DR Congo: reasons to expect an increased copper mining production in a foreseen future

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TOPICS

- An overview of DRC mineral occurrences and copper commodity
- Copper mining projects being extending—What extra-production can be expected?
- DRC copper production targets in a foreseeable future
- Challenges to an optimal and sustainable development
An overview of DRC mineral occurrences and copper commodity occurrences

DRC general geology map and commodity occurrences

Mineral commodities
- Industrial mineral
- Nonmetallic
  - As, Sb, Nb, Ta, Sn, W, Ti
  - Al, Fe, Mn
  - Gold
  - Diamond
  - Pb, Zn, Ge, Cd
  - REE, Th
  - U, V, Co
  - Be
  - Mg, Hg, Sr
  - S
  - Ni, Cr
  - Cu
  - Gemstone
  - Ag, Pt, Pd
  - P
  - Zr, Monazite
Unsurprisingly, mining licences cover almost all the parts of the country where geology has been well assessed and commodities occurrences reported and established.

Mining Research and Extractive Operations within the DRC Copperbelt
Historical locations of major copper extractive operations (UMHK/GECAMINES)

Copper reserves, production and extension of copper mining projects
The top-5 copper projects and their proven reserves

<table>
<thead>
<tr>
<th>#</th>
<th>Project/ Company</th>
<th>Major owners</th>
<th>Deposit(s)</th>
<th>Proven res. (t Cu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tenke Fungurume Mining, TFM Sarl</td>
<td>Freeport Mc MoRan, Lundin/TMC</td>
<td>Kwatebala, Tenke, Fwaulu</td>
<td>10,500,000</td>
</tr>
<tr>
<td>2</td>
<td>SICOMINES Sarl</td>
<td>GECAMINES &amp; Chinese Consortium</td>
<td>Aggr.</td>
<td>6,977,824</td>
</tr>
<tr>
<td>3</td>
<td>Katanga Mining Limited</td>
<td>Katanga Mining (TSX)/Glencore</td>
<td>Kamoto, KOV, Tilwizembe</td>
<td>2,200,000</td>
</tr>
<tr>
<td>4</td>
<td>SODIFOR</td>
<td>SODIMICO</td>
<td>Lufua/Kishiba</td>
<td>1,430,000</td>
</tr>
<tr>
<td>5</td>
<td>RUASHI MINING</td>
<td>Metorex</td>
<td>Ruashi</td>
<td>1,141,889</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>22,249,713</strong></td>
</tr>
</tbody>
</table>

Project extensions – What extra production can be expected and when?

<table>
<thead>
<tr>
<th>#</th>
<th>Mining Companies / Projects</th>
<th>2010 Copper Exports (t)</th>
<th>Foreseeable Production (t)</th>
<th>Schedule (y)</th>
<th>Expect. additional Copper (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TFM sarl</td>
<td>121,000</td>
<td>230,000</td>
<td>2012-2015</td>
<td>110,000 280,000</td>
</tr>
<tr>
<td>2</td>
<td>KCC/Katanga Mining</td>
<td>57,000</td>
<td>110,000</td>
<td>2012-2013</td>
<td>53,000</td>
</tr>
<tr>
<td>3</td>
<td>CHEMAF</td>
<td>15,044</td>
<td>30,000</td>
<td>2012-2013</td>
<td>15,000</td>
</tr>
<tr>
<td>4</td>
<td>CMSK</td>
<td>10,569</td>
<td>16,200</td>
<td>2012-2013</td>
<td>5,600</td>
</tr>
<tr>
<td>5</td>
<td>MUMI</td>
<td>17,981</td>
<td>40,000</td>
<td>2012-2013</td>
<td>22,000</td>
</tr>
<tr>
<td>6</td>
<td>RUASHI Mining</td>
<td>30,000</td>
<td>60,000</td>
<td>2012-2013</td>
<td>30,000</td>
</tr>
<tr>
<td>7</td>
<td>AMCK</td>
<td>13,000</td>
<td>60,000</td>
<td>2012-2013</td>
<td>47,000</td>
</tr>
<tr>
<td></td>
<td><strong>Total expected additional copper from projects extension (2013)</strong></td>
<td></td>
<td></td>
<td><strong>282,600</strong></td>
<td></td>
</tr>
</tbody>
</table>
Anvil Mining Limited (AVM)

Anvil Mining Ltd, TSX and ASX listed, has been in production in DRC since 2002. Kinsevere project, with its deposit located in the Katangan Copper belt, is becoming Anvil's flagship project. Other projects currently operated are Kamoto and Kulu.

