined with its owner Sumitomo Electric Industries it is the world's #2 auto wire and wiring harness supplier. The world #1 is Yazaki.



- 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.

Sumitomo Wiring Systems, Ltd.

It plans to have 18 harness plants in China!
Expanding Vietnamese capacity by 60%



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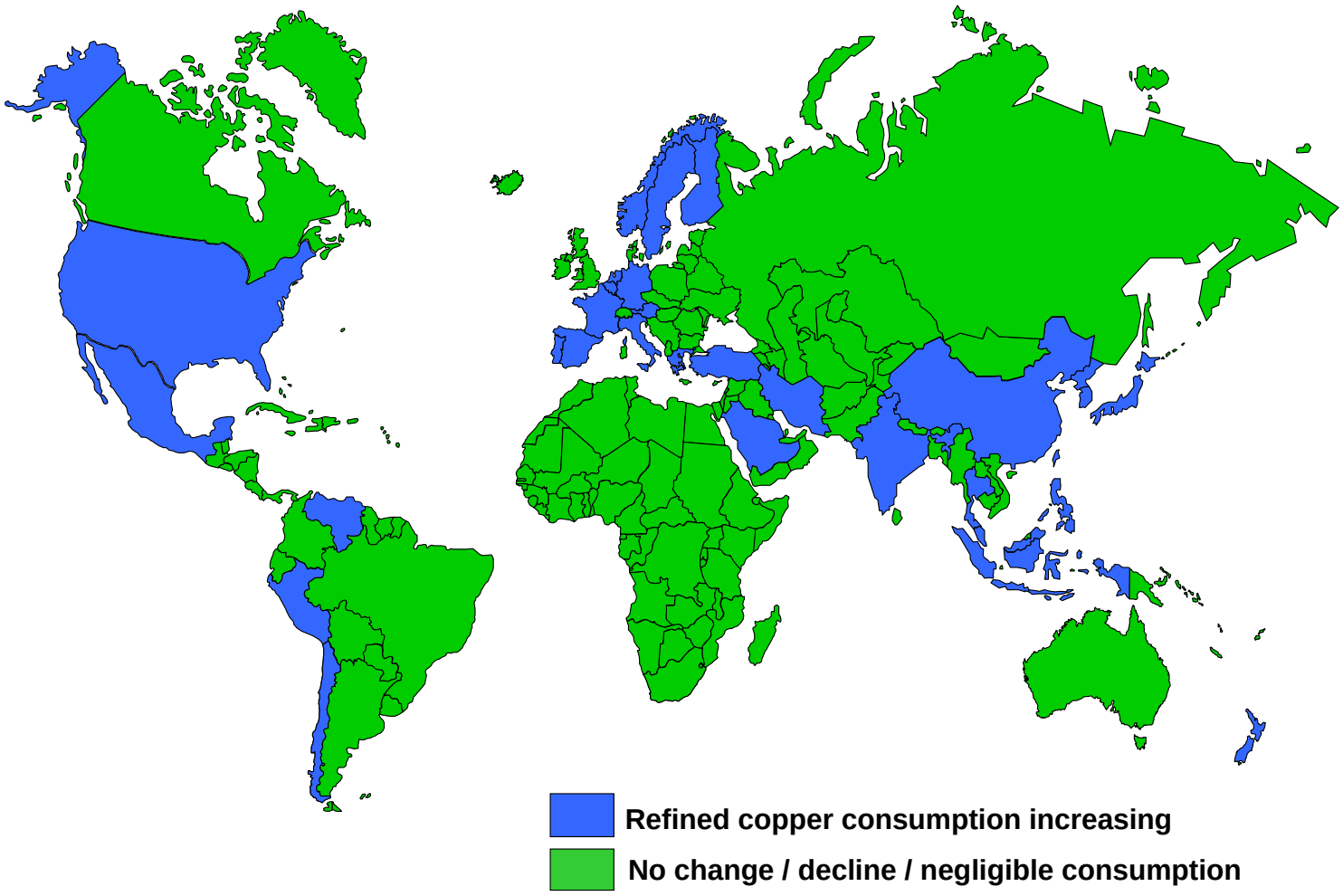
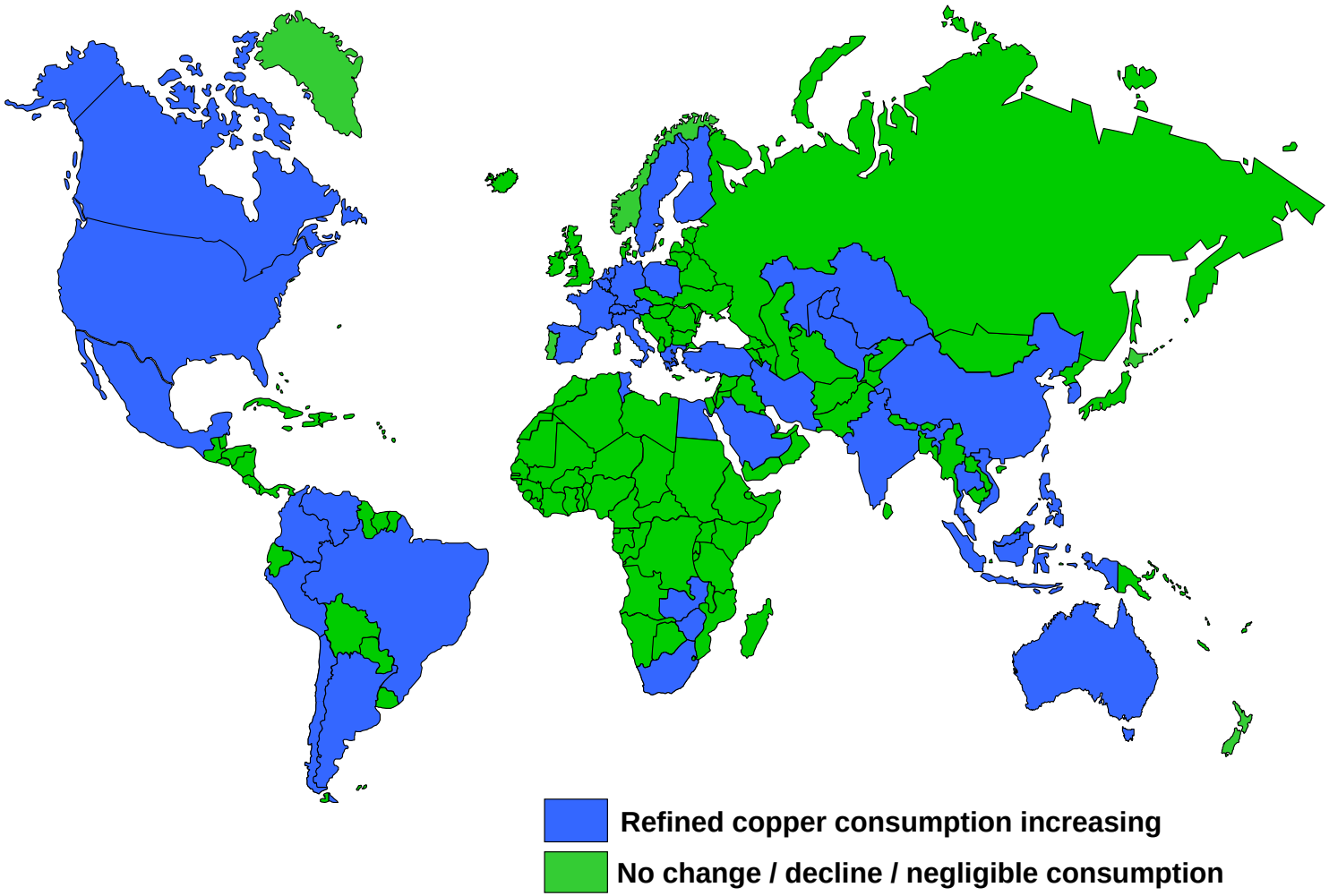
The 1980s – Distribution of copper consumption growth



