

## **BUOYANT PHYSICAL & INVESTMENT MARKETS FOR COPPER**

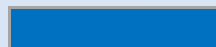
- In copper, a production-consumption deficit and falling stocks have been seen in 2010 and these should continue through 2011-2012.
- Exchange traded funds' (ETFs) actual (and prospective?) managers have already begun to compete with industry for those diminishing physical stocks, driving up the price and backwardating the market.
- Commodity index funds (CIFs) - long term investors - are continuing to buy metal futures contracts, and their prospects have been enhanced by positive roll yields, caused by the ETF driven backwardation.

**By Peter Hollands of Bloomsbury Minerals Economics  
and Glen Jones of Intierra Resource Intelligence**

# Section one: demand

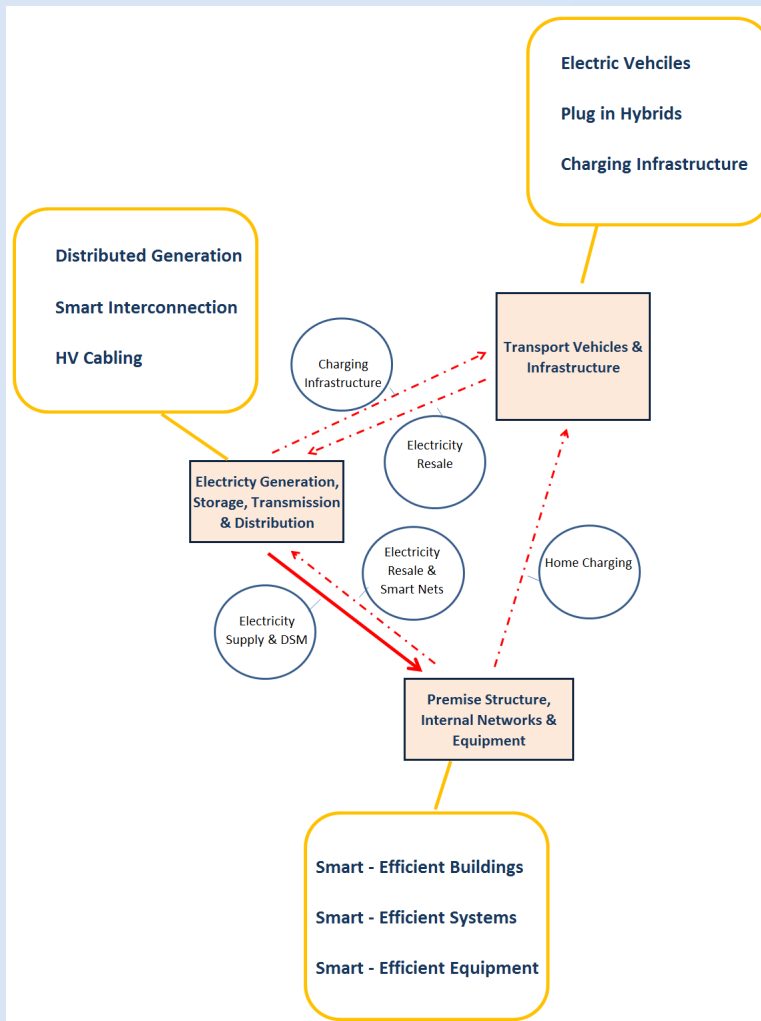
## Copper's existing markets - % share by segment

	WIRES, CABLES & LEADS			MILL, FOUNDRY & OTHER PRODUCTS			TOTAL
	Energy / Bare Cable & Wire	Telecom/ Data Cable	Winding Wire	Copper Tube	Cu/Alloy PSSF	Alloy RBS & Other	All Products
Building Construction	18%	1%	0%	4%	1%	5%	30%
Power Network	6%		2%		0%	3%	11%
Telecom Infrastructure	0%	3%			0%		4%
Industrial Machinery	4%	0%	3%	0%	1%	8%	16%
Automotive	3%		1%		3%	0%	8%
Air Conditioners	0%		1%	6%		0%	7%
Electrical & Electronic	4%	0%	3%		4%	1%	12%
General & Other	5%	0%	1%	0%	4%	3%	12%
<b>TOTAL</b>	<b>41%</b>	<b>5%</b>	<b>11%</b>	<b>10%</b>	<b>13%</b>	<b>19%</b>	<b>100%</b>



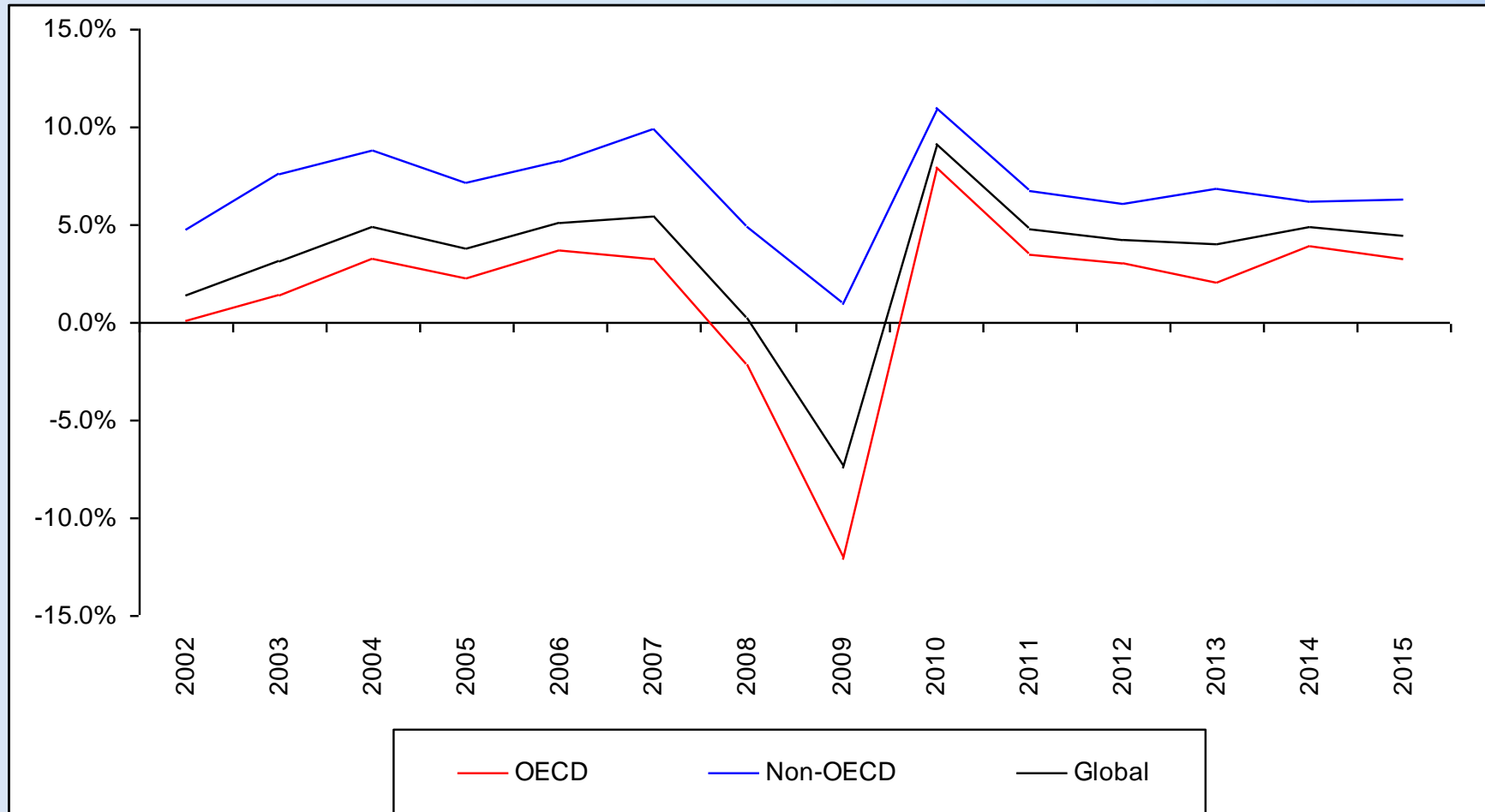
Major markets and those to experience big volume change

