Quantifying the Costs and Benefits on SLCP Action

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Breakout Session: Bringing SLCPs and PM2.5 into Integrated Air Pollution and Climate Change Strategies in Asia: Linking Science, Models, and Action
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Benefits of air pollution policies

• Based on Asian low carbon scenario (LCS, toward 2 degree target), effectiveness of air pollution policies are assessed.
  – LLGHG mitigation
    • REF: Without LLGHG mitigation
    • LCS: Global GHG emissions in 2050 will be half to those in 1990.
  – Air pollution reduction (SOx, NOx, and VOC)
    • ː Without air pollution reduction
    • Air: Reducing air pollution
      – SOx and NOx: Emissions in 2050 will be half to those in 2005.
      – VOC: Emissions in 2050 will be reduced by 30% to those in 2005.

→ By using AIM (Asia-Pacific Integrated Model), the future emissions under the above policies are assessed.
### Results from Environment Research and Technology Development Fund (S-6), MOEJ

**Two Scenarios toward Low Carbon in Asia**

<table>
<thead>
<tr>
<th>Overall Features</th>
<th>Advanced Society Scenario</th>
<th>Conventional Society Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economy</strong></td>
<td>Society that is highly motivated and actively working to achieve a transition to next-generation social systems, programs, technologies etc.</td>
<td>Society that is cautious about making changes to social systems, programs, technologies and so on and that is concerned about the transition costs of social change.</td>
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<tr>
<td></td>
<td>Average annual growth rate: 3.27%/year (global) 4.16%/year (Asia)</td>
<td>Average annual growth rate: 2.24%/year (global) 2.98%/year (Asia)</td>
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<tr>
<td><strong>Population</strong></td>
<td>Total population in 2050: 6.9 billion (global) and 4.6 billion (Asia)</td>
<td>Total population in 2050: 6.9 billion (global) and 4.6 billion (Asia)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>Active efforts to improve education Average number of years of schooling: 4 - 12 years (2005) (\rightarrow) 11 - 14 years (2050)</td>
<td>Standard improvements to educational policy Average number of years of schooling: 4 - 12 years (2005) (\rightarrow) 8 - 13 years (2050)</td>
</tr>
<tr>
<td><strong>Use of Time</strong></td>
<td>Diverse mix of lifestyles, but a comparatively long period of time spent on work and career advancement</td>
<td>Diverse mix of lifestyles, but a comparatively long period of time spent on time with family and friends</td>
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<tr>
<td><strong>Unemployment</strong></td>
<td>Full employment in 2075</td>
<td>Fixed at 2009 level</td>
</tr>
<tr>
<td><strong>Government Efficiency</strong></td>
<td>Improved from a comparatively early stage</td>
<td>Improved gradually at a slow pace</td>
</tr>
<tr>
<td><strong>International Cooperation</strong></td>
<td>Lower trade barriers and reduced foreign direct investment risk</td>
<td>Gradual progress in establishing cooperative relationships among countries in Asia</td>
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<tr>
<td><strong>Technical Innovation</strong></td>
<td>High rate of advancement</td>
<td>Gradual advancement</td>
</tr>
<tr>
<td><strong>Transportation</strong></td>
<td>Increased demand resulting from high economic growth rate</td>
<td>Gradual increase in demand</td>
</tr>
<tr>
<td><strong>Land Use</strong></td>
<td>Speedy and efficient land improvement</td>
<td>Gradual and cautious land improvement</td>
</tr>
</tbody>
</table>

### GHG emissions in Low Carbon Scenario

**GHG emissions [GtCO2eq/yr]**

- Reduction due to Action 1 (urban transport)
- Reduction due to Action 2 (interregional transport)
- Reduction due to Action 3 (resources & materials)
- Reduction due to Action 4 (buildings)
- Reduction due to Action 5 (biomass)
- Reduction due to Action 6 (energy system)
- Reduction due to Action 7 (agriculture & livestock)
- Reduction due to Action 8 (forestry & land use)
- Other reduction
- Emission in Asia (LCS)
- Global Emission (LCS)
- Global Emission (BaU)

By Dr. S. Fujimori (NIES)
Results from Environment Research and Technology Development Fund (S-7), MOEJ

SOx emissions (MtSO2/yr)

NOx emissions (MtNO2/yr)
Results from Environment Research and Technology Development Fund (S-7), MOEJ

CO2 emissions (GtCO2/yr)

Results from Environment Research and Technology Development Fund (S-7), MOEJ

Coal consumption (EJ/yr)
Climate mitigation and air pollution mitigation

- In REF (without LLGHG mitigation) scenario, both LLGHG and air pollution emissions can be reduced by introducing air pollution policies.
  - Not only installation of end-of-pipe technologies but also fuel switch, energy saving and other measures will be introduced.
- Even in LCS scenario, not only air pollution but also LLGHG emissions can be reduced in the short term. (It is assumed that in LCS all countries will follow their Copenhagen target in 2020)

Climate mitigation and air pollution mitigation link together.
→ Air pollution policies can mitigate environmental impacts.
→ What kind of direct and indirect benefits?
  How much to introduce air pollution policies?
Emissions from urban household in each province in China

- taking into account local climate and economic conditions
- Scenarios
  - Baseline: only conventional technologies
  - Countermeasure: optimal introduction of energy saving technologies

From the viewpoints of cause-effect relationship on air pollution, local emissions will be assessed in this project.

By Dr. R. Xing (NIES)