Evolution of Industrial Policy and Green Growth in Korea

Sanghoon Ahn
Managing Director
Korea Development Institute
Part-01 Industrial Policy in East Asia
## Industrial Policy: Literature Review

<table>
<thead>
<tr>
<th>Schools</th>
<th>Insights on sector identification and promotion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental state</td>
<td>Government picks winners (in consultation with business).</td>
</tr>
<tr>
<td>(Johnson 1982; Amsden 1989; Wade 1990)</td>
<td></td>
</tr>
<tr>
<td>Rent-seeking</td>
<td>Government can’t and shouldn’t pick winners. (Self-fulfilling incompetence and corruption?)</td>
</tr>
<tr>
<td>(Krueger 1974)</td>
<td></td>
</tr>
<tr>
<td>Self-discovery</td>
<td>Winners pick themselves, with help from search and problem-solving networks.</td>
</tr>
<tr>
<td>(Rodrik 2007)</td>
<td></td>
</tr>
<tr>
<td>New structural economics</td>
<td>Latecomers can pick winners in mature industries by benchmarking early movers (based on CA).</td>
</tr>
<tr>
<td>(Lin and Monga 2010)</td>
<td></td>
</tr>
<tr>
<td>Product space</td>
<td>Winners are readily identifiable, but how do we go from the periphery to the core?</td>
</tr>
<tr>
<td>(Hidalgo et al. 2007)</td>
<td></td>
</tr>
<tr>
<td>Strategic risk-taking</td>
<td>Winners are readily identifiable, but the key is to take strategic risks, weighing the challenges of skill accumulation, scale economies, and complementary investments against the possibility of capacity underutilization and financial distress.</td>
</tr>
</tbody>
</table>
Trade and productivity growth in East Asia

  - Focusing on East Asian miracle economies as “large scale exporters of manufactured goods of increasing sophistication”
  - (1) The main engine of growth is the accumulation human capital, especially in the form of learning-by-doing on the job;
  - (2) For such learning to persist, workers and managers should continue to take on new tasks;
  - (3) For such learning to continue on a large scale, the economy must be a large scale exporter.
Industrial Policy in Korea

- IP for Export Promotion
- IP with Effective Monitoring and Evaluation
- IP as a Public-Private Partnership
- IP in a Rapid Evolution
Industrial Policy Approaches

- **Outward-Oriented, Bottom-up, Integrated Industrial Policy**
  - Discover latent and potential comparative advantage through experimentation and international benchmarking.
  - Positively reinforce successful experiments and phase out unsuccessful experiments by providing performance-based rewards.
  - Systematically study what has to be done to fill the missing links in the domestic value chain and move up the quality ladder, and make concerted efforts to aim for international competitiveness from the outset.
  - Take strategic risks, weighing the challenges of skill accumulation, scale economies, and complementary investments against the possibility of capacity underutilization and financial distress.

- **Inward-Oriented, Top-down, Ad Hoc Industrial Policy**
  - Promote upstream industries with large spillovers (“Big Push” through coordinated domestic industrialization).
  - Go top-down. Disregard feedback.
  - Problem: Insufficient Demand, Suboptimal-Scale Plants, Higher Costs, Monumental Projects

Korea retained the ownership of its export-oriented industrialization and progressively developed its own capabilities to add value and manage risks even as it actively learned from, and engaged with, the outside world.
Korea’s Big-Push Partnership: Government and Business Groups

- Two-Tier Approach to Coordination and Innovation
  - Government: National-Level Coordination and Innovation
  - Chaebol: Group-Level Coordination and Innovation
  - Big-Push Partnership: Information and Risk Sharing

- International Trade as an Essential Component
  - Coordination
  - Scale Economies: Overcoming the Limits of Domestic Market
  - Market Test and Reward Based on Performance in a Competitive Setting: Less Prone to Political Influence and Manipulation
  - Learning by Exporting: Upgrading Mechanism

