View of the Global Development of the World Non-Ferrous Metals and Commodities

Purpose: Information
Submitted by: International Lead and Zinc Study Group (ILZSG)
View of the Global Development of the World Non-Ferrous Metals and Commodities

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Secretary-General
ILZSG, INSG, ICSG

Meeting of APEC Mining Task Force (MTF-8)
Beijing, China
24-25 June 2014
Data Provision

- Monthly Bulletins of Statistics on Copper, Lead & Zinc and Nickel
- Biannual/annual reporting on mine, smelter and refinery start-ups, closures, expansions and planned development
- Reporting on smelting and refining capacity and other plant details
- Studies on trends in downstream metals sectors
- Historical data series available on request
- Monthly press releases distributed widely
A Forum for Discussion

- **Markets**: forecasts of supply and demand for metals a year ahead
- **Trade**: monitoring of international trade in metals
- **Environmental policy**: sharing information on approaches to regulation
- **Industry Advisory Panel**: metals industry executives provide input to member governments
- **Study Group Sessions**: more than 150 participants at ILZSG (the largest)
Study Groups’ Main Publications

- World Statistics Bulletins
  - Latest available monthly data
  - Yearbooks with the historical annual data

- World Directories of Production Facilities
  - Mines, Smelters, Refineries, New Projects and Contact Details

- Other Reports, Studies, Newsletters
Attending Study Group Meetings

• Industry representatives from member countries are welcome and encouraged to participate in Study Group Sessions

• Industry or government delegates from non-member countries can request participation in Study Group meetings

• The Study Groups are unique forums where mining ministries can meet their global counterparts and the international metals industry
<table>
<thead>
<tr>
<th>Country</th>
<th>Country</th>
<th>Country</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Brazil</td>
<td>Cuba</td>
<td>European Union</td>
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<tr>
<td>Finland</td>
<td>France</td>
<td>Germany</td>
<td>Greece</td>
</tr>
<tr>
<td>Italy</td>
<td>Japan</td>
<td>Norway</td>
<td>Portugal</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Sweden</td>
<td>United Kingdom</td>
<td></td>
</tr>
</tbody>
</table>
International Lead & Zinc Study Group Members

Australia  Germany  Morocco  Serbia
Belgium  India  Namibia  South Africa
Brazil  Iran  Netherlands  Sweden
Bulgaria  Ireland  Norway  Thailand
Canada  Italy  Peru  United States
China  Japan  Poland  European Union
Finland  Korea  Portugal
France  Mexico  Russian Fed.
International Copper Study Group Members

- Australia
- Belgium
- Chile
- China
- Finland
- European Union
- France
- Germany
- Greece
- India
- Iran
- Italy
- Japan
- Luxembourg
- Mexico
- Peru
- Poland
- Portugal
- Russian Fed.
- Serbia
- Spain
- Sweden
- United States
- Zambia
Review and Outlook for Nickel
World Nickel Reserves 2013

Resources: about 130 million tonnes (Mt)

Reserves = A mineral reserve is that part of a measured or indicated resource for which current economic extraction has been demonstrated.

Mine Production 2.4 Mt

Sources: USGS, INSG
Despite increased usage of nickel produced from ore in recent years, there is plenty of nickel reserves available to the world.

APEC economies account for more than 48% of World Nickel Reserves
World Nickel Ore Production by region

(f) forecast April 2014
APEC members mine production is forecasted to be 66% in 2014.

Top APEC member producers in 2013:
- Indonesia (600 kt), Philippines (378.5 kt), Russian Fed. (240 kt),
- Australia (234.2 kt), Canada (223.3 kt)
On January 12, 2014, the Indonesian government started enforcing a ban on raw material exports in line with the 2009 Mining Law. The rationale for the ban is that Indonesia wants to shift from being an exporter of raw commodities to a manufacturer of higher value products. This will develop Indonesia’s downstream processing industry, potentially introduce new processing technology, increase domestic revenues and ensure availability of refined products for domestic use.

In 2013 Indonesia exported 64.8mt of nickel ore, most of them high-grade ore (1.7-2% Ni and 15-20% Fe). 90% of total Indonesian nickel ore export went to China where this material is used for the production of Nickel Pig Iron (NPI) an important raw material for the Chinese stainless steel industry. Since January 2014, export of nickel ore from Indonesia started to fade indicating the full implementation of the ban.
Indonesia ban on raw materials exports (2/2)

- Immediately after the Chinese New Year holidays nickel ore price started to rise contributing to rising NPI prices. In 2014, NPI production is expected to decline from 480,000 tonnes in 2013 to an estimated 400,000 tonnes this year with the reduction cushioned by destocking of ore in China.

- According to the Indonesian government nine nickel processing plants may be completed this year. The plants comprise two ferronickel and seven nickel pig iron smelters. As many as 63 smelters may be built by 2017 including 40 nickel plants.
World Primary Nickel Production by region

(f) forecast April 2014
• APEC members metal production is forecasted to be 70% in 2014.
• Top APEC member producers in 2013:
  China (694 kt), Russian Fed. (240 kt),
  Japan (178 kt), Australia (142 kt), Canada (137 kt)
World Primary Nickel Usage by Region

in 1000 tonnes

(f) forecast April 2014
APEC members total usage is forecasted to be 76% in 2014.

Top APEC members in 2013:
- China (900 kt), USA (147 kt),
- Japan (144 kt), Korea (72 kt)

(f) forecast April 2014
World Primary Nickel Balance

in 1000 tonnes

(f) forecast April 2014
China Refined Nickel Production and Nickel Pig Iron (monthly)
China Nickel Pig Iron Production and Imports of Nickel Ores

(annual)
First Use of Nickel - 2013

Source: Heinz H. Pariser, April 2014
World Stainless Crude Steel Production

Source: ISSF
Nickel projects

- One can see from the following listings that there are no shortage of nickel projects.
- Difficulty to find “rich deposits”, most have a low to medium nickel content and limited reserves.
- Obtaining finance is currently a problem.
- Actual timing to a possible realization of a deposit into a mine/refinery is today virtually impossible to accurately forecast.
## Nickel projects
### Directory 2013
(Released in December)

