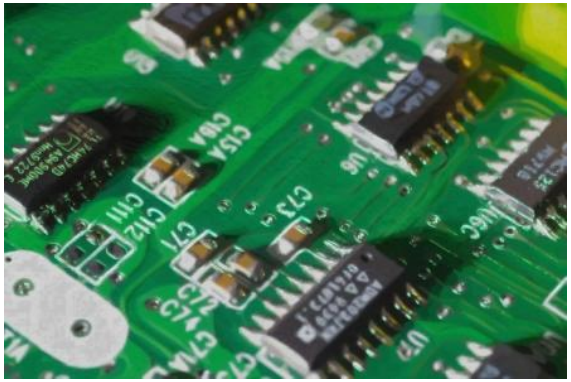
Enhanced Information Sharing on (Hazardous) Substances in Electronics

Connecting the production and end-of-life stages



Dr. Magnus Bengtsson
Group Director
Sustainable Consumption and Production
Institute for Global Environmental Strategies, Japan

Lack of Information on Chemicals in Products is an Obstacle in achieving a Greener Economy

Side event at CSD18, New York, 6th May, 2010

Institute for Global Environmental Strategies (IGES)

- Founded in 1998 by the Government of Japan
- Policy research institute working to promote Sustainable Development in the Asia-Pacific region
- 3 topical focuses: Climate Change, Natural Resource Management, Sustainable Consumption and Production
- Around 70 professional staff
- More details at www.iges.or.jp

