ICSG Directory of Copper Mines and Plants

(Agenda Item 9)

Presentation by Ana Rebelo,
Chief Statistician, ICSG
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ICSG Directory of Copper Mines and Plants is published bi-annually and is continuously updated with company reports/announcements. The Directory highlights current production capacity and provides a five year outlook of forecast capacity for existing and planned copper mines, plants and refineries on a country by country basis.

Once a year, the Secretariat undertakes a special update of the Directory with the collaboration of Member Countries, where they are requested to provide ICSG with an update on their copper industries. Responses from the next annual survey to be sent in September will be included in the October 2013 Directory.

The Secretariat prepared a background paper focused on the major developments in world copper mines and refineries production capacities. Capacity data is presented for the period 2012-2016 and reflects production capability and not necessarily production forecasts.

The following slides present a brief summary. Additional and more detailed information is available in the February 2013 Directory.
Evidence of the delays in mine project development
Research on China smelters and refineries enabled to update Directory data

<table>
<thead>
<tr>
<th>('000t Cu)</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>SX-EW</td>
<td>-18</td>
<td>54</td>
<td>-363</td>
<td>-432</td>
</tr>
<tr>
<td>Concentrates</td>
<td>-475</td>
<td>-424</td>
<td>-882</td>
<td>-857</td>
</tr>
<tr>
<td>Mines Total</td>
<td>-494</td>
<td>-370</td>
<td>-1,245</td>
<td>-1,289</td>
</tr>
<tr>
<td>Smelters</td>
<td>17</td>
<td>15</td>
<td>798</td>
<td>928</td>
</tr>
<tr>
<td>Electrolytic Refineries</td>
<td>-40</td>
<td>282</td>
<td>507</td>
<td>777</td>
</tr>
<tr>
<td>Refineries Total</td>
<td>-97</td>
<td>317</td>
<td>126</td>
<td>326</td>
</tr>
</tbody>
</table>

Kt= Thousand Tons, Mt = Million Tons, SX-EW = Solvent Extraction-Electrowinning
- Annual average world mine capacity growth until 2016 is expected to be around 8%.
- World mine production capacity expected to grow to 27.7 Mt of copper in 2016.
- Concentrate to grow to 22Mt and SX-EW to 5.7 Mt.

**Projected Trend in Annual World Copper Mine Production Capacity**

<table>
<thead>
<tr>
<th>Year</th>
<th>Concentrates (Mt)</th>
<th>SX-EW (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>15,215</td>
<td>4,609</td>
</tr>
<tr>
<td>2012</td>
<td>15,648</td>
<td>4,733</td>
</tr>
<tr>
<td>2013</td>
<td>16,554</td>
<td>4,891</td>
</tr>
<tr>
<td>2014</td>
<td>17,496</td>
<td>4,865</td>
</tr>
<tr>
<td>2015</td>
<td>19,570</td>
<td>5,301</td>
</tr>
<tr>
<td>2016</td>
<td>22,019</td>
<td>5,686</td>
</tr>
</tbody>
</table>

Kt = Thousand Tons, Mt = Million Tons, SX-EW = Solvent Extraction-Electrowinning
South America will remain the region with the largest copper mine installed capacity and is expected to bring to the market until 2016 an additional 2.3 Mt capacity (31% of the world total growth). Asian and African copper mining capacity also increasing substantially. All together, these three regions represent 78% of the world additional copper mine production capacity to come on stream by 2016.
Chile will retain its position as the biggest copper mine producer in the world but Peru is the leading contributor to the growth.
Growing interest in developing projects in countries that up to now are not mining copper
Until 2016, roughly 2.2Mt additional capacity will come from expansion/ramp-up output at mines currently operating (including mines that started in 2012) and around 5.2 Mt will originate in new projects.
COPPER MINE PROJECTS (cap > 100Ktpy Cu)

Total annual Capacity of Listed Projects : 9 Mt Cu
Expansion at Selected Mines

- Olympic Dam
- Andina
- Collahuasi
- Cerro Verde II (Sulphide)
- Buenavista del Cobre
- La Caridad
- Morenci
- Konkola
- Toquepala
- Tenke Fungurume
- Kansanshi
- Lumwana
- Quebrada Blanca
- Sarcheshmeh
- Kamoto

Legend:
- Future expanded cap.
- Expansion by 2016
- 2012 cap.
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.

Source: Nautilus Minerals Inc website
Project copper Smelter Production Capacity Increase by Country

Expected increase in 2012-2016

(1) Beyond 2016, future possible new/expanded smelters in Mongolia, Egypt, Saudi Arabia, Philippines, Indonesia and Tanzania
Until 2016, world copper refinery capacity expected to grow by 4.6 Mt (18%) to 30 Mt.
3.6Mt of the expansion expected to come from electrolytic refineries and almost 1 Mt from electrowinning capacity.
Supremacy of Asia over the other regions.
Some growth in Africa and North America
In remaining regions capacity is expected to remain practically unchanged.
China is by far the biggest contributor to the growth with a strong increase of around 2.1 Mt, representing 47% of the world growth in the period. India and the DRC will see a combined growth of around 800kt.
You can see here the countries’ imbalance of copper concentrates production capacity in comparison to their electrolytic refinery production capacity. Although the refinery production capacity shown here includes as well secondary refined capacity, the chart gives a clear picture of the importer and exporter countries of copper concentrate by 2016.
The data presented in ICSG Directory of Copper Mines and Plants reflects copper production capacity or capability, not necessarily meaning effective production rates or production forecasts.

Actual production may in fact differ significantly from capacity as many factors may negatively impact output levels.

Economic and market conditions, as well as technological and business factors, may also result in production levels that vary from the indicated capacity: production levels may be affected by operational failures, unforeseen cuts in production and closures or by the delay or cancellation of projects.

<table>
<thead>
<tr>
<th>% Capacity Utilization Rates*</th>
<th>2012</th>
<th>Average of Last 15 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mines</td>
<td>82%</td>
<td>88%</td>
</tr>
<tr>
<td>Refineries</td>
<td>79%</td>
<td>83%</td>
</tr>
</tbody>
</table>

* Source: effective production data from ICSG Copper Bulletin compared with capacity data from ICSG Directory of Copper Mines and Plants