The 1990s – Distribution of copper consumption growth



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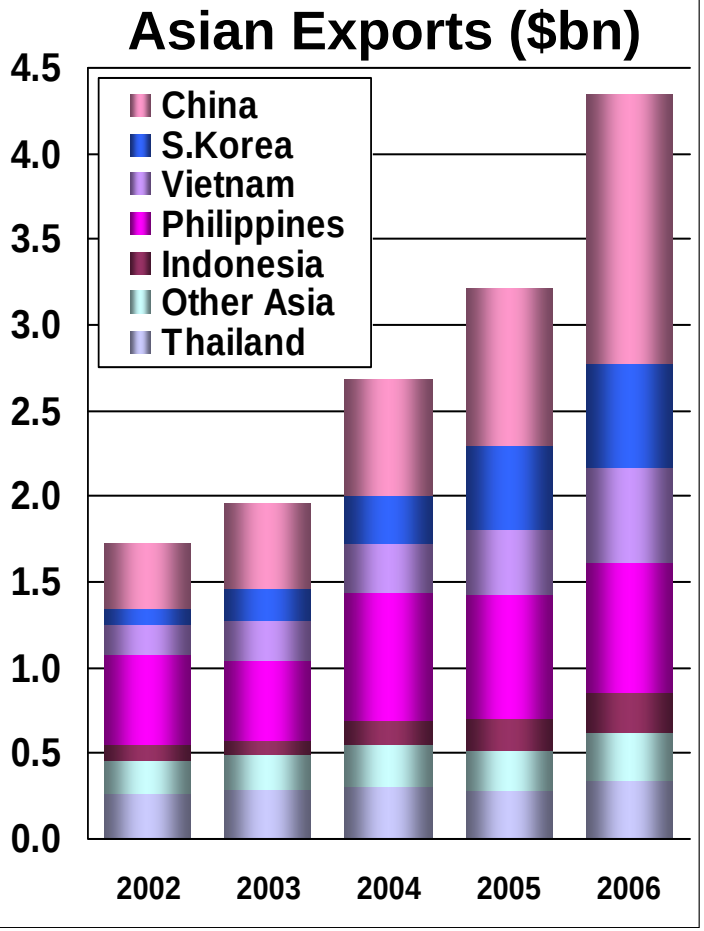
Auto wiring harnesses – global supply chain in motion

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!



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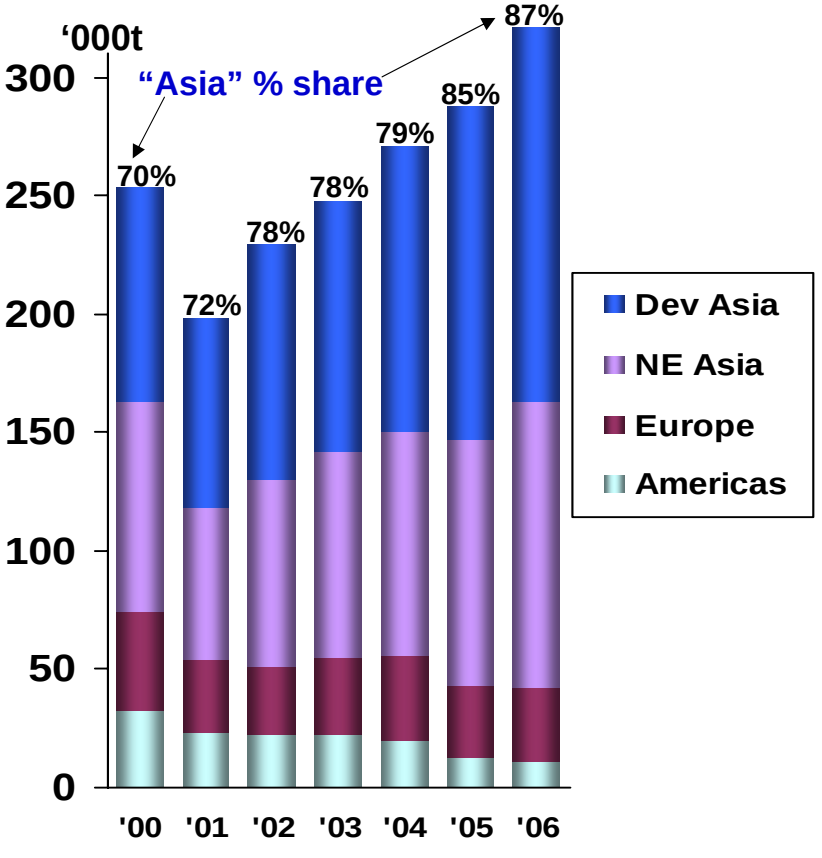
Electro-deposited copper foil: Globalisation in microcosm

Demand by Region



- 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*)