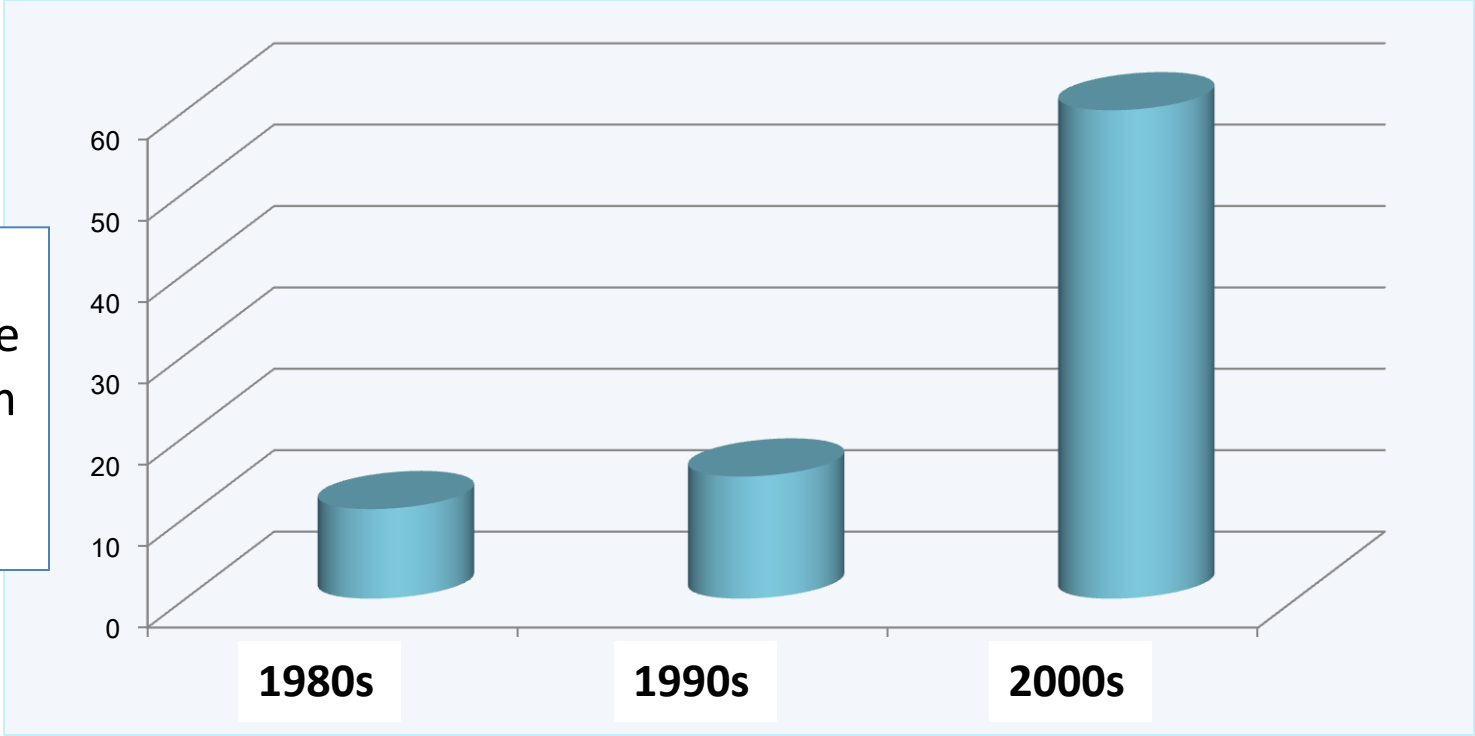
Photo: Yasuhiko HOTTA

Outline

1. End-of-life treatment of electronics, associated hazards, and the need for information on chemical content
2. The current situation in Japan
   — Existing information systems
   — Results from an interview survey
3. Final conclusions

Electronic products are becoming increasingly complex

Number of elements of the periodic system used in circuit boards



Source: Johnson, J. et al. 2007

- These changes are not well known in the recycling industry
- Manufacturers have not paid much attention to how such changes can affect recycling processes or how/if new materials can be effectively recovered.

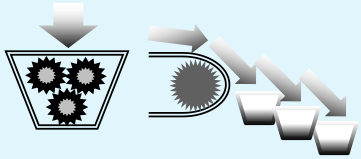
Examples of hazardous substances and components in electronics

Components	Found in	Substances of concern
Cathode ray tubes	Old TV sets, PC monitors, oscilloscopes	Pb in cone glass Ba in electron gun getter Cd in phosphors
Printed circuit boards	Ubiquitous, from beepers to PCs	Pb, Sb in solder Cd, Be in contacts Hg in switches BFRs in plastics
Batteries	Portable devices	Cd in Ni-Cd batteries Pb in lead acid batteries Hg in Hg batteries
Gas discharge lamps	Backlights of LCDs	Hg
Plastics	Wire insulation, plastic housing, circuit boards	Polyvinylchloride Brominated flame retardants

Chemical hazards are present at all stages of the recycling chain

Recycling chain

Disassembly



Size reduction and separation

Metallurgical treatment

Final treatment

Hazards

Removal of hazardous components

- Hg switches: Hg
- Batteries: Cd, Pb, Hg
- Gas discharge lamps: Hg
- CRTs: Pb, phosphors
- Printed Circuit Boards

Shredding

- Formation of dust particles containing plastics, metals, ceramic and silica

Smelting