- Containment of Corruption and Rent-Seeking
  - Changes in Political Economy (1960-61)
  - Meritocracy, Monitoring, and Incentives
Part-02  |  Trade and Industrialization in Korea
<table>
<thead>
<tr>
<th>Year</th>
<th>Per Capita GDP (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1945</td>
<td>67</td>
</tr>
<tr>
<td>1953</td>
<td>87</td>
</tr>
<tr>
<td>1962</td>
<td>100 (1964)</td>
</tr>
<tr>
<td>1970</td>
<td>1,000 (1977)</td>
</tr>
<tr>
<td>1980</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>11,432</td>
</tr>
<tr>
<td>1995</td>
<td>7,355</td>
</tr>
<tr>
<td>1998</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>16,413</td>
</tr>
</tbody>
</table>

**7 Five-Year Economic Development Plans**

- Liberation (1945)
- Korean War (1950–53)
- Big Push
- Join OECD (1996)
- Financial Crisis (1997)
Industrialization: GDP share

Note: Services include public utilities and construction.
Source: Bank of Korea (http://ecos.bok.or.kr).
Industrialization: Employment share

Source: National Statistical Office (http://www.kosis.kr)
Industrialization: How Long Did It Take?

Netherlands (98)
Denmark (114)
Belgium (75)
France (104)
Ireland (114)
U.S. (54)
Germany (68)
Canada (41)
Norway (68)
Sweden (45)
Japan (39)
Italy (34)
Venezuela (32)
Spain (33)
Finland (25)
Portugal (36)
Taiwan (20)
Malaysia (26)
Korea (19)

Note: The numbers in parentheses indicate the length of the industrialization period in years.
Source: Jungho Yoo (1997).
Changes in Export Commodity Profile

- **Wig**
- **Textile**
- **Automobile**
- **Semiconductor**

**HCl Product**
Semiconductor, Mobile Phone, DTV, Display, Automobile, Ship-building, etc.

**Light Industry Product**

**Agricultural Product**

- 1960: 50%
- 1970: 14%
- 1980: 6%
- 1990: 14%
- 2000: 80%
## Korea’s Top 10 Exports: Evidence on Industrial Upgrading

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Iron Ore</td>
<td>Textiles</td>
<td>Textiles</td>
<td>Electronics</td>
<td>Semiconductors</td>
</tr>
<tr>
<td>2</td>
<td>Tungsten Ore</td>
<td>Plywood</td>
<td>Electronics</td>
<td>Textiles</td>
<td>Computers</td>
</tr>
<tr>
<td>3</td>
<td>Raw Silk</td>
<td>Wigs</td>
<td>Iron and Steel Products</td>
<td>Footwear</td>
<td>Automobiles</td>
</tr>
<tr>
<td>4</td>
<td>Anthracite</td>
<td>Iron Ore</td>
<td>Footwear</td>
<td>Iron and Steel Products</td>
<td>Petrochemical Products</td>
</tr>
<tr>
<td>5</td>
<td>Cuttlefish</td>
<td>Electronics</td>
<td>Ships</td>
<td>Ships</td>
<td>Ships</td>
</tr>
<tr>
<td>6</td>
<td>Live Fish</td>
<td>Fruits and Vegetables</td>
<td>Synthetic Fibers</td>
<td>Automobiles</td>
<td>Wireless Telecommunication Equipment</td>
</tr>
<tr>
<td>7</td>
<td>Natural Graphite</td>
<td>Footwear</td>
<td>Metal Products</td>
<td>Chemicals</td>
<td>Iron and Steel Products</td>
</tr>
<tr>
<td>8</td>
<td>Plywood</td>
<td>Tobacco</td>
<td>Plywood</td>
<td>General Machines</td>
<td>Textile Products</td>
</tr>
<tr>
<td>9</td>
<td>Rice</td>
<td>Iron and Steel Products</td>
<td>Fish</td>
<td>Plastic Products</td>
<td>Textile Fabrics</td>
</tr>
<tr>
<td>10</td>
<td>Bristles</td>
<td>Metal Products</td>
<td>Electrical Goods</td>
<td>Containers</td>
<td>Electronics Home Appliances</td>
</tr>
</tbody>
</table>
Manufacturing Structure

Source: Bank of Korea (http://ecos.bok.or.kr)
Exports and Imports (1953-2009)

Source: Bank of Korea (http://ecos.bok.or.kr).
Inflows of grants, loans, and FDI (1953-2009)

[Graph showing inflows of grants, loans, and FDI from 1953 to 2009.]

