MYTH, MISUNDERSTANING, MISCOMMUNICATIONS AND MISTAKES - FACT AND IN-DEPTH ANALYSIS OF PRODUCT-RELATED ENVIRONMENTAL REGULATIONS ON ELECTRICAL AND ELECTRONIC EQUIPMENT IN CHINA, JAPAN AND KOREA

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Abstract: The purpose of this article is to provide clarification to corporate environmental managers of multinational companies on current and emerging product-related regulatory developments in China, Japan and Korea. "WEEE" and "RoHS" are no longer an isolated "European phenomenon" but are becoming part of a much larger and irreversible trend, requiring manufacturers and users of impacted products around the world to become more proactive and strategically focused. This is of concern where the responsible corporate actors have limited on-the-ground experience and have a home-country bias when it comes to the way in which they interpret environmental policies and regulations. By providing and analyzing the background and details of new product-related environmental policies and regulations affecting the electrical and electronic products industry, this article aims to provide corporate environmental managers with guidance on the different legal systems and the development and implementation of product-related environmental regulations in these three critical Asia markets.

1. INTRODUCTION: FACTS AND FIGURES OF CHINA, JAPAN AND KOREA

Facts and figures of one country may be a simple description and profile of its endowment and legal, political or economic situations. When reading between the lines of facts and figures, it can be realized that simple facts and figures have valuable information, in particular, for third-country managers.

All three countries have a civil law system in place. Thus, all particulars of society shall be written in legal texts and only legal texts are authoritative in a strict sense. However, diversities arise. When the People's Republic of China was established in 1949, the roots of the Chinese legal system were derived from the Soviet Union model of the socialist legal system (Chao Xi 2005). In 1948 when the Japanese Constitution was drafted after the Second World War, the Constitution relied heavily on the legal systems of European countries (in particular, Germany). During the Japanese rule of Korea from 1910 to 1945 and after the independence of the Republic of Korea in 1948, the Korean legal system was transferred from the Japanese legal system which originated from the European civil law system. At a first glance, a big dissimilarity among the legal systems of the three countries can be recognized. This very basic gap prevails in all infrastructural aspects of the three countries.

Regarding legislative structure and law-making process, China has "a monistic system with several levels", which means that the National People's Congress (NPC), as the highest state body, has the unitary legislative power over the entire nation and it delegates certain legislative powers to the local People's Congress and the central and local governments. In Japan, the "Diet" has the sole law-making power as the legislative branch of the Japanese government. It consists of two Houses, the House of Representatives and the House of Councillors.

Table 1. Comparison of Key Facts and Figures of China, Japan and Korea

	China	Japan	Korea
Legal Family	Civil Law	Civil Law	Civil Law
Foreign Legal Influence	Former Soviet Union	Germany	Germany, Japan
Population	1,306,313,812 (Jul-2005)	127,417,244 (July 2005 est.)	48,289,037 (July 2003 est.)
Language	Mandarin (Putonghua, based on the Beijing dialect), Yue (Cantonese), Wu (Shanghaiese), Others	Japanese	Korean
Religion	Officially Atheist (2002) Daoist (Taoist), Buddhist, Muslim 1%-2%, Christian 3%-4%	Observe both Shinto and Buddhist 84%, other 16% (including Christian 0.7%)	Christian 49%, Buddhist 47%
Labor Structure (ILO 2002 Report)	Agriculture: 49% of workers, 17.6% of GDP Industry: 22% of workers, 49.4% of GDP Services: 29% of workers, 32.9% of GDP (01-Jan-2003)	Agriculture: 5% workers, 3% of GDP Industry: 25% workers, 42% of GDP Services: 70% workers, 55% of GDP (01-Jan-2004)	Agriculture: 20.8% of workers, 5.1% of GDP Industry: 40.5% of workers, 42.5% of GDP Services: 38.7% of workers, 52.4% of GDP
Major Export Partners	Export partners: US 22.8%, Hong Kong 16.2%, Japan 12.4%, South Korea 4.4% Import partners: Japan 16.1%, Taiwan 10.9%, South Korea 10.4%, US 7.4%, Germany 5.4% (2004)	Export partner: US 22.7%, China 13.1%, South Korea 7.8%, Taiwan 7.4%, Hong Kong 6.3% (2004) Import partner: China 20.7%, US 14%, South Korea 4.9%, Australia 4.3%, Indonesia 4.1%, Saudi Arabia 4.1%, UAE 4% (2004)	Export partners: US 20.7%, China 12.1%, Japan 11.0%, Hong Kong 6.3%, Taiwan 3.9% (2001); Import partners: Japan 18.9%, US 15.9%, China 9.4%, Saudi Arabia 5.7%, Australia 3.9% (2001)
Average Annual Income	US $950	US $34,210	US $9,460 (World Bank, 2001)

