Sustainable Mineral Resources Development Policy

Purpose: Information
Submitted by: Korea
Sustainable Mineral Resources Development Policy

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Korea Resources Corporation (KORES)

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I. Korean Mining Industry Status

- concentrate on nonmetal mining development
- produce coal, metal on a small-scale

### Korean Mining Industry Status

<table>
<thead>
<tr>
<th>Section</th>
<th>Reserve (1,000MT)</th>
<th>Mine</th>
<th>Workers</th>
<th>Capacity (K Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>12.3</td>
<td>5</td>
<td>4,050</td>
<td>2,084</td>
</tr>
<tr>
<td>Metal</td>
<td>1.3</td>
<td>15</td>
<td>343</td>
<td>648</td>
</tr>
<tr>
<td>Nonmetal</td>
<td>155.1</td>
<td>402</td>
<td>3,227</td>
<td>92,905</td>
</tr>
<tr>
<td>Total</td>
<td>168.7</td>
<td>422</td>
<td>7,620</td>
<td>95,637</td>
</tr>
</tbody>
</table>
The Problem of Development in Mining

- **Environment**
  - forests damage
  - river pollution
  - dust, noise

- **Labor**
  - mining site go underground
  - roof falls

- **Economy**
  - shortage of added value improvement
technology on mineral
Changing Perception of Mineral resources

Changing perception of mineral resources

Change to Advanced Functionalities & High value-added industry

Increasing demand of high efficiency raw materials
Mining is no more Primary Industry

It can be high value-added industry

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Price Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slacked Lime (CaOH₂)</td>
<td>60~150 thousand won</td>
</tr>
<tr>
<td>Unslacked Lime (CaO)</td>
<td>55~100 thousand won</td>
</tr>
<tr>
<td>PCC (CaCO₃)</td>
<td>250~5,000 thousand won</td>
</tr>
<tr>
<td>GCC (CaCO₃)</td>
<td>120~240 thousand won</td>
</tr>
</tbody>
</table>

Changing perception of mineral resources

Continuous decreasing metal mineral price in 90’s

 Mine close due to economic feasibility

Global Price trend of major Mineral (US$/mt)

Iron ore: 2005 2011.7
Copper: 2005 2011.7
NiKel: 2005 2011.7
Zinc: 2005 2011.7
Aluminium: 2005 2011.7

Rising necessity of redevelopment
Increasing value of domestic metal mineral mining
Continuous increasing price of MR
Changing perception of mineral resources

**Major mineral deposits in the world**

<table>
<thead>
<tr>
<th>Mineral</th>
<th>0%</th>
<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>China 46.7%</td>
<td>U.S 14.2%</td>
<td>U.S 8.2%</td>
<td>Other Economies 30.9%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uranium</td>
<td>Kazakhstan 33.2%</td>
<td>Canada 18.2%</td>
<td>Australia 11.9%</td>
<td>Other Economies 37.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>China 41.5%</td>
<td>Australia 17.6%</td>
<td>Brazil 13.7%</td>
<td>Other Economies 27.2%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>China 33.6%</td>
<td>Peru 7.7%</td>
<td>Chile 7.2%</td>
<td>Other Economies 51.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>China 30.5%</td>
<td>Australia 12.1%</td>
<td>Peru 12.1%</td>
<td>Other Economies 45.1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>Russia 17.8%</td>
<td>Indonesia 12.1%</td>
<td>Philippines 56.9%</td>
<td>Other Economies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dependence on Imports of mineral**

- 2000: 76.0%
- 2001: 84.3%
- 2002: 90.7%
- 2003: 94.8%

**Annual Growth Rate**

- 1999: 200%
- 2000: 200%
- 2001: 200%
- 2002: 200%

**Changing perception of mineral resources**

- Weaponized natural resources, Neo-Resource nationalism
  - Reflect developing economies’ opinions who want to independent from developed economies
  - The economy which has plenty resources use their natural resources to improve their economic status
  - Forming new kind of Cartel
    - GECF

- Revolution of Natural Resources Law
  - Restriction to foreigners in Strategic mineral

- Regulation of protecting strategic resources law
  - Increase export tariffs of Rare Earth
  - Decrease Rare Earth exportation

- Prior allocation of mining supply
  - Disambiguation of effective time of exploration right
  - Mine hole area limitation of exploration and mining right

- Amendment of Mining Law
  - Revise of existing contracts’ share ratio and etc.
  - Tighten mine retrocession condition

- Tighten royalty policy for metal price (1~6%)
IV. Sustainable Development in Mining

Environment-Friendly Mine Development

- Support development of environment-friendly mine
  - Underground mining equipment & underground installation of crushing, transport, processing facilities

Support underground mining equipment
- Surface mining
  - Underground mining

Support underground crushing & transport facilities
- Outer
  - Underground
Human Friendly Mine Development