Sources: 1) Among grants, financial aid from U.S. and international organizations are from Bank of Korea, Economic Statistics Yearbook, 1984, p.245, and reparation payments from Japan are from Economic Planning Board, Whitepaper on Reparation Payments, 1976, p.29.
3) Commercial and public loans (1966-2007), foreign direct investment and GDP are from Bank of Korea (http://ecos.bok.or.kr).
Part-02 Evolution of Trade Policy in Korea
Import-Substitution in the 1950s

- One of the poorest country in the world
- Pursued import-substitution industrialization
  - “Three white” industries etc.
  - Limited by the small size of domestic market
- Dependent on foreign aid
  - 50% of government expenditure, 70% of import
  - Domestic currency overvalued, import regulated
  - Lack of foreign currency for investment
Export-Promotion in the 1960s

- First 5-year economic development plan (1962-)
  - To end the vicious circle of poverty
- Rapid export expansion started
  - Three devaluations triggered export expansion
- Export drive by strong export promotion policy
  - Export targets (1962), monthly export promotion meetings (1964), Korea Trade Promotion Agency (KOTRA, 1962)
  - Comprehensive Export Promotion Program (1964)
  - Subsidies, tax incentives, credit incentives, tariff rebates …
  - All abolished by the 1980s (too costly; countervailing duties)
Promoting HCIs in the 1970s

- Government-led HCI promotion
  - To promote the defense industry for self-defense
  - To catch up Japan in HCIs
  - To respond to increased protectionism in light industries
  - To achieve import-substitution in capital goods

- Top-down approach towards private firms
  - Long-term policy loans at preferential rates with tax benefits
  - Public investment in human capital and infrastructure
  - Giving favors to large enterprise groups ("Chaebol")

- Temporary import-substitution measures to protect HCIs
Stabilization / Liberalization in the 1980s

- Drastic change in policy directions
  - From growth to stability
  - From government-led to private-sector-led
- Macroeconomic stabilization
  - Comprehensive Economic Stabilization Program (1979)
- Industrial rationalization
- Financial liberalization
- Market opening
Marginal effective tax rates on corporate income

Light industries

Heavy and chemical industries

Trend in R&D expenditure

Import liberalization

Korea’s tariff rates (1978-2007)

Source: APEC (http://www.apectariff.org).
Part-03 | Case Study: Automotive Industry
Korea’s industrial policy involve top down / economy wide directives for technological upgrading and achievement of international scale

<table>
<thead>
<tr>
<th>Industry</th>
<th>1st 5 Year Plan 1962-66</th>
<th>2nd 5 Year Plan 1967-71</th>
<th>3rd 5 Year Plan 1972-76</th>
<th>4th 5 Year Plan 1977-81</th>
<th>5th 5 Year Plan 1982-86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Policy Direction</td>
<td>• Onset of industrialization • Export-first principle • Development of import substitution industries</td>
<td>• Strengthening of the international competitiveness of light industry • Domestic production of industrial raw materials • Introduction and absorption of technologies (KIST)</td>
<td>• $10bn exports • Proclamation of HCI (development six leading industries) • Proclamation of domestic development of technologies, education of technological manpower</td>
<td>• Expansion of research facilities • Industrial rationalization (energy saving) • International class • Precision • Plant export</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>Import substitution</td>
<td>Establishment of export oriented infrastructure</td>
<td>Export maximization</td>
<td>Saving energy</td>
<td>Intl. scale</td>
</tr>
<tr>
<td>Chemical</td>
<td>Cement / Fertilizer / Oil refinery</td>
<td>Petrochem. Complex</td>
<td>Methanol Plant</td>
<td></td>
<td>Fine chemical industry</td>
</tr>
<tr>
<td>Metal</td>
<td>Iron &amp; steel mukk</td>
<td></td>
<td></td>
<td></td>
<td>Intl. scale (20-60mn tons)</td>
</tr>
<tr>
<td>Shipbuilding</td>
<td>Wooden vessels</td>
<td>Hyundai shipyard</td>
<td></td>
<td></td>
<td>Intl. scale</td>
</tr>
<tr>
<td>Machine</td>
<td>Small car assembly</td>
<td>Bus, truck assembly</td>
<td>Parts development / automobile mfg. plant</td>
<td>Mass production (300K) / Exports ($150MN)</td>
<td>Precision machinery large scale machinery</td>
</tr>
<tr>
<td>Electronics</td>
<td>Radios, telephones</td>
<td>TV</td>
<td>Gumi complex</td>
<td>Mini computer, VTR</td>
<td>Semiconductors &amp; Computers</td>
</tr>
<tr>
<td>Technology &amp; Engineering</td>
<td>Civil &amp; architect / Equipment sub contract / R&amp;D by KIST</td>
<td>Equipment sub contract / R&amp;D by KIST</td>
<td>Scientists</td>
<td>Specialised research institute (Daeduk)</td>
<td>Plant engineering / Process development</td>
</tr>
</tbody>
</table>