- Emission of metal fumes, mixed chlorinated and brominated dioxins and furans (PXDD/Fs)

Incineration and landfilling

- Emission of metal fumes, PXDD/Fs
- Leaching of heavy metals and BFRs

Hazards associated with recycling and waste treatment

Hazards CAN BE reasonably managed – Proper disassembly is key

Low risk scenario:
Hazardous components are removed

Removal

Special treatment

Lower risk of pollution and occupational exposure

Disassembly

Shredding and separation

Formation of dust containing particles of metals, plastics, ceramic, silica, etc.

E.g., Circuit board shredding → dust of Pb, Cd, Sb, Be, Hg, plastics

Metallurgical treatment

Emissions of metals, Cl/Br dioxins & furans

Metals → metal fumes (Cd, Pb)

PVC, BFRs in plastics → PXDD/Fs

High risk scenario:
Hazardous components are not removed

Hg switches
Batteries
Plastics, etc.

Higher risk of pollution and occupational exposure

Improved information on chemicals in products is only part of the picture

Safe and effective recycling requires:

- Awareness, knowledge and know-how among recyclers
- Motivation and proper incentives – Pressure from legislators, customers or peers to seek and use information on substances in products, and to use this information for improving recycling practices
- Technology – Infrastructure for safe treatment of components containing hazardous substances
- Dialogue among producers, the end-of-life community, and stakeholders on priorities and improvement strategies
- Innovation – Product design considering the end-of-life

Potential benefits of improved information exchange

- **<u>Information disclosure</u>:** from Producers to Recyclers

  - **Safer recycling and waste treatment** Safer treatment and better protection of workers' health and the environment

