

Preliminary Proposal for the International Standardization of Material Flow-Based Environmental Management Accounting

June 2007 Beijing

International Standardization Committee for
Environmental Management Accounting
/ Japan Industrial Standards Committee (JISC)

Background

- Environmental Management Accounting (EMA) has continued to develop since 1992, when US EPA launched “Environmental Accounting Project”. EMA has been contributed very significantly to the sustainable society not only in developed countries, but also in developing countries.
- IFAC (accounting professional body) released International Guidance Document on EMA in 2005, but there exists no guidance on EMA in ISO 14000 family.

What is EMA?

- ❑ EMA is a tool for linking the environment with the economy at the system level.
- ❑ Applying EMA, organisation can conserve the environment while enjoying economic benefits.
- ❑ EMA is useful not only for big organisations, but also for SMEs.

History of EMA

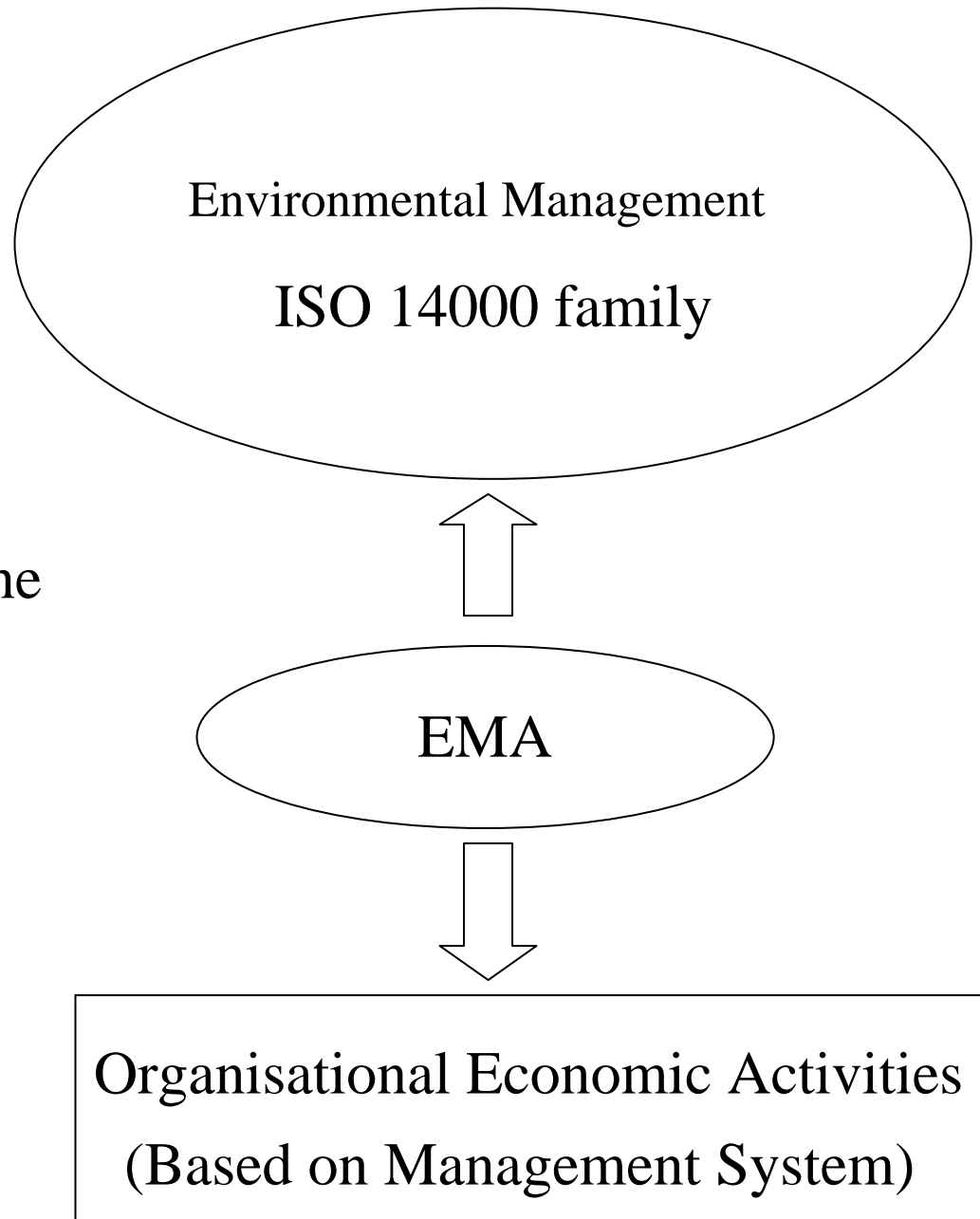
- ❑ 1992: The US Environmental Protection Agency (EPA) initiates the “Environmental Accounting Project” (Continuing through 2002)
- ❑ 1996~1998: The EC provides support for research and development of EMA. Afterward, the “EMA Network (EMAN)” is formed.
- ❑ 1999: The Japanese Ministry of International Trade and Industry (METI) initiates the EMA Project (continues to this day).
- ❑ The United Nations Division for Sustainable Development (UNSD) forms the “EMA Expert Working Group.” The Group has met 9 times through 2005, and has published workbooks and pamphlets regarding EMA.
- ❑ 2002: METI publishes the “EMA Procedural Workbook.”
- ❑ 2003: The US EPA establishes the Environmental Management Accounting Research & Information Center (EMARIC).
- ❑ 2003: The German Federal Environmental Ministry / Federal Environmental Agency issues the “Environmental Costing Management Guide”
- ❑ 2004: METI initiates a project for encouraging the use of materials flow cost accounting.
- ❑ 2005: The International Federation of Accountants (IFAC) issues the “International Guidance Document on Environmental Management Accounting.”
- ❑ 2007: METI Published Guide of Material Flow Cost Accounting

Purposes

- The purpose of the international standardization is to offer a common platform by providing a general framework and a way of implementation of EMA.
- This proposal focuses the aspect of material flow and provide guidance on material flow cost accounting (MFCA):
material flow-based EMA.
- This proposal is not associated with any third-party certification.

