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**UNIVERSITY OF
TECHNOLOGY SYDNEY**

BRIEFING PAPER

**PRODUCT STEWARDSHIP
SCHEMES IN ASIA:
CHINA, SOUTH KOREA,
JAPAN, AND TAIWAN**

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DEFINITIONS

Extended producer responsibility or **EPR** has been defined in the National Waste Policy Discussion Paper (2009) in the following manner:

“...places primary responsibility on the producer for the reuse, recycling or disposal of their products once no longer required by the consumer”

Product Stewardship has been defined in the National Waste Policy Discussion Paper (2009) in the following manner:

“...a policy approach recognising that manufacturers, importers, governments and consumers have a shared responsibility for the environmental impacts of a product throughout its full life cycle. Product stewardship schemes establish a means for relevant parties in the product chain to share responsibility for the products they produce, handle, purchase, use and discard “

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1. SUMMARY

This document summarises the main features and outcomes of product stewardship schemes in Japan, Taiwan, South Korea and China. Information was obtained from English-language documents. An overview of the types of schemes, key drivers and lessons for Australia is presented in this summary section, followed by more detailed information tables for each country in subsequent sections.

Comparison of Schemes

Experience with Product Stewardship (PS), including Extended Producer Responsibility (EPR), schemes varies across the four countries as shown in Table 1. Japan’s product stewardship scheme is the most established, and documentation of the scheme’s features and outcomes is extensive. In comparison, the enabling legislation for the China WEEE (Waste Electrical and Electronic Equipment) scheme was only passed earlier this year, and the scheme mechanisms are currently under development.

All schemes cover electrical and electronic equipment such as televisions, computers, refrigerators, air conditioners and mobile phones. Schemes in Japan and South Korea also cover additional products including packaging. There are also a range of different approaches, obligations and mechanisms that have been put in place under different national schemes. Schemes in Taiwan, South Korea and China have placed a financial responsibility upon producers, while the Japanese scheme places financial responsibility on consumers, and gives physical responsibility for specified end-of-life consumer goods to producers.

It should be noted that there are two key differences between a number of the countries examined here, and Australia; namely, the extent to which incineration is used for waste management and energy generation, and the relative scarcity of land that is available for landfill.

Table 1: Comparison of product stewardship and EPR schemes in selected Asian countries

	Japan	Taiwan	China	South Korea
Scheme	Product Stewardship	EPR	EPR	EPR
Year of introduction	1998-2000: Original establishing legislation. Other legislation relates specifically to home appliances (HARL 2001)*, computers and an increasing variety of other consumer goods including cars (LPEUR 2001)*	1988: EPR incorporated into the <i>Waste Disposal Act 1988</i> 1997: Seven IT scrap items designated for recycling program that commenced in 1998.	Scheduled for 2011	2003 Product Recycling System (replaced earlier Producer Deposit Refund scheme which ran from 1992-2002)
Product and material coverage	Packaging, electrical and electronic appliances, (other recycling programs cover food, construction and demolition waste, end of life vehicles).	Electrical and electronic equipment, (other recycling programs cover food, construction and demolition waste, end of life vehicles including tyres, lubricants, and batteries)	Electrical and electronic equipment	Electronic equipment, tyres, lubricant, batteries, fluorescent lamps, packaging.
Obligations and mechanisms	Consumer responsibility to purchase recycling ticket that enables them to dispose of home appliances (consumers pay a higher price for the disposal of products that are more expensive to recycle). Producers are obliged to take back and recycle goods of particular types.	Producer has financial responsibility. Registered recyclers take physical responsibility for goods in return for a small subsidy. No contribution by producers is made on equipment that is exported.	Details to be determined. Manufacturers will pay fees into central government fund.	Producer responsibility to meet recycling targets based on sales.

*HARL=Home Appliance Recycling Law, LPEUR = Law for Promotion of Effective Utilisation of Resources

Key Drivers

Across Japan, Taiwan, South Korea and China, the drivers for PS and EPR schemes and waste management include:

- Limited space for landfill – a driver of recycling initiatives in South Korea, Japan and Taiwan.
- Lack of capacity to safely manage specific forms of waste at a municipal level – Previous approaches to recycling home appliance and e-waste in Japan and Taiwan placed management responsibility on municipalities. The development of PS and EPR schemes was driven by concerns that local governments lacked technical expertise and capacity to effectively and safely manage products containing hazardous substances. Consequently, physical responsibility for managing specific forms of waste assigned away from municipalities, to manufacturers in some schemes and to registered collection and processing groups in others.
- International regulations and agreements – It appears that compliance with EU ROHS (Restrictions On Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) regulations has influenced China’s development of its own ROHS and WEEE regulations. International agreements such as the Basel Convention and associated amendments have also influenced the practices of countries such as Taiwan, despite the fact that it is not a signatory.
- Increasing price of oil and raw materials, new recycling technologies – the increasing price of oil and raw materials makes inputs for manufactured goods more expensive and increases the cost of exporting. Japan is looking ahead to a more closed loop economy by developing the technologies and systems that can underpin this new economy. Recycling is viewed as an important income generating activity.
- Resource scarcity, resource depletion and the increasing price of resources used in manufacturing has played a role in linking “waste management” activities to resource efficiency and even resource acquisition activities. For Taiwan and Japan, this has been a large part of the motivation for increasing their capabilities in recycling and their openness to accepting “waste” that is not strictly a responsibility for local producers.

