

## The Regulatory Framework of Taiwan's Municipal Waste Recycling

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In addition to landfilling and incineration, waste minimization and recycling have become priorities in Taiwan's municipal waste management strategies over the past 10 years. Major recycling initiatives being implemented in Taiwan include producer responsibility, "pay-as-you-throw," and mandatory sorting provisions. Currently, the producer responsibility regime established under the Waste Disposal Act and administered by the Environmental Protection Administration (EPA) requires that manufacturers or importers of listed items, including containers, batteries, cars, motorcycles ("scooters"), tires, oil, televisions, refrigerators, air conditioners, washing machines, computers, and printers, pay recycling fees to government recycling funds. EPA then uses the recycling funds to subsidize collection and recycling. The 2001 recycling fund budget totals NT\$57 billion (NT\$35 = US\$1). Under the producer responsibility regime, EPA-designated retailers ("sellers") 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 face penalties if they don't separate recyclables from the trash before 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. Targeting a 10% recycling rate for municipal waste in 2001. EPA plans to research and develop new recycling techniques, expand the scope of producer responsibilities, and strengthen existing municipal recyclable collection programs. To this end, among other initiatives, EPA has prepared a draft "Resource Recycling and Reuse Act" that would complement the existing producer responsibility programs by incorporating into the current recycling framework the concept of product life-cycle management.

### Introduction

Producer responsibility, pay-as-you-throw, and mandatory sorting are the three "cornerstones" of Taiwan's waste minimization policy. The Taiwan EPA administers a nation-wide producer responsibility program, while the local governments implement local pay-as-you-throw and/or mandatory sorting programs. This paper outlines key aspects of the regulatory framework underpinning these programs, focuses on producer responsibility initiatives under the existing Waste Disposal Act, and introduces the draft "Resource Recycling and Reuse Act", which aims to further promote Taiwan's recycling and other waste minimization efforts.

### The Evolution of Producer Responsibility in Taiwan

Assessed against the degree of government intervention, there are four stages of control of Taiwan's municipal waste recycling. The first stage covers the period prior to 1988 and is characterized by market-driven recycling initiatives. The second stage commenced with the Waste Disposal Act Amendments of 1988, which infused the existing recycling regime with government-imposed producer responsibilities, and ended with the Waste Disposal Act Amendments of 1997. During the second stage, manufacturers, importers, and sellers of government-designated products were responsible for recycling post-consumption products. At this time, the Taiwan EPA's role was to audit the success of manufacturer, importer, and seller recycling programs.

The third stage followed the Waste Disposal Act Amendments of 1997, when EPA established eight third-party managed recycling funds, into which manufacturers and/or importers whose products were covered by the Act paid recycling fees to fund collection and recycling activities. Eight fund management committees were responsible for administering the funds and related collection and recycling activities. The fourth stage commenced in July 1998, when EPA transferred management responsibility for these funds to a centralized, government body under EPA, the Recycling Fund Management Committee.

The Waste Disposal Act, as it existed after the 1988 Amendments, represents Taiwan's first law imposing extended producer responsibility on manufacturers, importers, and sellers of an expanding array of consumer products. Article 10-1 of this version of the Waste Disposal Act provides that "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 treated;
  2. contains components that are not readily biodegradable;
- or
3. contains hazardous substances.

The categories of wastes and scope of industries covered by the above Section are designated by EPA; rules for collecting and treating of each type of general waste are promulgated by EPA in consultation with Responsible Agency for the Enterprise Associated with the Industry at

Issue at the central government level.” 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.” Under the Act, EPA listed sixteen items subject to the Act’s producer responsibility requirements. EPA also issued rules governing the recycling of covered items and target recycling rates for these items (Table 1). As a result, the regulated industry jointly established organizations to develop recycling plans to submit to EPA for approval. The industry then implemented EPA-approved plans and reported to EPA with their achieved recycling rates.

**Table 1 The Listed Items\***

Items	Date of Listing	Effective Date of the Rule	Recycling Rate Targets (%)
PET Bottles	1989/1	1989/6	50 – 70
Tires	1989/6	1989/9	50 – 85
Containers of pesticides for sanitation applications	1989/8	1990/8	50 – 75
Agricultural Chemical Containers	1989/10	1990/9	20 – 65
Aluminum Cans	1989/12	1990/8	30 – 70
Steel Cans	1989/12	1990/8	20 – 70
Lubricants	1990/1	1990/5	30
Lead Acid Batteries	1990/4	1990/8	30 – 70
Mercury-Containing Batteries	1990/5	1990/8	5 – 55
Fluorescent Lamps	1990/8		
PS Foamed Containers	1991/7	1991/8	50 - 55
Other Plastic Containers	1992/3	1994/4	50
Aseptic Containers	1992/9	1994/4	60
Glass Bottles	1993/8	1994/4	35
Paper Containers	1993/8	1994/4	50
Autos and Scooters	1993/9	1994/12	60

\* Effective until Waste Disposal Act Amendments of 1997.