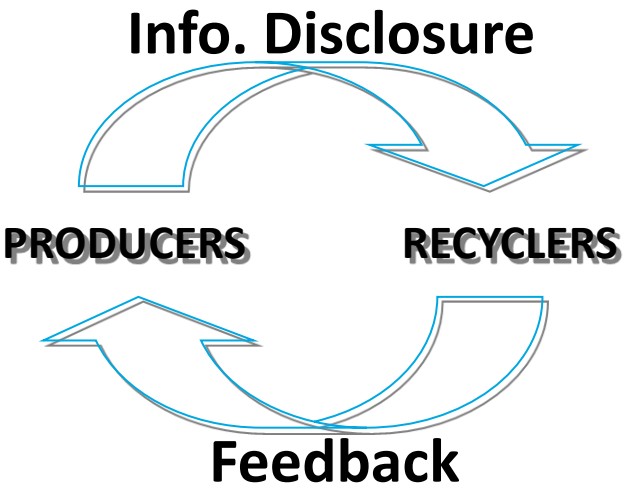
  - **Higher overall recycling ratio** Larger number of materials could be recycled and the recycling ratio could be increased

  - **Higher use value of recycled materials** Secondary materials that are less contaminated or with better defined composition

- **<u>Feedback</u>:** from Recyclers to Producers

  - **Improved product design considering end-of-life**

  - **Reduced costs for recycling**

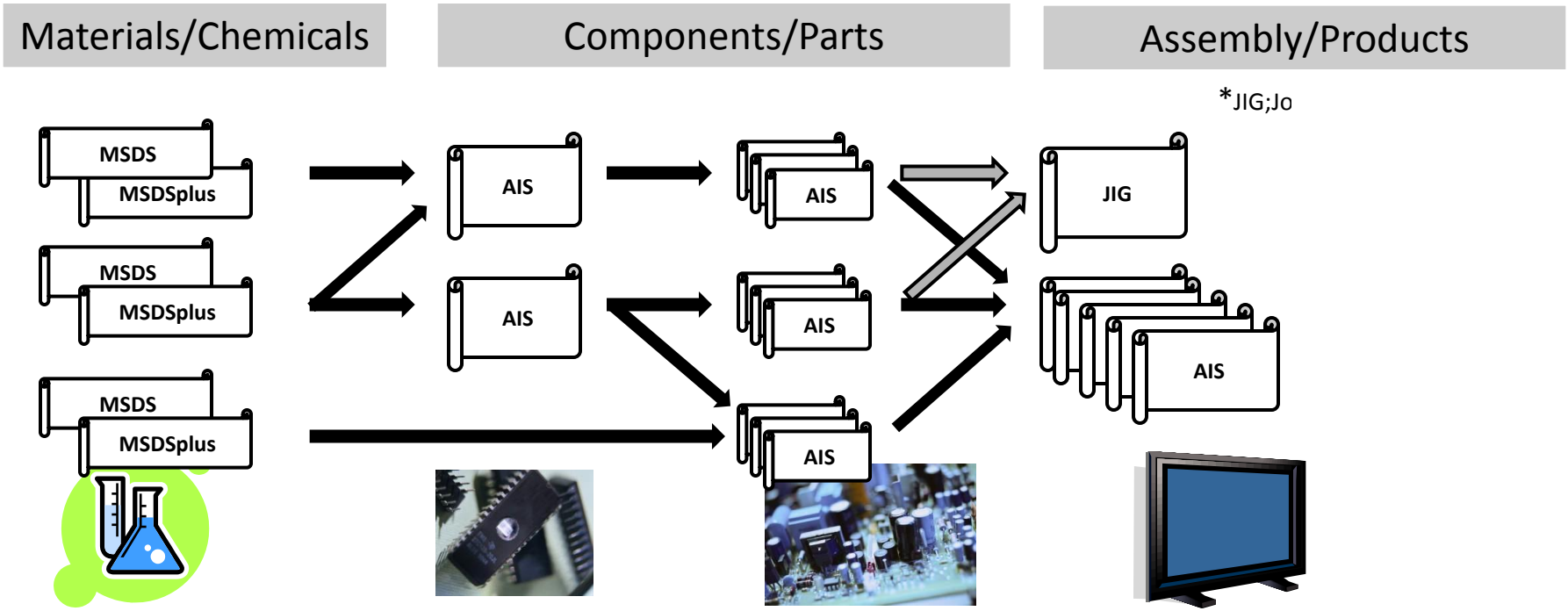


Collection and recycling of e-waste in Japan

Products	Collection scheme	Effect
Refrigerators, Washing machines, TVs, PCs, Air conditioners	• **EPR system** • Producer responsible for recycling • Consumers pay recycling fee	• Moderate collection rate • Some export, both as "second-hand" and illegally
Mobile phones	• Network operators run a joint initiative to collect and recycle	• Low collection rate
Other large household electronics (Audio, Microwave ovens etc.)	• Some municipalities collect as "large waste" on designated days • Sold to recyclers	• Unknown • Some export
Small electronics (Cameras, MP3s etc.)	• A few pilot projects • Often public-private partnerships	• Minor

Information systems in Japan – JAMP

- JAMP (Joint Article Management Promotion-consortium) is an industry initiative to manage information on chemicals in products.
- It is developed in response to REACH.
- It allows producers of articles to collect chemical information from suppliers of materials and components



Information systems in Japan – JAMP

Chemicals List for JAMP

Laws and directives required for MSDSplus

code	Laws and Directives	Revised Ver.
JP01	Law Concerning the Examination and Regulation of Manufacture ， etc of Chemical Substances (Class 1 specified chemical substances)	Oct. 31, 2007
JP02	Industrial Safety and Health Law (chemicals prohibited to be manufactured)	Sep. 7, 2007
JP03	Poisonous and Deleterious Substances Control Law (specified poisonous substances)	Aug. 15, 2007
EU01	RoHS directive	2002/95/EC
EU02	ELV directive	2000/53/EC
EU03	67/548/EEC (Annex I CMR-cat1, 2)	2008/58/EC
EU04	76/769/EEC (excpet 67/548/EEC Annex I CMR-cat1, 2)	2007/51/EC
EU05	REACH SVHC	Oct. 28, 2008

Criteria to report optionally (Addition or deletion in the future is possible.)

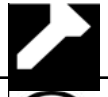
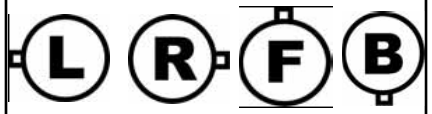
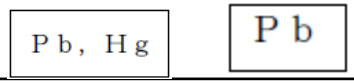
code	Laws and Directives	Revised Ver.
OT01	ESIS PBT (Fulfilled)	Oct. 28, 2008
IA01	GADSL	2008 GADSL ver. 2.0
IA02	JIG (JIG A substances)	JIG-101A 2007