Relevance for an Australian EPR scheme

There are significant differences between cultural, institutional, industry, trade, and geographic contexts of the Asian countries reviewed for this study and Australia. A United Kingdom Department of Trade and Industry report (2005) on Japanese WEEE programs, notes that there are a number of factors that contribute to the successes of the Japanese system that would be difficult to replicate in the UK. These differences may be less important when applied to the Australian context (outside of Europe and closer to Asia) however, a number of general lessons can be drawn from these countries’ experiences with PS and EPR:

- **Effective design of financial incentives** is critical to ensuring the success of a scheme. For example, the product deposit refund system in South Korea, which was the predecessor of the current EPR scheme, failed to encourage recycling because the level of the deposit was lower than the costs of recycling. However, if poorly designed, incentives that successfully influence the rate of recycling might undermine the larger goal of waste reduction, which underpins the scheme. For example, in South Korea and Taiwan, mandatory targets for producers based on sales volumes could create an incentive for producers to collect items before the end of their useful life. Emphasis on sales-based targets fails to encourage reuse or design for the environment.

- **A *coordinated mechanism***, which creates incentives and obligations for various players along the supply chain, can effectively promote resource efficiency. In contrast to producer-oriented schemes in South Korea and Taiwan, the Japanese product stewardship scheme assigns responsibility to consumers as well as producers. Consumers are required to contribute financially to the recycling costs of the products by purchasing a multi-part docket or manifest, which allows the appliance to be collected for disposal and tracked through the dismantling and recycling processes. This amount is separate from the purchase price of the item and can be obtained at the local post office. Consumers pay a lower price for the disposal of products that are less expensive to recycle, which encourages consumers to consider the costs of disposing their purchase, and encouraging producers to improve product designs with disassembly and recycling firmly in mind.
- ***Convenience*** is an important factor influencing consumer behaviour. For example, in Taiwan, there are low rates of return of notebooks (laptops), because the amount paid to the consumer who returns the notebook is not considered sufficiently high. In contrast, Japan's system makes use of convenient collection points and free collection services and the multi-part docket system that have encouraged a high rate of participation by consumers without a financial incentive. (Department of Trade and Industry (UK) 2005)
- ***Impacts on competition*** should also be considered. In producer-oriented schemes, challenges can exist in balancing development of the recycling industry against opportunities for the formation of monopolies. For example, in South Korea, there are concerns that the Producer Responsibility Organisations (PROs) have monopoly control over various recycling markets. In Taiwan this has been avoided, with recycling activities spread across the numerous small and medium-sized manufacturers. Both of these outcomes contrast poorly with the example presented by Japan, whose system of mandating a physical responsibility for products to manufacturers has produced a circuit in which producers are provided with incentives to reduce the costs to recycling facilities, consumers and, ultimately, their own purchasing departments.
- The ***participation of manufacturers*** in the physical management of their end-of-life products appears to be a significant factor in the success of EPR schemes in the four countries that have been reviewed. These countries are manufacturers of electrical, electronic and other producer goods, but each assigns responsibility for end-of-life goods in different ways. Those schemes that assign only a financial responsibility for end-of-life goods to the manufacturer appear to be less effective in improving the efficiency and reducing the costs for resource recovery (Lu, Wernick et al. 2006). In Australia, some products (e.g. tyres and packaging) are manufactured domestically, but large volumes of consumer goods, such as white goods, household appliances, computers and televisions are imported from other countries, including South Korea, China, Japan and Taiwan. In Japan a significant proportion of recycling arises from goods that are manufactured in other countries by companies that have no presence in Japan. The burden of recycling these goods is distributed amongst those manufacturers that do exist in Japan, and is paid for when consumers purchase a multi-part disposal docket. Japan is also active in Joint Ventures (e.g. in China) to recycle its products in other countries.
- ***Accounting for free-riders*** is also important, and an aspect of EPR and PS schemes that is well managed by Japan. Consumers pay more for disposing of generic goods, providing consumers with an incentive to purchase a product that is manufactured in Japan, and reflecting the higher costs associated with recycling equipment that has not been subjected to the processes of design for disassembly (DfD) or design for environment (DfE).