Source: Author complied from data of ENHESA, CIA Fact, ILO, World Bank

Legislative power is conferred to the National Assembly, a unicameral legislature, in Korea.

In addition to the different populations of the three countries, their labor structures are quite varied from agriculture (49% for China, 5% for Japan, 20.8% for Korea) to service (29% for China, 70% for Japan, 38.7% for Korea). The regulatory focus of each country cannot be the same as a result of this difference in labor structure.

2. FRAMEWORK OF PRODUCT-RELATED ENVIRONMENTAL REGULATIONS IN CHINA, JAPAN AND KOREA

2.1. China

The Clean Production Promotion Law of 29 June 2002, the amended Solid Waste Pollution Prevention and Control Law of 29 December 2004, the 10th 5-Year Plan on Recovery and Use of Recyclable Resources of 10 January 2002 and the Circular on 11th 5-Year Plan on National Environmental Protection Legislation of 28 November 2005 have provided a framework for the use of clean technology, non-toxic or non-hazardous materials and reuse and recycling of discarded products in China.

Under this framework, the Regulation on Take-Back and Disposal of Waste Home Appliances of 7 September 2004 and the Management Measures for the Prevention and Control of Pollution from Electronic Information Products of 10 December 2003 (which were adopted on 28 February 2006) and the Measures on Pollution Prevention from Waste Electrical and Electrical Equipment of 21 September 2005 were proposed by the National Reform and Development Commission, the Ministry of Information Industry and the State Environmental Protection Administration, respectively. Table 2 shows regulatory and policy measures that would have to be taken by Chinese authorities in 2006 or later in accordance with the aforementioned three Measures.

Table 2. Scheduled Product-related Regulatory Measures on Electrical Electronic Equipment in 2006 and Later in China (Selective)

Main Government Authority	Regulatory Measures	Time Scale	Base Regulations
MII	List of Major Electronic Information Products	2006?	Management Measures for the Prevention and Control of Pollution from Electronic Information Products of 28 February 2006
AQSIQ	Test Methods of Hazardous Substances in Major Electrical and Electronic Equipment	2006?	
MII, AQSIQ	National Standards (GB) on the Threshold Limits on Hazardous Substances	2006?	
MII	Phase-Out Schedule for EEE containing Hazardous Substances	2006?	
	3 Types of Labels on Recyclability of Discarded EEE	2006?	
	Label on Validity Date for Safe Use	2006?	
SEPA	List of Waste Electrical and Electronic Equipment (WEEE)	2006?	Proposed Measures on Pollution Prevention from Waste Electrical and Electrical Equipment of 21 September 2005
SEPA, EPB	Reporting of Waste Electrical and Electronic Equipment	2006?	
EPB	Specific Measures on Registration of Facilities involved in Collection, Storage, Dismantling, Use and Disposal of WEEE	2006?	
SEPA	Technical Policy, Technical Rules and Standards on Collection, Storage, Dismantling, Use and Disposal of WEEE	2006?	
	Collective or Individual Collection System for WEEE	2006?	
NDRC	List of Waste Home Appliances	2006?	Proposed Regulation on Take-Back and Disposal of Waste Home Appliances of 7 September 2004
	Coordination on Collection and Disposal of Waste Home Appliances	2006?	
Local Government	Enforcement Rules on Collection and Disposal of Waste Home Appliances	2006?	
NDRC	Technical Rules and Technical Standards on Disposal of Waste Home Appliances	2006?	
	Policy on Pollution Prevention from Waste Home Appliances	2006?	
NDRC, AQSIQ	Safety Standards, Performance Standards and Labeling on Discarded Home Appliances	2006?	
	Technical Rules on Dismantling of Discarded Home Appliances	2006?	
Local Government	Local Collection and Disposal Program on Waste Home Appliances	2006?	

