Industrial Energy Efficiency Promotion Policies in Republic of KOREA

Korea Energy Economics Institute

Dr. Seung Jick YOO
Contents

- Energy Consumption in Trend and Projection
- Policies and Measures for Energy Efficiency
- Improvement in Industrial Sector
- Energy Efficiency policies w/Climate Change
- Policy
# Final Energy Consumption by Sectors

(Unit: Thou. TOE)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>1991</th>
<th>1996</th>
<th>2001</th>
<th>2006</th>
<th>Growth Rate/year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>91-96</td>
</tr>
<tr>
<td>Industrial Sector</td>
<td>42,914 (51.2)</td>
<td>67,868 (51.4)</td>
<td>85,158 (55.7)</td>
<td>97,235 (56.0)</td>
<td>9.6</td>
</tr>
<tr>
<td>Transportation</td>
<td>16,156 (19.3)</td>
<td>29,792 (22.6)</td>
<td>31,909 (20.9)</td>
<td>36,527 (21.0)</td>
<td>13.0</td>
</tr>
<tr>
<td>Household, Buildings</td>
<td>21,919 (26.2)</td>
<td>31,713 (24.0)</td>
<td>32,893 (21.5)</td>
<td>35,986 (20.7)</td>
<td>7.7</td>
</tr>
<tr>
<td>Public Sector</td>
<td>2,813 (3.4)</td>
<td>2,659 (2.0)</td>
<td>2,989 (2.0)</td>
<td>3,836 (2.2)</td>
<td>-1.1</td>
</tr>
<tr>
<td>Total</td>
<td>83,803 (100.0)</td>
<td>132,033 (100.0)</td>
<td>152,950 (100.0)</td>
<td>173,584 (100.0)</td>
<td>9.5</td>
</tr>
</tbody>
</table>
Trend of Energy Intensity Indication

  - Annual improvement rate of 1.4% for the last 5 yrs (2001~06)
  - High Share of Manufacturing Industry (29% in 2005 cf. Japan (22.5%)) and Energy Intensive Industries (28.3%, Japan (20.9%))
Int’l Comparison of Energy Intensity w/ per capita GDP

KEY WORLD ENERGY STATISTICS from the IEA in 2005, 2007

- Energy Indicator Improvement w/ Increase in per Capita Income.
- Showing Above Average Energy Intensity, but Following Other Countries’ Path
## Recent Changes in Energy Consumption Sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>'02</th>
<th>'03</th>
<th>'04</th>
<th>'05</th>
<th>'06(p)</th>
<th>AAGR(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>'02~'06</td>
</tr>
<tr>
<td>Industrial Sec.</td>
<td>89.2</td>
<td>90.8</td>
<td>93.0</td>
<td>94.4</td>
<td>96.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Transportation</td>
<td>33.8</td>
<td>34.6</td>
<td>34.6</td>
<td>35.6</td>
<td>36.6</td>
<td>2.0</td>
</tr>
<tr>
<td>Household/Commercial/Public Sec.</td>
<td>37.5</td>
<td>38.6</td>
<td>38.4</td>
<td>41.0</td>
<td>40.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>160.5</td>
<td>164.0</td>
<td>166.0</td>
<td>171.0</td>
<td>173.4</td>
<td>2.0</td>
</tr>
</tbody>
</table>

- **Stabilization of Energy Consumption in Industrial Sector**
  - Decrease in Share of Energy Intensive Industry from 31.1% (‘02) to 26.4% (‘06)
  - Higher Growth of High Value Added Industries s/ IT Industry
- **Transportation & Household/Commercial/Public Sector**: still showing high growth
## Forecast of Energy Consumption by Sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>2006</th>
<th>2012</th>
<th>2017</th>
<th>AAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>06-12</td>
</tr>
<tr>
<td>Industrial Sector</td>
<td>97.2 (56.0)</td>
<td>111.9 (54.7)</td>
<td>125.3 (54.5)</td>
<td>2.4</td>
</tr>
<tr>
<td>Transportation</td>
<td>36.5 (21.0)</td>
<td>42.4 (20.8)</td>
<td>47.5 (20.7)</td>
<td>2.5</td>
</tr>
<tr>
<td>Household, Commercial, Public Sector</td>
<td>39.8 (22.9)</td>
<td>50.1 (24.5)</td>
<td>57.0 (24.8)</td>
<td>3.9</td>
</tr>
<tr>
<td>Total</td>
<td>173.6</td>
<td>204.4</td>
<td>229.8</td>
<td>2.8</td>
</tr>
</tbody>
</table>

- Share of Industrial Sector Decreasing from 56% to 54.5%.
- Industrial Sector Showing AAGR of 2.3% Lower than That(4.5%) of GDP
  - Efficiency Improvement and Larger Share of Service and High Value Added Industry
Policies to Improve Energy Efficiency(I)