- A **resource and innovation focus** that changes the perception of end-of-life consumer goods from worthless 'waste' to an increasingly cost-effective source of materials may be an important to success. Future initiatives should include a focus on innovation in developing recycling systems, processes and technologies as income generating activities within sustainable production and consumption cycles. Involving the Department of Innovation, Industry Science and Research this may help overcome the perception of end-of life goods as wastes (environmental problem to be managed) and see them viewed as resources within a more sustainable economy.

Country By Country

CHINA	
1. What is the scheme?	<p>The Management Regulation on the Recycling and Treatment of Disposed Appliances and Electronics Products (China WEEE)</p> <ul style="list-style-type: none"> February 2004 – regulation proposed (Yu, Hills et al. 2008). August 2008 – draft regulation issued (China Environmental Law 2009) 25 February 2009 – signed by Premier Wen Jiabao (Lehman, Lee et al. 2009) 1 January 2011 – regulation becomes effective (Lehman, Lee et al. 2009)
2. Key features	<p>Mechanisms</p> <p>This scheme places responsibility for e-waste management on manufacturers (Chung and Murakami-Suzuki 2008):</p> <ul style="list-style-type: none"> The product stewardship scheme is currently under development, so the exact mechanisms have not yet been established (Lehman, Lee et al. 2009). The physical responsibility for e-waste recycling is not clearly stipulated in regulations (Chung and Murakami-Suzuki 2008). A government-managed fund will be established for the recovery and disposal of waste electrical and electronic products. Manufacturers of electrical and electronic products, consignees and their agents will be required to pay fees into the fund (Lehman, Lee et al. 2009). <p>Enforcement</p> <p>Penalties range from fines (up to RMB 5,000,000 ~ AUD 900,000), revocation of operational licences, to shut down of infringing enterprise (Lehman, Lee et al. 2009).</p> <p>Products and materials</p> <ul style="list-style-type: none"> Coverage: The specific electrical and electronic products subject to these regulations has not yet been established (Lehman, Lee et al. 2009). Exclusions: Product repair and refurbishment, and the re-utilisation of such products as second-hand goods. (Lehman, Lee et al. 2009).
3. Administrative arrangements	<p>Governance</p> <ul style="list-style-type: none"> The Ministry of Environmental Protection (MEP) will have primary responsibility for the coordination and enforcement of the WEEE Regulations. Other participating agencies include the National Development and Reform Commission (NDRC) and the Ministry of Industry and Information Technology (MIIT). (Lehman, Lee et al. 2009).
4. Drivers for scheme	<ul style="list-style-type: none"> It appears that EU ROHS and WEEE regulation has driven the development of ROHS and WEEE regulations in China, because China is a major manufacturer and exporter of electrical and electronic products.
5. Related actions/ complementary measures	<p>Restrictions on Hazardous Substances</p> <ul style="list-style-type: none"> The WEEE Regulations are intended to complement China’s Restrictions on Hazardous Substances (RoHS Regulations) implemented in 2006. Together, the two sets of