Sectoral targeting? – some industrial activity has a far-reaching impact on employment and technology across sectors

[CASE] South Korea’s auto manufacturing related jobs

<table>
<thead>
<tr>
<th>Total</th>
<th>Direct Employment Impact</th>
<th>Indirect Employment Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Raw Materials</td>
<td>Parts &amp; Assembly Manufacturing</td>
</tr>
<tr>
<td>1,603,000</td>
<td>131,290 (8%)</td>
<td>264,502 (14%)</td>
</tr>
<tr>
<td></td>
<td>Electric &amp; Electronics</td>
<td>Assembly 108,947</td>
</tr>
<tr>
<td></td>
<td>Plastic</td>
<td>Auto Parts 155,555</td>
</tr>
<tr>
<td></td>
<td>Rubber</td>
<td>Car Sales 57,309</td>
</tr>
</tbody>
</table>

Source: Korea Development Bank, “South Korea’s Industry 2008”
### Automotive industry in developing countries

<table>
<thead>
<tr>
<th>First Promotion Plan</th>
<th>Korea</th>
<th>Taiwan</th>
<th>Brazil</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly Sector</td>
<td>1962</td>
<td>1961</td>
<td>1956</td>
<td>1962</td>
</tr>
<tr>
<td>Indigenous model</td>
<td>Indigenous model development by local assemblers</td>
<td>Indigenous model development by local or foreign assemblers</td>
<td>Global production strategy by multinationals</td>
<td>Global production strategy by multinationals</td>
</tr>
<tr>
<td>Ind. model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export Promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components Sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export Promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>3,177,870</td>
<td>386,686</td>
<td>1,827,038</td>
<td>1,575,447</td>
</tr>
<tr>
<td>Exports</td>
<td>1,814,938</td>
<td>6,338</td>
<td>534,740</td>
<td>1,195,147</td>
</tr>
<tr>
<td>(2003 vs. 2010)</td>
<td>2,772,107</td>
<td>36,914</td>
<td>767,432</td>
<td>1,921,839</td>
</tr>
</tbody>
</table>
Evolution of Industrial Policy in Korea: Auto Industry

Korea’s auto industrial policy

- Vicious cycle of low capabilities, low scale economies and high prices
- Heavy and Chemical Industrialization Program of 1973
  - Exports of localized heavy and chemical products
  - Import substitution of passenger cars within 3 years
  - Volume production of Korean-type cars
  - A dominant market share guaranteed
  - Combination of top-down and bottom-up measures
- Development and exports of small-sized cars to the US market
  - Establishment of assembly lines specific to exports
  - Strong ties with multinationals (capital, sales network, etc)
  - Vertical subcontracting system
- Global top 10 targeted
  - Inter-assembler competition
  - Production facilities expanded
  - Subcontracting system
  - Domestic sales promoted (interest-free installment financing)

Production, Exports, Domestic Sales

Production facilities expanded
Subcontracting system
Domestic sales promoted (interest-free installment financing)
Technical evolution should be the underlying force of industrial development

Development stages in the Korean automobile sector

<table>
<thead>
<tr>
<th>Character</th>
<th>Kit assembly</th>
<th>Local model, mass production</th>
<th>Restyling, JIT, front-wheel drive</th>
<th>Advanced design of engines and transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local content (%)</td>
<td>30</td>
<td>85</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Models produced</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Mid-stage volume</td>
<td>14000</td>
<td>57000</td>
<td>264000</td>
<td>1000000~</td>
</tr>
<tr>
<td>Acquired technology</td>
<td>Inspection, production management</td>
<td>New model development, quality control</td>
<td>Mass production, JIT, front-wheel drive, US standards</td>
<td>Design with advanced technology</td>
</tr>
</tbody>
</table>

# Korea’s Transition Toward a Knowledge Economy

Korea’s transition toward a knowledge economy was intimately linked to export promotion, industrial upgrading, and human resource development, and institution-building was largely complete by the end of the 1980s.

