

**Asia-Pacific Environmental Innovation Strategies (APEIS)
Research on Innovative and Strategic Policy Options (RISPO)
Good Practices Inventory**

Deposit-Refund Systems for PET Bottles in Taiwan

Summary of the Practice

Keywords: Recycling, Deposit-refund system, Extended producer responsibility, PET bottle management

Strategy: Creation of inter-boundary market for recyclable materials

Environmental areas: Urban environment, Waste management

Critical instruments: Regulatory instruments

Country: Taiwan

Location: Taiwan

Participants: Business sector, retailers, consumers, recycling companies, government.

Duration: Since 1989

Funding: Producers

Background:

Taiwan is a small but highly populated island nation, with an estimated population of 21,501,000¹, and 13,885 square miles in area. Therefore, Taiwan faces a lack of available space for waste disposal facilities. In addition to landfills and incineration, waste minimization and recycling have become priorities in Taiwan's municipal waste management strategies over the past ten years. Furthermore, local residents often protest the building of landfills and incineration plants. Major recycling initiatives being implemented in Taiwan include extended producer responsibility (EPR) systems, 'pay-as-you-throw' schemes, and mandatory sorting provisions. As part of the Taiwanese comprehensive plan for waste management, the government has enacted EPR measures.

The EPR regime has been established under the Waste Disposal Act (mainly due to the amendments of 1988 and of 1997) and administered by the Environmental Protection Administration (EPA). It requires that manufacturers or importers of containers, batteries, cars, motorcycles (scooters), tires, oil, televisions, refrigerators, air conditioners, washing machines, computers, and printers, pay recycling fees to government recycling funds. The EPA then uses the recycling funds to subsidize collection and recycling. The 2001 recycling fund budget was New Taiwan dollars (NT) \$57 billion (NT\$35 = US\$1) in total. Under the producer responsibility regime, Taiwanese EPA-designated retailers must accept end-of-life items returned to them by the consumers.

At the local level, Taipei City implements a pay-as-you-throw program, whereby citizens pay waste collection and treatment fees through the purchase of special trash bags approved by the Taipei City Government. However, recyclables that are separated by citizens are collected free-of-charge by the city. Taichung City and Kaohsiung City, on the other hand, enforce mandatory sorting schemes, whereby citizens have to pay penalties if they don't separate recyclables from the trash before waste pick up. These programs have resulted in a significant reduction in municipal waste. Per capita waste collected per day has dropped from 1.143 kg in 1997 to 0.978 kg in 2000.

Waste Disposal Act: the law of EPR

The Waste Disposal Act Amendments of 1997, reflected in Articles 10-1 and 23-1 of the Act, prescribe the basic elements of producer responsibility requirements now in force in Taiwan.

Key provisions in the 1997 version of the Act include:

¹ 1995

(Article 10-1) (Section 1) Manufacturers, importers and sellers of articles, packaging, or containers, which, after consumption, may produce waste and seriously pollute the environment, shall be responsible for the collection and treatment thereof if such waste:

1. is not easily cleared away or disposed of,
2. contains components that are not readily biodegradable,
3. contains hazardous substances, or
4. possesses recycling or reuse value.

(Section 2) Categories for general wastes mentioned in the above Section and the scope of industries covered by the above Section shall be promulgated by EPA; rules for collecting and treating of each type of general waste shall be promulgated by EPA in consultation with the responsible agency for the enterprise associated with the industry at issue at the central government level.

(Section 3) Industries designated under the above Section shall register with EPA. In addition, manufacturers/importers shall submit recycling fees based on the quantities sold/imported and a rate decided by EPA. Recycling fees shall be submitted prior to the bi-monthly value added tax. These recycling fees shall be deposited into recycling funds in banks. Rules for collection, payment, safekeeping and use of the funds shall be promulgated by EPA. The recycling fund shall be used to pay for the costs of collection and treatment of the wastes, to subsidize the recycling system, to reimburse municipalities for waste disposal, to pay for the cost of certifications conducted by third parties selected by EPA, and for other uses approved by EPA.

(Section 4) EPA may, on its own or via a qualified agent, conduct inspections and collect relevant data regarding the sales volumes, recycling volumes, and disposal volumes reported by designated industries. When necessary, EPA may request inspection assistance from the local tax administration office.

(Section 5) Labels on articles, packaging or containers mentioned in Section 1, and the collection facilities to be established in accordance with the type and size of sellers, shall be decided by EPA.

(Section 6) The rates for recycling fees shall be decided by taking the following into consideration: material, volume, weight, recycling or reuse value, and recycling rate. EPA shall promulgate rules to establish a Recycling Fee Rate Review Committee.

(Section 7) EPA may prohibit or restrict the manufacture, importation, or sale of articles, packaging, or containers which may seriously pollute the environment.