	<p>regulations are intended to set forth a unified regime which applies to activities of waste electrical and electronic product disassembly, resource recovery, design, hazardous substance reduction, and disposal to landfill (Lehman, Lee et al. 2009).</p> <ul style="list-style-type: none"> ○ Notes: there is currently limited available documentation about the exact mechanisms for influencing activities across the product lifecycle. See also below for evaluations. • The China RoHS Regulations provide a framework for substance restrictions, pre-market certifications, labelling and information disclosure requirements affecting a broad range of products and parts defined as “electronic information products” (MII et al., 2006) (Yu, Hills et al. 2008; 2009). It appears that phase 1 Labelling Requirements have been introduced. The list of products subject to phase 2 restrictions, exemptions and testing requirements is expected in 2009 (Premier Farnell 2009).
6. Evaluation of outcomes	<p>Yu, Hills and Welford (2008) conducted surveys and interviews with China’s electrical and electronic manufacturers to explore the influence of China RoHS and China WEEE in motivating environmental product design. They found that, as at 2007 (prior to significant implementation of either scheme), EPR regulations had little influence on product design:</p> <ul style="list-style-type: none"> • Overall awareness of China WEEE and RoHS among China’s EE companies was low. Only 53 per cent and 72 per cent of survey respondents, respectively, had good knowledge about them. The authors suggest that this resulted from a lack of dissemination of information about China WEEE and RoHS. • The overall impact of EPR regulations in China is relatively low compared to those in the EU. Only 28 per cent and 39 per cent of respondents, respectively, perceived the impact of China WEEE and RoHS to be ‘very significant’ or ‘significant’. • Due to previous changes required to comply with EU ROHS, China ROHS has not imposed significant additional changes on manufacturers. More than 90 per cent of respondents claimed to have made relevant preparation by the time China RoHS was approved, but not yet implemented.
7. References	<p>AEA. (2009). "AeANET : China RoHS Overview." from http://www.aeanet.org/GovernmentAffairs/gabl_ChinaRoHSpaage0905.asp.</p> <p>China Environmental Law. (2009). <i>China: WEEE finally did it</i>. Retrieved 26 May 2009, 2009, from http://www.chinaenvironmentallaw.com/2009/03/06/china-weee-finally-did-it/.</p> <p>Chung, S.-W. and R. Murakami-Suzuki (2008). <i>A Comparative Study of E-Waste Recycling Systems in Japan, South Korea and Taiwan from the EPR Perspective: Implications for Developing Countries. Promoting 3Rs in Developing Countries: Lessons from the Japanese Experience</i>. M. Kojima. Chiba.</p> <p>Lehman, Lee, et al. (2009). <i>Overview of the new China WEEE regulations</i>. Retrieved 26 May 2009, from http://www.lehmanlaw.com/press-room/china-law-news/china-news/china-news-single-display-llx/article/5/overview-of.html.</p> <p>McElwee, C. (2008). <i>China RoHS: Phase II in 2009?</i>, from http://www.chinaenvironmentallaw.com/2008/12/23/china-rohs-phase-ii-in-2009/.</p> <p>Premier Farnell (2009). China RoHS - an overview.</p> <p>Yu, J., P. Hills, et al. (2008). <i>Extended Producer Responsibility and Eco-Design Changes: Perspectives from China</i>. Corporate Social Responsibility and Environmental Management 15: 111-124.</p>

SOUTH KOREA	
1. What is the scheme?	<p>Extended Producer Responsibility: “Producer Recycling” Scheme (PRS)</p> <ul style="list-style-type: none"> • 1992-2002 – Deposit Refund Scheme for producers, but not consumers of TV sets, air conditioners, washing machines and refrigerators (Rossem, Tojo et al. 2006). This evolved into the current EPR scheme. • June 2000 – Voluntary agreements were signed by the three major electronic producers that held 80 per cent of the market share: Samsung Electronics Inc., LG Electronics Inc., and Daewoo Digital Inc. Television sets, washing machines, air conditioners and refrigerators were the designated products under the Voluntary Agreements. These producers committed to voluntarily collect and treat their waste. They agreed to build their own recycling plants and to operate them in close cooperation. (Kim 2004) • January 2003 – Product Recycling System launched under an amendment to the Recycling Act (Chung and Murakami-Suzuki 2008). Initially, TVs, refrigerators, washing machines, air conditioners and PCs were covered (Park, 2005; ENVICO, 2006), followed by a wide range of products and packaging materials (see below).
2. Key features	<p>Mechanisms</p> <ul style="list-style-type: none"> • Under the previous Producer Deposit Refund scheme (1992-2002), manufacturers were required to pay advance deposits to cover recycling costs. These deposits were calculated from the number of products supplied during the previous year. (Chung and Murakami-Suzuki 2008) • Under the Product Recycling System, the Ministry of Environment (MoE) annually sets recycling targets for individual producers based on the previous year’s sales. • MoE also annually sets item-specific recycling rates within the range of 55% to 70% based on weight (Chung and Murakami-Suzuki 2008). • Manufacturers can fulfil their legal obligation to recycle by doing their own recycling; outsourcing to commercial recycling companies; or by paying fees to the Producer Responsibility Organisation to do the recycling (Chung and Murakami-Suzuki 2008). • Retailers and suppliers are required to collect and transport used equipment for free if the customer purchases a similar product (Kahhat, Kim et al. 2008). • In addition to the EPR program, if users wish to simply discard old electronic goods, they must pay a fee. The revenue is used to pay for local government collection and recycling (Kim 2004). • All producers must report their recycling activities to the government annually.