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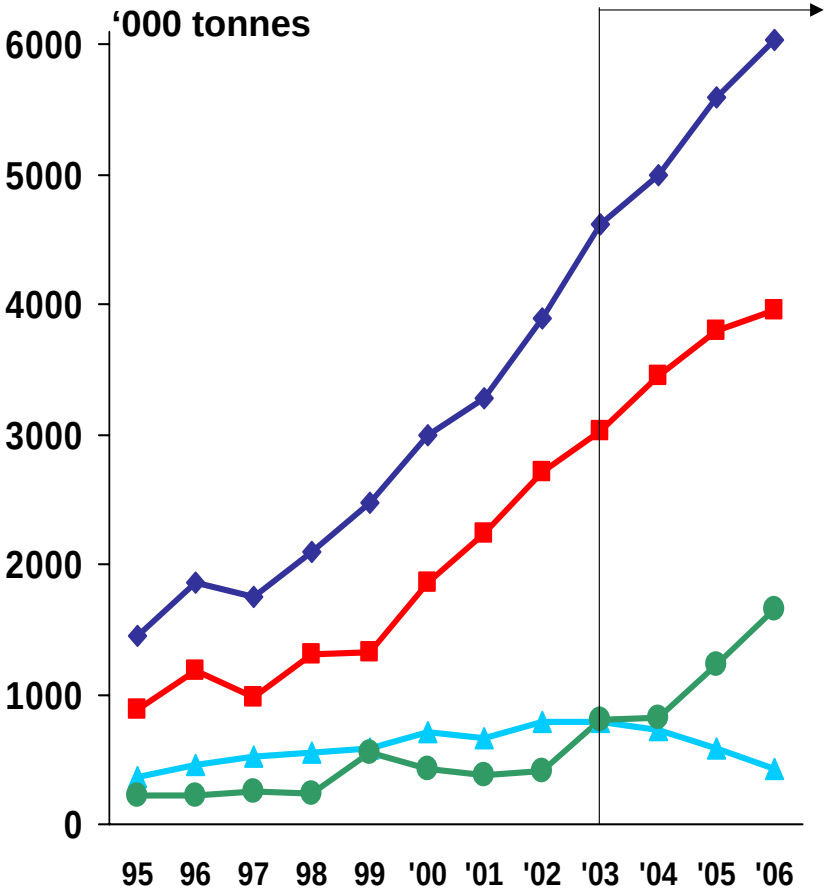
China - The world's workshop….the dawn of "the Pacific century"



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

CHINA	Change '03-'06 ('000 Tonnes)
Net Cu Demand	+1423
Direct Scrap Use	+854
Net Imports of Cu Semis & W&C	-365
Refined Cu Cons.	+934