(Article 23-1) (Section 1) Continued failure to pay recycling fees in accordance with Section 3 of Article 10-1, after expiration of the time period specified for payment, shall be referred to the courts for enforcement; upon such a referral, a non-compliance penalty of between one-to-two times the amount due shall be assessed. Submission of false or inaccurate recycling fee calculation data shall be referred to the courts for enforcement; upon such a referral, the violator shall be required to pay the original amount due, as well as a non-compliance penalty of one-to-three times the original amount due. If the submission of false or inaccurate data incurs criminal responsibility, then the matter shall be referred to the appropriate criminal prosecution and investigation authorities. For violations of other sections of Article 10-1, a penalty of between NT\$60,000 and NT\$150,000 shall be imposed and an order for compliance within a specified time period shall be issued and, if the violation continues after the end of the specified time period, then continuous daily fines shall be imposed.

(Section 2) Serious noncompliance situations shall result in orders to suspend business for a time period of between one month and one year, or partially or completely suspend particular operations.

Items regulated under EPR

Items falling into the scope of the EPR scheme include a wide range of packaging and containers, various dry battery chemistries, autos, scooters, tires, lead-acid batteries, lubricants, televisions, refrigerators, air conditioners, washing machines, computers, and printers. Fluorescent lamps were

added in January 2002. Foamed plastics for insulation and shock absorption purposes were added in April 2002.

The industry's responsibility

The manufacturers or importers under the EPR scheme must register themselves to EPA, report to EPA the amount of items sold or imported, and pay recycling fees for such items. The manufacturers or importers of containers or batteries containing mercury or cadmium must affix specified recycling labels on their products. Sellers that are required to display collection-point marks at their stores and accept items returned by the consumers include: hypermarkets, supermarkets, franchised convenient stores, franchised drugstores, gas stations, convenience stores at traffic stations (such as bus stations, railway stations, airports, and highway service areas), cordless communication equipment retailers, and camera retailers. Furthermore, the sellers must take back used appliances (televisions, refrigerators, air conditioners, washing machines) from consumers purchasing new appliances at the sellers' establishments.

Recycling Fund management

Due to the 1997 Waste Disposal Act Amendments, EPA established eight agents (third party agents) to manage recycling funds. Manufacturers and/or importers whose products were regulated in the Act pay recycling fees to the recycling funds. Eight fund management committees were responsible for administering the funds and activities relating to collection and recycling. In July 1998, EPA transferred management responsibility for these funds to a centralized government body under EPA, the Recycling Fund Management Committee.

Recycling fees paid by manufacturers/importers are distributed to Recycling Management Funds (RMFs), which comprise a segment of EPA's budget and are administered by the Recycling Fund Management Committee. The total 2001 budget for the eight RMFs is NT\$5,748,475,000 (roughly US\$164,242,140) (Table 1). Seventy percent of the funds are distributed to trust funds, which are used to subsidize collection or treatment of regulated items based on the certified collectors and recyclers. The remaining 30 percent are distributed to non-profit revolving funds, which are dedicated to education, research and development, audit and certification, grants for municipalities and citizen groups, and administration.

Table 1. The 2001 Budget of the Eight RMFs

Funds	2001 Budget (NT\$ 1000)
Containers & dry batteries	2,381,886
Vehicles (autos and scooters)	970,200
Tires	523,800
Lead acid batteries	75,696
Lubricants	75,600
Containers of agricultural chemicals	37,118
Appliances (TVs, refrigerators, air conditioners, washing machines)	1,289,010
Information products (computers and printers)	395,165
Total	5,748,475

Source: Lee, S C. (2003).

Penalty

Article 23-1 of the Act provides that for violations of Article 10-1, a penalty of between NT\$60,000 and NT\$150,000 (approximately US\$1,714 to US\$4,285) shall be imposed and an order for compliance within a specified time period shall be issued and, if the violation continues after the end of the specified time period, then continuous daily fines shall be imposed.

Objectives:

Currently, EPR schemes taken in place in Taiwan include deposit-return systems, mandatory product take-backs, and compulsory environmental labeling. Under its Waste Disposal Act, the recycling requirements for PET came into force first in 1989. In order to fulfill their obligations for PET recycling under the Waste Disposal Act, members of the PET industry created a modified deposit-refund system.

The deposit-refund system for PET bottles in Taiwan aims to:

- Increase collection of PET bottles separated from municipal solid waste,
- Increase the recycling rate of PET bottles,
- Improve waste management of PET bottles, and
- Promote better product design for recycling.

Description of the activity:

How does it work?

Under the deposit-refund system for PET bottles, manufacturers and importers pay certain fees into a fund and consumers are given a refund for returning PET bottles into designated collection sites. The industry formed a foundation to administer the recycling fund, which is meant to cover consumer refunds and collection and recycling costs for the bottles. PET manufacturers and importers were required to pay into the recycling fund according to their sales. Initially, consumers, who returned PET bottles to any of the more than 10,000 established collection locations, were paid a refund of NT\$2.00 (approximately US\$0.06). Recycling plants paid collectors NT\$0.50 per bottle for each bottle delivered. By 1992 Taiwan's PET recycling rate was 80 percent.