## New applications for copper in tomorrow's world

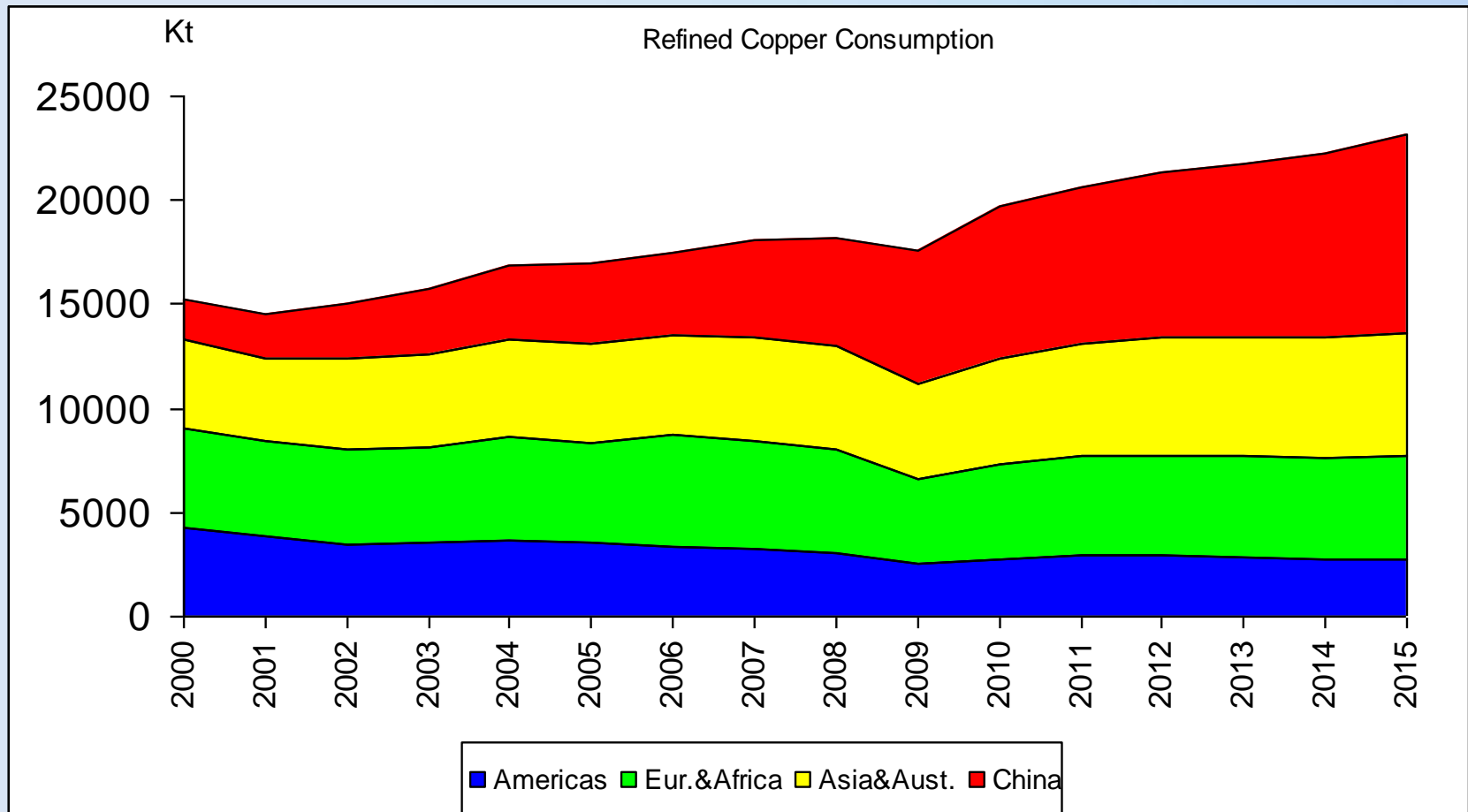


- ❑ The main opportunities in copper have 3 focal points – each driven to a greater or lesser extent by the need to reduce carbon emissions and to create a stable energy future
- ❑ The focal points in order of importance are: (1) Transport - electric & hybrid vehicles; (2) Power infrastructure - distributed & renewable energy, smart & integrated networks; (3) Premise & Equipment - enhanced wiring, efficient systems and equipment
- ❑ Taken together, new markets are expected to contribute around 1.0Mt of consumption over the next decade

## OECD, non-OECD and global industrial production growth to 2015



## Refined copper consumption, historically and forecast to 2015



## To consumption, one has to add investment demand

### *Sources of demand*

### *How these types of demand are met*

From physical consumers

20 Mtpy

16.5 Mtpy primary (newly mined)

3.5 Mtpy secondary (scrap based)

From investors in physical stock (ETFs)

~ 0.2 Mtpy prospectively

0.2 Mtpy growth in non-hedged stock

From investors in nearby futures (CIFs)

~ 0.2 Mtpy since 2005

either 0.2 Mtpy growth in the short  
hedges of exchange stock holders  
or 0.2 Mtpy growth in speculative  
shorts or producer hedge shorts

## Section two: supply

**Mine production has peaked in many key countries but not globally**

**Global mine prod. growth 1991-00: 4% pa; 2001-05: 3% pa; 2006-10: 1% pa**

	Peak		Subsequent Trough		2010f
	<u>Year</u>	<u>kt</u>	<u>Year</u>	<u>kt</u>	<u>kt</u>
Chile*	2007:	5557	2010:	5400	5400
Australia	2005:	930	2009:	858	862
Poland	2005:	512	2010:	425	425
USA	1997:	1940	2005:	1140	1158
Mexico	1997:	390	2009:	238	259
Congo D.R.	1981:	505	2002:	32	392
Philippines	1980:	305	2004:	16	48
Canada	1973:	824	2009:	491	500

\* Chile – most likely not the final peak which will probably be 6 Mtpy+

## **New Mining Projects 2011 – 2015**

<b>Year</b>	<b>Annual kt</b>	<b>Projects</b>
<b>2011</b>	<b>626</b>	<b>16</b>
<b>2012</b>	<b>1,760</b>	<b>22</b>
<b>2013</b>	<b>1,296</b>	<b>17</b>
<b>2014</b>	<b>974</b>	<b>8</b>
<b>2015</b>	<b>480</b>	<b>3</b>

**2011-2015 Total LOM Production: 66 Projects, 102,258 kt**

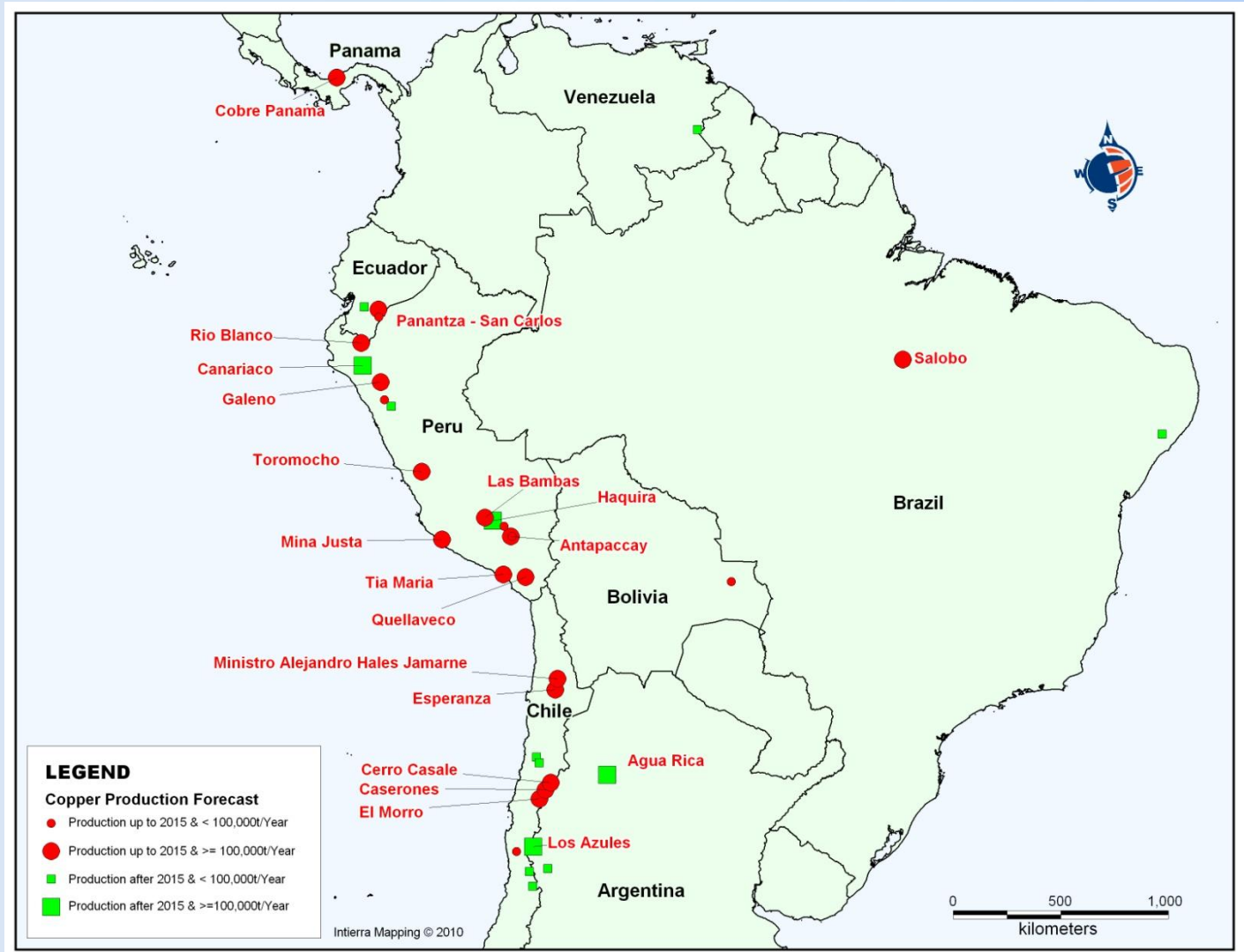
**>2015 Total LOM Production: 55 Projects, 58,825 kt**

## New Mining Projects Production 2011 – 2015 Top Countries

Country	Projects	Annual kt	LOM kt
Peru	11	1,787	34,025
Chile	6	828	13,820
Canada	10	349	6,617
Afghanistan	1	260	4,160
Panama	1	250	7,500
Ecuador	2	239	4,780
Brazil	1	200	3,600
USA	4	195	3,765
Mongolia	1	191	11,460
Kazakhstan	2	105	1,300
Zambia	1	100	2,800