- Support equipment & facilities for accident prevention
  - Facilities for preventing roof fall & rock reinforcement
  - Training for mine disaster reduction

- Support accident prevention & improve work environ.
  - Training for accident prevention & safety
  - Ventilation shaft excavation for improving work environment
Economic Mine Development

- Increased productivity through large-scale equipment
- Improve value added of non-metal & localization of raw materials
  - Support value added facilities

- Large-scale equipment
  - Mine truck
  - Explosive cargers

- Value added facilities
  - Infrasizing equip.
  - Centrifugal separator

V. The Major Policy
**Major policies**

**Promote large and middle size mines by focusing strategy**

- **Close Survey Mining & Drilling**
- **Modernization**
- **Mine Safety Facility**

Focusing strategy for supporting mine advancement (45 mines)

Promoting systematically and comprehensively support by relating Exploration, Development, Safety and Refinery industry

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**Major policies**

**Convert mining, crushing, milling, transporting and refining facility installation to inside of mine for Green Mine**

- **Open-pit mining**
- **Crushing/Milling/Dust collection equipment**
- **Underground Mining/Underground Installation (Green Growth Policy)**
- **Concentrating/Smelting/Value added equipment**
- **Build Transportation Equipment inside of mine**
Mine accident prevention and working environment improvement

- Reinforce mine safety training
- Sharing roles between private sector and economy
- Equipment and facility support for mine accident prevention

Expanding exploration of domestic natural resources

- Securing 17.5 Billion tonnes of ore at 2015

Major policies

Boost mining competitiveness by improvement of value-added

- High Value-Added Material (Industrialize base material)
- Technology Improvement* (Build Mineral Industry Cluster)
- Domestic 5 Major Non-metallic Minerals (Limestone, Quartz, Feldspar, Agalmatolite, Kaolinite)
- Reinvestment (Establish Virtuous Circle Structure)
Major policies

Sharing roles between private sector and member economy government to promote domestic natural resources industry

1. Secure Ore
2. Mine Advance ment
3. Government
4. Mine
5. Produce & Investment
6. Green Development

- Member economy government: Supporting infrastructure and producing environment
- Private sector: producing, investing, and forming infrastructure

VI. Experience Sharing and Spread
Overseas Project Location

<table>
<thead>
<tr>
<th>Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.proj</td>
<td>289</td>
</tr>
<tr>
<td>Minerals</td>
<td>35</td>
</tr>
<tr>
<td>Economy</td>
<td>46</td>
</tr>
</tbody>
</table>

Korean Win-Win Model - I

Developing Value-added Mineral Resources with Infrastructure

Case in Madagascar

Korea
- Huge capital investment
- Training local labour
- Mine and plant construction

Madagascar
- Mineral (Nickel, Cobalt)
- Government support for foreign investment

Ambatovy Construction

Nikel 30% Off-take
Project For Humans and Environment

- Eco-environmental protection & Community Development
  - Constructing Pipeline, Minimizing Impact
  - Ensuring Water Quality
  - Building homes
  - Community health care & education

- Conducting Overall safety training
  - Fire prevention Program & Safety Training
  - Chemical Accident prevention Program & Safety Training

Effects
- Environmental hazards management for Earth
- Operating Sustainable Safety Program for Human

Korean Win-Win Model - II

- Linking Mineral Resources Exploration Projects with Port Infrastructures

Case in DR Congo

Korea
- Capital support
- Build-Operating-Transfer
- Tech & Manpower exchange
- Economic Development

DR. Congo
- Mineral (Copper, Cobalt)
- Mineral Exploration rights

Banana Port Construction
- $500 Mil of Construction value

Copper Exploration
- Offer 4 copper projects
Experience sharing and spread Model - III

Prevention environmental disruption technology & sharing business experience
And tighten cooperation in environmental disruption field

Case in Mongolia

- MIRECO signed MOU about Mongolia’s environmental disruption (Jan. 25. 2010)
- Research on the actual condition of environmental disruption and build informatization campaign (Dec. 2010~Mar. 2014)
- Baganuur coal mine’s vegetation restoration campaign (Dec. 2010~Dec. 2020)

• Sharing Korea’s environmental disruption technology and business experience
• Tighten cooperation between two economies in environmental disruption field
• Complete full package: Mine development → construct infrastructure → Prevention environmental disruption
Purpose of suggestions
Promotion of official cooperation based on partnership in field of mineral resources & energy

Current status in Joint Committee on Mineral Resources & Energy
- 36 economy governments worldwide
- 9 APEC economies in field of energy & resources
  - APEC members
    - Australia, Viet Nam, Russia, Peru, Chile, Etc

Suggestions
Building mechanisms of cooperation with non-member economies among APEC members

Thank You!