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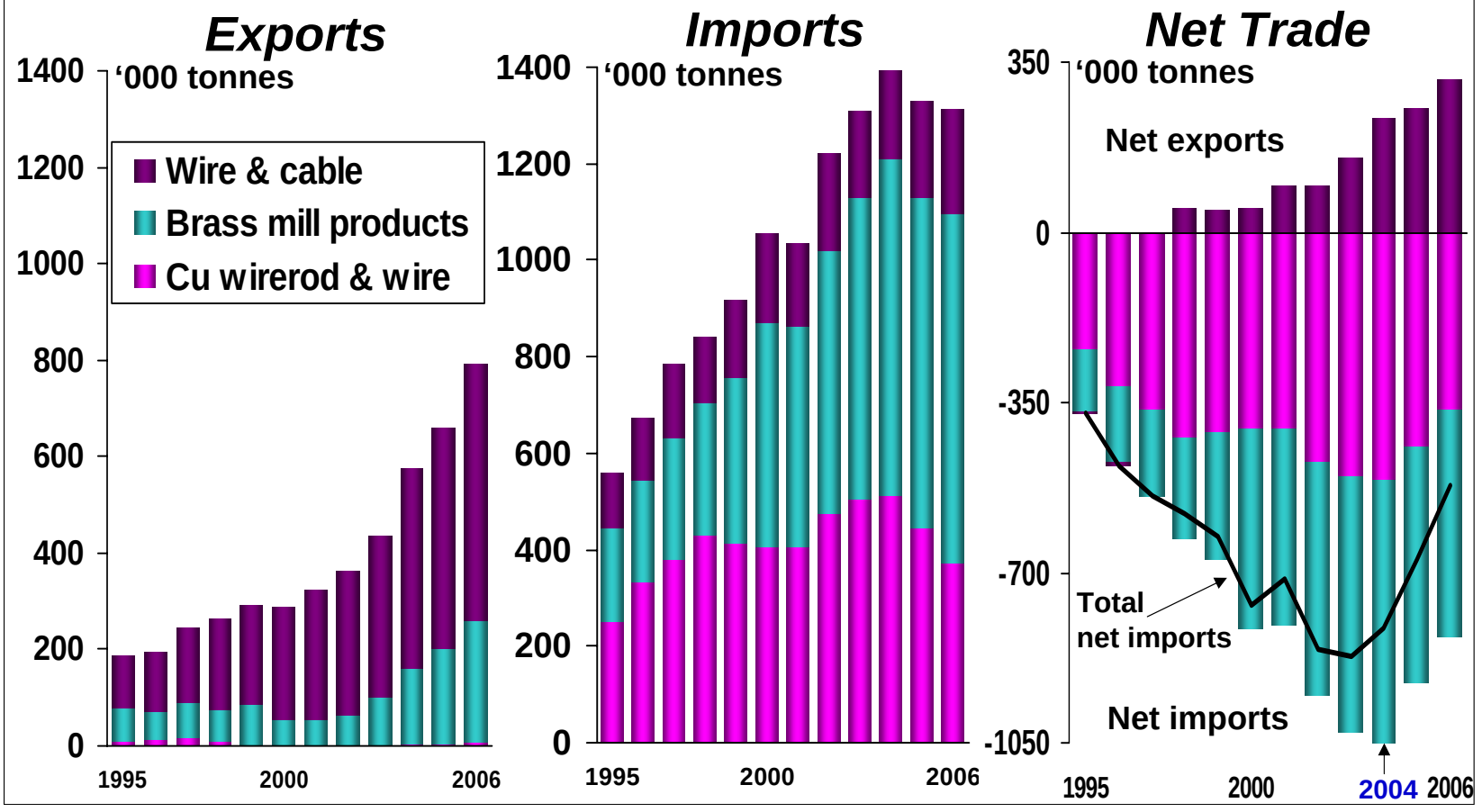
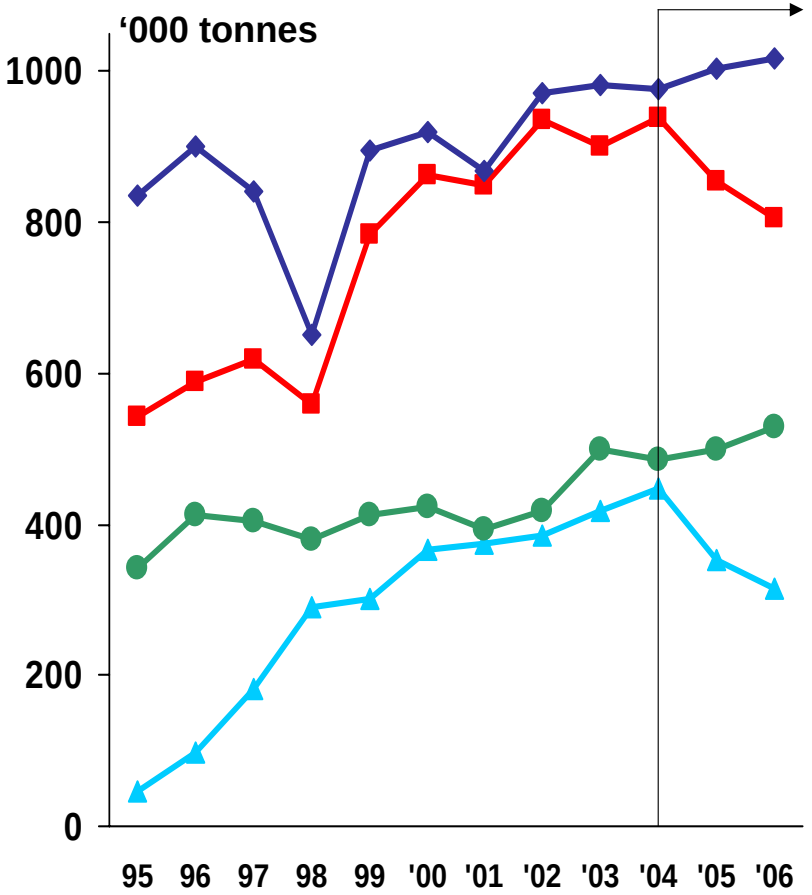
Chinese trade in cu wirerod, brass mill products, wire & cable