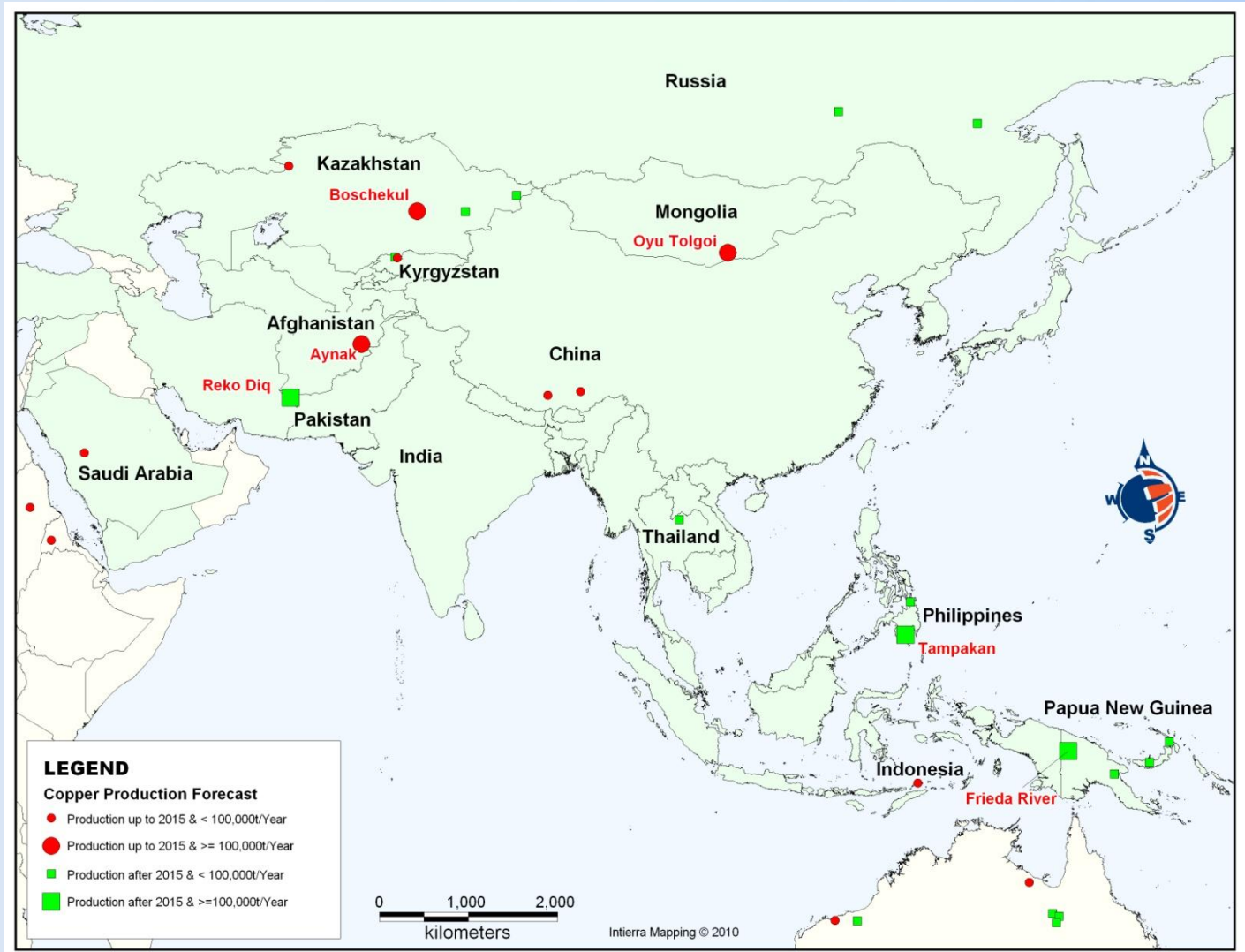
# South America

# Future Production Copper Projects



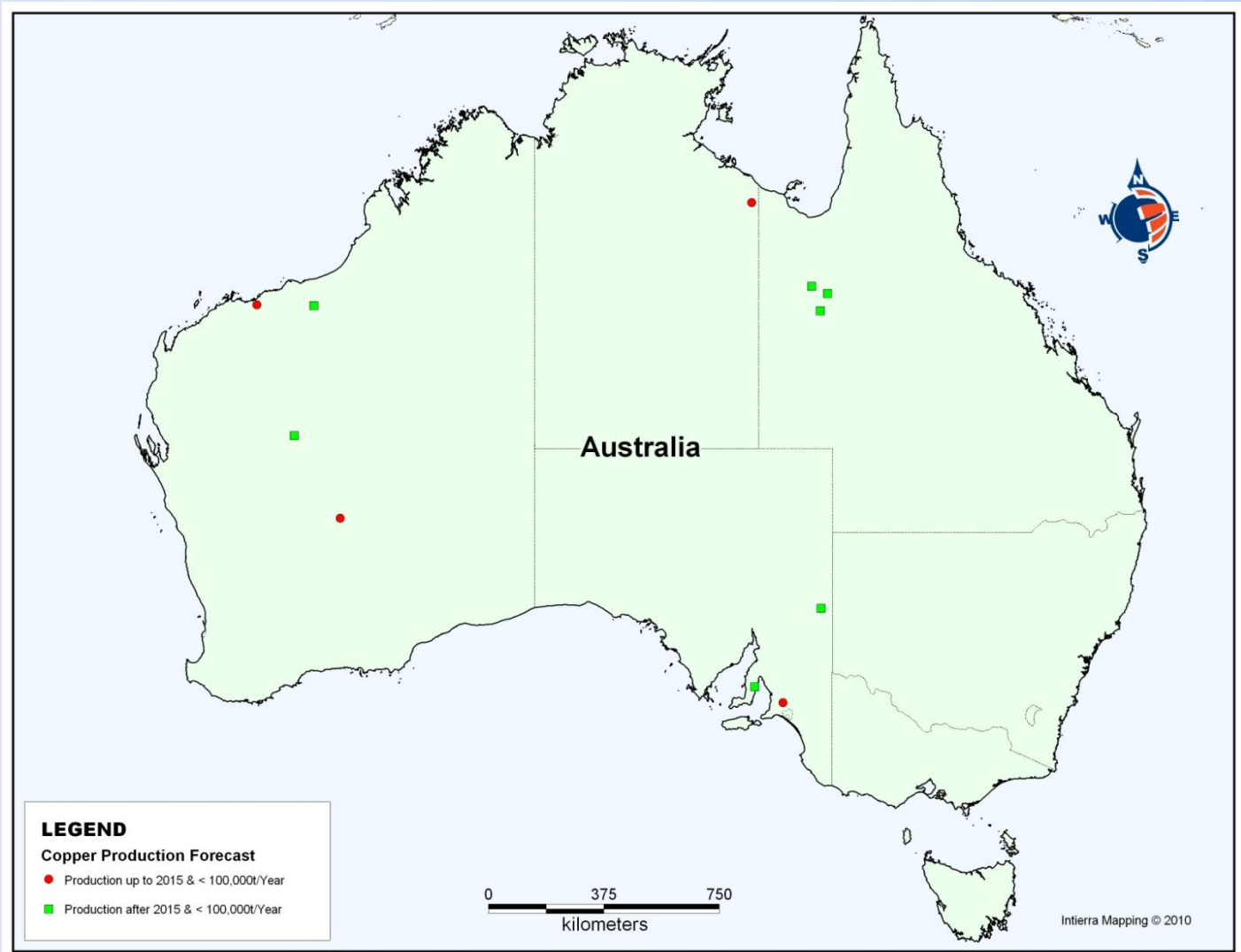
# Asia

# Future Production Copper Projects



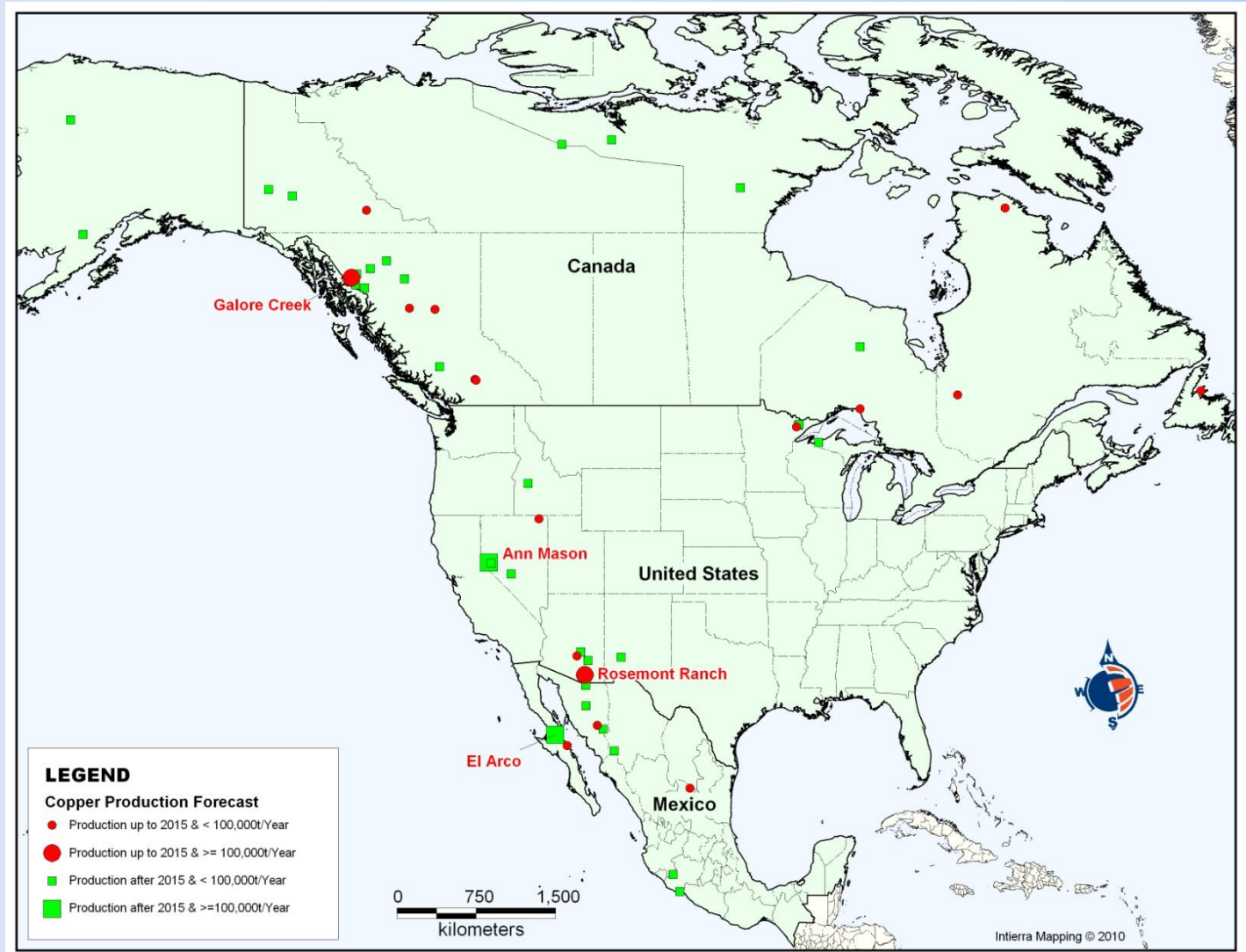
# Australia

## Future Production Copper Projects



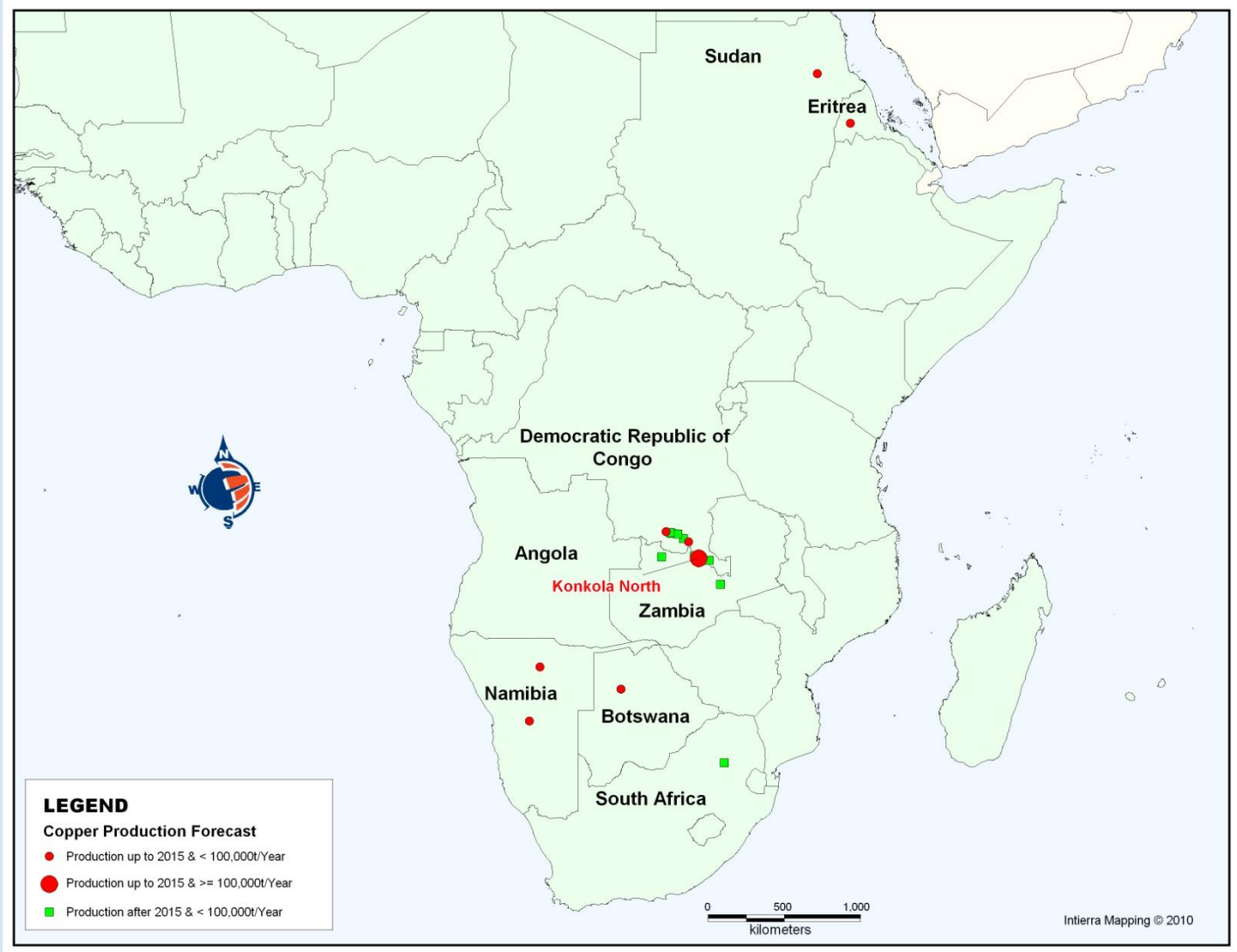
# North America

# Future Production Copper Projects



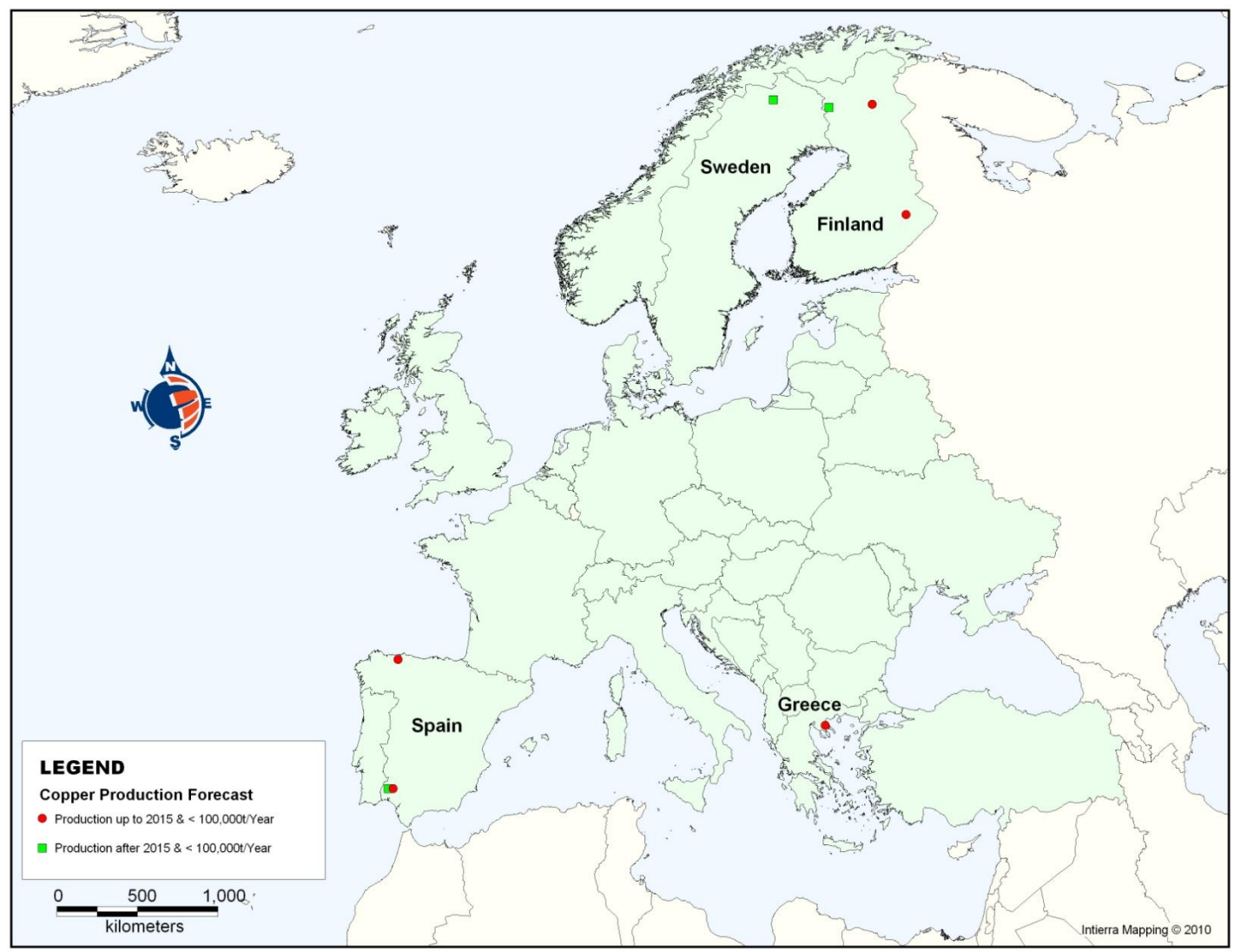
# Africa

## Future Production Copper Projects

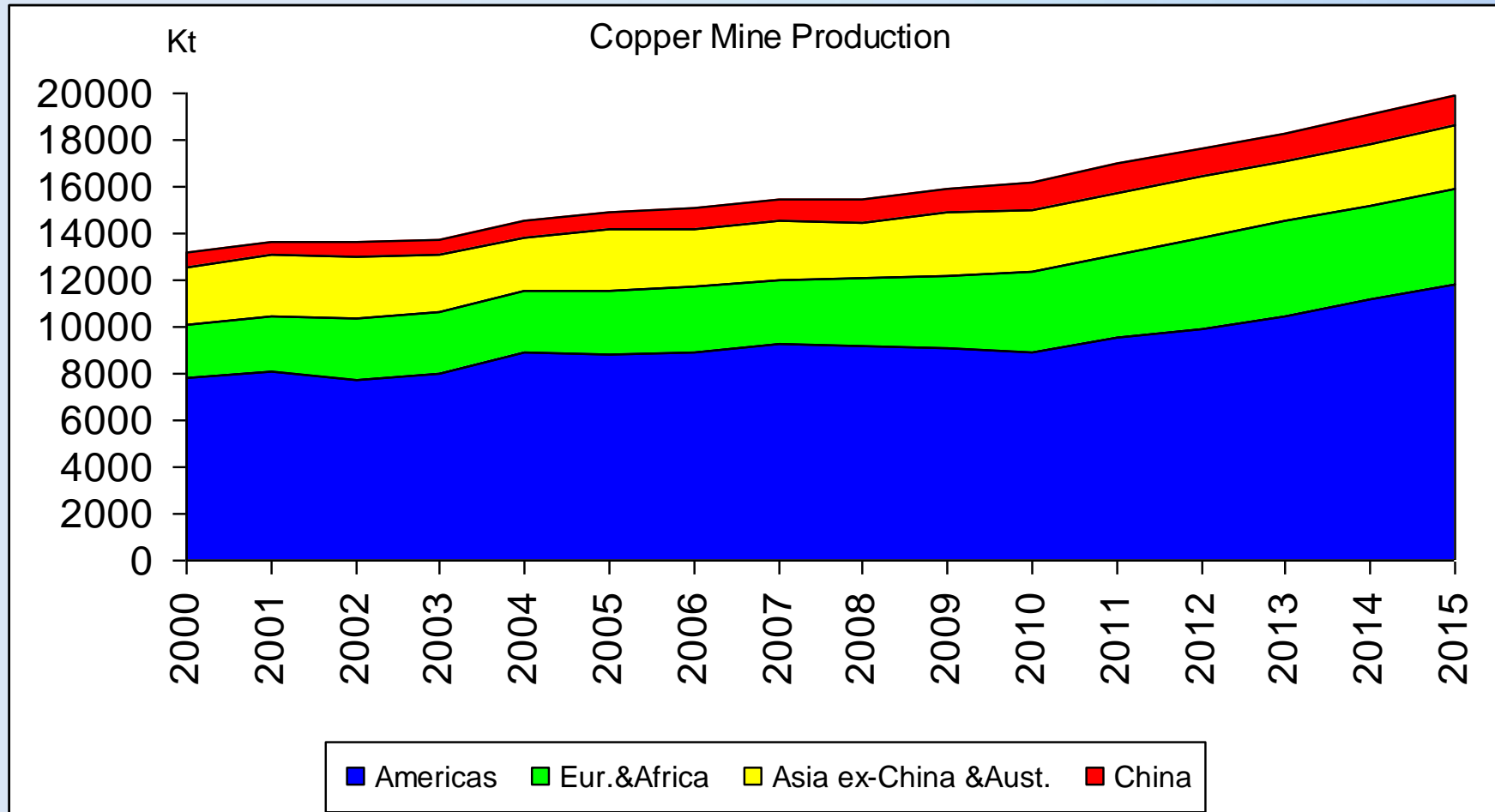


# Europe

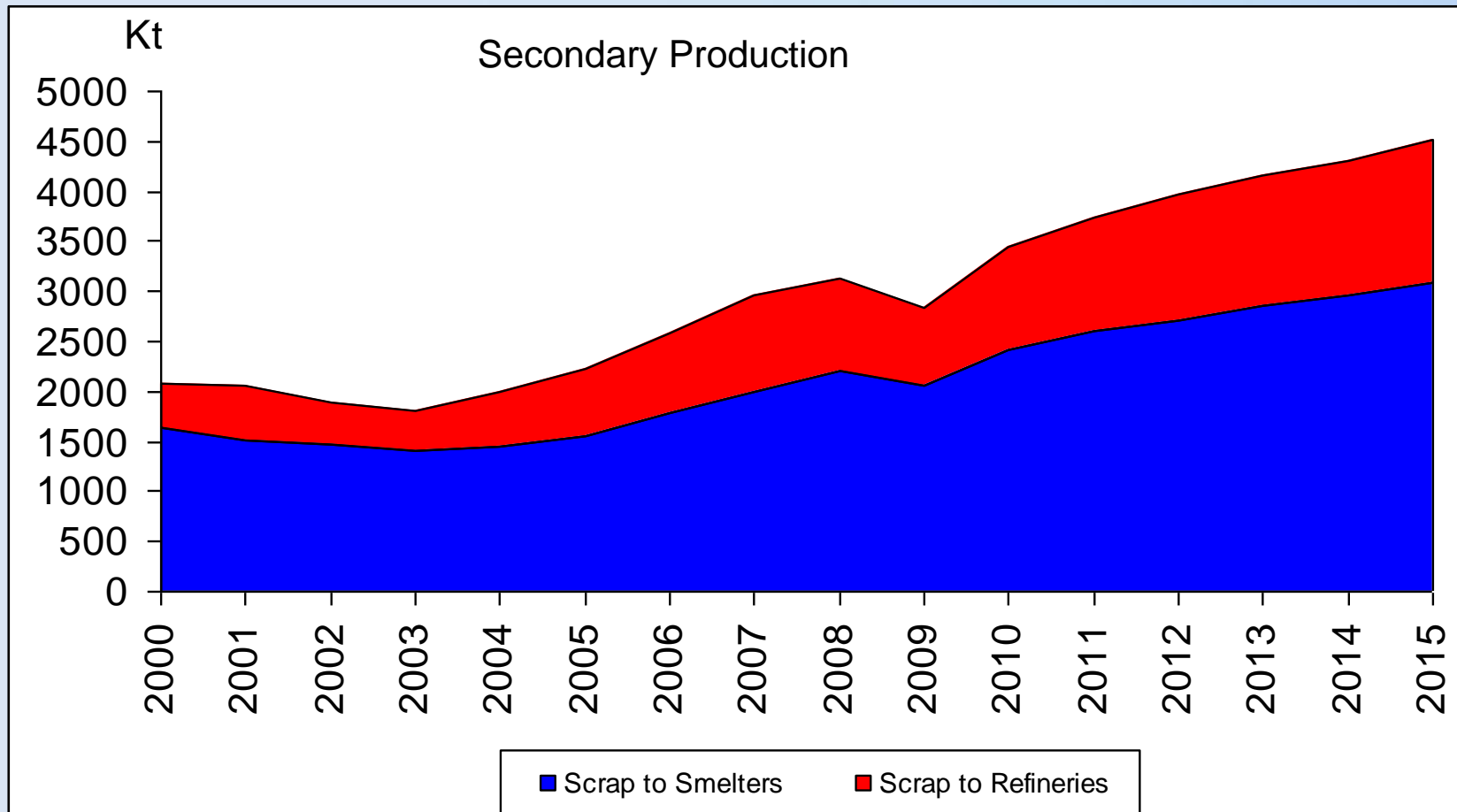
## Future Production Copper Projects



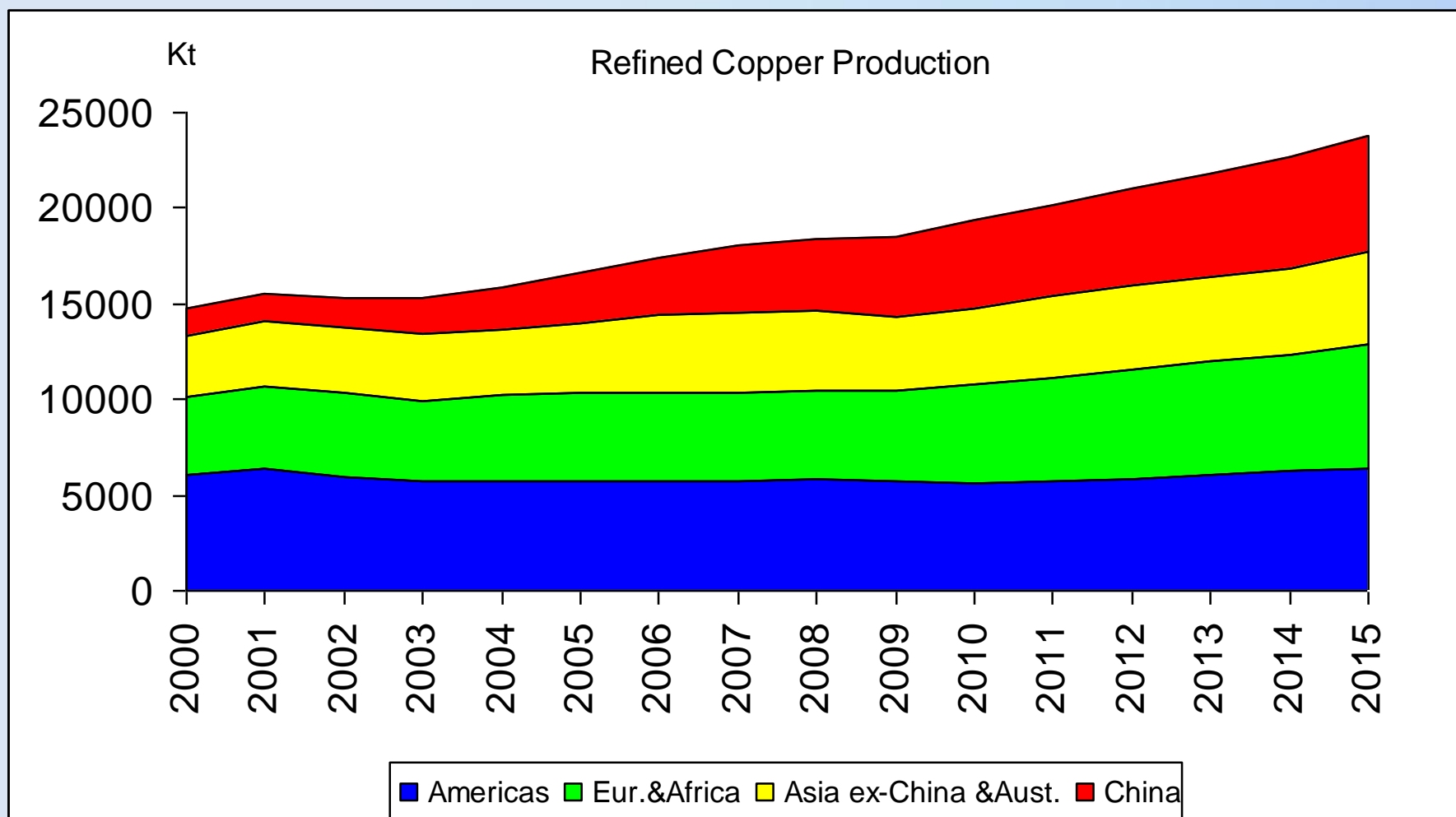
