Low Carbon Scenarios in Asia

Junichi Fujino
National Institute for Environmental Studies

Japan Pavilion Side Event “Pathways toward low carbon societies in Asia by 2050 and contribution of Japan to their realization: Quantitative & Qualitative Assessment of LCS using Asia-Pacific Integrated Model (AIM)”

Wednesday 13 November 2013, 15:00-16:30
Warsaw
AIM (Asia-Pacific Integrated Model) since 1990

- AIM (Asia-Pacific Integrated Model) is an integrated assessment model to assess mitigation options to reduce GHG emissions and impact/adaptation to avoid severe climate change damages.
Overall research procedure of our LC development approach

- Area
- Base year
- Target year
- Covered sectors
- Actors/Players
- LCS target

Setting framework

Qualification of Socio-economic Vision

Quantification of Socio-economic Visions and GHG emission

Try and error to keep consistency and unity among Socio-Economic policies and LCD targets

Analysis of Alternative LCD scenarios and measures

Design LCD Actions and Roadmaps from the analysis

- Demography
- Lifestyle
- Economy
- Transport
- Building
- Resource efficiency
- Energy strategy
- Power supply

Quantifications of parameters:
- Population
- Final demand
- Transport parameters
- Energy service demand generation
- Energy device share
- Power supply assumptions

Evaluation of Scenarios / measures:
- Transportation system
- Energy service demand generation
- Energy device share
- Power supply options
- Renewable energy
- Carbon sink
- etc.
International Network of AIM

Japan  National Institute for Environmental Studies
Kyoto University
Mizuho Information Research Institute

China  Energy Research Institute, NDRC
Institute of Geog. Sci. & Nat. Res. Research, CAS
Institute of Env. & Sus. Dev. in Agri, CAAS
Guangzhou Institute of Ene. Conversion, CAS

India  Indian Institute of Management, Ahmedabad
School of Planning and Architecture, Bhopal

Korea  Seoul National Univ.
Korea Environment Institute

Indonesia  Bogor Agri. Univ.
Bandung Institute of Tech.

Thailand  Asian Institute of Tech.
Thammasat Univ.
King Mongkut’s Univ.

Malaysia  Univ. of Malaysia

Austria  IIASA

Netherlands  PBL

USA  Pacific Northwest National Lab.

In addition, collaborating with Vietnam, Cambodia, Bangladesh, Nepal, Taiwan, ...
Brief History of AIM and its application

AIM/Enduse [Japan] and application to Asian countries

Assessment of long-term global scenario using AIM/CGE [Global]

AIM/CGE [Japan]

AIM/Air

AIM/Climate

Impact Assessment Models

Carbon tax policy in Japan

IPCC SRES and other long-term scenarios

UNEP/GEO

EMF

ECO-ASIA MA JPN mid-term target


Start of AIM Project (FY1990-)

AIM Workshop (FY1995-)

AIM Training WS (FY1997-)

COP3 @Kyoto (FY1997)

Publication of SRES COP8 @Delhi(FY2002)

Japan LCS Project (FY2004-FY2008)

COP Side Event(FY2005-)

Japan UK Joint Project (FY2006-FY2007)

LCS-RNet (FY2009-)

BOCM-MRV LoCARNet 3rd 5-year plan at NIES SATREPS (FY2011-FY2015)

Asia LCS Project (FY2009-FY2013)
Contents of Present AIM

Emission Model
- Account model
- Enduse model
- Economic model
- mid-term target
- low carbon scenario

Impact/Adaptation Model
- AIM/Impact [Policy]
- AIM/Impact
- local target
- future society

Simple Climate Model
- long-term vision
- temperature

Other Models
- Population
- Transportation
- Residential
- Burden share
- Stock-flow
- Accounting

Model World
- carbon tax
- IPCC/WG3
- IPCC/integrated scenario

Real World
- Mitigation Target, Climate Policy, Capacity building, ...

Real World
- Agriculture
- Water
- Human health
AIM Models for CC policy assessment in Indonesia

- ExSS (Extended Snap-shot) model
- Enduse model
- CGE (Computable General Equilibrium) model
- AFOLU (Agriculture Forestry and other Land use) model
How to reach to Low Carbon Society in Asia?