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



South Korea – Tiger, Tiger burning out…

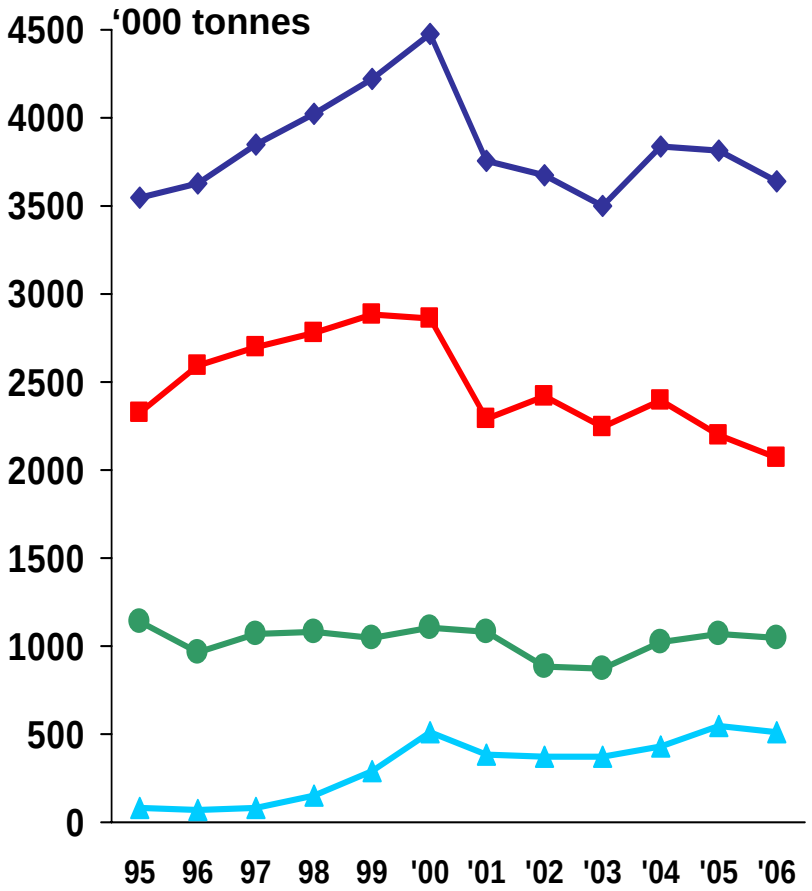


The main reason for the slump in refined cu consumption since 2004:

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

SOUTH KOREA	Change '04-'06 ('000 Tonnes)
Net Cu Demand	+41
Direct Scrap Use	+43
Net Exports of Cu Semis & W&C	-133
Refined Cu Cons.	-135

USA - The old workshop…the end of “the American century”

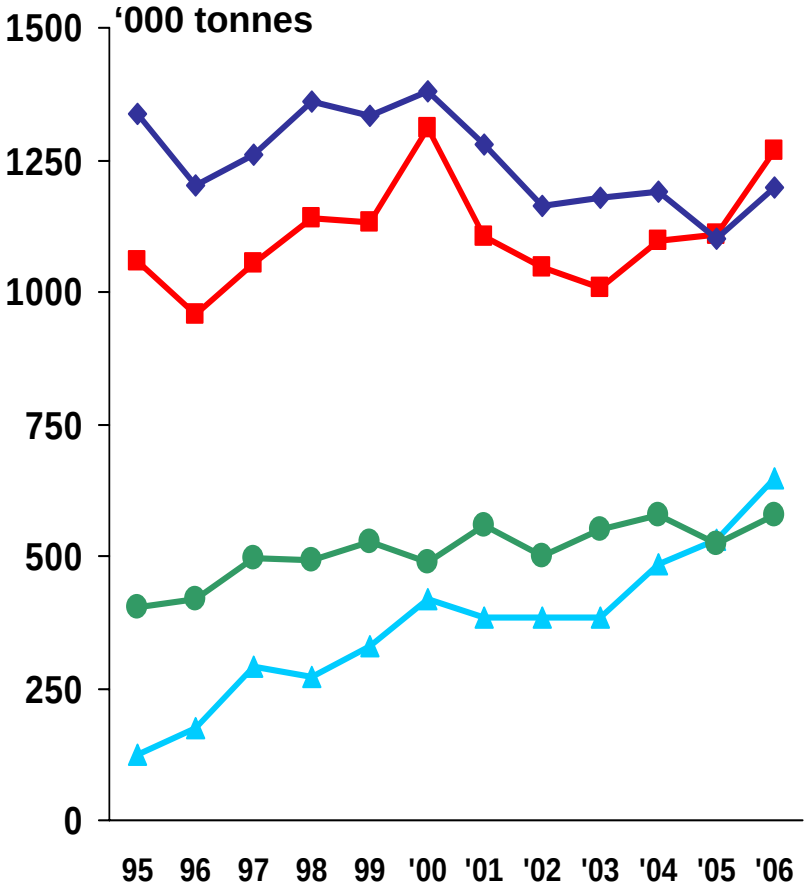


The weak dollar has been the most important defender of US refined copper consumption, but even so…