## Copper mine production to 2015, base case forecast



## Secondary (scrap-based) refined production, historically and base-case forecast to 2015

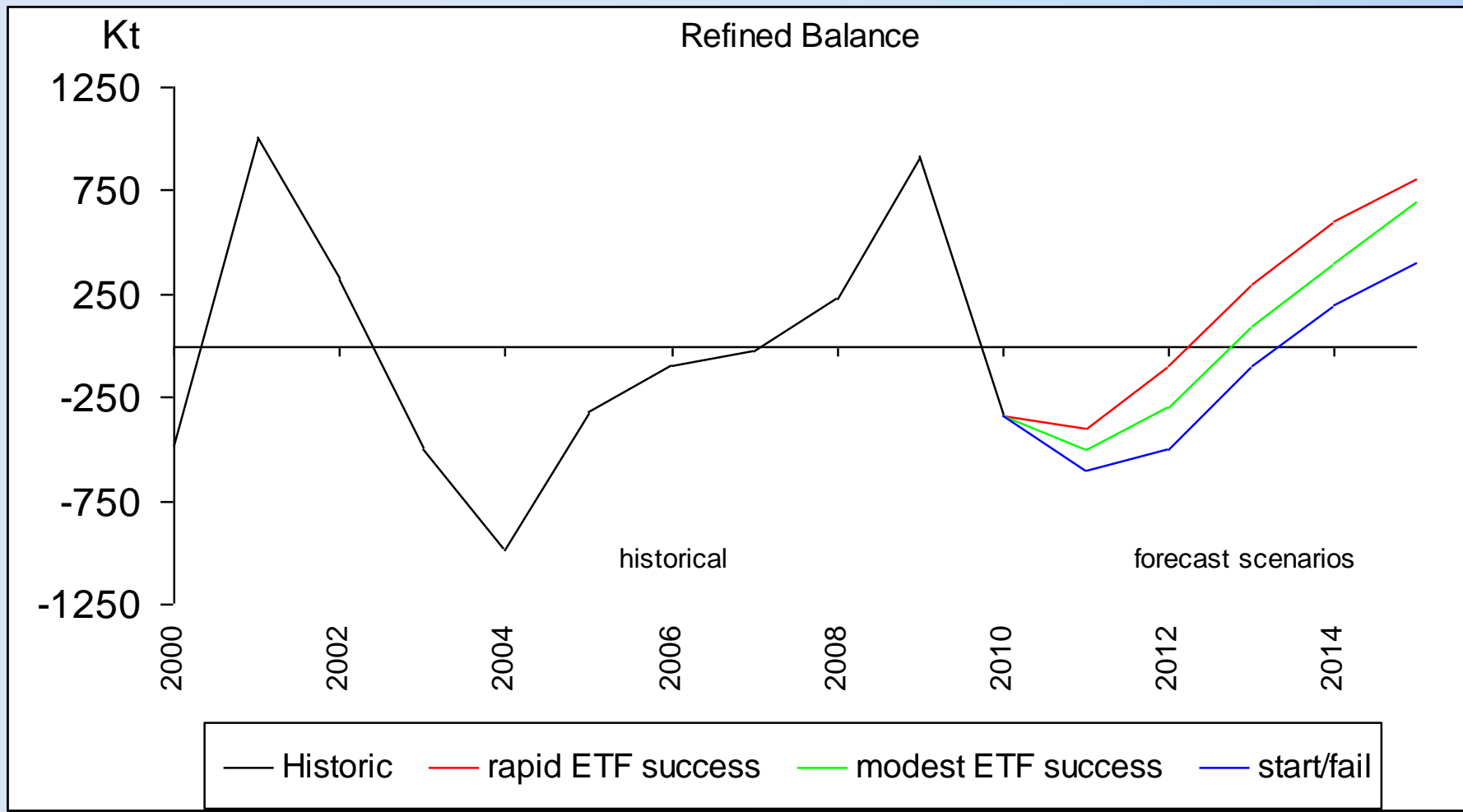


## Refined production, historically and forecast to 2015



# Section three: market balance and stocks under different ETF scenarios

## Refined copper balance to 2015 under different ETF scenarios



## Distribution of stocks, assuming rapid ETF success

	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>
Production	19.3	20.2	21.1	22.0	22.8	23.9
<u>Consumption</u>	<u>19.6</u>	<u>20.6</u>	<u>21.2</u>	<u>21.7</u>	<u>22.2</u>	<u>23.1</u>
Balance	-0.3	-0.4	-0.1	0.3	0.6	0.8
ETF Stock	0.00	0.30	0.45	0.55	0.55	0.55
Non-ETF Exchange Stock	0.50	0.20	0.15	0.25	0.60	1.00