<table>
<thead>
<tr>
<th></th>
<th>Ore &amp; Concentrate</th>
<th>Intermediate Products</th>
<th>Refined Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committed Developments</td>
<td>295,400</td>
<td>192,400</td>
<td>583,100</td>
</tr>
<tr>
<td>Likely Project Developments</td>
<td>118,750</td>
<td>31,000</td>
<td>139,000</td>
</tr>
<tr>
<td>Potential Project Developments</td>
<td>147,240</td>
<td>142,100</td>
<td>445,900</td>
</tr>
<tr>
<td>NPI Committed Developments</td>
<td>-</td>
<td>-</td>
<td>18,000</td>
</tr>
<tr>
<td>NPI Likely / Potential Developments</td>
<td>-</td>
<td>-</td>
<td>250,600</td>
</tr>
</tbody>
</table>

Capacity (Ni content, t/y)
Primary Nickel Capacity by Economy

2012: \(\approx 1.8\text{Mt}\)

New committed developments: \(\approx 0.5\text{Mt}\)

Note: no Chinese NPI projects included.
# Nickel Capacity on Stream / Ramp Up in 2014

<table>
<thead>
<tr>
<th>Project Name / Country</th>
<th>Product</th>
<th>Mode</th>
<th>Estimated Production</th>
<th>Projected Total Production</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambatovy / Madagascar</td>
<td>Class I</td>
<td>Ramp Up</td>
<td>≈ 40 000</td>
<td>60 000</td>
<td>Open market</td>
</tr>
<tr>
<td>Long Harbour / Canada</td>
<td>Class I</td>
<td>Start Up</td>
<td>≈ 10 000</td>
<td>50 000</td>
<td>Mainly replacement</td>
</tr>
<tr>
<td>Tagaung Taung / Myanmar</td>
<td>FeNi</td>
<td>Start Up</td>
<td>≈ 15 000</td>
<td>22 000</td>
<td>China</td>
</tr>
<tr>
<td>Koniambo / New Caledonia</td>
<td>FeNi</td>
<td>Start Up</td>
<td>≈ 17 000</td>
<td>60 000</td>
<td>Open market</td>
</tr>
<tr>
<td>Onça Puma / Brazil</td>
<td>FeNi</td>
<td>Ramp Up</td>
<td>≈ 12 000</td>
<td>58 000</td>
<td>Open market</td>
</tr>
<tr>
<td>Barro Alto / Brazil</td>
<td>FeNi</td>
<td>Ramp Up</td>
<td>≈ 25 000</td>
<td>36 000</td>
<td>Open market</td>
</tr>
<tr>
<td>Goro / New Caledonia</td>
<td>Semi / Class I</td>
<td>Ramp Up</td>
<td>≈ 25 000</td>
<td>60 000</td>
<td>Australia &amp; China</td>
</tr>
<tr>
<td>Ramu / PNG</td>
<td>Semi</td>
<td>Ramp Up</td>
<td>≈ 20 000</td>
<td>30 000</td>
<td>China &amp; Other</td>
</tr>
<tr>
<td>Talvivaara / Finland</td>
<td>Semi</td>
<td>Ramp Up</td>
<td>≈ 10 000</td>
<td>35 000</td>
<td>Finland</td>
</tr>
<tr>
<td>Raventhorpe / Australia</td>
<td>Semi</td>
<td>Ramp Up</td>
<td>≈ 35 000</td>
<td>39 000</td>
<td>Australia &amp; Other</td>
</tr>
<tr>
<td>Taganito / The Philippines</td>
<td>Semi</td>
<td>Start Up</td>
<td>≈ 20 000</td>
<td>30 000</td>
<td>Japan</td>
</tr>
<tr>
<td>Santa Rita / Brazil</td>
<td>Conc.</td>
<td>Ramp Up</td>
<td>≈ 15 000</td>
<td>25 000</td>
<td>Brazil &amp; Finland</td>
</tr>
<tr>
<td>Kevitsa / Finland</td>
<td>Conc.</td>
<td>Ramp Up</td>
<td>≈ 10 000</td>
<td>10 000</td>
<td>Open market</td>
</tr>
</tbody>
</table>

Note: no Chinese NPI projects included.
Review and Outlook for Lead
World Lead Reserves 2013

Resources: about 2000 million tonnes (Mt)

Reserves = A mineral reserve is that part of a measured or indicated resource for which current economic extraction has been demonstrated.

Mine Production = 5.4 Mt

Sources: USGS, ILZSG

Not to scale
World Lead Reserves
2013 Breakdown

- Despite increased consumption of lead produced from ore in recent years, increases in reserves have grown more, and there is more lead available to the world than at any other time in the past.

APEC countries account for more than 87% of World Lead Reserves
Lead Mine Output 1964-2014f

Source: ILZSG
Distribution of Lead Mine Supply

**2003**
- Europe: 11.3%
- Mexico: 4.6%
- Peru: 9.6%
- USA: 15.3%
- Canada: 5.1%
- Australia: 23.6%
- Other: 10.7%
- China: 19.8%

**2013**
- Europe: 7.1%
- Mexico: 4.5%
- Peru: 4.9%
- USA: 6.3%
- Canada: 0.4%
- Australia: 13.2%
- Other: 0.4%
- China: 52.9%

Source: ILZSG
Distribution of Lead Mine Supply
APEC economies - 2013

Total 2013 World Lead Mine Production: 5.39Mt
Total 2013 APEC Lead Mine Production: 4.58Mt (85% of World Production)

Source: ILZSG
## Selected Lead Mine Openings/Expansions 2013

<table>
<thead>
<tr>
<th>Mine</th>
<th>Annual Capacity*</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paroo Station, Australia</td>
<td>85,000t</td>
<td>2013 (reactivation)</td>
</tr>
<tr>
<td>Perkoa, Burkina Faso</td>
<td>2,000t</td>
<td>2013 (new)</td>
</tr>
<tr>
<td>Zijin Mining Group, China</td>
<td>10,000t</td>
<td>2013 (new)</td>
</tr>
<tr>
<td>Escobal, Guatemala</td>
<td>9,000t</td>
<td>2013 (new)</td>
</tr>
<tr>
<td>Del Toro, Mexico</td>
<td>10,000</td>
<td>2013 (new)</td>
</tr>
<tr>
<td>Valaricena, Mexico</td>
<td>8,000t</td>
<td>2013 (reactivation)</td>
</tr>
<tr>
<td>Cerro Lindo, Peru</td>
<td>12,000t</td>
<td>2013 (4kt expansion)</td>
</tr>
<tr>
<td>Santander, Peru</td>
<td>9,000t</td>
<td>2013 (reactivation)</td>
</tr>
</tbody>
</table>