<table>
<thead>
<tr>
<th>Development Stage</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industrial Policy</strong></td>
<td>Factor-Driven</td>
<td>Investment-Driven</td>
<td>Innovation-Driven</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S&amp;T Policy</strong></td>
<td>Support Export Development</td>
<td>Promote Heavy and Chemical Industries</td>
<td>Shift from Industry Targeting to R&amp;D Support</td>
<td>Provide Information Infrastructure and R&amp;D Support</td>
<td>Promote New Engines of Growth and Upgrade R&amp;D</td>
</tr>
<tr>
<td><strong>S&amp;T</strong></td>
<td>- MOST/KIST</td>
<td>- Government Research Institutes</td>
<td>- National R&amp;D Plan</td>
<td>- Informatization</td>
<td>- Universities’ Leading Role</td>
</tr>
<tr>
<td></td>
<td>- S&amp;T Promotion Act</td>
<td>- Technical and Vocation Schools</td>
<td>- E-Government</td>
<td>- GRI Restructuring</td>
<td>- Efficient NIS</td>
</tr>
<tr>
<td></td>
<td>- Five-Year Economic Plan Including S&amp;T</td>
<td>- R&amp;D Promotion Act</td>
<td>- Private Sector Initiatives in R&amp;D</td>
<td>- U-I-G Linkages</td>
<td>- RIS and Innovation Clusters</td>
</tr>
</tbody>
</table>

---

Korea’s transition toward a knowledge economy was intimately linked to export promotion, industrial upgrading, and human resource development, and institution-building was largely complete by the end of the 1980s.
Exposed to global competition, private-sector companies came to realize that innovation was key to their prosperity and dramatically increased their R&D expenditures.
Part-04  Green Growth in Korea
Figure 2. Korea has become one of the most energy-intensive economies in the OECD area

Tonnes of energy per unit of GDP in thousand 2000 US$ using PPP exchange rates

Figure 3. International comparison of greenhouse gas emissions

A. Share of global greenhouse gas emissions in 2005

- China
- United States
- India
- Russian Federation
- Brazil
- Japan
- Germany
- Indonesia
- Canada
- Mexico
- United Kingdom
- Australia
- Iran
- Italy
- Korea
- France

B. Growth in greenhouse gas emissions between 1990 and 2005

- China
- United States
- India
- Russia
- Brazil
- Japan
- Germany
- Indonesia
- Canada
- Mexico
- United Kingdom
- Australia
- Iran
- Italy
- Korea
- France

Source: OECD Environmental Database.
Figure 5. Government energy RD&D budget as a share of GDP

Source: IEA/OECD Energy Database.
<table>
<thead>
<tr>
<th>Action</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>September 2008</td>
</tr>
<tr>
<td>The President proclaims “Low Carbon/Green Growth” as the nation’s vision to guide development during the next 50 years</td>
<td></td>
</tr>
<tr>
<td>Announcement of the “National Strategy for Green Growth” up to 2050</td>
<td>July 2009</td>
</tr>
<tr>
<td>Institutional framework</td>
<td>January 2009</td>
</tr>
<tr>
<td>Establishment of the “Presidential Committee on Green Growth” and its secretariat</td>
<td></td>
</tr>
<tr>
<td>Creation of the local green growth committees in each of the 16 metropolitan cities and provinces</td>
<td>November 2009</td>
</tr>
<tr>
<td>Start of the monthly implementation evaluation meetings, chaired by the prime minister</td>
<td>September 2011</td>
</tr>
<tr>
<td>Medium-term plan</td>
<td>July 2009</td>
</tr>
<tr>
<td>Launch of the “Five-Year Plan for Green Growth” (2009-13)</td>
<td></td>
</tr>
<tr>
<td>Emission target</td>
<td>November 2010</td>
</tr>
<tr>
<td>Announcement of a target to reduce greenhouse gas emissions by 30% relative to the BAU baseline by 2020</td>
<td></td>
</tr>
<tr>
<td>Setting reduction targets by sector and industry</td>
<td>July 2011</td>
</tr>
<tr>
<td>Legal foundation</td>
<td>January 2010</td>
</tr>
<tr>
<td>Enactment of the “Framework Act on Low Carbon, Green Growth”</td>
<td></td>
</tr>
<tr>
<td>Submission of a bill to the National Assembly to create an Emission Trading Scheme</td>
<td>April 2011</td>
</tr>
</tbody>
</table>