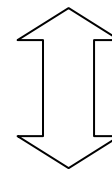
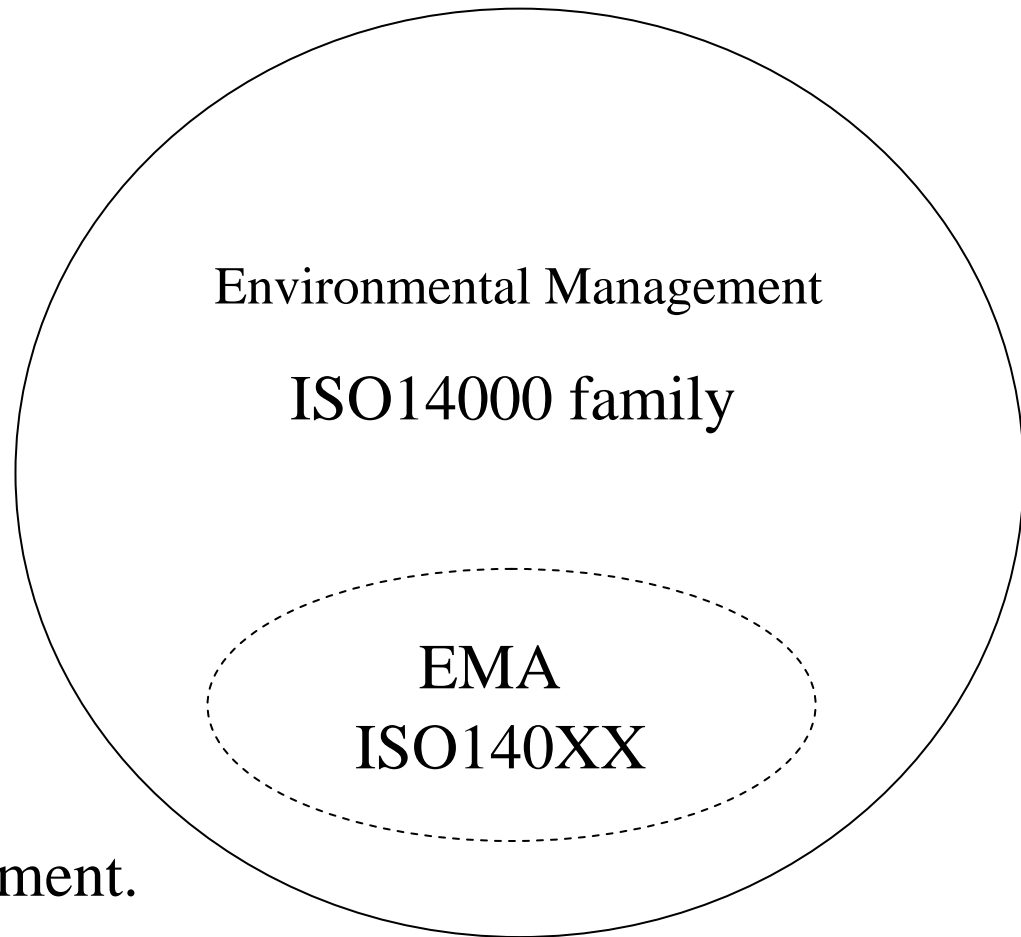
Current Situation

ISO 14000 family should strengthen the linkage between organisational economic activities and the environment.



EMA Standardization Proposal

The inclusion of EMA into ISO 14000 family, and advancement toward the inclusion of a system for linking organisational economy and the environment.



This proposal is not associated with any third-party certification

**Organisational Economic Activities
(Based on Management system)**

Relationship with ISO 14000 Family

- ISO 14001-
EMA provides useful information when setting environmental target.
- ISO 14031-
EMA substantially increases resource productivity as OPI.
- ISO 14040-
EMA can be integrated with LCA at the process level.

Environmental Management- Guidance on Material Flow-Based Environmental Management Accounting – Framework and Implementation (Tentative version)

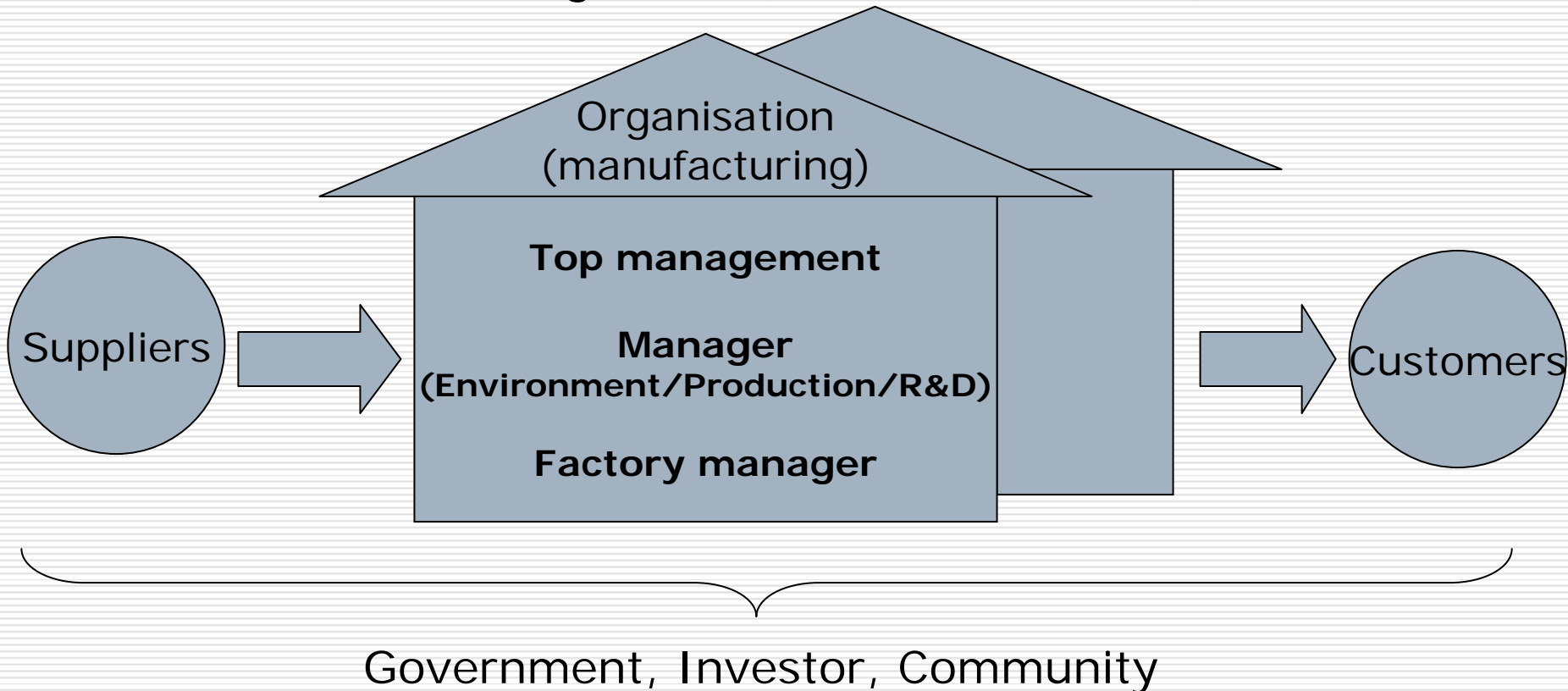
- (0) Introduction**
 - (0.1) Relationship with ISO 14000 Family**
 - (0.2) Relationship with other guidelines on environmental management accounting**
 - (1) Scope**
 - (2) Normative references**
 - (3) Definitions**
 - (4) General comments**
 - (4.1) Environmental management accounting definition**
 - (4.2) Use of environmental management accounting**
 - (4.3) Items of special concern in environmental management accounting**
 - (5) Framework**
 - (5.1) Physical flow of material: materials flow accounting**
 - (5.2) Monetary flow of material: materials flow cost accounting**
 - (6) Implementation of material flow cost accounting**
 - (6.1) Setting cost centre**
 - (6.2) Measurement of information**
 - (6.3) Reporting**
 - (7) Index for Resource productivity from material flow cost accounting**
 - (8) Relation between material flow cost accounting and conventional cost accounting**
- Annex Example of Application**
-

Who Use the Standard?

