Energy Market of Korea

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1. ENEGY STATUS
Korea at a Glance

Korea in the World (2004)

- Population: 25th (48 million)
- GDP: 11th (680 billion dollars)
- TPES: 10th (215 million TOE)
- Oil consumption: 7th (2.3 million b/d)
GDP Growth & Energy Consumption

![Graph showing GDP Growth & Energy Consumption between 1980 and 2004. The graph displays a steady increase in both GDP and energy consumption over the years.](image-url)
Korea in World Energy Trade

- **Overseas Energy Dependency**
  
  1980: 73.5%
  2004: 96.6%

- **Energy Imports**
  
  1980: US$ 6.7 billion
  2004: US$ 49.6 billion

- **Korea as Main Energy Importer**
  
  LNG: 2nd, 22 MT (2004)
2. ENERGY CONSUMPTION
Energy Consumption by Source

1980
- Bituminous: 22.5%
- Anthracite: 7.6%
- LNG: 0.0%
- Nuclear Power: 2.0%
- Hydro: 1.0%
- etc: 5.7%
- Oil: 61.1%

2004
- Bituminous: 22.0%
- Anthracite: 2.0%
- LNG: 12.9%
- Nuclear Power: 14.8%
- Hydro: 0.7%
- etc: 2.0%
- Oil: 45.6%
Trends of Oil Dependency (’79~’04)

- During the 1990s, the petrochemical industry expanded its production facilities.
  - Ethylene output increase:
    1 m ton in 1990; 3.5 m ton in 1994; 5.1 m ton in 1998; and 5.5 m ton in 2000.
- Since the 1988 Olympics, the number of cars has sharply increased from 1.1 m in 1988 to 5.1 m in 1994, to 10 m in 1997 and to 12 m in 2000.
Power Generation by Source

The share of oil is **78.7%** in 1980

- Oil: 78.7%
- LNG: 0%
- Hydro: 5.3%
- Nuclear Power: 9.3%
- Coal: 6.7%

35,600GWh

The share of oil is **6.5%** in 2004

- Oil: 6.5%
- LNG: 16.4%
- Hydro: 1.7%
- Nuclear Power: 38.2%
- Coal: 37.2%

342,200GWh
3. ENERGY INDUSTRY
Petroleum Industry

**OIL IMPORT (’04):** 826 million barrel, approx. 30 billion $

- Total 826 M B (30 Billion $)
- Saudi, 258 (31%)
- UAE, 150 (18%)
- Iran, 59 (7%)
- Kuwait, 73 (9%)
- Others, 286 (35%)

**OIL CONSUMPTION Status & Prospect**

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil Consumption (million barrel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>'70</td>
<td>55</td>
</tr>
<tr>
<td>'80</td>
<td>183</td>
</tr>
<tr>
<td>'90</td>
<td>356</td>
</tr>
<tr>
<td>'00</td>
<td>743</td>
</tr>
<tr>
<td>'04</td>
<td>753</td>
</tr>
<tr>
<td>'05</td>
<td>761</td>
</tr>
<tr>
<td>'10</td>
<td>796</td>
</tr>
</tbody>
</table>

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Exports of petroleum products by Country (As of 2003)

- Korea: 209 million barrels
- China: 98 million barrels
- Japan: 29 million barrels
- Australia: 36 million barrels
- Taiwan: 77 million barrels
Trends of exports of petroleum products (’01~’04)

- 2001: $7.78 billion
- 2002: $6.45 billion
- 2003: $6.65 billion
- 2004: $10.17 billion

Billion $
Oil Refining

- **Refining Capa.:** 2.7 million B/D
  *the 5th in the world: USA>Russia>Japan>China>Korea*

- **Rate of Highly Advanced Facility:** 22.5%(615 thousand B/D),
  *the 8th in the world (USA>Italy>Swiss>UK>Japan>China>Taiwan>Korea)*
Gas Industry (LNG)