*Pb Metal contained

Source: New Mines and Smelters 2013 & 2014 Reports, ILZSG
### Selected Lead Mine Openings/Expansions (committed)

Source: New Mines and Smelters 2014 Report, ILZSG

<table>
<thead>
<tr>
<th>Mine</th>
<th>Annual Capacity*</th>
<th>Open (expected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>McArthur River, Australia</td>
<td>93,000t</td>
<td>2014 (51kt expansion)</td>
</tr>
<tr>
<td>George Fisher, Australia</td>
<td>130,000t</td>
<td>2014 (36kt expansion)</td>
</tr>
<tr>
<td>Lady Loretta, Australia</td>
<td>60,000t</td>
<td>2014 (15kt expansion)</td>
</tr>
<tr>
<td>Hera, Australia</td>
<td>8,000t</td>
<td>2014 (new)</td>
</tr>
<tr>
<td>Gorubso, Bulgaria</td>
<td>11,700t</td>
<td>2014 (6kt expansion)</td>
</tr>
<tr>
<td>Halfmile Lake, Canada</td>
<td>16,000t</td>
<td>2014 (new)</td>
</tr>
<tr>
<td>Kayar, India</td>
<td>15,000t</td>
<td>2014 (new)</td>
</tr>
<tr>
<td>Nuestra Senora, Mexico</td>
<td>5,000t</td>
<td>2014 (2kt expansion)</td>
</tr>
<tr>
<td>Ozernoye, Russia</td>
<td>50,000t</td>
<td>2017 (new)</td>
</tr>
<tr>
<td>Garpenberg, Sweden</td>
<td>50,000t</td>
<td>2014 (20kt expansion)</td>
</tr>
<tr>
<td>Pend Oreille, USA</td>
<td>8,000</td>
<td>2015 (reactivation)</td>
</tr>
</tbody>
</table>

*Pb Metal contained
World Lead Mine Supply Forecast

ILZSG Forecast

➤ 2014  + 5.2 %

to 5.66 million tonnes

Source: ILZSG
Lead Recycling

• 55% of lead production annually comes from recycled materials, mainly lead acid batteries

• This is a much higher figure than for other non-ferrous metals

• Each year more than 75% of lead in products reaching their end-of-life is recycled

• And this figure is around 90% for lead acid batteries
Distribution of Lead Metal Supply

2003
- China: 15%
- USA: 23%
- Canada: 4%
- Mexico: 3%
- Australia: 4%
- Japan: 5%
- Other: 13%

2013
- China: 44%
- USA: 13%
- Europe: 17%
- Canada: 3%
- Mexico: 3%
- Australia: 2%
- Korea: 4%
- Japan: 2%
- Other: 12%

Source: ILZSG
Distribution of Lead Metal Supply
APEC economies - 2013

Total 2013 World Lead Metal Production: 11.22Mt
Total 2013 APEC Lead Metal Production: 8.08Mt (72% of World Production)
World Lead Metal Supply Forecast

ILZSG Forecast

➢ 2014  + 4.3 %

to 11.68 million tonnes

Annual Change

Source: ILZSG
Distribution of Refined Lead Usage

**2000**
- **China**: 9.0%
- **India**: 4.6%
- **Korea Rep**: 4.6%
- **Other**: 24.2%
- **USA**: 27.2%
- **Europe**: 30.5%

**2013**
- **China**: 45.3%
- **India**: 4.4%
- **Korea Rep**: 4.3%
- **Other**: 15.7%
- **USA**: 15.3%
- **Europe**: 15.0%

Source: ILZSG
Distribution of Lead Metal Usage
APEC economies - 2013

Total 2013 World Lead Metal Usage: 11.23Mt
Total 2013 APEC Lead Metal Usage: 8.31Mt (74% of World Usage)
Chinese Two-wheel Electric Bicycles Production
1999-2014f

Source: BGRIMM/ILZSG

'000 sets
Good Opportunity for Lead in Micro-Hybrids Globally

• Micro-hybrids developed to meet new legislation on emissions

• Numbers rising rapidly

• More work done by battery and therefore bigger batteries (and more lead) needed

• 2nd generation micro-hybrids now under development. Enhanced lead-acid performance expected
World Lead Metal Demand Forecast

ILZSG Forecast

- **2014** + 4.3% to 11.73 million tonnes

Source: ILZSG
World Refined Lead Metal Balance

Source: ILZSG
Review and Outlook for Zinc
World Zinc Reserves 2013

Resources: about 1900 million tonnes (Mt)

Reserves 250 Mt

Mine Production 13.2 Mt

Resource = A mineral resource is a natural occurrence of material in the earth's crust for which there is reasonable prospect for current or eventual economic extraction.

Reserves = A mineral reserve is that part of a measured or indicated resource for which current economic extraction has been demonstrated.

Sources: USGS, ILZSG
Despite increased consumption of zinc produced from ore in recent years, increases in reserves have grown more, and there is more zinc available to the world than at any other time in the past.