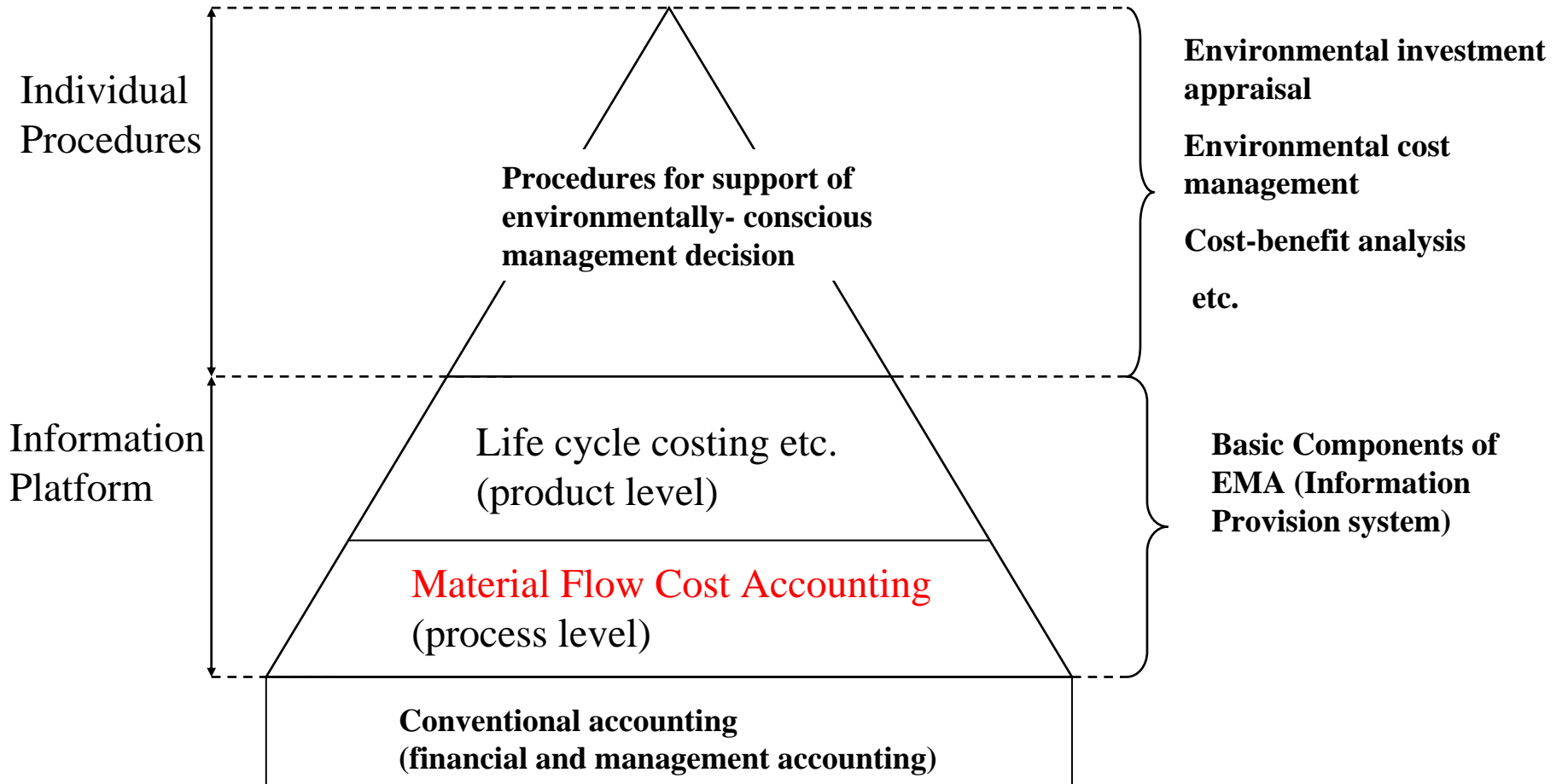
- Primary Users:
Environmental Manager, Production Manager, Cost Controller, Accountant Design Manager, Logistic Manager
- Secondary Users:
Divisional Head, Top Management
- Thirdly Users:
Supplier, Customer, Government
- Potential Users:
Investor, Community, Consumer