The Environment and Resource Committee of the National People's Congress is working on a draft Act on Promotion of Reduction, Reuse and Recycling of Resources which would be proposed and adopted the Act in 2007. The draft Act would incorporate provisions on extended producer responsibility, green consumption as well as green public procurement.

2.2. Japan

As is well known in the international community, Japan has been promoting "3Rs Policy", i.e. reduction of waste generation, reuse of parts, and recycling of discarded products, nationally and internationally. For example, collection and recycling of discarded products have been controlled by the Home Appliance Recycling Law, the Law on the Promotion of Efficient Use of Resources and the Waste Management and Public Cleansing Law. In the case of disposal of waste, the Waste Management and Public Cleansing Law is applied.

Since the adoption of the Law on the Promotion of Efficient Use of Resources (LPEUR) in 1991, Japan has provided a systemic framework on the reduction, reuse and recycling of waste. The Waste Management and Public Cleansing Law of 18 June 2003, the Law on the Promotion of Efficient Use of Resources of 8 February 2002, and the Law on the Recycling of Specific Home Appliances of 7 June 2000 contain provisions on the mandatory take back of end-of-life electrical and electronic equipment.

Table 3. Products covered under Law on the Promotion of Efficient Use of Resources

Types of Products	Regulatory Control	Examples
Specific Resource-saving Products	Requiring rational use of raw materials and reduction of waste generation from products	Automobiles, TVs, air conditioners, refrigerators, PCs (CRT and LCD), gas and oil appliances
Specific Reuse-promotion Products	Requiring design and manufacture of easily reusable or recyclable products	Automobiles, TVs, air conditioners, refrigerators, PCs (CRT and LCD), copiers, gas and oil appliances, devices using compact rechargeable batteries
Specific Labeling Products	Requiring labels for separate collection	Steel or aluminium cans, PET bottles, paper and plastic containers, compact rechargeable batteries
Specific Resource-Recycling Products	Promoting voluntary collection and recycling	Compact rechargeable batteries, PCs (CRT and LCD)
Specific By-products	Requiring use of by-products as recyclable resources	Coal ash generated from electricity industries, soil and sand, lumber generated from construction industries

Article 4 of LPEUR of 8 February 2002 provides that, when producing or selling products, facilities shall take appropriate measures for rational use of raw materials and shall use recyclable resources or recycled components as far as practicable. Also facilities shall take into consideration the promotion of the manufacture of durable products, the reuse of all or parts of products after collection, and the use or treatment as recyclable resources or reusable parts. There are 69 types of products covered under the Law on the Promotion of Efficient Use of Resources of 8 February 2002. Products covered under LPEUR are stipulated in Table 3. The general obligation on producers to use recyclable resources or reusable parts is applied only when producing products above a threshold amount per year, e.g. automobiles (10,000 cars), personal computers (10,000 units), printers (10,000 units), portable data collecting devices (10,000 units), unit type air conditioners (50,000 units), copying machines (1,000 units), refrigerators (50,000 units).

The Law on the Recycling of Specific Home Appliances (LRSHA) of 7 June 2000 stipulates a collection and recycling system in which retailers have responsibility for the collection of discarded home appliances and producers have responsibility for the recycling of discarded home appliances. Home appliances covered under LRSHA include air conditioners, TVs, refrigerators, freezers, and washing machines.

Responding to the Directive 2002/95/EC of 27 January 2003 on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS), the Ministry of Environment and the Ministry of Economy, Trade and Industry have held meetings on how to incorporate restriction on the use of hazardous substances in products into the existing regulatory framework and to find the best ways to reduce the use of hazardous substances in products. Pursuant to the Preliminary Report on the Reduction of Environmental Loads from Hazardous Substances in Products of 24 June 2005, the following five measures were proposed to reduce the use of hazardous substances in products: a) requiring producers or importers of products containing hazardous substances to provide information on hazardous substances in products under the Law on the Promotion of Efficient Use of Resources; b) requiring waste dischargers to provide detailed waste manifest of discarded products containing hazardous substances under the Waste Management and Public Cleansing Law; c) clarifying the specification of waste manifest by providing appropriate guidelines under the Waste Management and Public Cleansing Law; d) using unified product information systems; and e) requiring information disclosure on the use of hazardous substances in products under the Green Procurement Law.

