INDIA

KOREA’S STEEL INDUSTRY -- RAW MATERIALS & ENVIRONMENTAL POLICY --

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Korea’s Steel Industry
-- Raw Materials & Environmental Policy --

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Ministry of Commerce, Industry & Energy

Presentation Outline

1. Current Status
2. Major Challenges
3. Development Tasks
   3-1. Stable Supply of Raw Materials
   3-2. Environment-Friendly Technology
Current Status

Korea’s Crude Steel Production: 4.2% of global share
Since 1965, crude steel production has increased 209 fold.
  • 1981: Production reached 10M tons and maintained avg. annual growth of 7%
  • 1998: Financial crisis temporarily slowed production

Production

Crude steel production: 230,000 tons (1965)
Crude steel production surpassed 10M tons (1981)
Financial crisis (1997)
Crude steel production surpassed 30M tons (1993)
Crude steel production: 47.82M tons (2005)
POSCO Gwangyang Works completed (1992)
Electric furnace facility expansion (mid 90s)
Demand & Supply

- Crude steel production: total 47,820 (in thousand tons)
  - 26,728 converters; 21,092 electric furnaces
  - 7,468 specialty steel; 40,351 ordinary (carbon) steel
- Demand of steel products: total 63,385 (in thousand tons, including semi-finished)
  - 16,261 export; 47,124 domestic consumption
- Steel products production: total 55,065 (in thousand tons)
  - 18,589 long products; 30,715 flat products; 4,072 steel pipes; 1,083 castings & forgings

Demand by Industry

- Demand in construction has been decreasing since 1995 while demand in the automotive and shipbuilding sectors has increased
- 2004 Steel consumption by industry (%)
  - Construction: 40; Automotive: 20; Shipbuilding: 18; Home appliance: 7.4
  - Fabricated metal products: 7; Machinery: 4

(Unit: %)
Trade

- 2002: Shift to a net steel importer
  - 2006: export 16.3; import 18.9 (in million tons)
- Import-export structure by region
  - Korea’s trade concentrated on China, Japan, and Southeast Asia
  - Sharp increase in bilateral trade with China since mid 1990s

Korea's Steel Imports

- E.U. (25)
- Japan
- China
- Korea
- Others

Korea's Steel Exports

- E.U. (25)
- USA
- Japan
- Southeast Asia
- China
- Others

Major Challenges
Raw Materials

- Korea relies heavily on imports for raw materials making it vulnerable to external conditions
  - 100% of Iron & Coking Coal; 30% of Steel Scrap
  - Korea’s annual imports
    - Iron Ore: 430mil tons; Coking Coal: 210mil tons; Steel Scrap: 7mil tons

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Australia</th>
<th>Brazil</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Ore</td>
<td>57%</td>
<td>33%</td>
<td>9%</td>
</tr>
<tr>
<td>Coking Coal</td>
<td>55%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Steel Scrap</td>
<td>42%</td>
<td>26%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Environmental Regulations

- The Kyoto Protocol, which entered into force on 16 Feb 2005, is emerging as a new economic guideline and technology yardstick
  - Stricter and target-specific regulations, such as CO₂ reduction, have compelled industries to adopt environment-friendly practices
  - Korea is the world’s 10th largest CO₂ emitter

<table>
<thead>
<tr>
<th>Emission By Industry</th>
<th>Energy 82.7%</th>
<th>Industrial 12.1%</th>
<th>Waste 6.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission By Gas Type</td>
<td>CO₂ 87.7%</td>
<td>HFO₂ 1.3%</td>
<td>NO₂ 3.1%</td>
</tr>
<tr>
<td></td>
<td>N₂O 3.1%</td>
<td>HFO₃ 0.5%</td>
<td>SF₆ 5.0%</td>
</tr>
</tbody>
</table>
Energy Consumption

- As an energy-intensive industry, steel production costs may rise with stricter international environmental regulations
  - The steel industry consumes 10.5% of energy in Korea, but the proportion is declining: 12.8% ('90) → 11.0% (2000) → 10.5% (2004)

Domestic Energy Consumption (Unit: thousand TOE)