Information Flow and Users

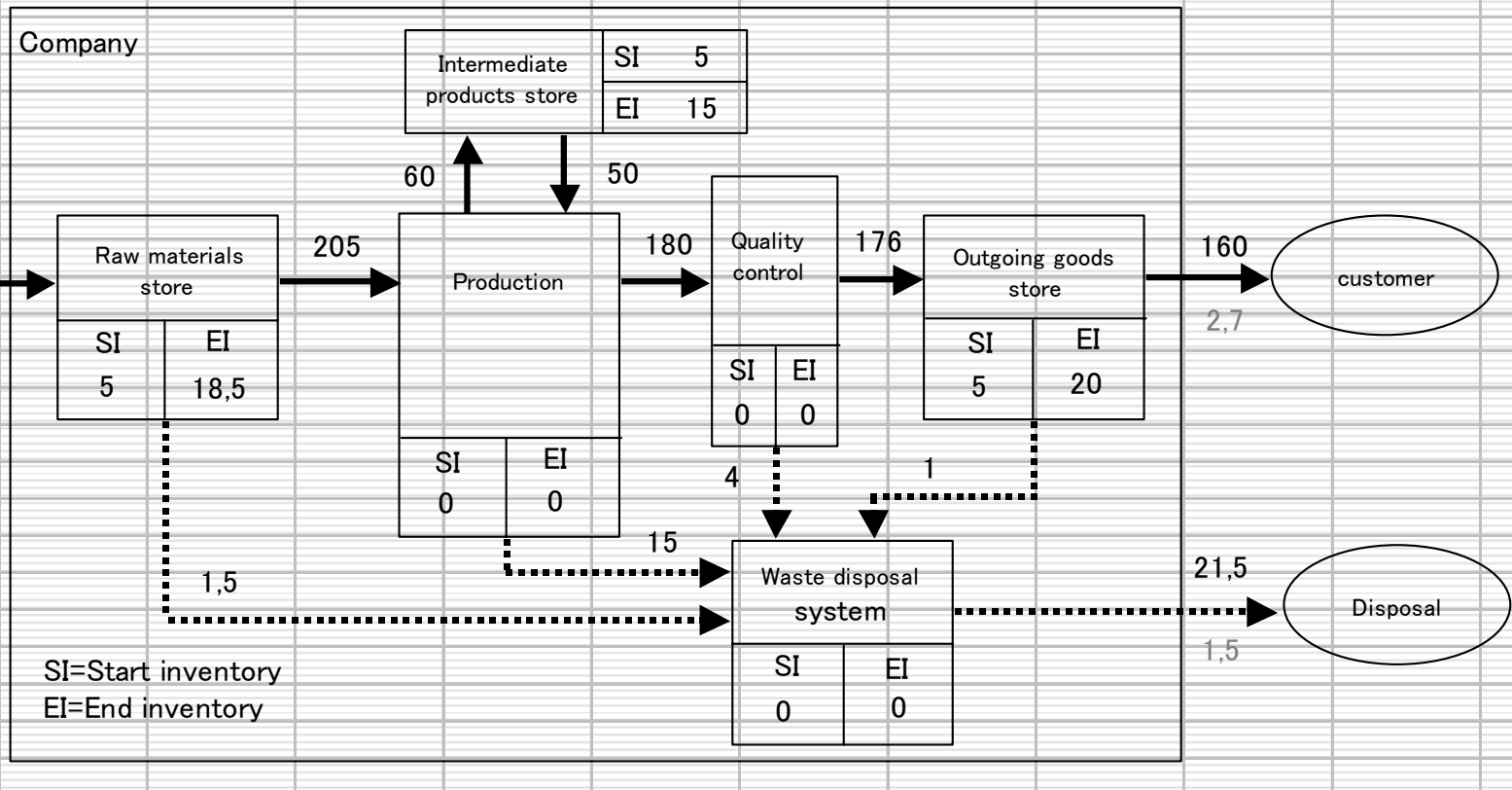
Total management (Domestic & Global)



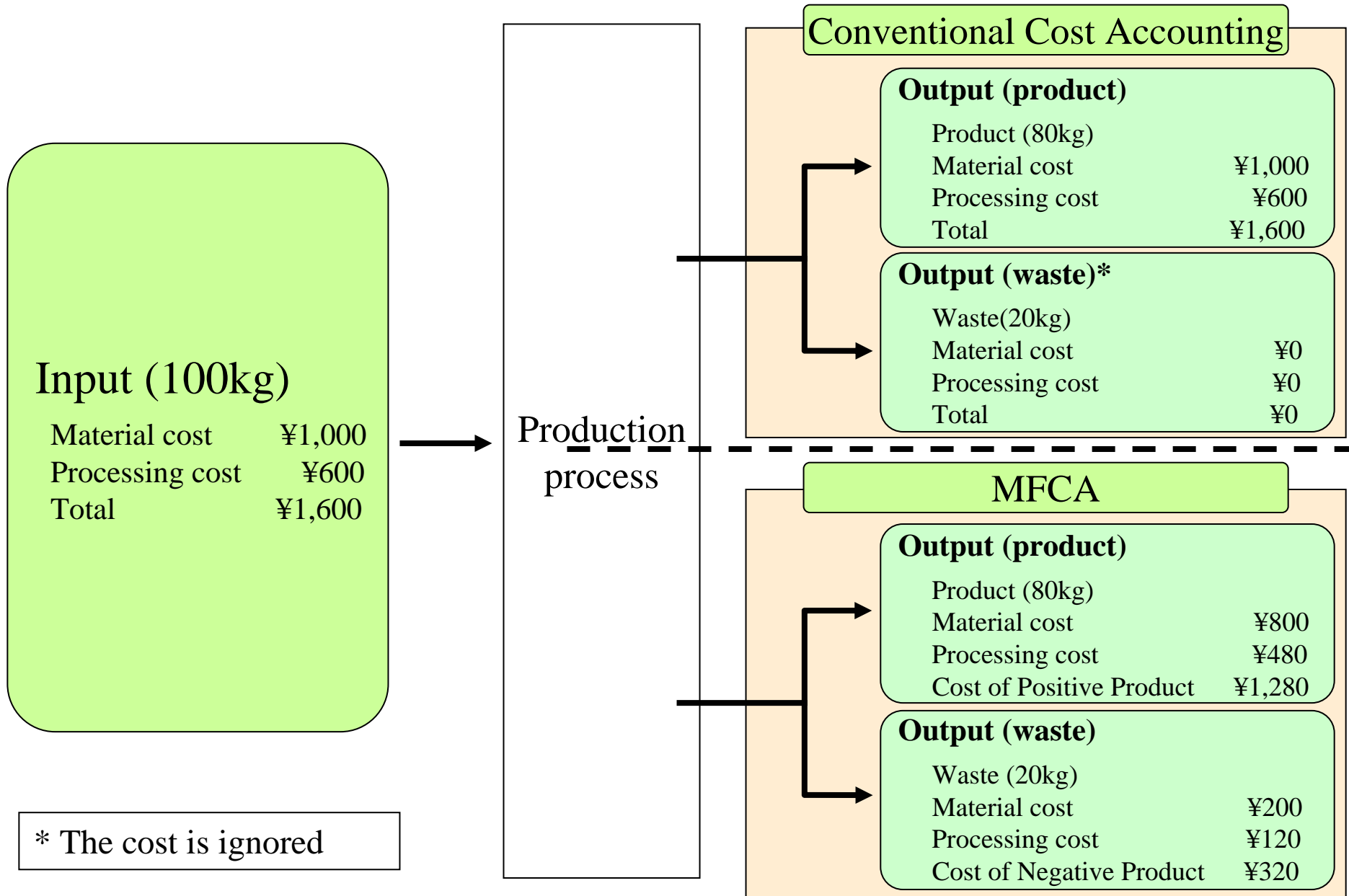
Position of material flow cost accounting(MFCA) in EMA



Material flow model in a company



Calculation of Material Flow Cost Accounting (MFCA)



Merits of international standardization of EMA: toward sustainability by eco-innovation

- ❑ Clarification of the impact of business processes on the environment and economy;
- ❑ Promotion of waste reduction and resource conservation using EMA information;
- ❑ Contribution to global warming prevention through energy consumption reduction using EMA information;
- ❑ Enablement of recommendation of environmental conservation procedures that confer great economic benefits to small- and mid-size enterprises;
- ❑ Elimination of confusion in terms of interpretation of EMA information, and greater convenience for the user.