	<p>Enforcement</p> <ul style="list-style-type: none"> If manufacturers do not fulfil the mandatory recycling rates, they are required to pay a fee. This is the amount of recycling shortage multiplied by 115 to 130 per cent of the standard recycling cost announced by the MoE (Kim 2004). They also face an additional recycling charge (Chung and Murakami-Suzuki 2008). <p>Products and materials</p> <ul style="list-style-type: none"> Products: electronic products (TV, computers, refrigerators, air conditioners, washing machines, mobile phones, audio products, printers, copiers, facsimiles); tyres; lubricant; batteries (7 types); fluorescent lamps (Ministry of Environment - Republic of Korea 2009)(Ministry of Environment - Republic of Korea 2009)(Ministry of Environment - Republic of Korea 2009)(Ministry of Environment - Republic of Korea 2009) Packaging materials: metal cans; glass bottles; paper packaging and synthetic resin packaging materials that are used to pack food and beverages; agricultural, marine farm products; cleansers; medicines and cosmetics (Ministry of Environment - Republic of Korea 2009).
<p>3. Administrative arrangements</p>	<p>Governance</p> <p>Schemes have varying models of organisation; some roles and tasks are distributed amongst individual organisations while others are centralised with the Government.</p> <ul style="list-style-type: none"> The Ministry of Environment (MOE) administers the Product Recycling System scheme, including specification of recycling targets and rates. South Korea has 11 Producer Responsibility Organisations each for different recyclable products including: (1) cans, (2) expanded polystyrene, (3) glass bottles, (4) lubricants, (5) EEE, (6) batteries, (7) fluorescent lights, (8) paper packaging, (9) tyres, (10) PET, and (11) plastic. (Asian Development Bank 2006) The Korea Environment and Resource Corporation (ENVICO) is responsible for the implementation of the EPR system, including maintaining records on product shipments, investigating recycling performance, and levying recycling charges (Chung and Murakami-Suzuki 2008).
<p>4. Drivers for scheme</p>	<ul style="list-style-type: none"> A key driver for developing recycling schemes in South Korea was insufficient landfill space. (Chung and Murakami-Suzuki 2008) The EPR scheme was developed in response to “the failure of the Korean Deposit-Refund scheme” (Kim 2004). Under the PRS scheme, the deposit rate was far lower than the actual costs of recycling e-waste, so there was little incentive for manufacturers to recycle. There were also concerns that municipalities would not effectively treat e-waste, thus resulting in harm to the environment. (Chung and Murakami-Suzuki 2008)
<p>5. Related actions/ complementary measures</p>	<p>Other waste management policies and programmes in South Korea include:</p> <ul style="list-style-type: none"> Empty container return deposit system for drink bottles (glass). Business Waste Minimisation System – requires businesses in 14 industrial fields producing more than 200 tons of designated wastes and 1000 tonnes of general wastes per year to submit waste management plans. Businesses that achieve waste minimisation are publicly recognised by the government.

	<ul style="list-style-type: none"> • Restrictions on the use, production, distribution and/or free distribution of various disposable products including plastic bags, takeaway containers and cutlery, and advertising material. • Packaging schemes including phased bans on packaging containing synthetic resins, and standards for packaging ratios. • The Recycling of Electrical and Electronic Equipment and Vehicles Act, 2008 (The Act) (Ministry of Environment - Republic of Korea 2009) <ul style="list-style-type: none"> ○ Enacted in January 2008, The Act requires the manufacturers or importers of electric and electronic products and vehicles to provide recyclers with information relevant to recycling, such as materials used, hazardous materials, and disassembly sequence. ○ Manufacturers or importers of electric and electronic products are required to collect more than a certain ratio of their products sold on the market. ○ In order to promote the recycling of end-of-life cars, the Act prescribes that vehicle manufacturers or importers shall develop and distribute a technology for the recycling of vehicles. ○ The Act prescribes that the costs for disposing of, and recycling, hazardous materials from scrapped vehicles can be added to the price of end-of-life vehicles.
6. Evaluation of outcomes	<ul style="list-style-type: none"> • The Ministry of Environment reported increased recycling rates in the first year of the EPR's operation. However, there may be some issues with measuring rates in terms of units rather than weight (Walls 2006). • Cooperation between manufacturers and municipalities is limited due to the financial situation of local governments (Chung and Murakami-Suzuki 2008). • Labelling requirements are not harmonised between countries, making the EPR implementation difficult for imported goods (Asian Development Bank 2006). • The government has identified the need for lowering barriers to entry for PROs. Existing PROs have effectively developed monopoly markets, making it relatively more difficult for importers to meet EPR regulations (Asian Development Bank 2006). • There are concerns that the EPR creates perverse incentives to recycle material rather than identifying opportunities for re-use. For example, companies could be providing incentives to their own employees to encourage new product purchases, in order to collect products (through take-back) to achieve required targets (Kim 2004). • The EPR places emphasis on meeting recycling rates rather than promoting design for environment (Chung and Murakami-Suzuki 2008). • Regarding the management of hazardous wastes, manufacturers are required to collect CFCs, but there are no regulations stipulating the method of treatment after collection. Most CFCs collected are reused without their harmful characteristics being nullified (Chung and Murakami-Suzuki 2008).