- Voluntary Agreement
  - Firm/Plant(> 2 TMTOE): Voluntarily Preparing Energy Efficiency Improvement Plan and Committing itself to Achieve Target
  - Government: Providing Fund at Preferential Interest Rate and Tax Credit
  - Voluntary Agreements made: 1,353 Plants(1.64MMTCO2/yr) as of Dec. 2006
    - 532('02)→686('03)→1,021('04)→1,288('05)→1,353('06)
  - Introduction of Negotiated Agreement: Involvement of Government in Planning and Setting Target Stage

Improvement of Energy Intensity (MMTE/Ton)
- Paper: 11.1%, Cement: 8.9%, Section Steel: 12.2%, Low Density Poly Ethylene: 11.8%
- Steel: Korea: Japan: USA: EU = 105:100:120:110
- Cement: Korea: Japan: USA: EU = 131:100:177:130
Policies to Improve Energy Efficiency(II)

- Energy Audit and Management of Energy Use
  - Mandatory Audit for Energy Intensive Use Plants: > 2 TMTOE, Every 5 years
  - Free Audit for the Mid- and Small-Size Firms

<Potential Fuel and Cost Savings through Energy Audit and Inspection in 2004>

<table>
<thead>
<tr>
<th>Type</th>
<th>Company</th>
<th>Energy Consumption</th>
<th>Saving Rate(%)</th>
<th>Fuel Savings</th>
<th>Cost Savings (million Won/yr)</th>
<th>Investment Cost (million won)</th>
<th>Payback Period (yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-depth Audit</td>
<td>113</td>
<td>3,033,033 Heat: 2,258,300 Electricity: 10.4 6.2</td>
<td>315,717 Heat: 140,326 Electric: 129,542</td>
<td>241,869</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free Audit</td>
<td>350</td>
<td>175,694 Heat: 471,174 Electricity: 8.7 6.5</td>
<td>15,346 Heat: 30,406 Electric: 7,992</td>
<td>14,059</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: www.kemco.or.kr
Policies to Improve Energy Efficiency (III)

- Demand-side Management by Energy Suppliers
  - Rebates, Cash-Back (5% decrease in Electricity Use in Household)
  - Considering Mandatory Efficiency Improvement Target to the Suppliers.

- Promotion of ESCO Firms and Projects in Industrial Sector
  - Initially for CHP, but extended to include process control, waste heat recovery facilities and cooling and heating systems, as well as process improvement.

- Financial Incentives to ESCO Firms and Projects
  - Budget: ('04) 83.1 Billion Won → ('06) 133.3 Billion Won → ('07) 147.4 Billion Won
  - Interest Rate for Loan: ('04) 5.25% → ('05) 3.0% → ('06) 3.0%
  - Working Capital Loan for Mid-Small ESCO firms

- Introduction of Performance Guarantee and Developing Human Resources/Expertise
Policies to Improve Energy Efficiency (IV)

- Financial Incentives for Investment on Energy Conservation Projects
  - Increase in Size of Fund for the Investment on Energy Conservation Projects
    - ('01)386.9 Billion Won → ('03)477.3 Billion Won → ('06)644.6 Billion Won → ('07)640.2 Billion Won

- Promotion of Loan from Commercial Banks to Mid-Small Size Firms
  - 30% of the fund (137.4 billion Won) for rational use of energy allocated to the mid-small size firms in 2005
  - Preferential treatment of the mid-small size firms: 90% of the budget of the projects and 70% of ESCO fund

- Increase in Tax Credit for Investment to 10% from 7% as of January 2005.
Policies to Improve Energy Efficiency (V)

- Standards and Certification
  - Increase in Number of Certified Energy Instruments (34 to 37 products)
    - Turbo blower, Condensing Burner, Motor, Boiler etc.
  - Minimum Standard for Electric Motor (Consuming 40% of Electricity)
  - The 7-Runners Program: R&D of Technology
    - Efficiency Improvement Target (to 2012): Boiler (89% → 95%), Electric Motor (85% → 90%), Furnace (40% → 60%), Dryer (50% → 75%) etc.

- E-top Program (Planned)
  - Energy Intensity Standards at the World Top Established for 30 Heavy Energy Using Instruments at the
  - Contracts with businesses on their goals and deadlines for efficiency improvement and provide financial supports at the favourable interest from 3 percent to 2 percent.
Further E.E. Improvement in Kyoto Mechanism

- CDM Projects
  - Bi-lateral and Uni-lateral CDM Projects
  - 12 Projects, CERs (13MMTCO2/yr, 10% of Global CERs, 2007.4)
  - Active Identification of CDM Projects

- Launching 1st Carbon Fund
  - Investment on CDM Projects, CERs and AAUs
  - Initial Size: 200 Billion Won

- Voluntary Emission Trading within a Firm
- Credit as Early Action and Government Purchasing of KCERs in National Registry
Thank You for Your Attention!

Dr. Seung Jick YOO

Korea Energy Economics Institute
sjyoo@keei.re.kr