Case studies of Material Flow-Based EMA

1. Canon Inc.

(Electrical and Optical Equipment)

2. Tanabe Seiyaku Co., Ltd.

(Pharmacy)

3. Nitto Denko Corporation

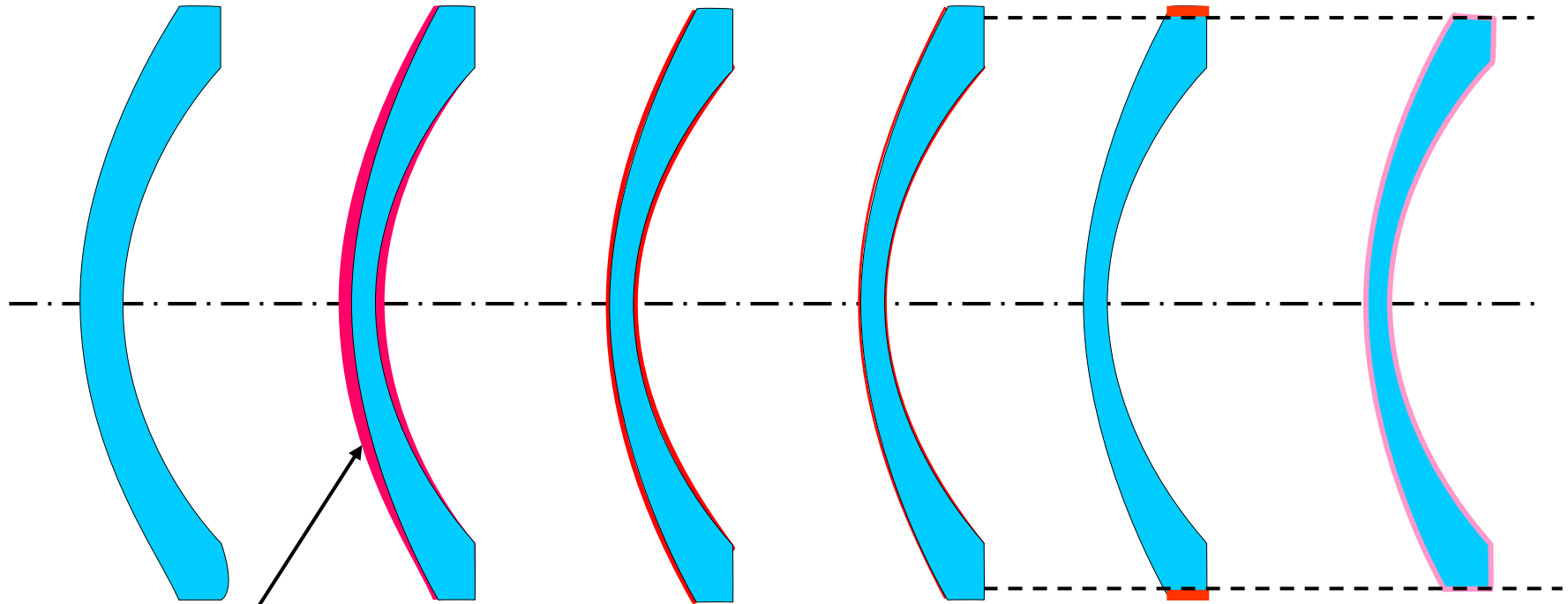
(Material and Subparts Manufacturers)

EMA leads eco-innovation.

Case (1) Canon Inc.

- Canon introduced material flow cost accounting (MFCA) in 2001, and had implemented it at 13 major operational sites in Japan and 8 manufacturing sites in South-East Asia.
- Canon has implemented MFCA in cooperation with upstream parts and materials manufacturers since 2005.
- Canon has a plan to introduce MFCA to all worldwide manufacturing sites by 2007.