As of July 2006, legally enforceable product-specific control on the use of hazardous substances is not present in Japan. However, the Law on the Examination and Control of Manufacture of Chemical Substances, the Law on the Reporting of Releases of Specified Chemical Substances to the Environment and the Improvement of Chemical Management, the Industrial Safety and Health Law, the Air Pollution Control Law, the Water Pollution Control Law and the Poisonous and Deleterious Substances Control Law provide a framework for the control on production, import, use and handling of chemicals in Japan.

In April 2005, together with the European Information, Communications and Consumer Electronics Industry Technology Association (EICTA) and the Electronic Industries Alliance (EIA), the Japan Green Procurement Survey Standardization Initiative (JGPSSI) published the Joint Industry Guide for Material Composition Declaration for Electronic Products (JIG). With the

launch of JIG, the JGPSSI has phased out the use of JGPSSI Guidelines and adopted JIG

2.3. Korea

With the introduction of an extended producer responsibility system from 1 January 2003 under the Act on the Promotion of Resources Saving and Recycling, a direct recycling obligation (i.e. fixing waste recycling targets) has been imposed on producers and importers of heavy waste-generating products and packaging materials. Under the Act, when producing or importing television sets, refrigerators, household washing machines, air conditioners, personal computers, hi-fi systems, or mobile phones (including batteries and chargers), the facility is required to recycle wastes generated from those products or their packages independently or contract with a waste recycling facility, or pay the appropriate charges to an appropriate waste recycling industry mutual-aid association. If recycling electronic products, the facility must reuse recyclable parts through intermediate treatment processes (e.g. dismantling, compressing, breaking, cutting), and recycle recyclable materials or export them for recycling. When selling new products subject to mandatory recycling, the sellers of the products must collect discarded products from customers with an additional charge being levied on the customers.

In the case of the electronics industry, the Association of Electronics Environment is designated as the Electronic Waste Recycling Industry Mutual-Aid Association by the Ministry of Environment. The Association of Electronics Environment is playing an active role in all aspects of the take-back and recycling of discarded electrical and electronic equipment (e.g. televisions, refrigerators, washing machines, air conditioners, personal computers, audio equipment, mobile phones).

Since early 2004, the Ministry of Environment of Korea has carried out a feasibility study to introduce an "Eco-Assurance System" which would regulate the use of hazardous substances in products. Also on 25 November 2004 the Eco-Assurance Committee for the Recycling of Electrical and Electronic Equipment and Vehicles was formed by the Ministry of Environment together with major Korean companies (e.g. Daewoo Electronics, Samsung Electronics, Hyundai Motors, GM-Daewoo Motors), the Ministry of Commerce, Industry and Energy and the Ministry of Construction and Transportation. The Eco-Assurance Committee has discussed regulatory measures of the developed countries, their impacts on Korean industries and responsive measures, identification of products subject to a Korean eco-assurance system, schedule to introduce an eco-assurance system, and system operation. These activities resulted in the proposed Law on the Recycling of Electrical and Electronic Equipment and Automobiles of 30 December 2005. The proposed Law of 30 December 2005 would restrict the use of hazardous substances in electrical and electronic equipment as well as in automobiles. It would also impose stringent recycling requirements on end-of-life vehicles. The proposed Law of 30 December 2005 has been under serious discussion and has been faced with strong opposition from industries, the Ministry of Commerce, Industry and Energy and the Ministry of Construction and Transportation.

3. RESTRICTION ON THE USE OF HAZARDOUS SUBSTANCES: WHAT DO YOU MEAN BY CHINESE, JAPANESE AND KOREAN ROHS-LIKE REGULATIONS?

3.1. China

After the issuance of the draft Management Measures for the Prevention and Control of Pollution from Electrical and Electronic Equipment of 25 August 2003, the Management Measures for the Prevention and Control of Pollution from Electronic Information Products were adopted by the Joint Ministerial Ordinance composed of 7 central governmental departments on 28 February 2006 (In the proposed Management Measures of 25 August 2003, the Ministry of Information Industry intended to be a sole competent authority). Thus, implementation and enforcement functions of the Management Measures of 28 February 2006 were allocated to the Ministry of Information Industry (MII), the General Administration of Customs (GAC), the General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ), the State Environmental Protection Administrating (SEPA), the Ministry of Commerce (MOFCOM), the National Development and Reform Commission (NDRC) and the State Administration for Industry and Commerce (SAIC).