7. References	<p>Asian Development Bank (2006). Meeting Notes of Workshop on Extended Producer Responsibility and International Material Flow.</p> <p>Chung, S.-W. and R. Murakami-Suzuki (2008). <i>A Comparative Study of E-Waste Recycling Systems in Japan, South Korea and Taiwan from the EPR Perspective: Implications for Developing Countries. Promoting 3Rs in Developing Countries: Lessons from the Japanese Experience</i>. M. Kojima. Chiba.</p> <p>Kahhat, R., J. Kim, et al. (2008). <i>Exploring e-waste management systems in the United States</i>. Resources, Conservation and Recycling 52(7): 955-964.</p> <p>Kim, N. (2004). <i>Evolution of the Extended Producer Responsibility System for Waste Electronic products in the Republic of Korea</i>, Asia-Pacific Environmental Innovation Strategies (APEIS).</p> <p>Ministry of Environment - Republic of Korea. (2009). <i>Major Policies - Waste</i>. from http://eng.me.go.kr/docs/sub2/policy_view.html?topmenu=C&cat=230&class=12.</p> <p>Rossem, C. V., N. Tojo, et al. (2006). <i>Extended Producer Responsibility: An examination of its impact on innovation and greening products</i>, Green Peace International, Friends of the Earth Europe and the European Environmental Bureau.</p> <p>Walls, M. (2006). <i>Extended Producer Responsibility and Product Design: Economic Theory and Selected Case Studies</i>. Discussion Paper. Washington, DC, Resources for the Future.</p>
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4. JAPAN

1. What is the scheme?

- Product Stewardship (“Basic law for a Recycling-Based Society”) Scheme
- 1998- 2000 ‘Basic Law for a Recycling-Based Society’ established using the “3Rs” framework of “reduce, re-use and recycle”.
- 2001: Two laws with complimentary focus
- 2001 “Home Appliance Recycling Law” is established under the above, covering four home appliances; air conditioners, refrigerators, CRT televisions and washing machines. Disposal of these appliances is managed using a multi-part docket system.
- 2001 “Law for Promotion of Effective Utilisation of Resources” established. This law is considered to be more closely aligned with European WEEE directives (Department of Trade and Industry (UK) 2005). This legislation is increasingly applied to a wider range of consumer goods, including cars, computers, and mobile phones, but also covers packaging,.
- Important Definitions: ‘Recycling’ is defined as the total weight of waste sold for recycling or reuse divided by the total input [by weight]. ‘Recovery’ of materials does not include refurbishment, social reuse, sale to third parties.

Source for definitions: (Department of Trade and Industry (UK) 2005)

2. Key features

Mechanisms

- Producers are required by law to take *physical* responsibility for specific types of goods under the legislation (2001).
- Targets for recycling and reuse of specific goods are set by legislation.
 - For example, targets for recycling under the “Home Appliance Recycling Law” are set on the basis of a proportion of materials depending on appliance type. For example, air conditioners were originally set at 60% and moved to 70% after 5 years; however, CRT television sets have remained at the original target of 50%.
- The goods covered by the “Home Appliance Recycling Law” are named within the legislation - by type (ie “refrigerators”).
- Consumers are financially responsible for disposal of their goods under the “Home Appliance Recycling Law”. This responsibility is managed through the purchase of multi-part disposal manifest or ‘docket’ for each appliance requiring disposal.
- Prices for disposal of each type of appliance are set by the government, however disposal costs for generic goods are set higher than those of branded products, creating some incentive for consumers to purchase locally-made branded products, and covering costs for products that may not have been designed for disassembly.
- Some goods can be taken to local post offices (who play a major role in Japanese EPR) for collection (e.g. TVs), others can be returned to the retailers from which they were purchased, or picked up by arrangement with a collection unit.
- A section of a multi-part disposal docket is kept by the appliances former owner as proof that the article was disposed of in a lawful manner. Post office and retailer collection points also keep a section of this multi-part disposal docket when the

