5. 3R (Reduce, Reuse, Recycle) in Japan

Collaboration with other Recycling Associations

**Members**

The Council for **PET Bottle** Recycling
Japan **Steel Can** Recycling Association
Japan **Aluminum Can** Recycling Association
**Glass Bottle** Recycling Association
Japan Recycling Council for **Beverage Cartons**
**Paper Packaging** Recycling Council
**Corrugated Packaging** Recycling Council
**Plastic Packaging** Recycling Council
## 5. 3R (Reduce, Reuse, Recycle) in Japan

### Target of 3R for PET Bottles

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Reduce</strong> (2004 BM)</td>
<td>PET Bottle Weight Reduction Target: more than 3%</td>
<td>PET Bottle Weight Reduction Target: more than 10%</td>
</tr>
<tr>
<td><strong>Reuse</strong></td>
<td>Study of Returnable System</td>
<td>Promote Mechanical BtoB instead of Reuse</td>
</tr>
</tbody>
</table>
| **Recycle**           | • Collection Rate Target: more than 75%  
                        | • Promote Outsiders to comply our Design Guideline | • Recycling Rate Target: more than 85%  
                        | • Promote Outsiders to comply our Design Guideline |
5. 3R (Reduce, Reuse, Recycle) in Japan

Voluntary Design Guideline for Designated PET bottles = Obligation of PET Bottle Manufacturers & Users

Plastic Closures must be made of PE or PP. Do not use Aluminum Closures.

Bottles must be made of only Clear PET (no color). When use multi-layer / coating for barrier, must evaluate a recycling performance.

Labels must be easily removable by hand.
5. 3R (Reduce, Reuse, Recycle) in Japan

Bale Quality: Obligation of Consumers & Municipality

Data from the Japan Containers and Packaging Recycling Association http://www.jcpra.or.jp/
5. 3R (Reduce, Reuse, Recycle) in Japan

Collection Status of PET Bottle

- Voluntary collection
- Municipality collection
- PET Bottle sales amount
- Collection Rate %

Graph showing the collection status of PET bottles in Japan from 1997 to 2010.

- **1997**: 0 Tons
- **2000**: 0 Tons
- **2005**: 300 Tons
- **2006**: 400 Tons
- **2007**: 500 Tons
- **2008**: 600 Tons
- **2009**: 700 Tons
- **2010**: 800 Tons

Collection Rate:
- **1997**: 22%
- **2000**: 10%
- **2005**: 30%
- **2006**: 40%
- **2007**: 50%
- **2008**: 60%
- **2009**: 70%
- **2010**: 72%
5. 3R (Reduce, Reuse, Recycle) in Japan

Comparison with Collection Rates in EU, USA and Japan
5. 3R (Reduce, Reuse, Recycle) in Japan

Value of Post Consumer PET

- Municipality collection
- Domestic recycling
- Contract Price for Bale

Export to China, etc.

- 77%
- 67%
- 49%
- 66% (Estimate)

- 40,000 JPY ≈ 500 USD
5. 3R (Reduce, Reuse, Recycle) in Japan

Collection and Recycling Channel

Unit: 000 Tons

2009 China Trade Statistics

Europe
- Export to China 1,361
- 18%
- 23%

North America
- Export to Japan 314
- 13%
- 23%

- Export to North America 171
- 171
- 13%

- Export to Europe 241
- 18%

- Export to China 1,361
- 23%

Region Figures:
- A 23
- ME 71
- SA 58
- HK 48
- SEA 195
- O 4
- K 51
- T 58
- SA 55
- MA 64

Note: Figures represent sales and tons. (sales figures are provided in parentheses.)
5. 3R (Reduce, Reuse, Recycle) in Japan

Flow of Collection and Recycling, 2010

- Actual Collection Volume: 628
  - Domestic: 298
  - Export to China, etc.: 330

- Recovered Flake Volume
  - Municipality: 206
  - Voluntary: 36
  - Recovered Overseas: 256

- Confirmed Flake Volume
  - Sheet: 84
  - Fiber: 59
  - Bottle: 20
  - Others: 9
  - Total: 172

Unit: 000 Tons
5. 3R (Reduce, Reuse, Recycle) in Japan

High Quality Recycled PET generates many Applications

Unit: 000 Tons

Sheet, 84 kt, 49%

Fiber, 59 kt, 34%

Bottle (Chemical BtoB), 20 kt, 11%

Others, 9 kt, 6%
5. 3R (Reduce, Reuse, Recycle) in Japan

PET BtoB Recycling Processes

Post Consumer PET Bottle → Sorting, Crashing & Washing

Chemical BtoB Recycling

- Glycolysis (BHET)
- Transesterification (DMT)
- Purification
- Hydrolysis (TPA)

Polymerization (PET) → AIES Method

- Glycolysis (BHET)
- Transesterification (DMT)
- Purification

- SSP

- Melt Extrusion

- Bottle (Food Contact Grade)

- Fiber Sheet etc.

Material Recycling

Teijin Method

Melt Extrusion

SSP
Mechanical BtoB recycling was started in Japan last year.

Guideline for use of Recycled Plastics in Food Package is being made by the Ministry of Health, Labour and Welfare.

The Guideline consists of the Following Items:

- Source Control
- Challenge Test
- Evaluation of Recycled Plastics
- Safety Standard
- Process Quality Control
5. 3R (Reduce, Reuse, Recycle) in Japan

Weight Reduction 2004 vs. 2010

2004 (g/btl)

**Soft Drinks**
- **Hot Fill**
  - 25.1 350ml
  - 27.5 500ml
  - 55.7 1.5L
  - 63.5 2L
- **C.S.D.**
  - 31.1 500ml
  - 48.3 1.5L
- **Aseptic**
  - 25.2 500ml
  - 51.7 2L

**Liquor**
- **Soy Sauce**
  - 25.0 500ml
  - 33.0 1L
  - 77.0 1.8L

**2004 Target = 100%**

**2010 Target = 97% (-3%)**

**2015 Target = 90% (-10%)**
5. 3R (Reduce, Reuse, Recycle) in Japan

Examples of Weight Reduction

<table>
<thead>
<tr>
<th>KIRIN Beverage “Pecology Bottle”</th>
<th>World Star Sustainability Award Winner</th>
</tr>
</thead>
<tbody>
<tr>
<td>2L Hot Fill</td>
<td>2L Aseptic</td>
</tr>
<tr>
<td>63 g/btl</td>
<td>38 g/btl</td>
</tr>
</tbody>
</table>

- Reduced in 2005: -21g
- Reduced in 2010: -4g
5. 3R (Reduce, Reuse, Recycle) in Japan

Examples of Weight Reduction

- **Coca-Cola (Japan) “Eco-ru Bottle: Shiboru”**
  - 500ml Aseptic 20.5 g/btl
  - 520ml Aseptic 12 g/btl
  - Bio-based Resin

- Reduced -8g

- **2011 DuPont Awards for Packaging Innovation**
- **2011 Warc Asia Strategy Prize**
5. 3R (Reduce, Reuse, Recycle) in Japan

Examples of Weight Reduction

Suntory (Pepsi) “Hybrid Bottle” Multi-Layer

500ml C.S.D. 31 g/btl

500ml C.S.D. 24 g/btl

Reduced -7g
Feasibility Study on Reuse of PET Bottle was started in 2008 and the Report was issued by the Ministry of Environment in 2009.

The report concluded that the Returnable System of PET Bottle was Superior to the One Way System in LCA only in the Following Conditions:

- Collection Rate of the Bottle: More than 90%
- Distance of Deliver / Return: Within 100 km