The Management Measures for the Prevention and Control of Pollution from Electronic Information Products of 28 February 2006 stipulate a general duty on producers of electronic information products by incorporating the concepts of design for the environment (DfE), energy efficiency, efficiency recycling and non-use of hazardous substances over 10 categories of electronic information products which include electronic radars, telecommunication equipment, broadcasting equipment and televisions, household electrical appliances, monitoring and control equipment, cables and wires, parts and components of electronic equipment, applied electronic equipment, and electronic materials and parts.

Table 4. Chinese-RoHS Affairs on Regulations and Standards (as of 1 August 2006)

Date	Regulations and Standards	Authority
28-Feb-2006	Management Measures for the Prevention and Control of Pollution from Electrical and Electronic Equipment	MII, NDRC, MOFCOM, GAC, AQSIQ, SEPA, SAIC
2006?	Standards on Marking for the Control of Pollution caused by Electronic Information Products (SJ/TXXXX-2006)	MII
2006?	Standards on the Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products (SJ/TXXXX-200X)	MII
2006?	Standards on Testing Methods for Regulated Substances in Electronic Information Products (SJ/TXXXX-200X)	MII
2006?	Standards on General Disassembly Requirements for Testing Hazardous Substances in Electrical and Electronic Products (GB/ZXXXX-2006)	SAC
2006?	Standards on Test Methods for Lead-Free Solders (SJ/TXXXX-200X)	MII
15-Aug-2005	Technical Standards on Dismantling and Reuse of Waste Electrical and Electronic Equipment (HJ/T181-2005)	SEPA
28-Jul-2005	Test Method on Lead, Mercury, Cadmium, Chromium and Bromine (SN/T 2003.1-2005)	AQSIQ
	Test Method on Mercury (SN/T 2004.1-2005)	
	Test Method on Lead, Cadmium and Chromium (SN/T 2004.2-2005)	
	Test Method on Hexavalent Chromium (SN/T 2004.3-2005)	
	Test Method on polybrominated biphenyls and polybrominated biphenyl ether (SN/T 2005.1-2005)	
	Test Method on polybrominated biphenyls and polybrominated biphenyl ether (SN/T 2005.2-2005).	
21-Jul-2005	Second List of Laboratories for Test of Six Hazardous Substances in Electrical and Electronic Equipment	AQSIQ

A detailed list of electronic information products will be determined by the Ministry of Information Industry in consultation with the State Environmental Protection Administration, the Ministry of Commerce, the General Administration of Customs, the State Administration for Industry and Commerce, the State Administration of Quality Supervision, Inspection and Quarantine and the National Development and Reform Commission.

However, those substances are not exhaustive. A list of hazardous substances could be updated by further Chinese government decisions. The concentration limits on those hazardous substances will be specified in National Standards.

Producers and importers of electrical and electronic equipment (EEE) shall determine an environmentally-friendly guarantee period of electrical and electronic equipment and provide that information in product specification. The Ministry of Information Industry will provide uniform guidance on the declaration of environmentally-friendly guarantee period of electrical and electronic equipment. Producers and importers of EEE shall declare raw materials used in EEE and packaging materials for EEE.

CCC (China Compulsory Certification) Mark is to be employed for pre-market control. The Certification and Accreditation Administration of China is in charge of CCC administration on electronic information products. For the import of electrical and electronic equipment, a customs declaration for the import of goods shall be obtained from the local Customs Office.

Regarding phase-out of hazardous substances in electrical and electronic equipment, a list of electrical and electronic equipment will incorporate detailed phase-out schedule for each type of electrical and electronic equipment. The Ministry of Information Industry will determine the phase-out schedule in consultation with the State Environmental Protection Administration, the Ministry of Commerce, the General Administration of Customs, the State Administration for Industry and Commerce, the State Administration of Quality Supervision, Inspection and Quarantine and the National Development and Reform Commission.

3.2. Japan

On 27 April 2006, the Ministry of Economy, Trade and Industry announced that amendments to the Law on the Promotion of Efficient Use of Resources and to subsidiary Ministerial Ordinances were adopted (the original text of the amended Law and Ministerial Ordinances has not yet been released).