	<p>materials are collected from the public in order to track the scheme.</p> <ul style="list-style-type: none"> • This docket informs a central database, that provides information to an online tracking system that allows consumers to confirm the correct disposal of their appliance or computer equipment. • Figures for items received and the level of recycling achieved are submitted by recycling plants on a monthly basis. • Statistics on goods covered under this scheme indicate that illegal dumping does take place, but is steadily decreasing (Ministry of Environment 2009). <p>Enforcement</p> <ul style="list-style-type: none"> • Enforcement as an EPR mechanism does not play a high profile role in Japan. The scheme sits within a culture of resource efficiency that can be traced in business and many other aspects of Japanese life. Manufacturers view the materials as an increasingly cost-effective resource for new products whose provenance is intimately known to them. <p>Products and materials</p> <ul style="list-style-type: none"> • Initially the “Home Appliance Recycling Law” only covered four types of home appliance – air conditioners, washing machines, refrigerators and CRT televisions. This group has recently been expanded to include LCD and plasma televisions, and clothes dryers. It is worth noting that the targets for LCD and plasma televisions are higher than those set for CRT version, due to the ability of Japanese television manufacturers to reuse these materials. • Computers and computer peripherals have been included under the complementary Law for Promotion of Effective Utilisation of Resources legislation since 2003. • Cars (ELV) have been included under the complementary Law for Promotion of Effective Utilisation of Resources legislation since 2005 (International Institute for Industrial Environmental Economics 2006; Togawa 2008). <p>Packaging:</p> <p>Packaging is managed under the “Containers and Packaging Recycling Law”.</p>
<p>3. Administrative arrangements</p>	<p>Governance</p> <ul style="list-style-type: none"> • Originally, this legislation began under the aegis of the Ministry of Economy, Trade and Industry (METI). <ul style="list-style-type: none"> • Responsibility now has moved to the Ministry of Environment (MoE). Municipal waste and Industrial waste are dealt with by different sections of the MoE. • Recycling facilities are often co-owned and operated as joint ventures by manufacturers. This extends to at least one international joint venture in China for recycling. • Post offices act as collection agents and sell disposal manifest/dockets.
<p>4. Drivers for scheme</p>	<ul style="list-style-type: none"> • Municipal governments not able to deal effectively or safely with hazardous wastes.

	<ul style="list-style-type: none"> • Predictions that landfill space would have been exhausted by 2008. • Resource efficiency in the light of increasing costs for materials and a paucity of national resources. • Identification of an opportunity to improve stocks of available resources through improvements to recovery and recycling.
5. Related actions/ complementary measures	<ul style="list-style-type: none"> • Nothing further identified, other than restating that the two enabling laws are complementary and cover different goods, as described earlier: <ul style="list-style-type: none"> • “Home Appliance Recycling Law” is established under the above, covering four home appliances – air conditioners, refrigerators, CRT televisions and washing machines – to which the multi-part docket system applies. • “Law for Promotion of Effective Utilisation of Resources”. This law is considered to be more closely aligned with European WEEE directives (Department of Trade and Industry (UK) 2005), but is increasingly covering a larger range of consumer goods.
6. Evaluation of outcomes	<ul style="list-style-type: none"> • Recycling statistics for specific products vary. For example, low rates of recycling of end of life vehicles have been recorded, reflecting the difficulty in transporting the vehicles to existing waste management facilities (Japan For Sustainability 2006; Togawa 2008) An advance disposal fee system has been used for end-of-life vehicles. • There are some indications that illegal dumping of home appliances materials has increased with time and this has been attributed to a ‘high’ cost to consumers. This was noted as a motivating factor for the disposal fee to be levied at the time of purchase (Department of Trade and Industry (UK) 2005).
7. References	<p>Department of Trade and Industry (UK) (2005) <i>Waste electrical and electronic equipment (WEEE): innovating novel recovery and recycling technologies in Japan</i>. Department of Trade and Industry (UK).</p> <p>International Institute for Industrial Economics (2006) <i>Extended Producer Responsibility: An examination of its impact on innovations and greening products</i>.</p> <p>Japan for Sustainability (2006) <i>The Recycling of End-of-Life Vehicles in Japan</i>. JFS Newsletter Japan, Japan For Sustainability.</p> <p>Ministry of Environment (2009) <i>State of Illegal Dumping of Home Appliances</i>. In Environment, M. O. (Ed., Government of Japan.</p> <p>Togawa, K. (2008) <i>Japan's Automotive Recycling System: Evaluation Three Years after Implementation</i>, In Kojima, M. (Ed.) <i>Promoting 3Rs in developing countries —Lessons from the Japanese Experience</i>. IDE</p>