Working Process of Lens for SLR Cameras

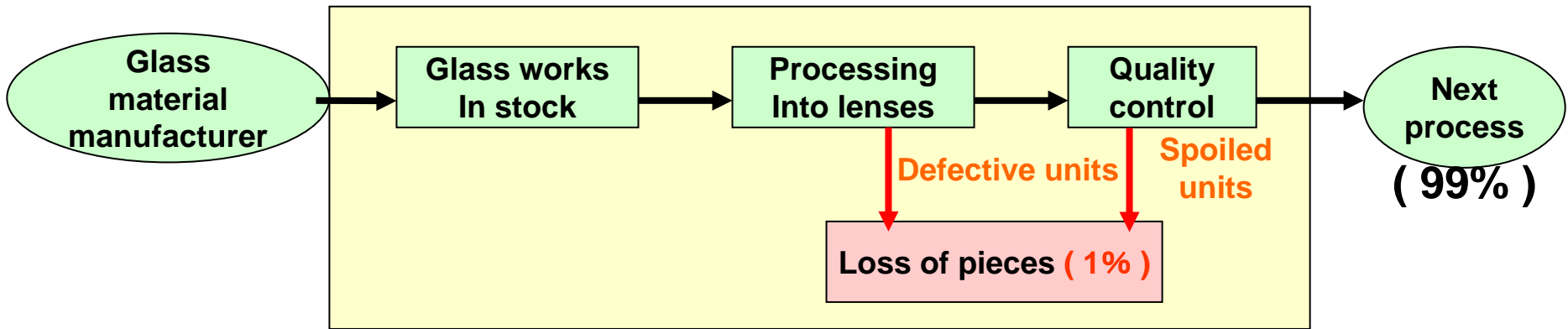


Shaved Portion

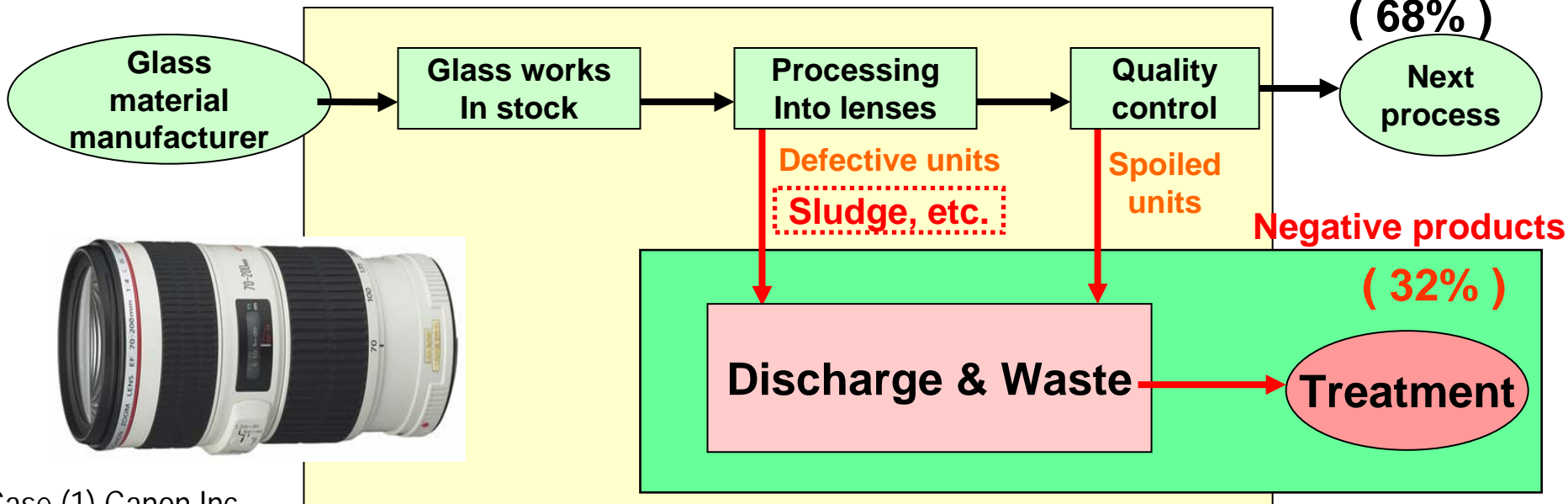


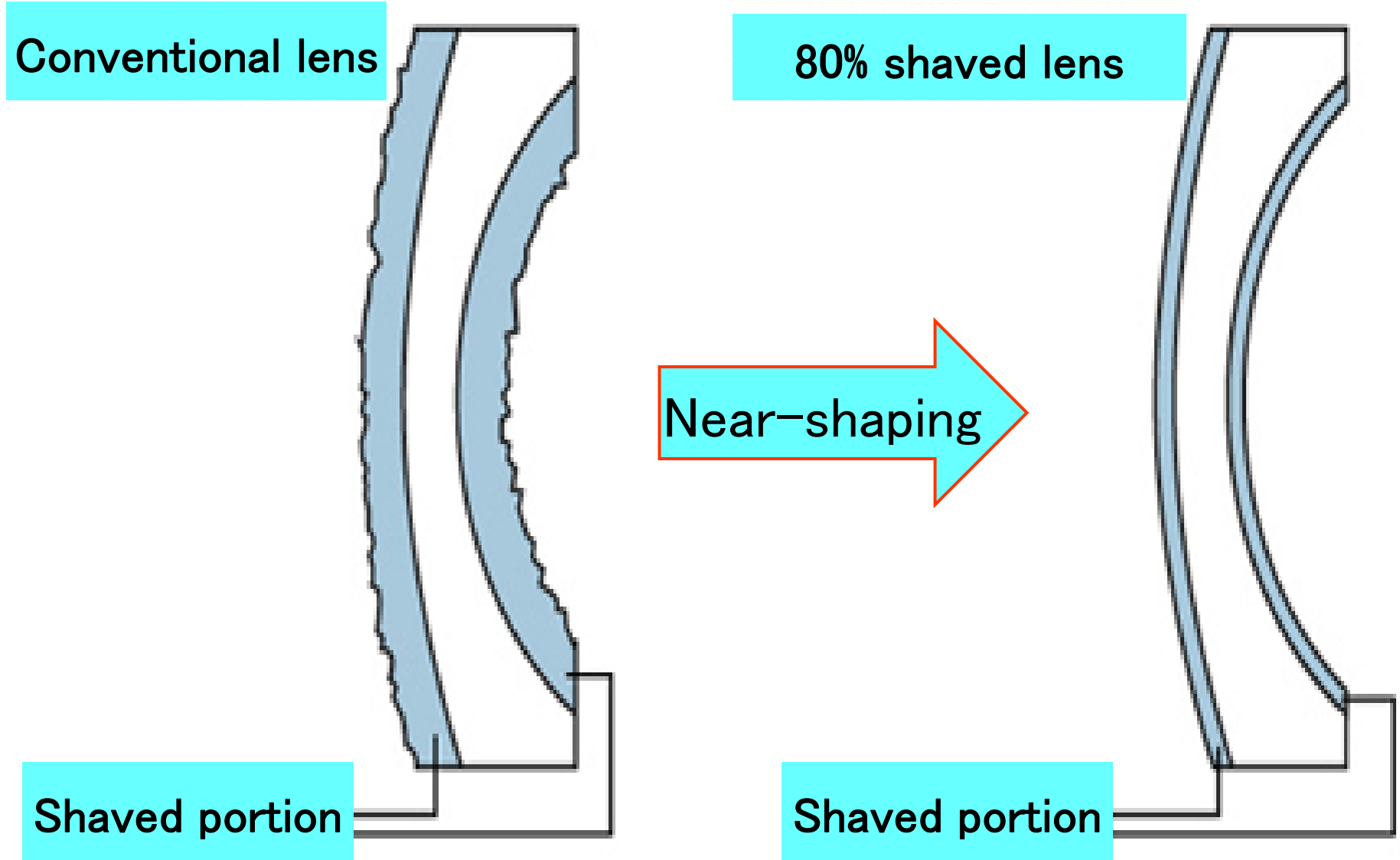
MFCA Analysis Result (Lens for SLR Cameras)