Table 5. List of Japanese Regulations containing Material Restrictions (Selective)

Regulations	Law No.	Authority
Law on the Promotion of Efficient Use of Resources and Enforcement Ordinance of Law on the Promotion of Efficient Use of Resources	Law No.48 of 26 April 1991 Government Ordinance No.327 of 18 October 1991	-
Ministerial Ordinance on Evaluation Standards on Reduction of Discarded Materials generated from Manufacturers of Electric Washing Machines	Ordinance No.70 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on Reduction of Discarded Materials generated from Manufacturers of Automobiles	Joint Ministerial Ordinance No.4 of 28 March 2001	METI, MLIT
Ministerial Ordinance on Evaluation Standards on the Use of Discarded Pipes using Reinforced Polyvinyl Chloride	Ordinance No.59 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on the Use of Recyclable Parts by Facilities involved in the Manufacture of Copy Machines	Ordinance No.60 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on Reduction of Discarded Materials generated from Manufacturers of Unit-Type Air Conditioners	Ordinance No.63 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on Reduction of Discarded Materials generated from Manufacturers of Televisions	Ordinance No.66 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on Reduction of Discarded Materials generated from Manufacturers of Refrigerators	Ordinance No.69 of 28 March 2001	METI
Ministerial Ordinance on Standards on the Use of Recycling Resources and Recycling Parts for the Manufacture of Personal Computers	Ordinance No.77 of 28 March 2001	METI
Ministerial Ordinance on Evaluation Standards on Collection and Recycling of Discarded Dry Cell Batteries by Manufacturers of Dry Cell Batteries	Joint Ministerial Ordinance No.1 of 28 March 2001	MHLW, METI, MOE
Ministerial Ordinance on Labeling of Specific Containers and Packaging Materials	Joint Ministerial Ordinance No.2 of 28 March 2001	MOF, MHLW, MAFF, METI
Standard on the Marking for Presence of Specific Chemical Substances for Electrical and Electronic Equipment (JIS C 0950:2005)	20 December 2005	JEITA
Joint Industry Guide for Material Composition Declaration for Electronic Products	26 May 2006	JGPSSI

As from 1 July 2006, the amended Law of 27 April 2006 requires producers, importers or sellers of personal computers, unit-type air conditioners, copy machines, televisions, electric microwaves, washing machines, cloth dryers or refrigerators to affix appropriate marking on the presences of hazardous substances (i.e. lead, mercury, hexavalent chromium, cadmium, polybrominated biphenyl, polybrominated diphenyl ether) to concerned products in accordance with the Marking for Presence of Specific Chemical Substances for Electrical and Electronic Equipment (JIS C 0950: 2005) (JIS C 0950 stipulates pictograms for the declaration of non-use of hazardous substances and how to affix markings to products or packaging materials. JIS C 0950 was drafted with reference to IEC 62321, 111/24/CD(2005-6-24) Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products).

3.3. Korea

The proposed Law on the Recycling of Electrical and Electronic Equipment and Automobiles of 30 December 2005 would require manufacturers and importers of electrical and electronic equipment and automobiles to comply with the threshold limits on the use of hazardous substances to be specified by the Ministry of Environment.

In the case of automobiles, manufacturers and importers would have to comply with the appropriate recycling rates to be specified by the Ministry of Environment. Manufacturers or importers of electrical and electronic equipment and automobiles would have to make self-declarations on the use of hazardous substances and comply with the threshold limits and recycling rates. In addition, they would

have to provide appropriate information to recyclers on the recycling of the products. Importers or owners of automobiles would be subject to recycling charges to finance the recycling of end-of-life vehicles.

When importing or manufacturing electrical and electronic equipment (EEE), facilities would have to collect and recycle discarded electrical and electronic equipment or pay appropriate charges to an appropriate Mutual-Aid Industry Recycling Association. Manufacturers or importers of EEE would have to comply with the mandatory recycling rates for waste electrical and electronic equipment (WEEE) to be specified by the Ministry of Environment. When having mandatory recycling requirement of EEE, the facility would have to submit a Mandatory Recycling Implementation Plan to the Ministry of Environment and obtain an approval for the plan therefrom. Sellers of EEE would have to collect WEEE and its packaging materials without charges when requested by buyers of EEE .