Source: Presidential Committee on Green Growth.
Figure 2.5. R&D spending and green technologies

A. Business R&D intensity and government support to business R&D in 2009

[Graph showing the relationship between Business R&D intensity, as a per cent of GDP, and Total government support to business R&D, as a per cent of GDP, for various countries. Each country is represented by a dot, and the size of the dot indicates the level of indirect tax support to business R&D in 2009 (in million USD PPP).]
B. Government R&D budgets for energy and the environment in 2010 (as a per cent of GDP)

Environment and Directed Technical Change

  - This paper introduces endogenous and directed technical change in a growth model with environmental constraints.
  - The final good is produced from “dirty” and “clean” inputs.
This paper shows that:

✓ Sustainable growth can be achieved with temporary taxes/subsidies that redirect innovation toward clean inputs;
✓ Optimal policy involves both “carbon taxes” and research subsidies, avoiding excessive use of carbon taxes;
✓ Delay in intervention is costly, as it later necessitates a longer transition phase with slow growth; and
✓ Use of an exhaustible resource in dirty input production helps the switch to clean innovation under laissez-faire.
Challenges in Green Growth Promotion

- Export Promotion
- Monitoring and Evaluation
- Public-Private Partnership
Green PPPs in Korea

Jongyeam (Jon) Lee, PhD

Public and Private Infrastructure Investment Management Center (PIMAC)
Green PPPs in Korea

I. **Track Record**

II. **Effects**

III. **Current Issues**

IV. **Role of PIMAC, KDI**

V. **Roadmap**
I. Green PPPs in Korea Track Record

Fields of Green PPPs

- Environmental (5)
  ① Sewer and Sewage Treatment Plants
  ② Livestock Wastewater Treatment Plants
  ③ Waste Disposal Facilities
  ④ Wastewater Treatment Facilities
  ⑤ Recycling Facilities

- Water Resources (1)
  ① Water Supply Facilities

Recent Track Record

- Total 63 projects
  - Sewer: USD 2,664M
  - Waste: USD 677M
  - Excretions: USD 38.5M

- Total 92 projects, USD 5.9 Billion

< BTO facilities by type >

< BTL (Sewage Treatment) by year >
### BTL Projects: Sewer

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (km)</td>
<td>9,915</td>
<td>1,570</td>
<td>3,611</td>
<td>1,539</td>
<td>2,204</td>
<td>791</td>
<td>200</td>
</tr>
<tr>
<td>Cost (Mill$)</td>
<td>5,915</td>
<td>909</td>
<td>2,097</td>
<td>1,188</td>
<td>909</td>
<td>609</td>
<td>202</td>
</tr>
<tr>
<td>No. of Projects</td>
<td>92</td>
<td>17</td>
<td>29</td>
<td>15</td>
<td>16</td>
<td>11</td>
<td>4</td>
</tr>
</tbody>
</table>

### BTO Projects: Sewerage, RDF Facilities, etc.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Solicited</th>
<th>Unsolicited</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>Cnt.</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>(Mill$)</td>
<td></td>
<td>(Mill$)</td>
</tr>
<tr>
<td>Cost (Mill$)</td>
<td>3,380</td>
<td>63</td>
<td>426</td>
</tr>
</tbody>
</table>
## II. Green PPPs in Korea Effects

### Saving Budget through Negotiations

#### - Total Project Cost

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counts</td>
<td>17</td>
<td>22</td>
<td>8</td>
<td>13</td>
<td>9</td>
<td>69</td>
</tr>
<tr>
<td>Posted</td>
<td>957</td>
<td>1,331</td>
<td>621</td>
<td>787</td>
<td>481</td>
<td>4,177</td>
</tr>
<tr>
<td>Negotiated</td>
<td>841</td>
<td>1,041</td>
<td>551</td>
<td>740</td>
<td>458</td>
<td>3,631</td>
</tr>
<tr>
<td>Saved</td>
<td>116</td>
<td>290</td>
<td>70</td>
<td>47</td>
<td>23</td>
<td>546</td>
</tr>
</tbody>
</table>