LNG IMPORT ('04): 22 million ton
approx. 6.5 billion $

- Qatar, 5.8 (26.7%)
- Indonesia, 5.3 (24.3%)
- Malaysia, 4.6 (21.3%)
- Oman, 4.4 (20.2%)
- Others, 1.6 (7.4%)

Total 22 million ton (6.5 billion $

LNG CONSUMPTION Status & Prospect

<table>
<thead>
<tr>
<th>Year</th>
<th>Unit: 1,000 ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>'87</td>
<td>1612</td>
</tr>
<tr>
<td>'90</td>
<td>2316</td>
</tr>
<tr>
<td>'00</td>
<td>14,216</td>
</tr>
<tr>
<td>'04</td>
<td>21,322</td>
</tr>
<tr>
<td>'10</td>
<td>25,331</td>
</tr>
<tr>
<td>'17</td>
<td>31,657</td>
</tr>
</tbody>
</table>

Unit: 1,000 ton
LNG Ship Building

- About 73% market share in the world
Coal Industry

- **Coal Import’04**: 76 million ton, the 2nd largest Import
  * Japan is the largest importing country
- **Import Source**: * Australia 30 million ton(40%), China 24 million ton(31.4%)*

### Import by Source (unit: million ton)
- **Australia**: 30 million ton (39.5%)
- **China**: 24 million ton (31.4%)
- **Indonesia**: 11 million ton (14.7%)
- **Russia**: 5 million ton (6.6%)
- **Others**: 6 million ton (7.8%)

### Total
- **Total**: 76 million ton (4.1 billion $)

### COAL CONSUMPTION Status & Prospect

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic Coal</th>
<th>Importing Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>'74</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>'84</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>'94</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td>'04</td>
<td>78</td>
<td>4</td>
</tr>
<tr>
<td>'05</td>
<td>84</td>
<td>4</td>
</tr>
</tbody>
</table>

### Chart Notes
- **Unit**: million ton
- **Status & Prospect**: 2005
District Heating Industry

- The First Supply: 1987
  - Rate of Supply ('04): 10.4%, 1.34 million Household
4. Long-Term ENERGY DEMAND FORECAST
Long-term Demand Forecast

- Energy demand by fuel

(Unit: Million TOE)

- Oil dependency is declining, but oil will remain the primary fuel.

- Demand for LNG is projected to grow by 5% per year, the highest growth rate.

- Coal and nuclear energy is projected to grow steadily together with increasing demand of electricity.

Source: KEEI, May 2001
Long-term Demand Forecast

- Energy demand by sector

Bar chart showing energy demand by sector for the years 2000, 2010, and 2020.
5. ENERGY POLICY
Developments in Korea’s Energy Policy

- **70’s: To secure oil supply**
  - Oil was cheap and easily accessible. After the two oil shocks, however, energy supply became an important policy issue.

- **80’s: To establish a stable supply system**
  - Energy source diversification, and expansion of energy supply infrastructure

- **90’s: To strengthen market functions**
  - In the late 90’s, structural reform was undertaken to introduce competition
  - Deregulation: oil price liberalization, elimination of entry barriers to oil industry, rationalization of coal industry
Goal and Direction of Korea’s Energy Policy

- Energy Security
- Sustainable Development
- Market Efficiency through Competition
- Environment-friendly Energy system
(1) Energy Security

- Energy Diversification Policy
  - Diversification of import sources

- Overseas Resources Development

- Oil Stockpiling
  - 113 Days of Emergency Stocks (as of Dec. 2004)

- International Cooperation

- Expanding Energy Supply Infrastructure
(2) Market Efficiency through Competition

- **Restructuring the Electricity Industry**
  - Currently, competition in generation sector is well underway
  - Next step: introducing competition into distribution sector

- **Restructuring the Gas Industry**
  - Restructuring plan announced in November 1999
  - Decisions to be made on import and wholesale sector:
    - Whether to spin off KOGAS into several companies
    - Or keep KOGAS and introduce a new player.
Energy Efficiency of Korean Industries

Korea’s energy intensity compared with developed countries

Energy intensity is the ratio of total domestic energy consumption to gross domestic product (TOE per US$1,000)

Energy Efficiency of Korean Industries

Higher energy intensity does not necessarily mean Korean industries are inefficient.