APEC economies account for more than 65% of World Zinc Reserves.
Distribution of Zinc Mine Supply

2003
- Europe: 10.6%
- Canada: 8.3%
- India: 3.3%
- Peru: 14.3%
- Australia: 16.0%
- Other: 27.1%
- China: 21.3%

2013
- Europe: 7.5%
- Canada: 3.2%
- India: 6.0%
- Peru: 10.2%
- Other: 25.7%
- Australia: 11.5%
- China: 35.8%

Source: ILZSG
Distribution of Zinc Mine Supply
APEC economies - 2013

Total 2013 World Zinc Mine Production: 13.20Mt
Total 2013 APEC Zinc Mine Production: 9.64Mt (73% of World Production)
World Zinc Mine Supply Forecast

ILZSG Forecast

➢ 2014  + 2.6 %

to 13.57 million tonnes

Source: ILZSG
## Selected Zinc Mine Closures 2013 to 2016

<table>
<thead>
<tr>
<th>Mine</th>
<th>Annual Capacity</th>
<th>Closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunswick, Canada</td>
<td>240,000t</td>
<td>2013</td>
</tr>
<tr>
<td>Perseverance, Canada</td>
<td>115,000t</td>
<td>2013</td>
</tr>
<tr>
<td>Lisheen, Ireland</td>
<td>175,000t</td>
<td>2014</td>
</tr>
<tr>
<td><strong>Century, Australia</strong></td>
<td><strong>510,000t</strong></td>
<td><strong>2015</strong></td>
</tr>
<tr>
<td>Bukowno Olkusz, Poland</td>
<td>70,000</td>
<td>2016</td>
</tr>
<tr>
<td>Skorpion, Namibia</td>
<td>154,000t</td>
<td>2016</td>
</tr>
</tbody>
</table>
## Selected Recent Zinc Mine Openings

<table>
<thead>
<tr>
<th>Mine</th>
<th>Annual Capacity (Zn contained)</th>
<th>Opened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerro Lindo, Peru (expansion)</td>
<td>45,000t</td>
<td>2013</td>
</tr>
<tr>
<td>Santander, Peru (new)</td>
<td>24,000t</td>
<td>2013</td>
</tr>
<tr>
<td>Perkoa, Burkina Faso (new)</td>
<td>95,000t*</td>
<td>2013</td>
</tr>
<tr>
<td>Bracemac-McLeod, Canada (new)</td>
<td>90,000t</td>
<td>2013</td>
</tr>
<tr>
<td>Valardena, Mexico (new)</td>
<td>90,000t</td>
<td>2013</td>
</tr>
</tbody>
</table>

*o/p operations suspended in March 14

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
# Selected Committed Additions to Zinc Mine Capacity

<table>
<thead>
<tr>
<th>Mine</th>
<th>Annual Capacity (Zn contained)</th>
<th>Scheduled Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dugald River, Australia <em>(new)</em></td>
<td>210,000t</td>
<td>2016/17</td>
</tr>
<tr>
<td>George Fisher <em>(expansion)</em></td>
<td>64,000t</td>
<td>2014</td>
</tr>
<tr>
<td>Lady Loretta <em>(expansion)</em></td>
<td>47,000t</td>
<td>2016</td>
</tr>
<tr>
<td>McArthur River <em>(expansion)</em></td>
<td>130,000t</td>
<td>2014</td>
</tr>
<tr>
<td>Halfmile Lake, Canada <em>(new)</em></td>
<td>55,000t</td>
<td>2014</td>
</tr>
<tr>
<td>Kayar, India <em>(new)</em></td>
<td>35,000t</td>
<td>2014</td>
</tr>
<tr>
<td>Garpenburg, Sweden <em>(expansion)</em></td>
<td>60,000t</td>
<td>2014</td>
</tr>
<tr>
<td>Ozernoye, Russia <em>(new)</em></td>
<td>350,000t</td>
<td>2016/17</td>
</tr>
<tr>
<td>Pend Oreille, United States <em>(new)</em></td>
<td>44,000t</td>
<td>2015</td>
</tr>
</tbody>
</table>

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
# Selected Zinc Mine Projects Under Consideration

<table>
<thead>
<tr>
<th>Mine</th>
<th>Estimated Annual Capacity (Zinc contained)</th>
<th>Possible Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oued-Amizour (Tala Hamza), Algeria</td>
<td>164,000t</td>
<td>2019/20</td>
</tr>
<tr>
<td>San Gregorio, Peru</td>
<td>105,000t</td>
<td>2016</td>
</tr>
<tr>
<td>Selwyn (Howards Pass), Canada</td>
<td>100,000t</td>
<td>2018</td>
</tr>
<tr>
<td>Izok Lake/High Lake, Canada</td>
<td>108,000t</td>
<td>2016</td>
</tr>
<tr>
<td>Bisha, Eritrea</td>
<td>90,000t</td>
<td>2016</td>
</tr>
<tr>
<td>Gergarub, Namibia</td>
<td>100,000t</td>
<td>2017/18</td>
</tr>
<tr>
<td>Khnaiguiyah, Saudi Arabia</td>
<td>80,000t</td>
<td>2017/18</td>
</tr>
<tr>
<td>Mehdiabad, Iran</td>
<td>400,000t</td>
<td>2019</td>
</tr>
<tr>
<td>Gamsberg, South Africa</td>
<td>200,000t</td>
<td>2019</td>
</tr>
</tbody>
</table>

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
**Distribution of Zinc Metal Supply**

**2003**
- China: 21.7%
- Korea: 5.3%
- India: 2.2%
- Europe: 30.7%
- Other: 31.4%
- Canada: 8.7%

**2013**
- China: 39.6%
- Korea: 6.9%
- India: 6.1%
- Europe: 18.5%
- Other: 23.8%
- Canada: 5.1%

Source: ILZSG
Distribution of Zinc Metal Supply
APEC economies - 2013

Total 2013 World Zinc Metal Production: 12.89Mt
Total 2013 APEC Zinc Metal Production: 8.64Mt (67% of World Production)
World Zinc Metal Supply Forecast

ILZSG Forecast

- 2014 + 4.4% to 13.46 million tonnes

Annual Change

Source: ILZSG
## Selected Zinc Smelter Openings/Expansions 2012/2013

<table>
<thead>
<tr>
<th>Smelter</th>
<th>Year</th>
<th>Annual Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCC Zinc, China <em>(new)</em></td>
<td>2012</td>
<td>100,000t</td>
</tr>
<tr>
<td>Huize-Zinc, China <em>(new)</em></td>
<td>2013</td>
<td>100,000t</td>
</tr>
<tr>
<td>Porto Vesme, Italy <em>(expansion of 40kt)</em></td>
<td>2013</td>
<td>150,000t</td>
</tr>
<tr>
<td>Harima Zinc, Japan <em>(conversion to recycling)</em></td>
<td>2012</td>
<td>90,000t</td>
</tr>
<tr>
<td>Onsan, Korea Rep <em>(expansion of 180kt)</em></td>
<td>2012</td>
<td>600,000t</td>
</tr>
<tr>
<td>La Oroya Zinc, Peru <em>(reactivation)</em></td>
<td>2012</td>
<td>80,000t</td>
</tr>
</tbody>
</table>