Because EPA did not have the capacity to check the achieved recycling rates reported by the industry, the recycling regime did not achieve many of the results desired by EPA. Under the regime, it also was difficult to penalize “free riders” without EPA’s active involvement—further straining EPA resources. Hence, the 1997 Amendments changed the legal framework to require that manufacturers and/or importers pay the

recycling fees into recycling funds. Under the 1997 Amendments, quantities of end-of-life products recycled must be certified by impartial third parties. In addition, EPA is authorized to check the quantities of items sold or imported by regulated industry members. Under such a regime, eight separate recycling funds were established (Table 2). The members of the committees that manage the funds are selected by EPA. Generally speaking, seventy percent of the committee members comprise representatives from the regulated industry, and the other thirty percent are academics and other respected citizens. Under the 1997 Amendments, the regulated industry no longer manages recycling programs. In 1998, by the requests of the Legislative Yuan, EPA took the charge of managing the recycling funds. The funds became public funds and the budgets of which must be approved by the Legislative Yuan.

**Table 2 The Eight Recycling Funds of 1997**

Name of the Funds	Items Covered
Containers & Dry Batteries	General Purpose Containers, Mercury-Containing Batteries
Containers of Agricultural Chemicals	Containers of Agricultural Chemicals
Vehicles	Autos, Scooters
Lead Acid Batteries	Lead Acid Batteries
Lubricants	Lubricants
Tires	Tires
Appliances	TV, Washing Machines, Air Conditioners, Refrigerators
Information Products	Computers and Computer Components

## The Regulatory Framework

### Producer Responsibility

#### *The Law*

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:

(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 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 noncompliance 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 noncompliance 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*

Items falling into the scope of such a producer responsibility 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 are to be added in January 2002. Foamed plastics for insulation and shock absorption purposes are to be added in April 2002.

#### *The Industry's Responsibility*

The manufacturers or importers of the regulated items must register with 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*

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 3). Seventy percent of the funds are distributed to trust funds, which are used to subsidize the collection or treatment of regulated items based on the certified collected or treated volumes. The remaining thirty percent are distributed to "non-enterprise revolving" funds, which are dedicated to education, research and development, audit and certification, grants for municipalities and citizen groups, and administration.

**Table 3 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 (TV, refrigerators, air conditioners, washing machines)	1,289,010
Information Products (computers and printers)	395,165
Total	5,748,475

**Pay-As-You-Throw**

Prior to July 2000, trash collection and treatment fees collected by local governments were based on the volume of water consumed by a household. Taipei City is the first and currently the only local government that now collects the fees based on the volume of trash. In this regard, Taipei City promulgated "The Municipal Waste Cleaning Fee Collection Ordinance" on April 28, 2000. According to the Ordinance, citizens must pay for and use special trash bags for trash to be collected by Taipei City. The price of the special trash bags includes the trash collection and treatment fees. The current fee rate is NT\$ 0.45 (approximately US\$ 0.013) per liter. To encourage recycling, the City picks up sorted recyclables free-of-charge. Fines of between NT\$ 1,800 to NT\$ 6,000 (roughly US\$ 51.40 and US\$ 171.40) will be imposed on illegal dumpers. Those counterfeiting the special trash bags will be fined between NT\$ 30,000 to NT\$ 100,000 (approximately US\$ 857 to US\$ 2,857) and be subject to criminal penalties.

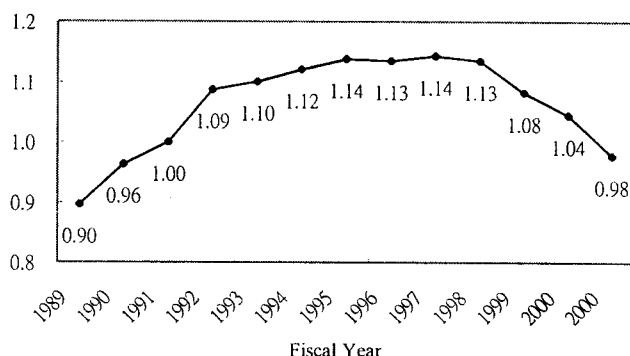
**Mandatory Sorting**

Taichung City launched Taiwan's first mandatory sorting initiative in July 1999. The City promulgated the "Municipal Waste Recycling and Cleaning Ordinance" on November 15, 2000. Under the Ordinance, citizens must sort trash into four categories before pick-up. The four categories are: (1) recyclables; (2) large-volume wastes (e.g., furniture); (3) hazardous wastes; and (4) general wastes. Additionally, Kaohsiung City implemented similar legal provisions and recycling programs effective as of 2001. Under such programs, the City government does not collect unsorted trash. Citizens who do not comply with the ordinance will face fines up to NT\$ 4,500 (roughly US\$128.50). EPA has asked all local governments to adopt mandatory sorting programs by the end of 2001, if pay-as-you-throw programs are not available.