Other information systems in Japan

Recycling Marks

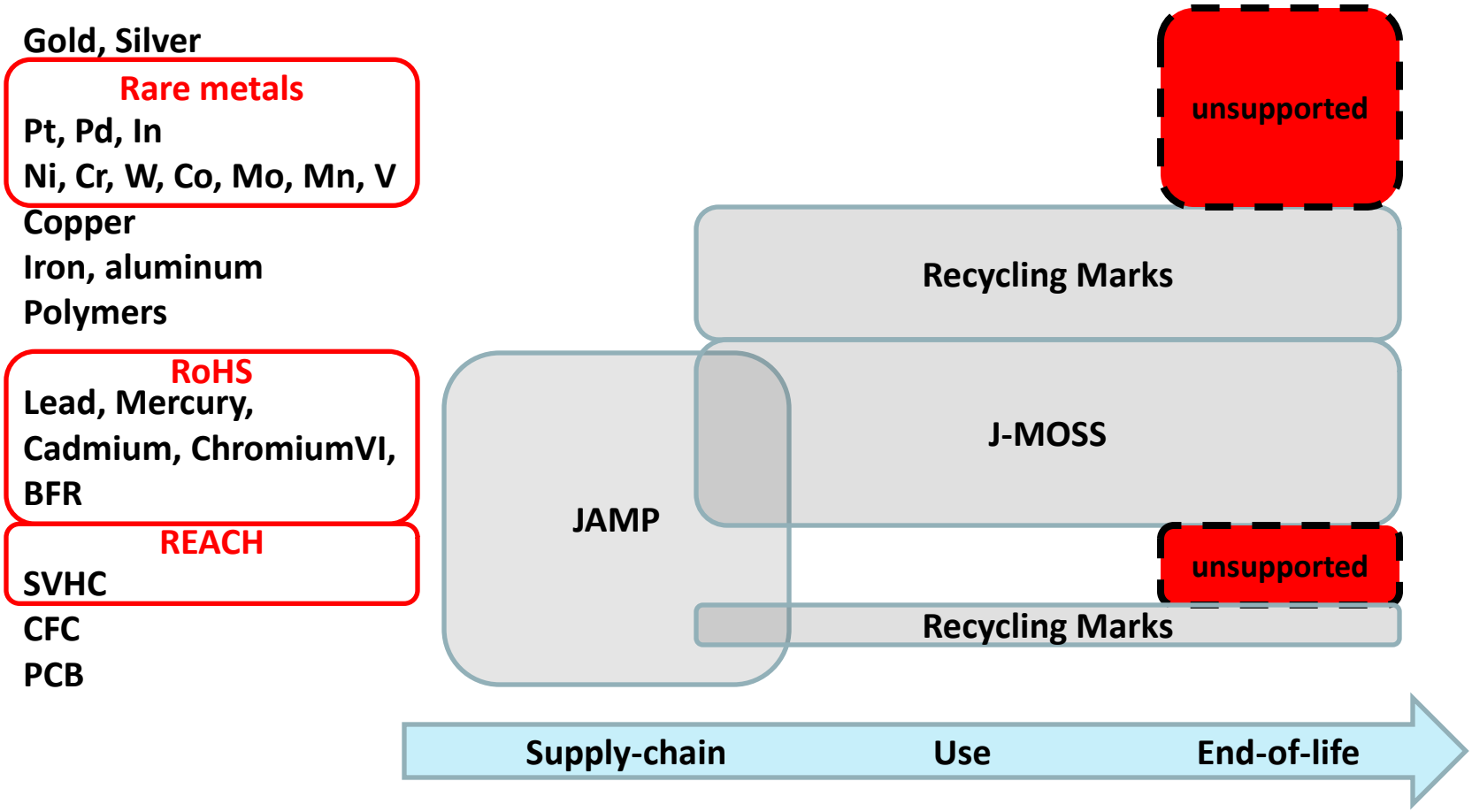
1. **Identification of plastic parts**
2. **Symbols to make manual disassembly easier**
3. **Marking for presence or absence of selected substances**
4. **Marking of equipment containing rechargeable batteries**

- Mostly voluntary systems
- J-Moss legal requirement
- Developed mainly for large household appliances
- Introduced over the last few years

Contents		Example of Marks	Year
Plastic Parts	Material Info.	>PC+ABS-CF FR(40)<	2007
	No Flame Retardants	>ABS< FR0	
	Contents Recycled Plastic	>PP< CR30	
	Label and Seal	>PET< / >PS<	
Metal Info.		-Fe-	2008
Recycling Symbols	Metal has been inserted into the plastic parts		2004
	Hole puncture location		
	Symbols to show the direction of the compressor's refrigerant enclosing pipe		
J-Moss Red and Green mark			2006
Marking presence of specific substances in circuit boards			2005
Rechargeable battery			2001

Reference; http://www.aeha.or.jp/

Overview of information systems



- Only limited information is currently shared to the end-of-life stages
- Information on SVHC is not passed on, but it would be possible to establish such systems based on JAMP
- No system for information on rare metals content

Interview results: Current situation (1)

- Awareness on hazards seems lower among recyclers than among producers
- Large recyclers have developed some knowledge on product composition. SME recyclers lack capacity and are in greater need for information from producers
- Many recyclers suppose that chemicals risks of “non-hazardous waste” are negligible
- Recyclers seem to equate good practices with regulatory compliance

Interview results: Current situation (2)

- Some information systems exist but are uncoordinated and not linked
- Information on chemicals in materials is often lost at the stage of parts manufacturers
- Information is not fully reliable and producers of articles often have to analyze the chemical contents of components themselves, e.g. to ensure RoHS compliance

Results: towards enhanced info sharing

- **Need for industry-wide approach**: Information systems should be introduced on an industry-wide basis, not by individual companies
- **Risk information**: Recyclers need broader information, not only on names and amounts of substances but also on negative effects and preventive measures
- **Reliability of information**: Improvements are needed, especially at the stage of parts manufacturers
- **Regulation of recycling and waste management**: Possible need for industry-specific standards on occupational health and environment
- **Synergies with information on other substances**: Recyclers are more interested in information systems on rare/valuable metals
- **Joint learning and problem solving**: Product designers need to visit recycling facilities in order to understand the processes used. Human interaction is important for information exchange and learning.