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1. What is the scheme?	<p>EPR Resource Recycling Four-in-One Program (household appliances) 1998: Recycling system begins operating to promote recycling (Ching-Wen 2004; Lu, Wernick et al. 2006)).</p>
2. Key features	<p>Mechanisms</p> <ul style="list-style-type: none"> • Manufacturers (including importers) pay fees for the collection and recycling of e-waste (Chung and Murakami-Suzuki 2008) • Manufacturers pay a fixed fee per unit sold within Taiwan but this doesn't apply to exports. • Fees are determined by the Fee Rate Reviewing Committee (FRRC), based on the following formula: $\text{Items sold (previous Financial Yr)} \times \text{costs to collect and recycle (per item)}$ • The FRRC consists of representatives from government, academic institutions, consumer groups, manufacturers and several other sectors (Chung and Murakami-Suzuki 2008). • Recycling organisations must be registered with the scheme to be eligible for receiving monies provided by manufacturers (Chung and Murakami-Suzuki 2008). • Registered recyclers are monitored by Auditing and Verification Organisations (AVOs) (Ching-Wen 2004). • Recyclers purchase items from collection points and collect the fee from the Recycling Fund Management Committee (Chung and Murakami-Suzuki 2008). • Targets for recyclers are not set, however the number of units collected and recycled are monitored and variations that are 15% above, or below, previous years sales figures triggers a request for an explanation by relevant AVO (Ching-Wen 2004). • Recyclers are required to document activities and to keep records for a period of three years. Data is reported quarterly. <p>Enforcement</p> <ul style="list-style-type: none"> • AVOs are responsible for conducting inspections, certification, monitoring, and quality audits on recycling companies (Ching-Wen 2004). • There are penalties for illegal dumping by collection services (e.g. combatted by the ability to trace vehicles using GPS). There are also penalties for false declarations on sales and processing of specific products. <p>Products and materials</p> <ul style="list-style-type: none"> • Electrical home appliances, waste notebook computers, waste computer CPUs, waste computer monitors, waste printers, waste keyboards. • Waste motorcycles, waste tyres, waste lubricants, waste cars, waste dry batteries, waste lead-acid accumulators. <p>Packaging:</p> <ul style="list-style-type: none"> • Waste PET containers, waste PVC containers, waste PP/PE containers, waste

	<p>expandable PS containers, waste un-expandable PS containers, waste metal containers, waste aluminium containers, waste glass containers, waste “tetra pak” containers, waste agricultural and special environmental agents containers, waste paper containers, waste lighting illuminant.</p>
3. Administrative arrangements	<p>Governance</p> <ul style="list-style-type: none"> • Taiwan Environment Protection Agency (TEPA) is an agency of Taiwan’s Ministry of Environment. TEPA is responsible for the management of the EPR system under the legislation, including the contracting of Auditing and Verification Organisations (AVOs). • Recycling Fund Management Board (RFMB) is a “bureau” of the Taiwan EPA that collects fees and distributes monies for specific recyclable products. • Fee Rate Reviewing Committee (FRRC) - composed of representatives of government, academia, consumer groups, manufacturers and other sectors (Chung and Murakami-Suzuki 2008). • Auditing and Verification Organisations (AVOs) – third party contractors providing monitoring and evaluation services to TEPA. • Commercial collection facilities receive fees from RFMB. • Commercial recycling facilities are registered with, and receive fees from RFMB. They also report intakes and outputs to AVOs as selected by government tender. • Product manufacturers provide a fee per unit sold in a financial year to RFMB. • Municipal governments may take part in collection of specific products for recycling by registered facilities.
4. Drivers for scheme	<ul style="list-style-type: none"> • Municipal governments have experienced difficulty in managing specific products – IT and electrical equipment being a particular problem. • Toxicity of substances in specific products – IT and electrical equipment contain toxic substances. • Taiwan, like several other countries has a much higher rate of incineration than Australia, and this process creates additional pollution issues, particularly with regard to plastics. • Recovery and reuse is increasingly cost effective (Chung and Murakami-Suzuki 2008). • Recovery of mixed metal wastes is seen as sufficiently important that waste trade import legislation has recently been relaxed for these materials (Taiwan Environmental Protection Agency 2009).
5. Related actions/ complementary measures	<ul style="list-style-type: none"> • Waste Import and Export legislation has been in place to prevent the importation and exportation of hazardous or problematic substances. This legislation has recently been relaxed with respect to some materials (Taiwan Environmental Protection Agency 2005; Taiwan Environmental Protection Agency 2009).
6. Evaluation of outcomes	<ul style="list-style-type: none"> • Statistics for Taiwanese waste collection, disposal and recycling over the period between 2000 and 2008 indicate that:

	<ul style="list-style-type: none"> • Incineration remains a key feature of Taiwan’s waste management. • Total volumes of solid waste are trending downwards. • Landfill (sanitary and general) is also trending downwards. • Organisations recovering materials from electrical home appliances and computer-related electronic equipment have been reporting volumes above 1,200,000 per year since 2001. <p>Source: (Taiwan Environmental Protection Agency 2005; Government of Taiwan 2009; Government of Taiwan 2009)</p> <ul style="list-style-type: none"> • Materials that are recovered and sold as either working equipment or as components for reuse are not counted in the recycling figures. Therefore it is important to evaluate the Taiwanese scheme in relation to the second-hand market. Lu and colleagues comment that the reward provided by the recycling fund to consumers is insufficient to motivate participation in certain areas. They note that the life of a computer is several years longer than the currency of its technology, and that with notebook or “laptop” computers this has resulted in low return rates (Lu, Wernick et al. 2006, p 17).
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