The proposed Law of 30 December 2005 provides unclear definitions of electrical and electronic equipment, i.e. machines or equipment (including components) operated by electric current or electromagnetic waves. It is expected that categories or further definition of EEE would be specified in subsidiary regulations, e.g. Presidential Ordinance, Ministry of Environment Ordinance.

Manufacturers and importers of electrical and electronic equipment and automobiles would have to comply with the threshold limits on the use of hazardous substances to be specified by the Ministry of Environment. Appropriate exemptions would be given in cases where it would be difficult to technically phase out the use of hazardous substances or find alternatives to their use. The Test Methods for Hazardous Substances would be issued by the Ministry of Environment and the Ministry of Commerce, Industry and Energy.

4. RISK MANAGEMENT UNDER GLOBAL COMPLEXITY

4.1. Step 1: Country Regulatory Roadmap

Looking at the European side, i.e. the originator, despite calls for more harmonization in content reporting, the European Commission has so far refused to take action.

To fill this void, enforcement authorities at Member State level have teamed up in an EU RoHS Enforcement Authorities Informal Network. The result is a RoHS Enforcement Guidance Document which provides advice to producers of electrical and electronic products on the type of documentation they need to keep. It is unclear at this stage how the enforcement authorities will proceed, but some will likely work together with customs (preventing non-compliant products to enter the market). If this is the case in the European Union, what could be the situation in other countries? In a worst-case scenario, standards, testing methods and threshold limits on hazardous substance might vary country by country.

Unfortunately, there is no king's way. Globalization and the global market involve diversity and complexity. A golden rule to approach the global market could be found only when we understand each local market. It is inevitable to track and maintain up-to-date regulatory affairs of each country so as to find a global approach.

4.2. Step 2: Develop Country-Specific Chemical Regulation Matrix

A country regulatory roadmap may allow focused analysis of specific issues of countries. Further looking at chemical issues such as RoHS, REACH and GHS, regulatory changes could impact the viability of chemicals and materials slated for use in developing new products for various markets and, in turn, equipment manufacturers may not have appropriate supply from chemical manufacturers when the viability of a chemical is gone due to regulatory change.

For this reason, companies may seek an "early warning mechanism" aimed at providing them with as much time as possible to evaluate the risks they and their products face from potential substance regulations, and to determine the appropriate response and strategy for such risks. As illustrated in Table 8, regulatory control on mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyl and polybrominated diphenyl have been very likely as they have been regulated under various regulations.

4.3. Setp 3: Global Priroity Chemical Matrix

Combination of country-specific chemical regulation matrices could enable companies to set up a Global Chemical Tracking System. A company can endeavor to identify specific materials and substances that become the subject of draft regulation in the countries of concern and that are subject to the review and scrutiny of concerned parties.

A Global Chemical Tracking System may also allow a company to identify priority chemicals impacting its products and processes .

Table 6. China Regulatory Roadmap on Product-related Environmental Policies and Regulations

Date	Title	Entry into Force	Business Impact		
			H	M	L
28-Feb-06	Management Measures for the Prevention and Control of Pollution from Electronic Information Products	1-Mar-07			
30-Sep-05	Act on Promotion of Reduction, Reuse and Recycling of Resources	2007?			
21-Sep-05	Measures on Pollution Prevention from Waste Electrical and Electrical Equipment	2006?			
30-Aug-05	Measures on Pollution Control of Waste Hazardous Chemicals	1-Oct-05			
28-Jul-05	Six Test Methods on Hazardous Substances in Electrical and Electronic Equipment	28-Jul-05			
21-Jul-05	Second List of Laboratories for Test of Six Hazardous Substances in Electrical and Electronic Equipment	21-Jul-05			
25-May-05	List of Laboratories for Test of Six Hazardous Substances in Electrical and Electronic Equipment	25-May-05			
25-Mar-05	List of Energy-Using Products (List I)	25-Mar-05			
29-Dec-04	Amended Solid Waste Pollution Prevention Law	1-Apr-05			
17-Sep-04	Regulation on Take-Back and Disposal of Waste Home Appliances	2006?			
13-Aug-04	Measures on the Management of Energy Efficiency Label	1-Mar-05			
9-Oct-03	Policy on the Pollution Prevention Technology of Waste Batteries	-			
23-Dec-01	Measures on the Certification of Environmental Protection Products	1-Jan-02			
10-Dec-01	Measures for Management of China Compulsory Certification Mark	1-May-02			
31-Dec-97	Regulation on Content Limits of Mercury in Batteries	1-Jan-05			