Investment: USD 0.435 billion

Extractive processes:
- Open pit mining (2007)
- Ore Concentration by HMS (2009)
- Leaching circuits (Q3, 2011)
- Coupling SX/EW (Q3, 2011)

Production capacity (p.a.):
- Currently: 15,000 t copper within concentrate.
- Expansion to 60,000 t of copper metal (end 2011)

Katanga Mining Limited (Glencore)

Katanga Mining Ltd, TSX, operates a large-scale copper-cobalt project in DRC, through two JVs: Kamoto Copper Company (KCC) and DRC Copper and Cobalt Project (DCP).

Investment: USD 1.3 (?) billion

Extractive processes:
- Open pit and underground mining
- Ore Concentration
- Leaching circuits
- Electrowinning
- Coupling SX/EW (by 2014)

Production capacity (p.a.):
- Currently: 70,000 t copper metal,
- Expansion to 150,000 t by 2012
- By 2015: 250,000 t copper metal.
Tenke Fungurume Mining Sarl (Freeport McMoRan, Lundin)

Investment: USD 2.3 billion

Extractive processes:
- Open pit mining
- Ore Concentration
- Leaching circuits
- Coupling SX/EW

TFM Sarl, listed at the TSX, is currently operating one of the largest copper-cobalt project in DRC, encompassing deposits located along the Tenke and Fungurume axis. Kwatebala is the most studied deposit.

Production capacity (p.a.):
- Currently: 115,000 t copper metal
- Expansion to 250,000 t by 2012
- Ultimately: 400,000 t copper metal.
Expansion Phase II
EW tank house-1floor remains to be poured, HDPE wrapping of cell beams started
Adding value to the copper production
( refined vs. concentrates)

Value drivers and sustainable growth of copper production
The most important value drivers (high in-situ metal values, long life reserves, rapid pay-back) are met when it comes to copper mining in DRC,...and this is not only true for the Kwatebala’s TFM project, depicted hereafter.

**Value drivers...**

- Very high in-situ metal value
- Long life reserves
- Rapid pay-back
- Lowest cash cost quartile

**LME copper prices (per ton)**

- 1960: $0
- 1970: $1,000
- 1980: $2,000
- 1990: $3,000
- 2000: $4,000
- 2010: $8,000

$5,000, $6,000, $7,000, $8,000
Incredibly higher ore grades in almost all deposits

Shaded bars represent copper projects in Africa. The average ore grade of African projects is 2% compared to 1-3% of other projects.

Deposits among the world's easiest to operate, with low cash costs

Shaded bars represent copper projects in Africa. The average capital intensity of African copper projects is $5,035/ton compared to $8,124/ton for other projects.
Major issues:

Energy availability, Warehousing and Transportation

Energy: the potential for an efficient power network

A huge hydroelectric potential (140 GWh) allowing for an useful networking and establishing of web-energy
- Production costs may drastically be increased if there is a lack of a stable, uninterrupted and reliable electricity.

- In spite of the hydroelectric potential very important, there is a weak power generation capacity mainly due to the obsolescence of machine units in the existing plants.

**Demand vs. available power in MW for copper-cobalt mining extraction (projections to 2015)**

![Graph showing demand vs. available power in MW for copper-cobalt mining extraction (projections to 2015)](image)
A strong need for new sources of energy to meet the demand of current and future copper mining projects

![Graph showing energy demand from 2005 to 2015](image)

An attempt to solve the energy issue...

- Establishing **PPP** (private-public partnerships) involving, in a collaborative schemes, private investors, mining companies and the national power corporation (S.N.EL) to refurbish the existing out of work electric power facilities and develop new plants meanwhile.
Transportation and infrastructure challenges

- Optimizing transportation of mining products (roads, railway) across the country, taking advantage of subregional (Southern and Central Africa) connectivity initiative projects where they exist.

- Reinforcing warehousing capabilities.

Thanks for your kind attention!