Final Conclusions

1. There is a need for more information on substances in products among the recyclers, especially SMEs
2. However, information on substances is not enough – recyclers need help to interpret such information and knowledge on how to act on it
3. Recyclers' motivation to acquire relevant information and to take appropriate action needs to be stimulated
4. There is a general need for improved communication between producers and the end-of-life community
5. The greatest hazards associated with e-waste are found in developing countries. Improved systems for information on chemicals in products is not likely to contribute significantly to solving those problems
6. Strengthened regulation and enforcement, and increased awareness raising are urgently needed

Thank you for your attention

For more information please contact me at:

bengtsson@iges.or.jp

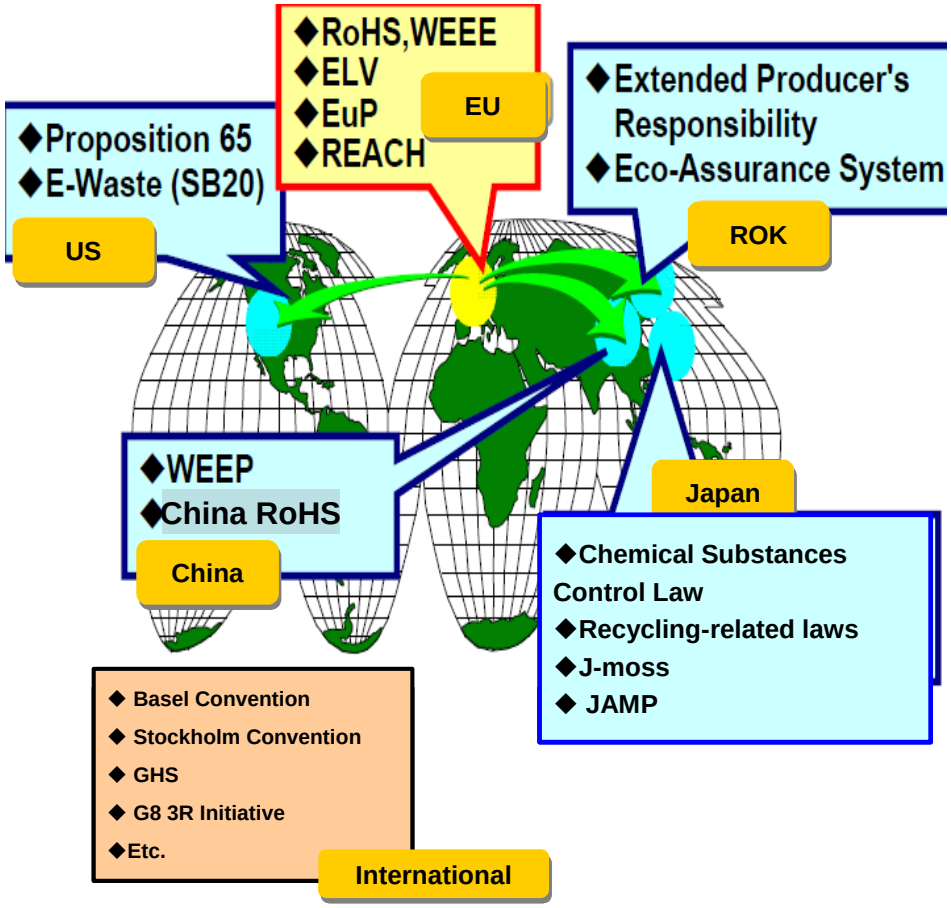
Recent initiatives on hazardous chemicals in products and end-of-life treatment

Globalizing movement

- Many policy initiatives, mainly originating from the EU
- Fewer hazardous substances used
- Improved availability of information on hazardous substances used in products
- Regional initiatives have global impact

Domestic initiatives in Japan

- Recycling-related laws (e.g. Electronic Home appliances, PCs)
- JAMP (industry response to REACH)
- Recycling Marks
- J-Moss (Japanese RoHS compliance mark)



Adapted from : Yoshiaki Ichikawa (Hitachi), "Eco-conscious design and the 3Rs", IGES/K-FACE Global Environmental Seminar Economic Globalization and the 3Rs, January 31, 2007

Overview of information systems (1)