Conventional Management



Material Flow Cost Accounting

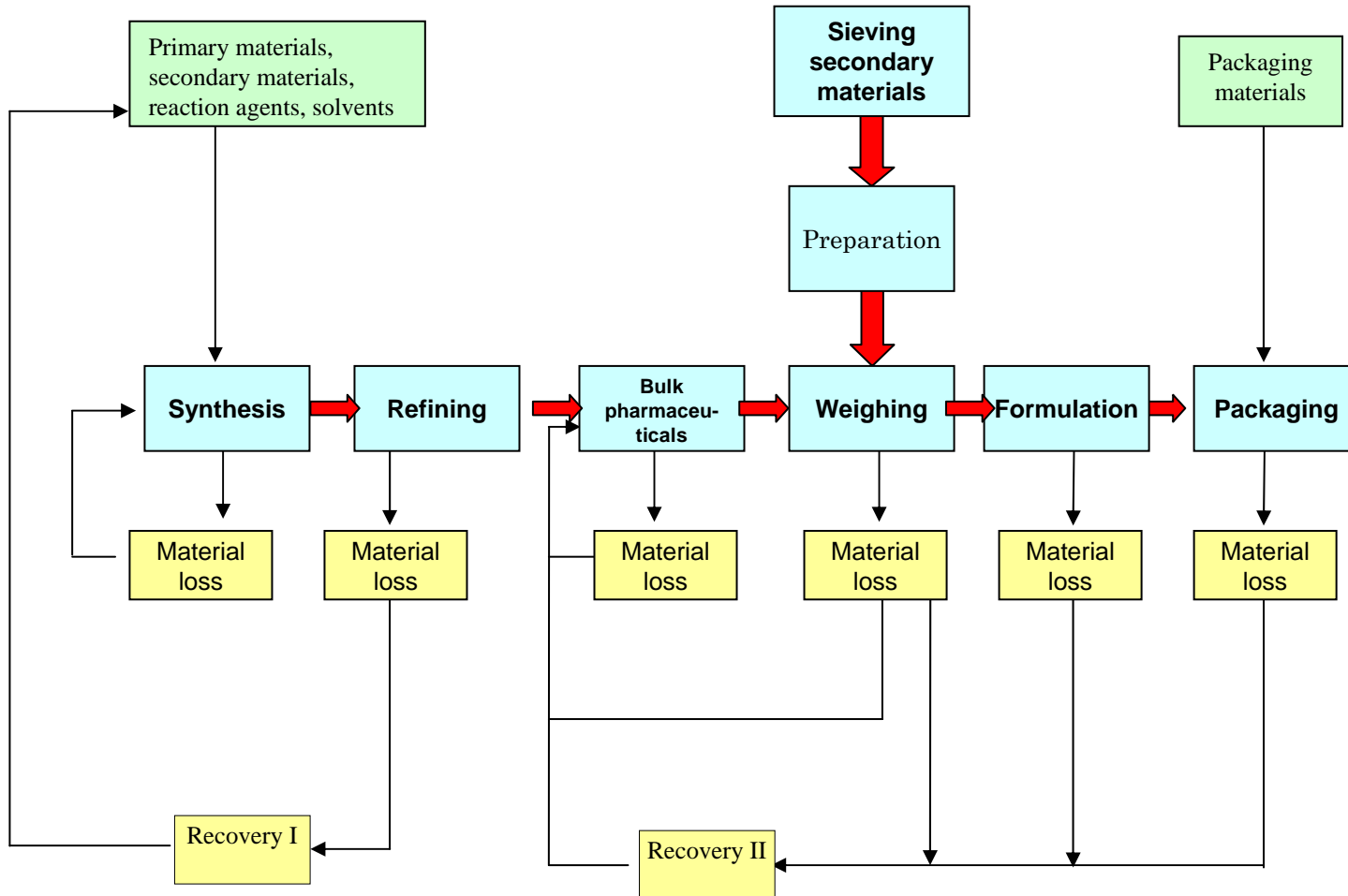




Case(2) Tanabe Seiyaku Co., Ltd.

1. In Jun 2001, Starting implementation of MFCA. Organizing project team. Trial at one manufacturing line.
2. In May 2003, based on material flow cost data capital investment on recycling chlorine-based solvents. Changing treatment of waste water.
3. In Feb 2004, Integration of ERP system (SAP R/3) and MFCA (material flow cost accounting) system.
4. Since 2004 MFCA performance evaluation meeting has been set up.

Production Flow Chart (Tanabe's Onoda Plant)



(Note: Preparations – Grinding work (to make finer and more uniform granular size))

Economic Effects from MFCA

Unearth problems

The incineration cost of waste water containing chloroform in the synthesis process was significant. (126 million yen)

Implementation of the countermeasures

1

Social environmental cost reduction by recycling chlorine solvent

◆ **Capital investment** Installation of the chloroform adsorption recovery system (in May 2003) at **66.1 million yen**

◆ **Effects** 1) Environmental impact reduction by lowering chloroform emissions (32t reduction)

2) Cost saving: **260,000 yen** a year

= [Material cost saving] – [Additional cost of recovery system operation]

2

Cost saving and environmental impact reduction by stopping waste water incineration for the drug concerned

◆ **Change of waste water disposal method** from incineration using the incinerator on the premises to activated sludge processing

◆ **Effects** Waste disposal cost and environmental impact reduction

Cost saving: **13.32 million yen/year**

Reduction of waste water incineration for the drug concerned

3

Cost saving and environmental impact reduction by abolishing incineration on the premises

◆ **Abolition of incineration on the premises**

◆ **Effects** Reduction of waste disposal cost and environmental impact, environmental risk avoidance

Cost saving: 40.59 million yen/year (due to lower labor cost, energy cost, etc.)

Overall effect : The total cost saving in phases one to three is expected to reach **54.17 million yen** (phase 1: 0.26 m + phase 2: 13.32 m + phase 3: 40.59 m)

The capital investment (66.1 million yen) will be recovered nearly in one year.

Environmental conservation effects from material flow based EMA

Energy-saving : 33 million yen/year

CO₂ conversion : 0.92 million (2,328t/year) reduction

	Energy-saving		CO2 reduction *	
Reduction of incineration cost by the abolition of incinerator (LSA crude petroleum)	756 kl/year	23.38 million yen/year	2,048 t/year	0.81 million yen/year
Reduction of electric power cost by the abolition of incinerator	773,015 kwh/year	10.82 million yen/year	315 t/year	0.12 million yen/year
Increase of electric power cost by the installation of the chloroform adsorption recovery system	85,731 kwh/year	1.20 million yen/year	35 t/year	0.01 million yen/year

$$\begin{aligned} (\text{Sum}) &= (\text{Reduced amount of fuel/electric power}) \times (\text{CO}_2 \text{ conversion coefficient}) \\ &\quad \times (\text{Conversion coefficient}) \times (\text{Exchange rate}) \end{aligned}$$

CO₂ conversion coefficient : Crude petroleum 2.71 t/KL Electric power 4.07t/10⁴ KWH

Conversion coefficient : 3.73 US\$/t CO₂ (Annual report of Prototype Carbon Fund the World Bank)

Exchange rate : 105.69 yen/US \$ (2004/3)

Installation of the Chloroform Adsorption Unit at Onoda Plant

The chloroform adsorption system using activated charcoal was installed at Onoda Plant in May 2003 to reduce chloroform emissions into the air. It is expected to significantly reduce the emissions as well as to save costs by recycling the recovered chloroform.

At this plant, chloroform is used in the production process of bulk pharmaceuticals, 95% of which is recovered and recycled, but the remaining 5% had been previously emitted into the air or discharged as waste water. This capital investment was made not only to reduce emissions into the air but also to serve as the first phase of countermeasures to the problem (significant waste disposal cost) identified through the introduction of the material flow cost accounting.

The plant acquired the ISO 14001 certification of the environmental management system in October 1998 and has made continuous efforts in contributing to the global environmental preservation. As one of Tanabe Seiyaku's major plants, it will continue to seek to be a greener plant through the promotion of its voluntary environmental measures.