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
### Selected Zinc Smelter Projects

**Startup 2014**

<table>
<thead>
<tr>
<th>Smelter</th>
<th>Annual Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plovdiv, Bulgaria <em>(expansion of 25kt)</em></td>
<td>100,000t</td>
</tr>
<tr>
<td>Ruili, China <em>(new)</em></td>
<td>100,000t</td>
</tr>
<tr>
<td>Yugang Zinc, China <em>(expansion of 100kt)</em></td>
<td>300,000t</td>
</tr>
</tbody>
</table>

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
## Selected Zinc Smelter Projects Under Consideration

<table>
<thead>
<tr>
<th>Smelter</th>
<th>Estimated Annual Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cia Paraibuna de Metais, Brazil</td>
<td>108,000t</td>
</tr>
<tr>
<td>Baiyin, China</td>
<td>385,000t</td>
</tr>
<tr>
<td>Shizhu, China</td>
<td>100,000t</td>
</tr>
<tr>
<td>Liuzhou, China</td>
<td>200,000t</td>
</tr>
<tr>
<td>Gongcheng, China</td>
<td>100,000t</td>
</tr>
<tr>
<td>Sichuan Hongda, China</td>
<td>210,000t</td>
</tr>
<tr>
<td>Xining, China</td>
<td>100,000t</td>
</tr>
<tr>
<td>Boyuan, China</td>
<td>100,000t</td>
</tr>
<tr>
<td>Ulju, Korea Rep</td>
<td>130,000t</td>
</tr>
<tr>
<td>San Luis Potosi, Mexico</td>
<td>200,000t</td>
</tr>
<tr>
<td>Odda, Norway</td>
<td>300,000t</td>
</tr>
</tbody>
</table>

Source: New Mines and Smelters 2013 and 2014 Reports, ILZSG
Zinc First and End Uses

Zinc First Uses

- Galvanizing: 52%
- Alloys: 16%
- Brass and Bronze: 17%
- Semis: 6%
- Chemicals: 3%
- Miscellaneous: 6%

Zinc End Uses

- Construction: 45%
- Transport: 25%
- Consumer Products & Electrical Appliances: 23%
- Industrial Machinery: 7%

Source: Brook Hunt / ILZSG
Distribution of Refined Zinc Usage

2003
- India 2.7%
- Korea Rep 4.8%
- Japan 7.5%
- Other 23.2%
- USA 14.9%
- China 15.6%
- Europe 31.4%

2013
- India 5.1%
- Korea Rep 4.3%
- Japan 3.8%
- Other 17.0%
- USA 7.2%
- China 44.3%
- Europe 18.2%

Source: ILZSG
Distribution of Zinc Metal Usage
APEC economies - 2013

Total 2013 World Zinc Metal Usage: 12.98Mt
Total 2013 APEC Zinc Metal Usage: 9.02Mt (70% of World Usage)
Production of Galvanized Steel in China

Source: CRU
World Zinc Metal Demand Forecast

ILZSG Forecast

2014 + 4.5% to 13.58 million tonnes

Annual Change

Source: ILZSG
Review and Outlook for Copper
World Copper Reserves 2013
(land-based resources only - contained copper metal)

Resources: about 3100 million tonnes (Mt)

Reserves
690 Mt

Source: USGS (resources/reserves data)
ICSG (production data)

Resource = A mineral resource is a natural occurrence of material in the earth's crust for which there is reasonable prospect for current or eventual economic extraction.

Reserves = A mineral reserve is that part of a measured or indicated resource for which current economic extraction has been demonstrated.
World Copper Reserves
2013 Breakdown

Despite increased consumption of copper produced from ore in recent years, increases in reserves have grown more, and there is more copper available to the world than at any other time in the past.

APEC economies account for around 76% of World Copper Reserves

Source: USGS
World Copper Mine Production, 1960-2013
(thousand metric tonnes copper)
Source: ICSG

Source: ICSG
Distribution of Copper Mine Production

2003
- Chile: 35.6%
- Peru: 6.3%
- China: 4.5%
- United States: 8.2%
- Indonesia: 7.3%
- Australia: 6.1%
- Zambia: 2.7%
- Kazakhstan: 3.5%
- Poland: 3.7%
- Canada: 4.1%
- Russian Fed.: 4.7%
- Mexico: 2.6%
- Iran: 0.9%
- Others: 9.1%

2013
- Chile: 32.0%
- Peru: 7.6%
- China: 8.6%
- United States: 7.0%
- Indonesia: 5.5%
- Australia: 4.0%
- Zambia: 4.2%
- Kazakhstan: 3.5%
- Canada: 3.5%
- Russian Fed.: 4.0%
- Mexico: 2.7%
- Congo: 4.7%
- Iran: 1.2%
- Brazil: 1.5%
- Poland: 2.4%
- Others: 9.9%

Source: ICSG
Distribution of Copper Mine Production
APEC economies - 2013

Total 2013 APEC Copper Mine Production : 13.6Mt
(equivalent to 75% of world copper mine production)