<u>SRB Stock</u>	<u>0.60</u>	<u>0.40</u>	<u>0.25</u>	<u>0.25</u>	<u>0.30</u>	<u>0.50</u>
<u>Total of above</u>	<u>1.10</u>	<u>0.90</u>	<u>0.85</u>	<u>1.05</u>	<u>1.45</u>	<u>2.05</u>
Change	-0.20	-0.20	-0.05	0.20	0.40	0.60

## Distribution of stocks: base case – assuming modest ETF success

	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>
Production	19.3	20.2	21.0	21.9	22.7	23.8
<u>Consumption</u>	<u>19.6</u>	<u>20.7</u>	<u>21.3</u>	<u>21.8</u>	<u>22.3</u>	<u>23.1</u>
Balance	-0.3	-0.5	-0.3	0.1	0.4	0.7
ETF Stock	0.00	0.25	0.30	0.35	0.35	0.35
Non-ETF Exchange Stock	0.50	0.25	0.20	0.25	0.50	0.75
<u>SRB Stock</u>	<u>0.60</u>	<u>0.40</u>	<u>0.25</u>	<u>0.25</u>	<u>0.30</u>	<u>0.45</u>
<u>Total of above</u>	<u>1.10</u>	<u>0.90</u>	<u>0.75</u>	<u>0.85</u>	<u>1.15</u>	<u>1.55</u>
Change	-0.20	-0.20	-0.15	0.10	0.30	0.40

## Distribution of stocks, assuming that ETFs start then fail

	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>
Production	19.3	20.2	20.9	21.8	22.6	23.7
<u>Consumption</u>	<u>19.6</u>	<u>20.8</u>	<u>21.4</u>	<u>21.9</u>	<u>22.4</u>	<u>23.3</u>
Balance	-0.3	-0.6	-0.5	-0.1	0.2	0.4
ETF Stock	0.00	0.20	0.05	0.00	0.00	0.00
Non-ETF Exchange Stock	0.50	0.30	0.30	0.25	0.40	0.60
<u>SRB Stock</u>	<u>0.60</u>	<u>0.40</u>	<u>0.35</u>	<u>0.35</u>	<u>0.35</u>	<u>0.40</u>
<u>Total of above</u>	<u>1.10</u>	<u>0.90</u>	<u>0.70</u>	<u>0.60</u>	<u>0.75</u>	<u>1.00</u>
Change	-0.20	-0.20	-0.20	-0.10	0.15	0.25