Case 3: Nitto Denko Corporation

Product: Adhesive Tapes for Electronics Application
Quantity: 912pcs.
Period: one month (Nov. 01-30, 2000)

Top: Adhesive (Red)
 Middle: Backing Film (Blue)
 Bottom: Separator (Green)

—————> Flow to Product
 - - - - -> Flow to Waste

Dissolution etc.,

Coating&Drying

Store

Slitting etc.,

Product

2, 474.39kg
 22, 144.50m²
 27, 404.00m²

¥177, 431.12
 ¥1, 165, 500.00
 ¥1, 264, 800.00

306.83kg
 21, 714.15m²
 24, 761.75m²

¥65, 009.62
 ¥1, 142, 850.00
 ¥1, 142, 850.00

SI: 127.58kg
 9, 028.80m²
 10, 296.00m²

EI: 83.40kg
 5, 902.35m²
 6, 730.75m²

SI: ¥27, 031.58
 ¥475, 200.00
 ¥475, 200.00

EI: ¥17, 670.94
 ¥310, 650.00
 ¥310, 650.00

351.01kg
 24, 840.60m²
 28, 327.00m²

¥74, 370.26
 ¥1, 307, 400.00
 ¥1, 307, 400.00

Waste: 103.14kg
 7, 299.10m²
 10, 785.50m²

Waste: ¥21, 852.79
 ¥384, 163.18
 ¥497, 792.32

247.87kg
 17, 541.50m²
 17, 541.50m²

¥52, 517.47
 ¥923, 236.82
 ¥809, 607.68
 Core etc ¥714, 582.22
 (¥2, 499, 944.19)

68%

<Total Waste>

Waste: 289.41kg
 7, 729.45m²
 13, 427.75m²

Solvent Gases 1, 981.29kg

Waste: ¥35, 209.79
 ¥406, 813.18
 ¥619, 742.32
 (¥1, 061, 765.29)

29%

Waste: 186.27kg
 430.35m²
 2, 642.25m²

Solvent Gases 1, 981.29kg

Waste: ¥13, 357.00
 ¥22, 650.00
 ¥121, 950.00

Solvent Gases ¥99, 064.50

Solvent Gases ¥99, 064.50

3%

Result of Material Flow Cost Accounting

Period: from November 01 to 30, 2000 (Unit: Yen)

Cost	Material	Energy	System	Disposal	Total
Positive Product	2,499,944 (68.29%)	57,354 (68.29%)	480,200 (68.29%)	N/A	3,037,498 (67.17%)
Negative Product**	1,160,830 (31.71%)	26,632 (31.71%)	222,978 (31.71%)	74,030 (100%)	1,484,470 (32.83%)
Total	3,660,774 (100%)	83,986 (100%)	703,178 (100%)	74,030 (100%)	4,521,968 912pcs (100%)

**Negative Product=Material Loss(Waste)

Implemented Countermeasure

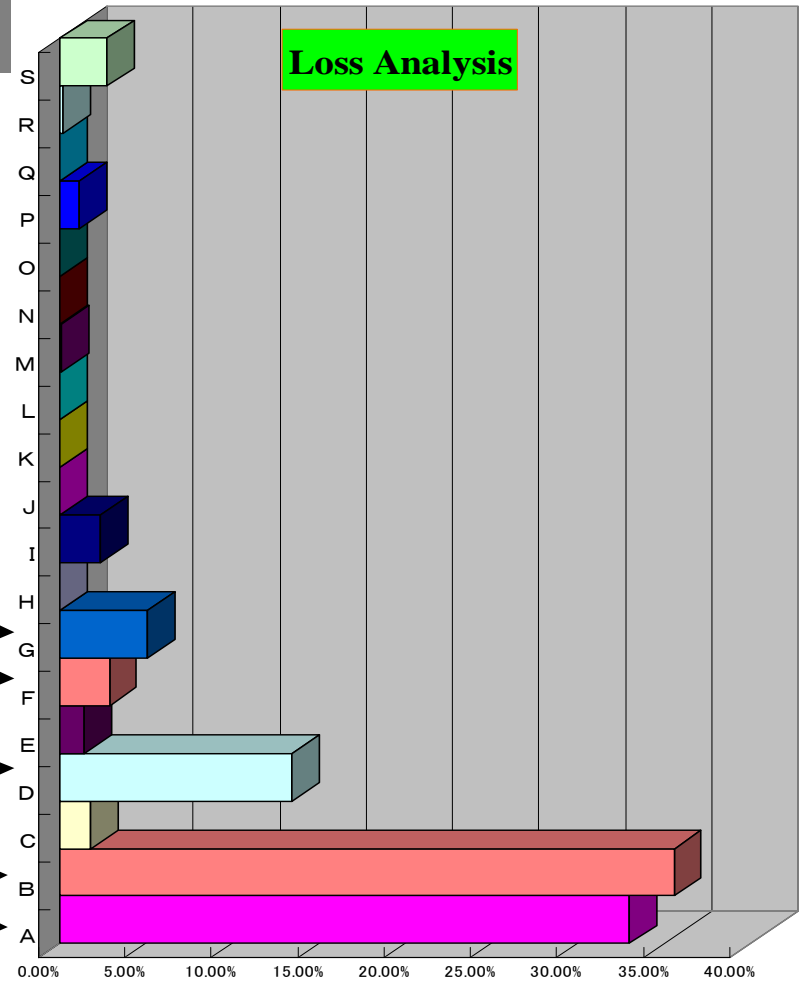
Improvement for Winding Roller
 Change of Slitter
 Change of Slitting Timing

Task Force Team Activities

Change of Coating Width
 Change of Separator Width
 Ageing Condition of Jumbo Roll
 Improvement for Jumbo Roll Rewinding

Improvement for Extruding Machine
 Up-Grade Pigment
 Up-Grade Base Resin

Packing Improvement for Materials
 Cleaning of Base Film Edge
 Others



New Investment

Improvement and Target

	2001	2003	2007 (Target)
Cost			
Positive Product	68%	78%	90%
Negative Product	32%	22%	10%
Total	100%	100%	100%

Concluding Remarks

- ❑ Material flow-based EMA is a tool for linking the environment with the economy at the system level. Organisation can conserve the environment while enjoying economic benefits.
- ❑ The purpose of the international standardization is to offer a common platform by providing a general framework and a way of implementation of EMA.
- ❑ This standardization contribute very significantly to sustainability by eco-innovation through EMA all over the world as it has been proved in the Japanese context.
- ❑ The Japanese committee will make a formal proposal of EMA as NWIP soon.

Member of Japanese Committee for EMA Standardization

- Chair: Professor K. Kokubu (Kobe University)
- Vice Chair: Professor M. Nakajima (Kansai University)
- Members:
Representatives from Japan Business Machine and Information System Industries Association (JBMIA), Japan Pharmaceutical Manufacturers Association (JPMA), Sustainable Management Forum of Japan (SMF), Japan Automobile Manufacturers Association, Inc. (JAMA), The Japan Electrical Manufacturers' Association (JEMA), Japan Electronics and Information Technology Industries Association (JEITA), The Japan Society Of Industrial Machinery Manufacturers (JSIM), Japan Chemical Industry Association (JCIA), The Federation of Electric Power Companies of Japan (FEPC), Petroleum Association of Japan (PAJ), The Japan Iron and Steel Federation (JISF), Japan Paper Association (JPA), Japan Cement Association (JCA), Nippon Keidanren, The Japan Chamber of Commerce and Industry (JCCI), Takasaki City University of Economics (TCUE), SEKISUI CHEMICAL CO., LTD., Green Futures LLC., Ministry of Economy, Trade and Industry (METI), Ministry of Environment (MOE)

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