Table 7. Existing Regulatory Control on Hazardous Chemicals in Japan (Selective)

Substance	Lead	Mercury	Cadmium	Hexavalent Chromium	PBB	PBDE
Control on Substances	Class-1 designated chemical substance	Class-1 designated chemical substance Poisonous substance	Class-1 designated chemical substance	Class-1 designated chemical substance Deleterious Substances		Class-1 designated chemical substance
Occupational Safety and Health	Hazardous substance requiring provision of MSDS	Specific chemical substance: class-2 substance	Specific chemical substance (class-2 substance)	Specific chemical substance (class-2 substance) Class-1 oxidizing solid	Hazardous substance requiring provision of MSDS	Class-4 combustible liquid
Environmental Pollution	Hazardous substance Water pollutant	Hazardous substance Water pollutant	Hazardous substance Water pollutant	Hazardous substance Water pollutant	Marine pollutant	-
Waste	Specially controlled industrial waste	Specially controlled industrial waste	Specially controlled industrial waste	Specially controlled industrial waste	-	-
Transport	-	Dangerous goods	-	Dangerous goods	Dangerous goods	-
Import and Export	Hazardous waste Substance requiring import or export approval	Hazardous waste Substance requiring import or export approval	Hazardous waste Substance requiring import or export approval	Hazardous waste Substance requiring import or export approval	-	-

Table 8. Global Chemical Tracking and Priority Chemicals

Chemicals			Tracking Report			Reg
N.	Cas	Name	Leg	Proposals	Others	Regs
1	[8002-05-9]	Petroleum distillate	3	0	0	311
2	[8052-42-4]	Asphalt, petroleum	2	1	0	150
3	[106-97-8]	Butane	0	1	1	161
4	[1336-36-3]	Chlorinated biphenyl	1	1	0	116
5	[13463-67-7]	111495 Titanium (lV) oxide tablets about 2 g Patinal	2	0	0	53
6	[2385-85-5]	1,1a,2,2,3,3a,4,5,5,5a,5b,6-Dodecachlorooctahydro-1,3,4-metheno-1H-cyclo buta(cd)pentalene	1	1	0	24
7	[50-29-3]	1,1,1-Trichloor-2,2-bis(4-chloor fenyl)-ethaan	1	1	0	103
8	[54-31-9]	4-Chloro-N-(2-furylmethyl)-5-sulfamoylanthranilic acid	0	1	1	6
9	[65997-15-1]	Cement	2	0	0	117
10	[7439-92-1]	Lead metal	1	1	0	223
11	[7440-02-0]	Nickel	1	1	0	193
12	[7440-23-5]	Natrium	1	1	0	187
13	[74-84-0]	Ethane	1	0	1	147
14	[8006-14-2]	natural gas	2	0	0	187
15	[86290-81-5]	Synthetic gasoline	1	0	1	212

5. CONCLUSION

Responding to calls from EU producers and importers, China is working fast to implement its own RoHS legislation, currently scheduled to enter into force on 1 March 2007. The Chinese Regulation foresees compulsory product certification with respect to the affected products. The embracement of this mechanism (similar to a compliance verification instrument) by such a crucial market may yet cause European lawmakers to change their approach. Besides China, Japan and Korea are following in the EU's footsteps and designing local RoHS legislation. While producers scratch their heads over how to ensure compliance with the requirements of the RoHS Directive as it stands, the European Commission is already planning its further reform.

Be it for environmental concerns or out of fear of losing competitiveness, harmonization in materials conformity declarations will have to be revisited in the future. The fact remains that despite its numerous imperfections and criticism from industry, electrical and electronic equipment will be subject to the growing hazardous materials restrictions. Also there could be as many different theories about RoHS's implementation as there are on its pronunciation.

Companies should be ready for diversity and complexity in the global market as they enjoy benefits of globalization. Not to mention, the survivor in the global market is the most adaptive, not the smartest nor the strongest.

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