# **Section four: prices under the influence of combined industrial and investment forces**

## **How investor longs in the futures market affect prices**

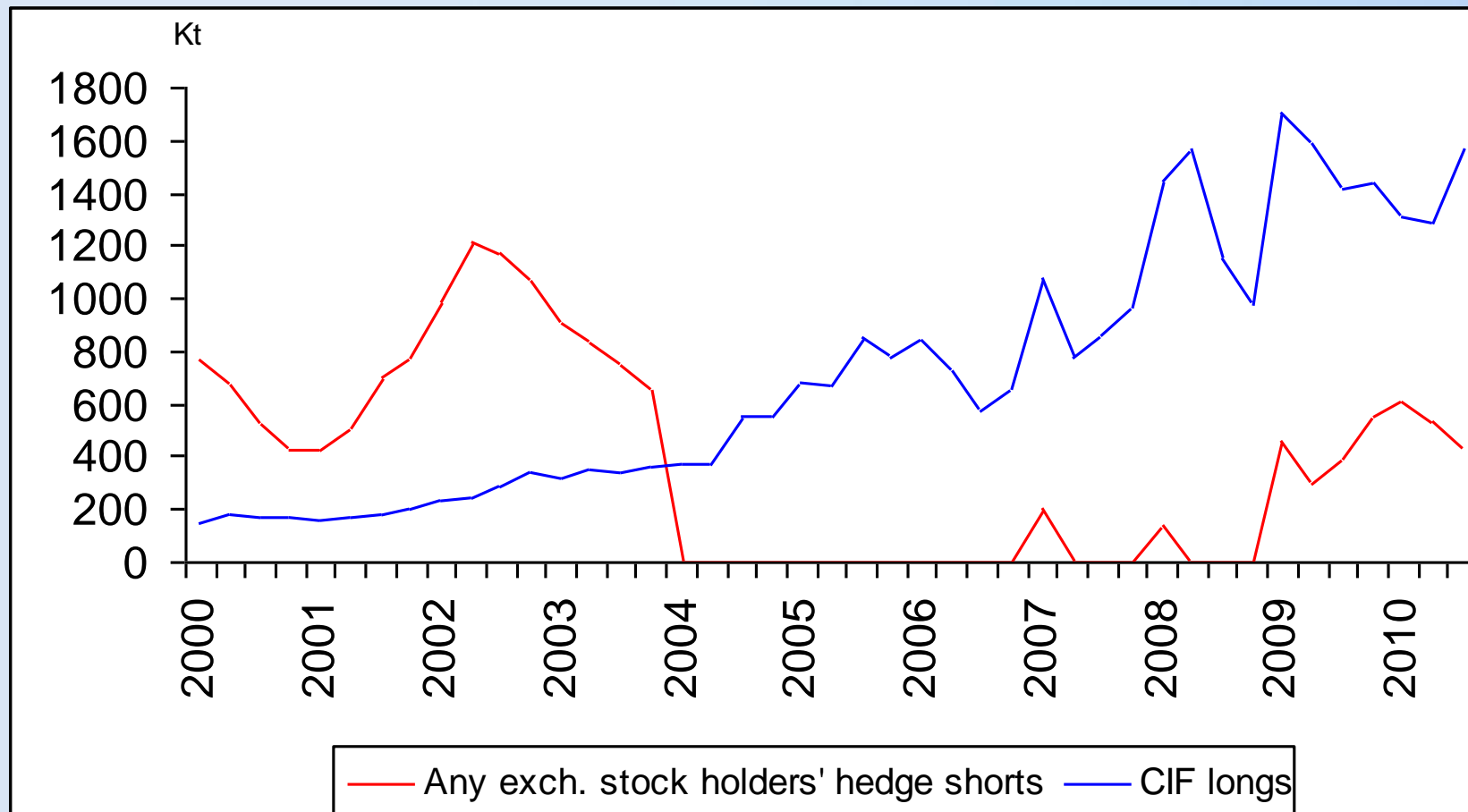
**Investor longs in the nearby futures market require counter-parties.**

**The quick route to equilibrium with new investor longs is for prices to rise until sufficient new speculative shorts or producer hedge shorts are tempted into the market.**

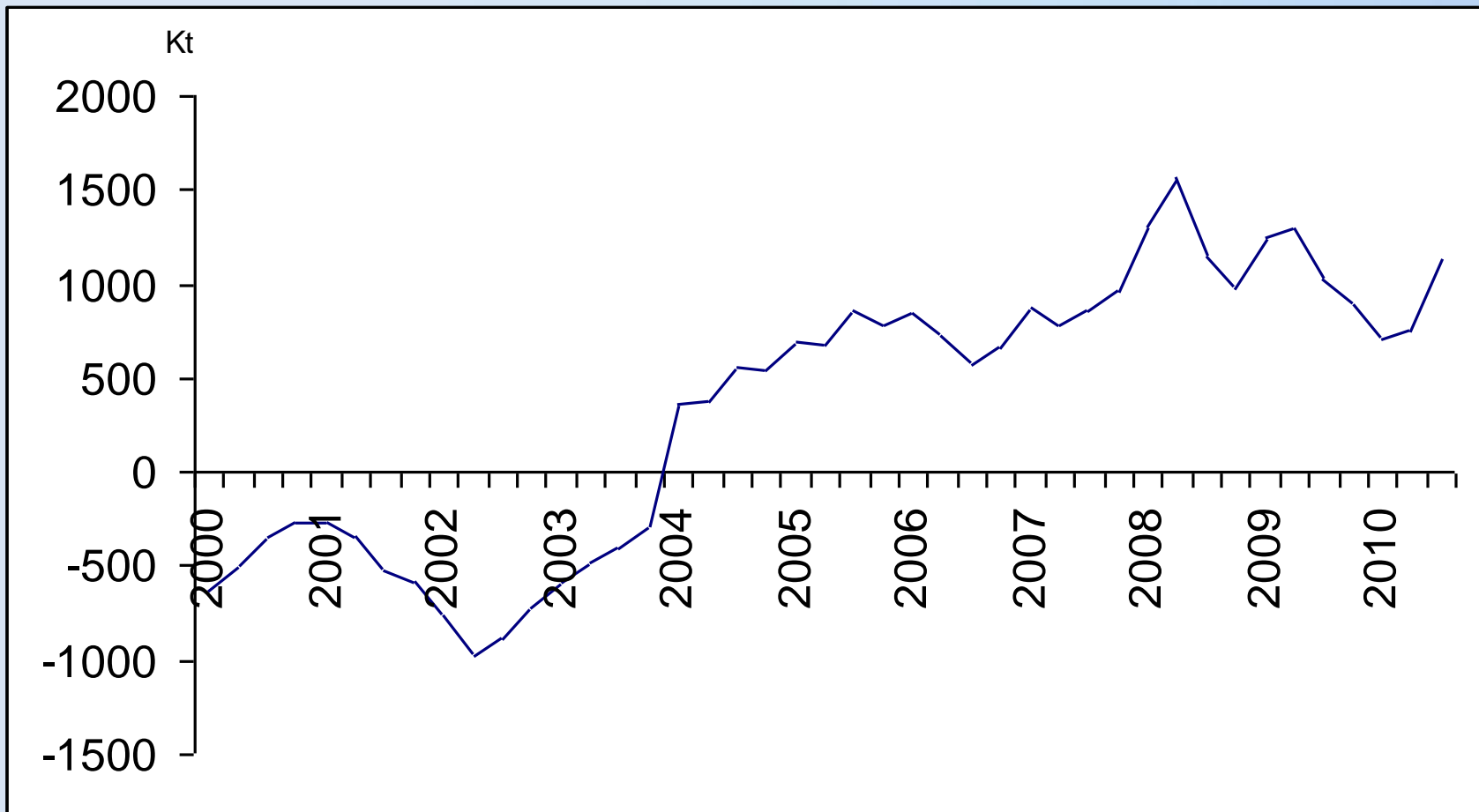
**That raises the price above physical market equilibrium and a longer term equilibration mechanism begins: available stocks increase. Eventually, stocks rise above the pinch point and the market then shifts into contango. From that point, around 80% of exchange stocks are short hedged by their owners (predominantly financial institutions). Those short hedges provide a more stable set of counter-parties for investors.**

**Given an adequate supply response, investor longs thus initially create higher prices but in the longer term create higher stocks.**