Saved 13%

#### - O&M Cost

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posted</td>
<td>127</td>
<td>423</td>
<td>149</td>
<td>193</td>
<td>122</td>
<td>1,014</td>
</tr>
<tr>
<td>Negotiated</td>
<td>110</td>
<td>263</td>
<td>111</td>
<td>165</td>
<td>99</td>
<td>747</td>
</tr>
<tr>
<td>Saved</td>
<td>17</td>
<td>160</td>
<td>38</td>
<td>28</td>
<td>23</td>
<td>267</td>
</tr>
</tbody>
</table>

Saved 26%
II. Green PPPs in Korea Effects

- Balanced Regional Development

Number of Companies: 249 Local > 155 Others
Average No. of Participating Companies per Project: 3.4 Local > 2.1 Others
⇒ Rising Proportion of Local Companies
II. Green PPPs in Korea Effects

- Early Provision of Services
  - Early Completion of Project with Efficient Financing
  - Reducing Social Cost of Residents Incurred before Completion
  - Raising Residents’ Benefit by Pre-Investment

Difference in Benefit by Completion Time
(A case of Jincheon BTL project, duration: 40 years, discount rate: 5%, Willingness-to-Pay: $6.11)

<Completed in 2010>
- USD 12.5M
<Completed in 2020>
- USD 20M

USD 32.5M

* Analysis of BTL Projects on Sewerage Facilities, Korea Environment Corporation
III. Green PPPs in Korea Current Issues

- Changed paradigm from conventional processing facilities to low carbon emission and recycling type facilities using new renewable energy

- Increased needs for maintenance & improvement of old facilities (e.g. sewer)

- More demand/interest on projects for improving living environment (e.g. eco-friendly river parks)

- Introducing various and complex PPP methods
  - Composite structure of BTO+BTL for linked projects (e.g. sewer + sewage treatment plant)
  - Bundling for securing feasibility and O&M efficiency (e.g. incineration + landfill + renewable fuels)
  - Needs more for Rehabilitation (RTO/RTL) than Building(BTO/BTL)
IV. Green PPPs in Korea: Role of PIMAC, KDI

KDI PIMAC enables comprehensive and systematic management of both traditional public investment and PPPs.

Executive Director

Public Investment Evaluation Division

PFS Unit 1
- Conduct and manage PFS
- Policy research on PIM
- Program Evaluation and Performance Management of Public Investment Projects

PFS Unit 2

Program Evaluation Unit

Public-Private Partnerships Division

PPP Policy Unit
- Formulate PPP Annual Plan and develop PPP guidelines
- Conduct Evaluation of PPP Projects
- Research on PPP
- Financing and refinancing of PPP
- Capacity building and training
- Infrastructure DB management

PPP Project Unit

Finance & Int’l Cooperation Unit

Policy and Research Division

Policy Research Unit
- Research on Methodology of Project Evaluation
- Appraisal for SOE Projects
- Conduct and manage RSF

Public Entity Project Evaluation Unit

RSF Unit
V. Green PPPs in Korea Roadmap

(Preliminary) Feasibility Studies Considering Characteristics of Environmental Facilities

- Green PPP projects make great impacts on public
- Indirect benefits should be considered for B/C analysis
  → put more weights on policy analysis
- Objectivity, neutrality, and transparency of evaluation must be secured
  → establish/designate independent (specialized) organization(s) for evaluation

Government Subsidy Systems to Facilitate New Projects

- Give incentives to green pilot projects
- Government subsidy programs should not be complicated and too different
  by project type and by facility type
Administrative Support for Resolving Complexity

- Green PPP projects are hard to lead inter-regional cooperation (e.g. NIMBY)
- Establish support system in accordance with trend of projects becoming complex more and more

Simplifying Process for Similar Projects with Identical Purpose

- For similar projects with same purpose, simplify recurring review process required in Basic Plan for PPP to shorten construction period and raise efficiency
Thank You