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

UNITED STATES OF AMERICA	Change ’95-’06 (‘000 Tonnes)
Net Cu Demand	+94
Direct Scrap Use	-83
Net Imports of Cu Semis & W&C	+427
Refined Cu Cons.	-250

Germany – At the centre of a united and enlarged Europe

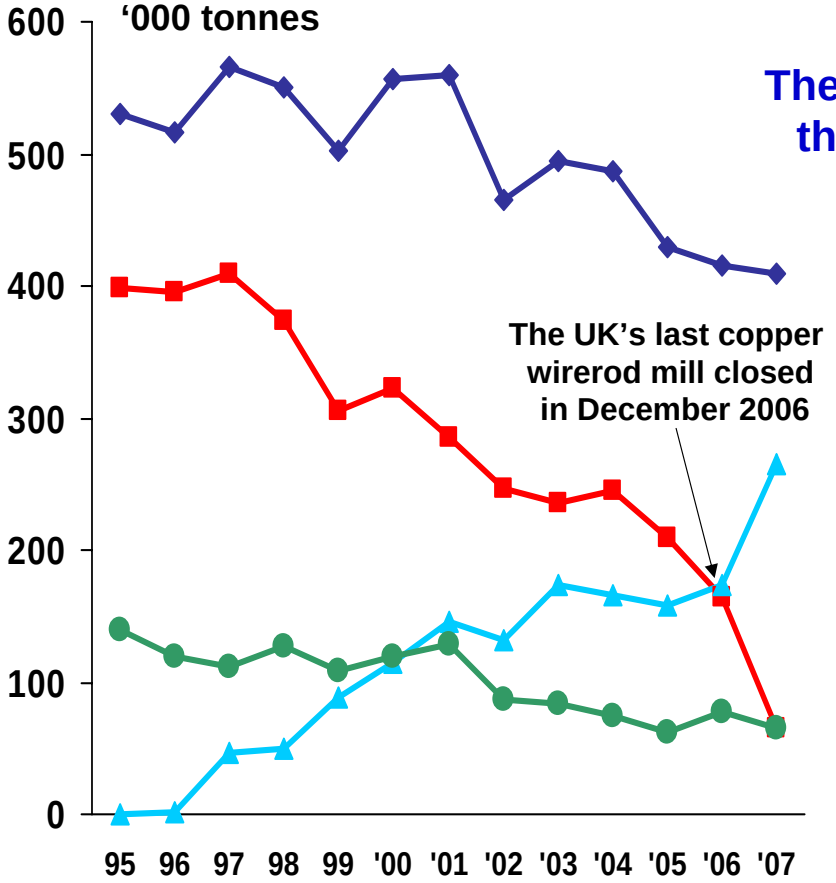


The leading driver of *increasing* refined copper consumption:

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

GERMANY	Change '95-'06 ('000 Tonnes)
Net Cu Demand	-140
Direct Scrap Use	+174
Net Exports of Cu Semis & W&C	+524
Refined Cu Cons.	+210

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)
Net Cu Demand	-121
Direct Scrap Use	-75
Net Imports of Cu Semis & W&C	+273
Refined Cu Cons.	-333

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Globalisation touches everything!

End Use Segment	Copper Products	Globalisation Effects
OEM Components. Perhaps eventually autos?	Connectors, ED Foil, Wiring Harness, Electric Motors, Cord sets, ACR Tube, etc.	Predominant industry trend. Accelerating in intensity. Esp. where very labour intensive.
Construction Products	Building wire, plumbing tube, pipe fittings and fixtures, lighting products	Taps, plumbing goods, lock sets, lighting – all exported in huge quantities from China
Utility / Network Products	Power cable, telecom cable, LAN cable, desal. tube, transformers, generators	EHV power cable market is global. LAN cable is routinely "rebadged" in China for US
"National Industries"	Ammunition Casings. Defence Industries. Coinage.	GWOT / Iraq / Afghanistan needed ammo subcontractors. National mints outsource.

