Japanese LCA Activities and 5th AIST Workshop

Atsushi INABA
Director, Research Center for Life Cycle Assessment
National Institute of Advanced Industrial Science and Technology
16-1 Onogawa, Tsukuna, Ibaraki 305-8569 Japan
Phone: +81-29-861-8145 Fax: +81-29-861-8195
e-mail: a-inaba@aist.go.jp
http://unit.aist.go.jp/lca-center/cie/index.html

History of LCA
1969: Comparison of Returnable Bottle with PET-Bottle (Coca Cola), USA
1970s: US-EPA REPA: Resource & Environmental Profile Analysis
1979: Establishment of SETAC (Society of Environmental Toxicology & Chemistry), USA
1984: BUWAL, Ecobalance of Packaging Materials, Switzerland
1989: Establishment of SETAC-Europe
1990: APMA, Analysis of Packaging Materials
1991-2: Guideline of LCA, SETAC, Leiden University
1994: The 1st International Conference on EcoBalance, Japan
1995: Establishment of The Society of LCA, Japan
1996: International Journal of LCA
1997: Issue of ISO14040
2002: Establishment of UNEP/SETAC Life Cycle Initiative
2006: Revise of ISO14040-43
New Standards
Published in July 1, 2006

Structure of current ISO 14040-43 standards
(all contain requirements)

ISO 14040  ISO 14041  ISO 14042  ISO 14043

ISO 14040 without requirements
"LCA - Principles and Framework"

ISO 14044 with all requirements
"LCA - Requirements and Guidelines"

Structure of the new standards ISO 14040 / 14044

LCA Activities in Japan, after 1993

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>Start of ISO/TC207</td>
</tr>
<tr>
<td>1994</td>
<td>1st ICEB</td>
</tr>
<tr>
<td>1995</td>
<td>2nd ICEB</td>
</tr>
<tr>
<td>1996</td>
<td>1st Int. Jof LCA</td>
</tr>
<tr>
<td>1997</td>
<td>ISO14040</td>
</tr>
<tr>
<td>1998</td>
<td>3rd ICEB, 1st APEC</td>
</tr>
<tr>
<td>1999</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>4th ICEB, 2nd APEC</td>
</tr>
<tr>
<td>2001</td>
<td>ISO/TC207 #KL</td>
</tr>
<tr>
<td>2002</td>
<td>UNEP/SETC LC Initiative</td>
</tr>
<tr>
<td>2003</td>
<td>GALAC</td>
</tr>
<tr>
<td>2004</td>
<td>The Institute of LCA, Japan</td>
</tr>
<tr>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>ISO14040 revise</td>
</tr>
</tbody>
</table>
Before 1998
Oct. 1998: The LCA Project by METI
We made effort to disseminate LCA in Japan

✦ Barriers
Industries of basic materials hesitated to disclose their LCI data
# We estimated their LCI data and used/distributed them in our software, which were mainly the data concerning CO₂.

✦ Difficulties
To get consensus of the importance of LCA
# We held seminars for industrial associations and companies.

→ Organizing Conference
1994: 1stICEB(64papers), 1996: 2ndICEB(129papers)

→ LCA Software in Japanese

Organization of the LCA project

METI
NEDO
JEMAI
Steering committee

Inventory study committee
WG-1: Data Collection
WG-2: Recycle & waste

Planning sub-committee
Database study committee
Impact assessment study committee

Advisory committee
(Academic & Industrial sectors)
LCA Japan Forum
(1) The system boundary of each product is “Gate to Gate”. Input products of the downstream processes are not collected completely by the upstream industrial associations. The data of the product should be complimented by other database for the “Cradle to Gate/Grave”.

(2) Transparent and reliable LCI data of around 250 industrial products were collected voluntarily by 22 industrial associations of the committee and 34 industrial associations joined in the project.