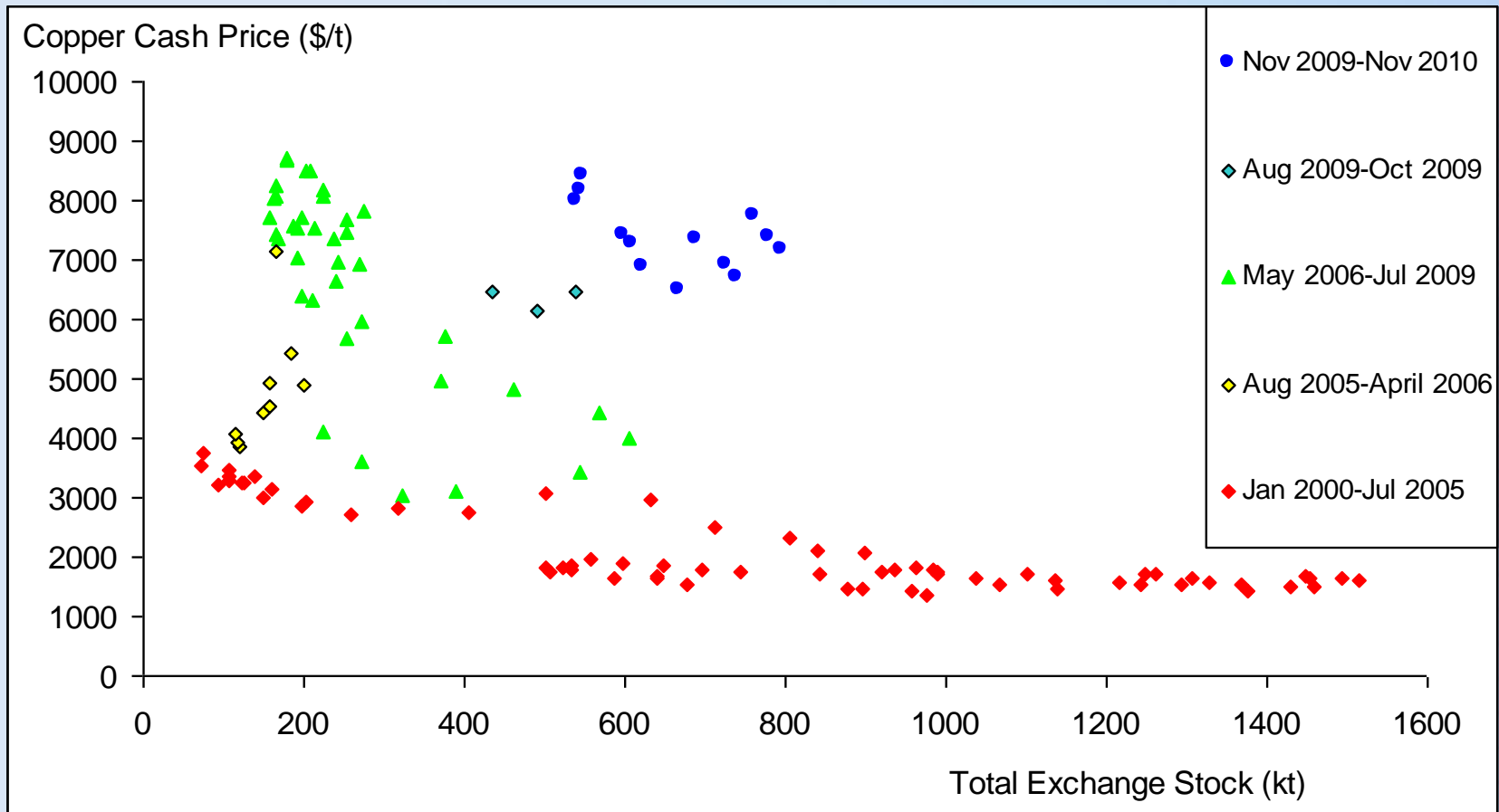
## Components of the new balance: index fund longs and any hedge shorts of exchange stock holders



**Index fund longs minus exchange stock holders' hedge shorts, taken as a rough measure of need for extra speculative shorts**



## Investment in futures has shifted the price to stock curve upwards and to the right (the latter by around 600 kt)



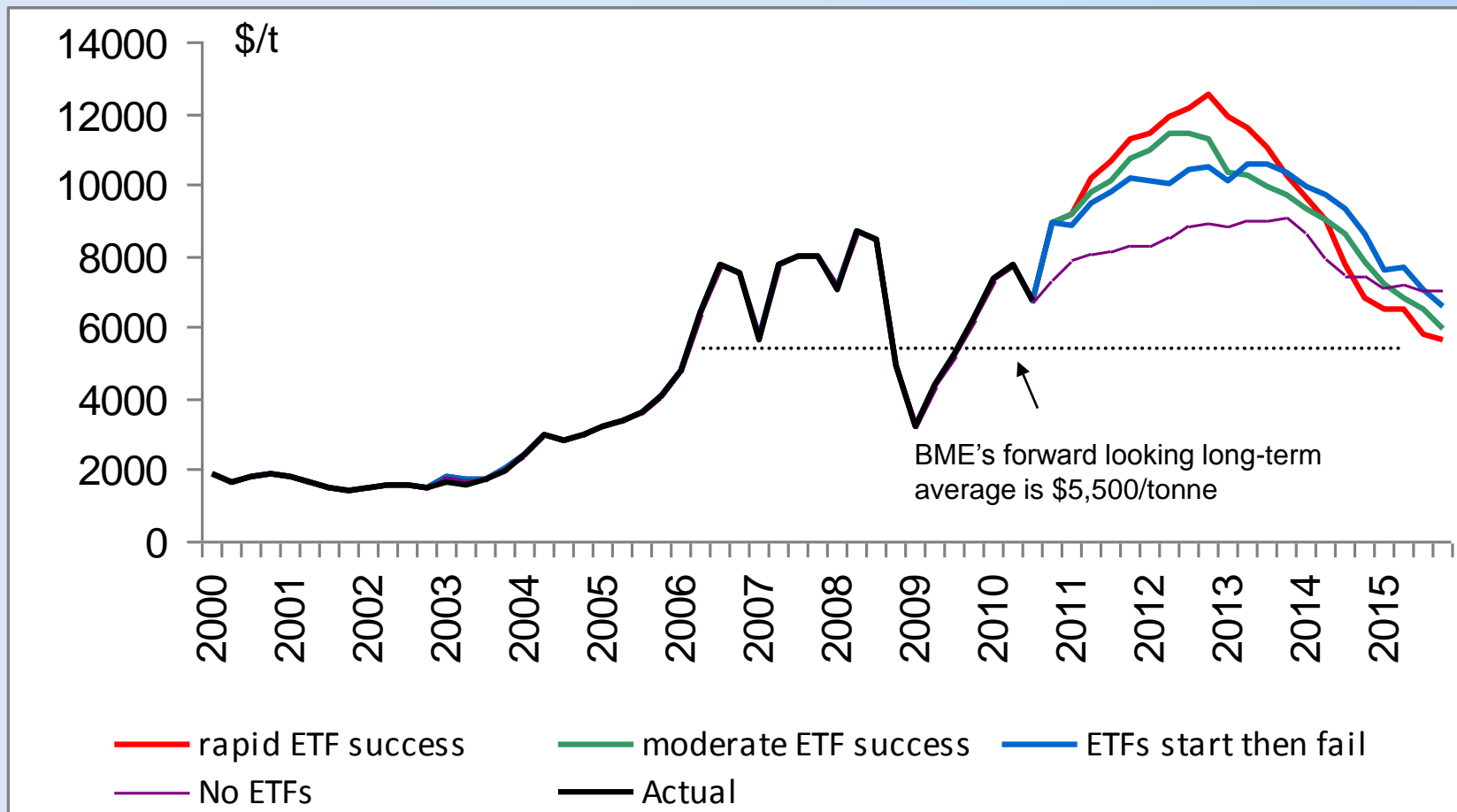
## **Prices are already behaving as if not all exchange stocks are available**

In the final quarter of 2010, according to the BME Copper Price Model, the cash to three months spread and prices have begun to behave as if around 250 kt of actual exchange stocks no longer existed.

BME interprets this as the sequestering of stocks ahead of ETF launches, combined with the launch of one (so far small) copper ETF. The cash price has soared and the nearby curve has backwardated.

That backwardation has begun to give a positive roll yield to those owning nearby futures and has thus further boosted index funds' and other investors' and speculators' urge to buy copper futures.

# The BME Copper Price Model's forecasts through 2015 using four scenarios of ETF success – or failure.



## **Conclusions on short-, medium- and long-term prices**

In the short term, too few mine projects will be starting up, resulting in physical deficits and falling stocks. Combined with about 200 ktpy of buying of futures by CIFs and 200 ktpy of buying of physicals by ETFs will keep prices in the \$7,500 - \$15,000 range in 2011-12, BME reckons.

After 2012, the balance of probability is that enough new mines will start up to create physical copper surpluses which will, BME believes, bring ETF buying to a halt, but not necessarily CIF buying. BME believes that prices would fall to the \$5,500 - \$7,500 range as a result.

If CIF buying were also to halt, BME believes that the price would fall to around \$5,500 per tonne, which we regard as the forward-looking long-term equilibrium. Below equilibrium, there would of course be cyclical downside risk, as well as risk of a trend to CIF and ETF disinvestment.

# Section five: BME's and Intierra's services

## **BME: provider of fresh market insights**

**BME provides the world's only analytical service that covers all of: production and consumption, competition for physical stocks from ETFs and the impact on prices of investor longs in the futures market.**

**BME has a newsletter-style monthly report, the *Copper Briefing Service*, which can be read end-to-end in thirty or forty minutes, and which forecasts one year ahead based on physical and investment forces.**

**BME also provides a book-style *Quarterly Report on Copper*, which includes forecasts through 2015, besides analysis of the main copper companies and the world's most thorough copper statistical database.**

**Backing up both of these reports, but also available as a stand-alone service, is BME's new *Interactive Price Model for Copper*.**

## **Intierra:**

### **BUSINESS INTELLIGENCE FOR THE MINERAL RESOURCE SECTOR**

Intierra provides a Business Intelligence Service that delivers information in context to those focused on the mineral resource industry and associated markets.

Typical core users of Intierra's insight and analysis are the world's largest mining and exploration companies, fund managers, investment bankers and analysts as well as several hundred other exploration companies.

Intierra's database contains over 40,000 projects, over 35,000 companies including 3500 listed companies.

Intierra monitors all commodities and all projects from grass roots through production.

Intierra Mapping is the global leader in hard copy map production; from global commodity maps to localized "Hot Play" maps.

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