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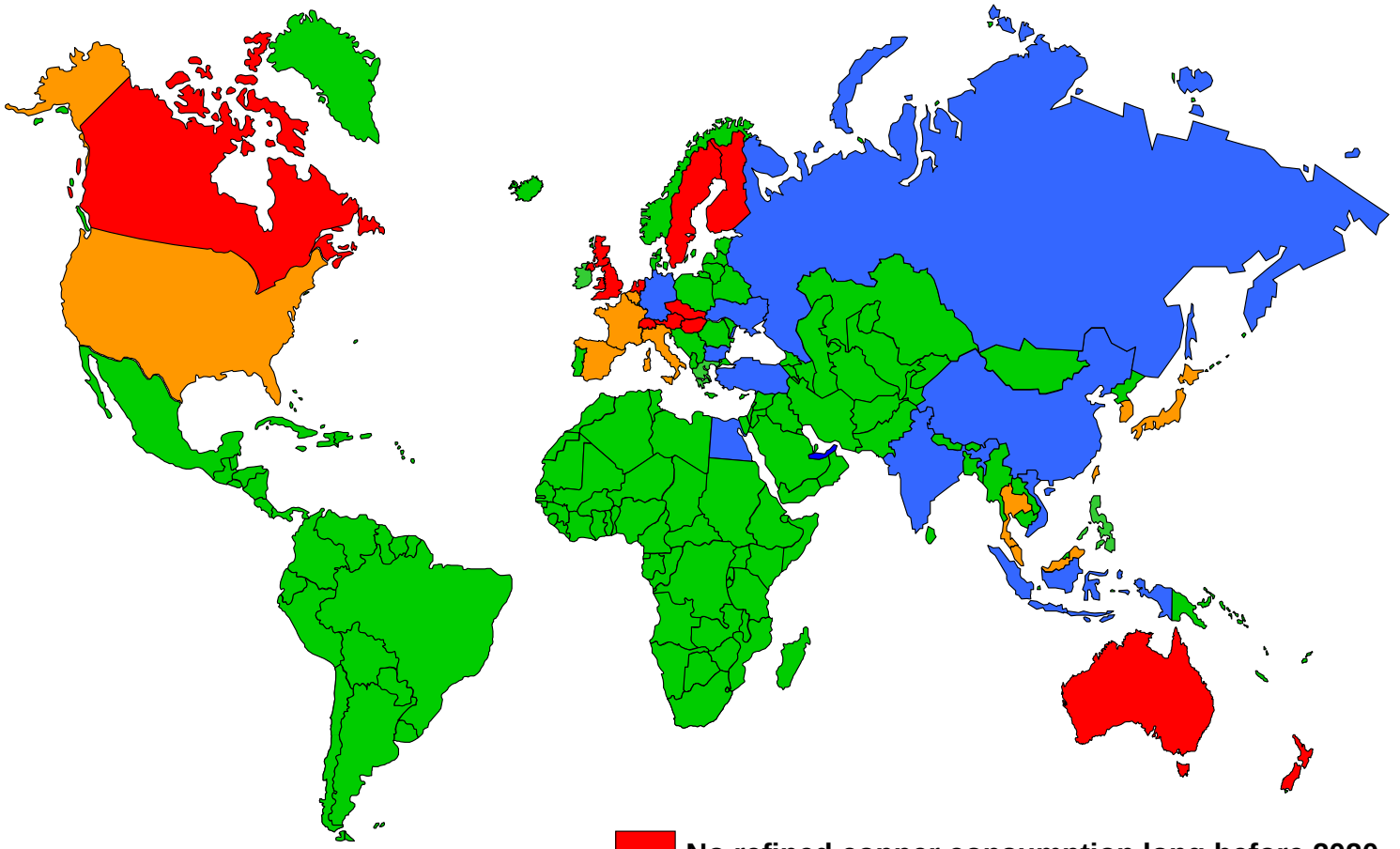
Where next for copper consumption growth?

Current projects from copper mill equipment suppliers

Product Segments	New Capacity Investment Hotspots
Copper Wirerod	China, United Arab Emirates, Saudi Arabia, Egypt, Turkey, Spain, Russia, Bulgaria*
Sheet and Strip	China, India, Bulgaria, Japan
Tube and Pipe	China, Mexico, USA, Iran, Thailand, Vietnam*
Rod and Bar	China, Bulgaria

2000-2020 - Distribution of copper consumption growth!?



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, OBMs 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.**

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Thank You!

CRU Copper team

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