Development of Asia LCS Scenarios

1. Depicting narrative scenarios for LCS
2. Quantifying future LCS visions
3. Developing robust roadmaps by backcasting

Policy Packages for Asia LCS

Funded by Ministry of Environment, Japan (GERF, S-6) and NIES
Low-Carbon Society Scenarios in Asia using AIM

Japan

Shiga Japan

Kyoto Japan

Jilin China

Guangzhou China

Ahmedabad India

Bhopal India

Thailand

Indonesia

Iskandar Malaysia

Putrajaya Malaysia

Cyberjaya Malaysia

Vietnam

Bangladesh

What is NEXT???

http://2050.nies.go.jp
Designing of Vietnam and Bangladesh 11 actions towards LC society

**Low Carbon Society Development towards 2030 in Vietnam**  
VNM2030

**Low Carbon Society Development towards 2025 in Bangladesh**  
BGD2035

**Actions in Low Carbon Society Development in Vietnam, 2030**

<table>
<thead>
<tr>
<th>Actions towards LCS in Vietnam in 2030</th>
<th>GHG mitigations (MtCO2 eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFOLU sectors</td>
<td></td>
</tr>
<tr>
<td>Action A1: Livestock Manure Management</td>
<td>3</td>
</tr>
<tr>
<td>Action A2: Livestock Enteric Fermentation</td>
<td>3</td>
</tr>
<tr>
<td>Action A3: Rice Cultivation Management</td>
<td>12</td>
</tr>
<tr>
<td>Action A4: Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>Action F: Forest and Land Use Management</td>
<td>21</td>
</tr>
<tr>
<td>Energy sectors</td>
<td>180</td>
</tr>
<tr>
<td>Action E1: Green Building</td>
<td>14</td>
</tr>
<tr>
<td>Action E2: Convenient Transport</td>
<td>15</td>
</tr>
<tr>
<td>Action E3: Energy Saving Behavior</td>
<td>17</td>
</tr>
<tr>
<td>Action E4: Energy Efficiency Improvement</td>
<td>79</td>
</tr>
<tr>
<td>Action E5: Fuel Shift in Industry</td>
<td>16</td>
</tr>
<tr>
<td>Action E6: Smart Power Plants</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
</tr>
</tbody>
</table>

**Actions in Low Carbon Society Development towards 2025 in Bangladesh**

**GHG emissions and their reduction by sector**

**Contribution to emission reduction by sector**

LCS-RNet Workshop, 2013
Low Carbon Society Scenario toward 2050, Indonesia, Energy sector IDN2050

Low Carbon Thailand towards 2050 THA2030

GHG emissions and their reduction by sector

Actions in Low Carbon Thailand towards 2050

<table>
<thead>
<tr>
<th>Action</th>
<th>2010 BAU (Mt)</th>
<th>2030 BAU (Mt)</th>
<th>2050 BAU (Mt)</th>
<th>Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Energy efficiency improvement in households</td>
<td>10,950</td>
<td>8,590</td>
<td>6,130</td>
<td>43.0</td>
</tr>
<tr>
<td>2. Energy efficiency improvement in buildings</td>
<td>16,000</td>
<td>12,000</td>
<td>8,000</td>
<td>40.0</td>
</tr>
<tr>
<td>3. Building codes</td>
<td>15,000</td>
<td>10,500</td>
<td>6,000</td>
<td>62.0</td>
</tr>
<tr>
<td>4. Energy efficiency improvement in industries</td>
<td>22,000</td>
<td>17,000</td>
<td>12,000</td>
<td>41.0</td>
</tr>
<tr>
<td>5. Fuel switching in industry</td>
<td>13,000</td>
<td>9,000</td>
<td>6,000</td>
<td>46.0</td>
</tr>
<tr>
<td>6. Fuel switching in transportation</td>
<td>5,000</td>
<td>4,000</td>
<td>3,000</td>
<td>40.0</td>
</tr>
<tr>
<td>7. Fuel switching in transportation</td>
<td>2,000</td>
<td>1,000</td>
<td>500</td>
<td>88.0</td>
</tr>
<tr>
<td>8. Modelling in transportation</td>
<td>1,000</td>
<td>500</td>
<td>200</td>
<td>76.0</td>
</tr>
</tbody>
</table>