3 Development Tasks

3-1 Stable Supply of Raw Materials
Raw Materials Supply

Steel Scrap
- Korea is the world’s 3rd largest steel scrap importer
- Steel Scrap the only raw material obtainable domestically
- Systematic scrap management and improvement of scrap recovering and processing technology

Mine Development & Overseas Steel Mill Construction
- Partnering with international raw materials suppliers
  - Investments in coal, iron ore mines or joint ventures with firms in Australia, Canada, Brazil
  - Overseas steel mills with India, Brazil, among others

Overseas Mines Investment

<table>
<thead>
<tr>
<th>Projects</th>
<th>Start-up</th>
<th>Ownership</th>
<th>Investment ($M)</th>
<th>Offtake (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>2003, 2010</td>
<td>20%</td>
<td>12.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Brazil</td>
<td>1998</td>
<td>50%</td>
<td>38.5</td>
<td>2.7</td>
</tr>
</tbody>
</table>

- POS-MAC (Iron Ore 22Mtpa)
- Jack Hills (Iron Ore 7.5Mtpa)
- KOBRAPO (Pellet 5Mtpa)
Development Tasks

3-2 Environment-Friendly Technology

Overview of Gov’t Measures

UNFCCC Task Force Committee

- Implementation of the 1st-3rd comprehensive action plan (CAP) (‘99~’07) in line with UNFCCC
  - Future commitments: establishment of GHG emission statistics & statistical framework for policy building
  - Energy saving/efficiency improvements & GHG reduction efforts

- Results from the 1st-2nd CAP: annual GHG emission decreased from 5% to 3%

- Participation in APP on Clean Development and Climate including Steel Task Force
Overview of Gov’t Measures

Government & Industry Information Exchange Network
- Establishment & Operation of Task Force for steel industry together with 7 other designated sectors
  - UNFCCC promotion & education; reviewing GHG emission protocol & framework; case studies on successful UNFCCC measures in other countries
- Increased participation rate of steel companies in VA (Voluntary Agreement): 2 in 1998 → 25 in 2005
  - POSCO signed on a demo agreement in Dec. 1998 / the number of KOSA (Korea Iron & Steel Association) members: 34
  - Reduction of energy use in overall industry from 1998 to 2004: 9,427 thousand TOE (2.5 trillion won)
  - The number of VA participatory companies: 15 in 1998 → 1,288 in 2005

Sustainable Development

- Development of environment-friendly and energy-saving technologies
  - Commercializing next-generation iron-smelting process: FINEX is scheduled for completion in December 2006; strip-casting in June 2006
  - Extending production of environment-related products: automotive steel sheets (hydroforming, TWB); chrome-free steel sheets

<table>
<thead>
<tr>
<th>Process</th>
<th>Cost Cuts in Production</th>
<th>Cost Cuts in Facility &amp; Investment</th>
<th>Cost Cuts in Production</th>
<th>Eco-friendliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINEX</td>
<td>19%</td>
<td>22%</td>
<td></td>
<td>Reducing emission of pollutants</td>
</tr>
<tr>
<td>Strip Casting</td>
<td>40%</td>
<td>1/3</td>
<td></td>
<td>Reducing energy consumption by 75-85%</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(SOx 100%→8% NOx 100%→4% Dust 100%→21%)</td>
</tr>
</tbody>
</table>
Strip Casting

Steelmaking | Casting | Grinding | Reheating | Rolling

Conventional

200 mm 2.7 ~ 6 mm
500 m
32 mm
70 m
HR

elimination

Strip Casting

1.6 ~ 3.0 mm
70 m
HR

FINEX

Blast Furnace

Fine Ore
Coking coal
Sinter Plant
Coke Ovens
Sinter
Coal
Blast Furnace
Hot Metal

FINEX

Non-Coking Coal
Fluidized Bed Reactors
Coal Briquettes
Metall Gasifier
Hot DRI Compactor
Hot Metal

Fine Ore

DSTI/SU/SC(2006)29
Energy-Saving Measures

- Energy Conservation through recovery facilities
- LNG electricity generation
- Promotion of recycling by-products and water
- Participation in international efforts as IISI “CO₂ Breakthrough Programme”

Thank you for your attention!

Ministry of Commerce, Industry & Energy
Republic of Korea