Problem arose: free riders and fund management

As recovery of PET bottles increased, however, payment of the refunds resulted in a deficit in the fund. The problem was further exacerbated by free riders – PET packaging manufacturers not registered with or reporting to the Recycling Fund Management Committee.

In order to solve the problem of fund deficit, the refund value has been reduced. First it was reduced to NT\$1.00 and then further, to NT\$0.50 per bottle. Along with reduction of the refund value, the Recycling Fund Management Committee has been working to increase manufacturers' and importers' compliance with the system. From July 1998 to May 2000, the number of enterprises reporting to the committee increased from 1,648 to 2,258. Beyond the problem of producer registration, the problem of nonpayment of fees was revealed. According to audits of 655 companies performed in 1999 and 2000, errors and underreporting by producers were discovered. Thus, over 259 million NT\$ was estimated as unpaid fees.

Critical Instruments

Regulatory instruments

Mandatory Deposit-Refund for PET Bottles

The mandatory deposit-refund system regulates involvement of all relevant producers (manufacturers and importers who sell drinks contained in PET bottles) in 'end' PET bottles management. Under this system, new financial responsibility is allocated to producers. Deposit fees that are collected from producers are used to pay end-users as a financial incentive to bring back used PET bottles to a designated collection point. The mandatory deposit-refund system contributes to the separate collection of PET bottles from the general municipal waste stream. The main advantage of a mandatory deposit-refund system is to increase the collection rate of certain waste products like PET bottles separate from the waste stream.

Impacts

Producers and product change

Not only for PET bottles, mandatory deposit-refund systems in Taiwan creates a greater impact for producers, who have been using various materials and packages for their final products without any clear consequence of their use to the environment and society. Since the new policy, 'Extended Producer Responsibility', has been introduced and actual EPR systems applied and new responsibilities allocated to producers, Taiwanese producers are starting to clearly understand the link between their products and their impact on society and the environment. Therefore, wide implementation of mandatory deposit-refund systems stimulates producers to improve their product design and the environmental-friendliness of their products, including packages.

End-users

The introduction of a mandatory deposit-refund system influenced public awareness on serious waste issues in Taiwan. It gave a lesson to end-users that they can contribute to better waste management through a participatory mechanism with direct financial incentives. In the short term, end-users participate in PET bottle collection mainly due to the financial benefits. However, in the long run, it will inspire the general public to be aware of environment-friendly behaviors and their consequences and will encourage environmental education beyond the waste issue.

Lessons Learned

In order to succeed with a mandatory deposit-refund system, several important factors should be considered: designation of convenient drop-off collection points, good cooperation with and incentive advantage creation for retailers (which are often a drop-off spot,) enough financial incentives for end-users, combination with other deposit-refund systems for other types of products (for instance, aluminum cans,) clear labeling, and controlling measures for free riders.

According to the Taiwanese deposit-refund system experience, successful factors are as follows:

First, they faced a deficit in the deposit-refund fund. There are two major causes that can be identified. One is that they failed to control unregistered producers. The producer registration system had a loophole for unregistered producers running their business in the domestic market. It relates to the industrial registration system, which is beyond the jurisdiction of the Ministry of Environment. Therefore, in order to prevent free riders in the mandatory deposit refund system, strong cooperation among ministries of industry and of environment is required.

Another cause is that they failed to establish a controlling measure to distinguish PET bottles with advanced payment of deposit fee and those without. In the case of Nordic countries, bar codes allow the collecting machines to automatically distinguish PET bottles outside of their own systems. PET bottles without a proper bar code, which can identify the deposit fee to be paid, would be pushed out from the collecting machines. Therefore, a proper labeling scheme combined with a bar code system, for example, is a prerequisite to prevent free riders.

Second, the Taiwanese fund management authority had tried to solve the fund deficit by reducing the amount of financial incentives for end-users for returning PET bottles. Even though there is no clear data available to demonstrate the impact of reduced return reward on the collection rate of PET bottles, it is expected to produce the negative outcome of decreasing collection rates. According to Danish, Swedish and other deposit-refund systems, the level of compensation is the most influential factor to change public behavior to return end PET bottles. It has often been seen that low financial compensation results in the failure of the deposit-refund system. Therefore, it is a critical point to consider and discuss further.

Potential for Application

Most developing countries in Asia do not have good waste management systems, which results in a huge amount of waste by not utilizing recyclable materials. Under the lack of a good waste management system, recyclable materials have been randomly collected by waste pickers. By improving the waste management system in a more systematic and participatory manner engaging all public, the potential to utilize recyclable materials is enormous. The potential is not only financial but also environmental benefits for society.

One way to improve collection of recyclable materials separated from the main waste stream is to apply a deposit-refund system. Therefore a deposit-refund system with good design would be beneficial for countries that are suffering from generated waste.

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