Source: ICSG
<table>
<thead>
<tr>
<th>Country ('000 t Cu)</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>Teghout 30kt (conc)</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Cobar exp 45 to 60 kt Cu (conc), Cadia Valley Op. Exp 75 to 90 kt (conc.)</td>
<td>Roseby cap 39kt (conc.), Pilbara cap 20kt (conc).</td>
</tr>
<tr>
<td>Brazil</td>
<td>Salobo II, cap 100kt (conc)</td>
<td>Serrote da Laje 30kt (conc)</td>
</tr>
<tr>
<td>Canada</td>
<td>Red Chris, cap 40kt (conc)</td>
<td>Afton Ajax 50kt (conc),</td>
</tr>
<tr>
<td>Chile</td>
<td>Caserones, cap 150kt (conc), Sierra Gorda cap 227kt (conc)</td>
<td>Antucoya 85kt (SXEW), Diego de Almagro cap 22kt (conc.)</td>
</tr>
<tr>
<td>China</td>
<td>Jia Ma Copper Mine exp 38 kt (Conc.), Xietongmen 56kt (conc)</td>
<td>Duobaoshan exp 30kt to 40kt (conc), Shaxi 16kt (conc), Yungla/ Pulang exp 20 to 70 kt (conc.)</td>
</tr>
<tr>
<td>DRC</td>
<td>Kipoi cap 50 kt (SXEW), Mabende cap 20kt (SXEW), Kolwezi tailings cap 70kt (SXEW), Kapulo cap 20 kt (conc)</td>
<td>Kinsenda 26kt (conc)</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Wetar cap 28 kt (SX-EW)</td>
<td></td>
</tr>
<tr>
<td>Iran</td>
<td>Sungun exp 45 to 90 kt (conc.)</td>
<td></td>
</tr>
<tr>
<td>Israel</td>
<td>Arava, cap 22kt (SXEW)</td>
<td></td>
</tr>
<tr>
<td>Kazakhstan</td>
<td></td>
<td>Bozhakol 100kt (conc), Aktogay 22kt (SXEW), Karchiga cap 38kt (conc)</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td></td>
<td>Andash cap 7kt (conc)</td>
</tr>
<tr>
<td>Mexico</td>
<td>Buena vista new SX-EW 120kt, Boleo cap 56kt (SXEW)</td>
<td>Angangeo cap 10 kt (conc.), Buena vista exp 125 to 313 kt (conc), La Caridad exp 170 to 210 kt (conc.)</td>
</tr>
<tr>
<td>Mongolia</td>
<td>Tsagaan Suvarga cap 75kt Cu (conc)</td>
<td></td>
</tr>
<tr>
<td>Myanmar</td>
<td>Monywa exp 20 to 40 kt (SX-EW)</td>
<td>Letpadaung 100kt (SXEW)</td>
</tr>
<tr>
<td>Namibia</td>
<td></td>
<td>Tschudi 17kt Cu (SXEW)</td>
</tr>
<tr>
<td>Peru</td>
<td>Torromocho cap 250kt (conc), Mina Justa cap 50 kt (SX-EW), Toquepala exp 100kt (conc.)</td>
<td>Corocohuayco cap 50 kt (SX-EW), Mina Justa cap 50 kt (SX-EW) + cap 60 kt (conc), Las Bambas 400kt (conc) Constancia 118kt (conc)</td>
</tr>
<tr>
<td>Russia</td>
<td>Podolskoe cap 10 kt (conc.)</td>
<td>Tominskoye cap 63kt (conc)</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td></td>
<td>Jabal Sayid cap 55kt (conc)</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td>Rio Tinto Mines, cap 37kt (conc)</td>
</tr>
<tr>
<td>USA</td>
<td>Restart Pinto Valley cap 60kt (conc), Morenci (SXEW) exp +100kt</td>
<td>Pumpkin Hollow 124kt (conc)</td>
</tr>
<tr>
<td>Zambia</td>
<td>Ichimpe cap 35kt (SX-EW), Mkushi cap 20kt (Conc.)</td>
<td>Kangaluwi Chisawa 35kt (SXEW), Sentinel Project cap 150 kt expanding to 300kt (conc) starts end 2014 but prod only 2015</td>
</tr>
<tr>
<td>2013 Ramp-up mines</td>
<td>RAMP-UP of projects that started in 2013 such as Ministro Halles cap 170kt (conc). Oyu Tolgoi, cap avg 425kt (conc)</td>
<td></td>
</tr>
</tbody>
</table>

Source: ICSG Directory of Copper Mines and Plants, published January 2014
After a period of underperformance, world copper mine production grew significantly last year and is expected to continue its growth trend due to the start-up of new capacity.

Based on planned output at mines, world copper mine production is anticipated to increase by 5% in 2014 and a further 7% in 2015 to reach 20.3 Mt Cu.

Source: ICSG forecast April 2014
## 2014-2015 Major contributors to copper mine production growth

<table>
<thead>
<tr>
<th>Selected Countries</th>
<th>Accumulated Growth 2014-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dif. Kt Cu</td>
</tr>
<tr>
<td>Chile</td>
<td>438</td>
</tr>
<tr>
<td>Peru</td>
<td>374</td>
</tr>
<tr>
<td>Indonesia</td>
<td>355</td>
</tr>
<tr>
<td>Zambia</td>
<td>268</td>
</tr>
<tr>
<td>United States</td>
<td>228</td>
</tr>
<tr>
<td>China</td>
<td>219</td>
</tr>
<tr>
<td>Mexico</td>
<td>201</td>
</tr>
<tr>
<td>DRC</td>
<td>198</td>
</tr>
<tr>
<td>Mongolia</td>
<td>120</td>
</tr>
<tr>
<td>Canada</td>
<td>88</td>
</tr>
<tr>
<td>Brazil</td>
<td>88</td>
</tr>
<tr>
<td>Eritrea</td>
<td>58</td>
</tr>
<tr>
<td>Australia</td>
<td>25</td>
</tr>
</tbody>
</table>

APEC countries represent 65% of the expected growth in world copper mine production in 2014-2015

Source: ICSG forecast April 2014
Factors that can impact ICSG forecast for copper mine production

- Copper price: if prices decline further, temporary cutbacks may occur (Jan-May 2014 average is 9% lower than corresponding period of 2013)
- Indonesia concentrates export ban that started in 2014 reducing production levels
- Unpredictable weather adverse conditions and unforeseen operational failure
- Labor issues/strikes.
- Decline in head grade may have greater impact in copper output than anticipated
- DRC ban on concentrate exports foreseen to start end 2014
- 20% of the world mine production growth in 2014-2015 comes from Africa a region with usually higher rates of disruptions
- Performance of ramp-up mines vis-à-vis current expectations
- Higher share of additional output in 2014/2015 will come from new projects meaning higher probability of disruptions due to delays or ramp up issues.