Total GHG mitigation in 2050: 239,560 MtCO2
Total GHG emissions in the 2050 BAU scenario: 586,705 MtCO2
Total GHG emissions in the 2030 BAU scenario: 428,870 MtCO2
AIM (Asia-Pacific Integrated Model): Provides Capacity Building for researchers and Policy Makers

- Support researchers, national and local government policy makers to **develop their country- and locally-tailored LCS scenarios and roadmaps** through AIM training workshop since 1994 and policy dialogue.

2013 AIM Training Workshop for young researchers in Asia

- Vietnam LCS WS, April, 2013
- Cambodia LCS WS, April, 2013
- JICA Training Course for 6 countries in Asia & Pacific Island Countries
Our AIM approach
“How to deploy LCS study to real world?”

Policy makers
Central/ regional government managers
NGOs

Proposal/ collaborative activity on LCS scenario and roadmap making

Each country’s domestic/local research institute
Application and development to actual LCS processes

Research members
Development and maintenance of study tools/models

Request of more practical, realistic roadmaps and also tractable tools for real world
Roadmap to Low Carbon Thailand

Final Energy Demand

Primary Energy Demand by fuel type in 2050

2050BAU

2050CM

2050BAU

Energy consumption (Mtoe)

Primary Energy Demand

SIIT-TU
GHG Emissions in 2050 (LCS)
What are LCS Actions in Thailand?

- LCS Actions include both supply-side and demand-side actions such as increasing the use of carbon capture storage (CCS) in power generation and industries, more utilization of bio-fuels, renewable energy (RE), promoting modal shift in transportation, and increasing energy efficiency (EE) in buildings and industries.
Thailand LCS scenario for 2°C Target
What are LCS Actions in the Peak Scenario?

- LCS Actions include both supply-side and demand-side actions such as increasing the use of carbon capture storage (CCS) in power generation and industries, more utilization of bio-fuels, renewable energy (RE), promoting modal shift in transportation, and increasing energy efficiency (EE) in buildings and industries.
GHG Emissions in 2050 (Peak CO₂)

GHG Mitigation by 2050 (Peak CO₂)

48.3%

Mitigation

- Smart Buildings: 52
- Comfortable Houses: 14
- Effective transport: 78
- Green Industry: 211

CO₂ Emissions (Mt-CO₂)

Scenario

2005 2050BAU 2050LCP
Total GHG Emissions 2005-2050 (Peak CO₂)
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Each country’s domestic/ local research institute
Application and development to actual LCS processes
Development and maintenance of study tools/models
## Drivers/paths for LCS in Cambodia

<table>
<thead>
<tr>
<th>12 Strategies</th>
<th>4 Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable forest management</td>
<td>Green environment</td>
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<tr>
<td>Sustainable waste management</td>
<td>Harmonization of green economy, society and culture</td>
</tr>
<tr>
<td>Green agriculture</td>
<td>Blue economy</td>
</tr>
<tr>
<td>Green transport</td>
<td>Eco-village</td>
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<tr>
<td>Green energy</td>
<td></td>
</tr>
<tr>
<td>Green tourism</td>
<td></td>
</tr>
<tr>
<td>Green human resource development</td>
<td></td>
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<tr>
<td>Green financial mobilization</td>
<td></td>
</tr>
<tr>
<td>Green technology and investment</td>
<td></td>
</tr>
<tr>
<td>Green Merchant Marine and sustainable coastal zone development and management</td>
<td></td>
</tr>
<tr>
<td>Low carbon infrastructure</td>
<td></td>
</tr>
<tr>
<td>Green building</td>
<td></td>
</tr>
</tbody>
</table>
AIM is...

- model simulation to provide LCS (Low Carbon Society) scenarios to support low carbon policy making
- human resource development platform and network of simulation modelers in Asia and the world
Sustainable Low-Carbon Asia comes from design, imagination and co-working...

Let’s work together!

Asia LCS

藤野 純一
Junichi FUJINO

fuji@nies.go.jp