Energy-intensive industries account for a larger proportion of value added in Korea.

Energy-intensive industries create lower value-added with the same energy input.

Non-energy-intensive industries: electronic, machinery, fine chemical

Energy-intensive industries: steel, metal, ceramic, petrochemical, etc.
Korea’s energy efficiency is at the same level as that of advanced countries. Due to Korea’s dependence on low-end production, however, value-added in Korea is relatively lower than in its developed counterparts.

<table>
<thead>
<tr>
<th>Industry (Item)</th>
<th>Energy Intensity (Mcal/ton)</th>
<th>Korea</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>steel (billets, electricity intensity)</td>
<td>420kWh</td>
<td>420kWh</td>
<td>515kWh</td>
</tr>
<tr>
<td>petrochemical (ethylene )</td>
<td>4,425</td>
<td>4,425</td>
<td>4,800</td>
</tr>
<tr>
<td>textile (acrylic fiber )</td>
<td>12,124</td>
<td>12,124</td>
<td>12,780</td>
</tr>
<tr>
<td>ceramic (cement)</td>
<td>263</td>
<td>263</td>
<td>239</td>
</tr>
<tr>
<td>paper (newspaper)</td>
<td>4,442</td>
<td>4,442</td>
<td>4,107</td>
</tr>
</tbody>
</table>

Sources: Industry Performance Under Voluntary Agreements (MOCIE, KEMCO, 2002)
### Energy Efficiency by Country: The Power Generation Industry

As of 2003, thermal efficiency in Korea’s power generation was 39.94%, which is among the highest in the world.

<table>
<thead>
<tr>
<th>Country</th>
<th>Korea '01</th>
<th>Korea '03</th>
<th>US</th>
<th>France</th>
<th>Italy</th>
<th>UK</th>
<th>Japan</th>
<th>Taiwan</th>
</tr>
</thead>
<tbody>
<tr>
<td>thermal efficiency of power generation* (%)</td>
<td>39.6</td>
<td>39.94</td>
<td>36.9</td>
<td>37.6</td>
<td>33.9</td>
<td>35.7</td>
<td>40.8</td>
<td>35.3</td>
</tr>
</tbody>
</table>
(3) Environment-Friendly Energy System

- **Addressing Climate Change**
  - Transition to low-carbon economy

- **Infrastructure of Kyoto Mechanism**
  - Classified as Non-Annex I in the UNFCCC
  - Studies on Introducing Domestic Emissions Trading

- **Clean Energy Supply System**
  - New and renewable energy supply
Korea’s renewable energy sources

- In renewable energy sources, Korea has a lower share
  - However, Carbon Intensity is lower than that of most OECD countries

< Renewable energy supply and CO2 emission among major economies >

<table>
<thead>
<tr>
<th></th>
<th>Korea</th>
<th>Denmark</th>
<th>France</th>
<th>U.S.A</th>
<th>Germany</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply rate (%)</td>
<td>1.4</td>
<td>10.4</td>
<td>6.8</td>
<td>4.4</td>
<td>2.6</td>
<td>3.1</td>
</tr>
<tr>
<td>Carbon Intensity (t-CO2)</td>
<td>2.22</td>
<td>2.59</td>
<td>1.42</td>
<td>2.47</td>
<td>2.42</td>
<td>2.33</td>
</tr>
</tbody>
</table>

Note: Data on renewable energy supply is as of 2001 and CO2 emission is as of 2002
Thank you!