Source: ICSG forecast April 2014
Distribution of Refined Copper Production

**2003**
- China: 12.0%
- Chile: 19.0%
- Japan: 9.4%
- United States: 8.6%
- Russian Fed.: 5.5%
- Germany: 3.9%
- India: 2.6%
- Kazakhstan: 2.8%
- Belgium: 2.8%
- Peru: 3.4%
- Australia: 3.2%
- Zambia: 2.3%
- Poland: 3.5%
- Korean Rep.: 3.3%

Others: 15.7%

**2013**
- China: 31.0%
- Chile: 13.1%
- Japan: 7.0%
- United States: 5.0%
- Russian Fed.: 4.2%
- Germany: 3.2%
- Peru: 1.7%
- Belgium: 1.9%
- Korea Rep.: 2.9%
- Australia: 2.3%
- Zambia: 2.8%
- Poland: 2.7%
- India: 2.9%
- Spain: 1.7%
- Kazakhstan: 1.6%

Others: 16.0%

Source: ICSG
Distribution of Refined Copper Production
APEC economies - 2013

Total 2013 APEC Copper Refined Production : 15.1 Mt (equivalent to 72% of world copper refined production)

Source: ICSG
In 2014 production to return to normal levels at smelters that had operational constraints in 2013

Chinese refined production to continue its expansion trend although at lower growth levels

Outside China, only a few expansions at existing plants as in Iran and South Korea

Increased availability of concentrate from new mine projects to boost primary electrolytic production

Continued expansion in World SX-EW capacity with major contribution from Africa

Possible reduced availability of scrap not expected to significantly constrain world refined production growth due to adequate concentrate supply

World growth in refinery production is expected to be around 6% in 2014 higher than the expected growth of 4% in 2015 because this year many countries are recovering from constrained output in 2013

Factors that can impact forecast: Decline in copper prices, concentrate availability below expectations, strikes, shortage of scrap, changes in environmental regulations, unfavorable sulphuric acid market and operational failures.

Source: ICSG forecast April 2014
### 2014-2015 Major contributors to refined copper production growth

APEC countries represent 68% of the expected growth in world refined copper production in 2014-2015.

<table>
<thead>
<tr>
<th>Selected Countries</th>
<th>Accumulated Growth 2014-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dif. Kt Cu</td>
</tr>
<tr>
<td>China</td>
<td>1,030</td>
</tr>
<tr>
<td>Congo</td>
<td>247</td>
</tr>
<tr>
<td>Chile</td>
<td>168</td>
</tr>
<tr>
<td>Zambia</td>
<td>154</td>
</tr>
<tr>
<td>Mexico</td>
<td>138</td>
</tr>
<tr>
<td>Indonesia</td>
<td>89</td>
</tr>
<tr>
<td>United States</td>
<td>80</td>
</tr>
<tr>
<td>Spain</td>
<td>74</td>
</tr>
<tr>
<td>Japan</td>
<td>74</td>
</tr>
<tr>
<td>India</td>
<td>73</td>
</tr>
<tr>
<td>Korean Rep.</td>
<td>70</td>
</tr>
<tr>
<td>Iran</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: ICSG forecast April 2014
Distribution of Copper Refined Usage

**2003**

- China: 20%
- United States: 15%
- Germany: 6%
- Japan: 7.7%
- Korean Rep.: 5.8%
- India: 1.4%
- Italy: 4.3%
- Russia Fed.: 2.9%
- Brazil: 1.9%
- Taiwan: 4.0%
- Others: 23%

**2013**

- China: 45%
- United States: 15%
- Mexico: 1.6%
- Belgium: 1.0%
- Spain: 1.6%
- Turkey: 2.2%
- Russian Fed.: 3.1%
- Brazil: 2.1%
- Taiwan: 2.1%
- Italy: 2.6%
- India: 2.1%
- Korean Rep.: 3.4%
- Japan: 4.7%
- Others: 15%
- Germany: 5%

Source: ICSG
Distribution of Copper Refined Usage
APEC economies - 2013

Total 2013 APEC Copper Refined Usage: 15.7 Mt
(equivalent to 74% of world copper refined production)

Source: ICSG
2014/15 Main Global Assumptions for Refined Copper Usage

- Copper consuming sectors growth linked to the performance of the world economy. Recent macro-economic data is positive but not supportive for strong improvement in usage levels in some major copper using countries. We think that the path is for a soft steady growing trend in world refined copper usage at around 3%.

- After three years of consecutive declines in EU copper usage, small growth is expected for 2014/2015. The building industry and automotive sector are expected to slowly recover and usage might benefit from better overseas export market.

- Japanese refined usage expected to remain basically unchanged in 2014/2015 from 2013 levels as although Japanese economy is growing relocation of production to other Asian countries impacts usage levels.

- Improved performance of the USA economy, economic program stimulus, growth in construction, manufacturing, and automotive sectors as well as new semis plants are all supportive of usage growth.

- Higher growth rates are expected for some Asian countries such as Indonesia, Malaysia and Thailand due to expansions of the semis industry and overseas demand and also for Brazil.

- India usage negatively impacted by imports of semis products.

- Semis industry in some of the Gulf countries expected to perform well.

- Russia is expected to continue producing wire rod at strong levels instead of exporting cathodes.

- Australia usage expected to decline due to the closure of its sole wirerod plant.

- Lower scrap availability supportive for the use of cathode at semis plants.

- China usage will continue to grow and to support world usage growth.

Source: ICSG forecast April 2014
2014/2015 Major Contributors to Refined Copper Usage Growth

<table>
<thead>
<tr>
<th>Selected Countries</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dif. Kt Cu</td>
<td>Dif. %</td>
</tr>
<tr>
<td>China</td>
<td>474</td>
<td>5.0%</td>
</tr>
<tr>
<td>EU</td>
<td>50</td>
<td>1.6%</td>
</tr>
<tr>
<td>United States</td>
<td>40</td>
<td>2.2%</td>
</tr>
<tr>
<td>Gulf + N Africa *</td>
<td>40</td>
<td>6.4%</td>
</tr>
<tr>
<td>Brazil</td>
<td>21</td>
<td>4.7%</td>
</tr>
<tr>
<td>India</td>
<td>15</td>
<td>3.3%</td>
</tr>
<tr>
<td>Russian Fed.</td>
<td>16</td>
<td>2.4%</td>
</tr>
<tr>
<td>Mexico</td>
<td>16</td>
<td>4.8%</td>
</tr>
<tr>
<td>Turkey</td>
<td>15</td>
<td>3.2%</td>
</tr>
<tr>
<td>Thailand</td>
<td>12</td>
<td>4.8%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>8</td>
<td>3.3%</td>
</tr>
<tr>
<td>Japan</td>
<td>6</td>
<td>0.6%</td>
</tr>
<tr>
<td>Korean Rep.</td>
<td>1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Australia</td>
<td>-56</td>
<td>-58%</td>
</tr>
<tr>
<td>World</td>
<td>684</td>
<td>3.2%</td>
</tr>
<tr>
<td>World Ex-China</td>
<td>210</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

*Includes Egypt, Saudi Arabia, Oman, UAE

APEC countries represent 93% of the expected growth in world refined copper usage in 2014-2015

Source: ICSG forecast April 2014
Based on the current assumptions, the market is expected to return to surplus in 2014 after four consecutive years of “apparent” deficits and to present a higher surplus in 2015 as although world usage is expected to improve, world production growth will largely exceed demand growth.