(3) Inventory: 14 flows
   (air) CO2, CH4, HFC, PFC, N2O, SF6, NOx, SOx, dust
   (water) BOD, COD, total P, total N, SS
After 1998
Oct.1998: The LCA Project by METI

- Organizing Conference
  1998: 3rdICEB(138papers)/1stAIST-WS(Current Status)
  2000: 4thICEB(206papers)/2ndAIST-WS(LCI, Data)
  2002: 5thICEB(266papers)/3rdAIST-WS(LCIA)
  2004: 6thICEB(250papers)/4thAIST-WS(Capacity Building)
  2006: 7thICEB(270papers)/5thAIST-WS(Global Supply Chain)

- LCA Software
  2000: NIRE-LCA,ver.3(Japanese) 600 sales as of Oct.2004
  2006: AIST-LCA,ver.4(English) Now start of the trial Use

- The LCA Project supported by METI
  1998: The 1st Project (Product LCA)
  2003: The 2nd Project (Including application for Local Government)
  2006: The 3rd Project (Dissemination to SMEs)
After 1998

- Use of LCA in Industries
  - Environmental Report

- Application of LCA
  - Eco Efficiency
  - Life Cycle Costing, Full Cost Analysis
    # Using LIME
  - From Product to Infrastructure and Service

- Dissemination to SMEs

The Current Status of EcoLeaf Program
- Current ratio by product category-

As of Oct 31, 2006
399 Products
Examples of LCA and Eco-efficiency in Environmental Reports, 2006

<table>
<thead>
<tr>
<th>Consumer ranking of Nikkei BP</th>
<th>Introduction of product LCA</th>
<th>Eco-efficiency</th>
<th>Factor</th>
<th>Benchmark year of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Toyota Motor Corp.</td>
<td>△</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>2 Honda Motor Co., Ltd.</td>
<td>△</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3 Mitsubishi Electric</td>
<td>△</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>4 Kirin Brewery Co., Ltd.</td>
<td>△</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>5 Sunory Ltd.</td>
<td>○</td>
<td>○</td>
<td>x</td>
<td>△</td>
</tr>
<tr>
<td>6 ADEO Co., Ltd.</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>7 Canon Inc.</td>
<td>○</td>
<td>○</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>8 Nissin Motor Co., Ltd.</td>
<td>△</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>9 Asahi Breweries, Ltd.</td>
<td>x</td>
<td>△</td>
<td>x</td>
<td>△</td>
</tr>
<tr>
<td>10 Sharp Corp.</td>
<td>△</td>
<td>△</td>
<td>x</td>
<td>△</td>
</tr>
<tr>
<td>11 Toshiba Corp.</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>12 Tokyo Electric Power</td>
<td>×</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>13 Kao Corp.</td>
<td>○</td>
<td>○</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>14 Matsushita Electric</td>
<td>△</td>
<td>△</td>
<td>x</td>
<td>△</td>
</tr>
<tr>
<td>15 Kirin Beverage Corp.</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>16 Sony Corp.</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>17 Asahi soft drinks Co., Ltd.</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>18 Sapporo Breweries, Ltd.</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>19 Lion Corp.</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
<tr>
<td>20 Fujifilm Corp.</td>
<td>○</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
</tbody>
</table>

Many of companies apply Eco-efficiency.

Current Collaborative Activities, AIST

<International Project>
ASEAN-Biomass Project (2004-2006)

<METI/JETRO/AOTS Projects>
Thailand, Malaysia; Development of National LCI Database

<Researchers Network>
UNEP/SETAC Life Cycle Initiative
International Life Cycle Panel, Vice Director (A.Inaba), Task Force Leader (N.Itsubo)
ISO/TC207/SC5-WG6, Co-chair (A.Inaba)
ISO/TC207-WG5 (Climate Change), Expert (M.Sagisaka)

<Organization Network>
Global Alliance of LCA Centers (Denmark, USA, Germany, Canada etc)

<MOU>
• Institute for Chemical and Engineering Science Ltd (Singapore), 13.Oct.2006
• The Philippine LCA Clearing House (Philipine), 15.Nov.2006
• Forschungszentrum Karlsruhe GmbH (Germany), soon

<Development of LCA Software>
• JEMAI-Pro (Japanese); 250 sales. As of Oct.
• JEMAI-Pro (English); Now on Trial Release
AIST workshops on LCA for Asia Pacific Region

1998: Current Status
2004: Capacity Building (2005) Int.Con.LCA in Bangkok

2006: Global Supply Chain

Food Chain and Waste Chain
→ Gaps of Life Style between Developed/Developing Countries
→ What is Sustainable Consumption/Production

Research Framework on Sustainable Consumption/Production