Source: ICSG forecast April 2014

<table>
<thead>
<tr>
<th>REGIONS</th>
<th>MINE PRODUCTION</th>
<th>REFINED PRODUCTION</th>
<th>REFINED USAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>1,828</td>
<td>2,068</td>
<td>2,389</td>
</tr>
<tr>
<td>N.America</td>
<td>2,379</td>
<td>2,668</td>
<td>2,896</td>
</tr>
<tr>
<td>Latin America</td>
<td>7,555</td>
<td>8,077</td>
<td>8,475</td>
</tr>
<tr>
<td>Asean-10 / Oceania</td>
<td>1,905</td>
<td>1,891</td>
<td>2,217</td>
</tr>
<tr>
<td>Asia ex Asean/CIS</td>
<td>2,077</td>
<td>2,271</td>
<td>2,524</td>
</tr>
<tr>
<td>Asia-CIS</td>
<td>583</td>
<td>596</td>
<td>629</td>
</tr>
<tr>
<td>EU</td>
<td>855</td>
<td>859</td>
<td>887</td>
</tr>
<tr>
<td>Europe Others</td>
<td>876</td>
<td>901</td>
<td>926</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18,059</td>
<td>19,330</td>
<td>20,942</td>
</tr>
<tr>
<td>World adjusted 1/ 2/</td>
<td>18,059</td>
<td>18,904</td>
<td>20,283</td>
</tr>
<tr>
<td>% change</td>
<td>4.7%</td>
<td>7.3%</td>
<td>6.5%</td>
</tr>
<tr>
<td>World Refined Balance</td>
<td>-282</td>
<td>405</td>
<td>595</td>
</tr>
<tr>
<td>World Refined Balance Adjusted for Chinese Bonded Stocks Change 3/</td>
<td>-541</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Major Uses of Copper: Usage by Region and End Use Sector, 2012
Basis: copper content, thousand metric tonnes

Americas 14%
Europe 20%
ROW 6%
Asia 60%

Industrial 12%
Transport 13%
Infrastructure 15%
Building Construction 30%
Equipment 30%

Source: International Copper Association
Severe impact of the 2008 financial crisis in the development of copper mine projects in the following three years. Most companies delayed development or even postpones their projects.

Recently companies announced a refrain in project expenditure and if the copper prices falls further there is a high probability of delays in the projects currently foreseen to be developed by 2016/2017.

Source: ICSG
Data presented in the next slides refers to production capacity which might differ from effective production levels.

Annual average world mine capacity growth until 2017 is expected to be around 7.5%

World mine production capacity expected to grow to 28.1 Mt of copper in 2017.

Concentrate to grow to 22.2 Mt and SX-EW to 5.9 Mt.

Source: ICSG Directory of Copper Mines and Plants, published January 2014
South America will remain the region with the largest copper mine installed capacity and is expected to bring to the market until 2017 an additional 2.5 Mt capacity (33% of the world total growth).

Asian, North American and African copper mining capacity also increasing substantially.

APEC copper mine production capacity to increase by 28% by 2017 reaching 19.8 Mt Cu.

Source: ICSG Directory of Copper Mines and Plants, published January 2014
Chile will retain its position as the biggest copper mine producer in the world but Peru is the leading contributor to the growth.

Source: ICSG Directory of Copper Mines and Plants, published January 2014
In the last decade, in parallel with copper mining in the so called “traditional” producing countries (eg, Chile, Peru, USA, Australia, etc), we have observed a geographical enlargement of the copper mining industry.

There has been growing interest in developing copper projects in countries that up to had limited copper production ...

Source: ICSG Directory of Copper Mines and Plants, published January 2014
... or that up to now are not yet mining copper
Looking into the future, mining companies are starting now to look at possible offshore deep-sea minerals exploration. The oceans represent around 70% of the world surface and its floor is believed to contain important mineral resources among which are copper, zinc, nickel, manganese, gold and silver.

To meet increasing copper demand, the discovery and exploration of new resources will be crucial and sea floor deposits could represent an important opportunity for additional supply.

However, the challenge is to be able to exploit those deposits efficiently and turn them into economically-viable operations.

ICSG identified three off-shore copper projects that could be producing in the near future. Clipperton Fracture Zone in the International Waters of the Pacific Ocean, between Hawaii and Mexico, Atlastis II Bacin Project in Red Sea, and Solwara 1 project located in the Bismarck Sea, Papua New Guinea.

Other zones where interest in exploration opportunities has risen are mid-Atlantic Ridge and Southwest Indian Ridge.
Until 2017, world copper refinery capacity expected to grow by 2.7 Mt to 29.4 Mt. 1.6 Mt of the expansion expected to come from electrolytic refineries and almost 1.1 Mt from electrowinning capacity. Supremacy of Asia over the other regions. Some growth in Africa and North America but decline in Australia and Europe (clorures). APEC copper refined production capacity to increase by 9% until 2017 reaching 20.7 Mt Cu.

Source: ICSG Directory of Copper Mines and Plants, published January 2014
Next Study Groups’ Meetings Dates

INSG: 13-14 October 2014, Lisbon, Portugal
ICSG: 13-14 October 2014, Lisbon, Portugal
International Metals Recycling Seminar: 15 October 2014, Lisbon, Portugal
ILZSG: 16-17 October 2014, Lisbon, Portugal
ICSG Industry Advisory Panel meeting: 23 October, London, United Kingdom