**Achievements**

Taiwan's recycling programs have resulted in a significant reduction in municipal wastes. Per day per capita waste has dropped from 1.143 kg in 1997 to 0.978 kg in 2000. The rate of decrease is more significant in

recent years (Figure 1). Tables 4 and 5 show the volumes collected and the recycling rates for the various producer responsibility programs. Generally speaking, the collected volumes have risen from 1998 to 2000.

**Figure 1. Trend of per day per capita waste (kg)****Table 4 Volumes Collected under Producer Responsibility Programs**

Items	Unit	Year		
		1998	1999	2000
Containers	Kg	128,421,624	187,264,351	225,936,176
Agricultural Chemical Containers	Kg	620,043	726,383	737,707
Dry batteries	Kg	13,514	256,682	632,099
Lead-acid batteries	Kg	26,285,710	30,334,316	31,688,269
Autos	Unit	52,031	102,257	137,668
Scooters	Unit	134,607	431,504	366,034
Tires	Kg	56,630,061	94,647,603	100,282,526
Lubricants	Kg	8,008,169	13,023,086	11,996,340
Appliances	Unit	416,413	1,155,270	985,548
Computers	Unit	138,528	485,975	946,518

**Table 5 Recycling Rates of Listed Items**

Items	Recycling Rates (%)		
	Year		
	1998	1999	2000
Containers	31.95	44.49	55.91
Agricultural Chemical Containers	78.38	63.63	85.30
Dry batteries	9.98	15.65	6.04
Lead-acid batteries	93.88	75.81	68.01
Autos	13.85	27.19	32.86
Scooters	14.61	45.50	37.55
Tires	47.75	83.46	73.99
Lubricants	8.35	7.46	11.37
Appliances	15.45	33.99	29.15
Computers	36.89	69.09	111.55

The pay-as-you-throw programs are also successful in Taipei City. The waste collected per day from July to December in 2000 averaged 1,834 metric tons, a cut of 38% from 2,970 metric tons in 1999. The average weight of recyclables collected each day increased from 73 metric tons in 1999 to 198 metric tons in 2000. The recycling rates also climbed from 2.38% in 1999 to 9.8% in 2000. Moreover, per day per capita waste dropped from 1.11 kg in the first half of 2000 to 0.69 kg in the last half, a dramatic cut of 38%. The costs of the pay-as-you-throw programs are NT\$ 189,000,000 (roughly US\$ 5,400,000). The benefits are reportedly NT\$ 82,000,000 (approximately US\$ 2,342,857) from selling recyclables, and NT\$ 356,000,000 (roughly US\$ 10,171,428) from savings in waste disposal. The net benefits are NT\$ 250,000,000 (approximately US\$ 7,142,857).

Taichung City's mandatory sorting program has also yielded positive results. From 1999 to 2000, recyclables collected rose from 21,405 metric tons to 38,234 metric tons, and the recycling rates increased from 9.02% up to 17.2%. In addition, per day per capita waste was reduced from 0.7 kg to 0.64 kg.

### Ways Forward

Targeting a 10% recycling rate for municipal wastes in 2001 and 18% in 2006, EPA will research and develop new recycling techniques, expand the scope of producer responsibility, and strengthen the municipalities' recyclable collection programs. Ongoing research and development projects focus on fluorescent lamps, foamed plastics, dry batteries, aseptic containers for agricultural chemicals, liquid crystal displays (LCD), cathode ray tubes (CRT), printed circuit boards, vehicles, tires, and CFCs. As for expanding the scope of producer responsibility, EPA proposes to subject microwave ovens, electromagnetic ovens, and electric dryers (for clothes) to the recycling requirements under the Waste Disposal Act beginning in September 2002. Moreover, EPA is studying whether to subject compact disks (CDs) to these requirements as well. With respect to strengthening municipalities' collection systems, EPA will keep providing local governments with grants to establish collection and sorting facilities, and offer training courses for employees engaged in waste collection. Furthermore, EPA evaluates the performances of municipalities in the area of waste minimization and rewards municipalities for outstanding efforts in this regard every year.

It is also worth noting that, at local government levels, food wastes have been the focus of recycling programs in recent months. Taichung City began collecting household food wastes from April 2001. Taipei City is undertaking trial runs of such a collection system, as well.

To further promote recycling and to complement the regime established under the "Waste Disposal Act", EPA recently completed a draft "Resource Recycling and Reuse Act", which incorporates the concepts of product life-cycle management, and segregates "recyclables" from "wastes." Descriptions of the core concepts in the

draft Act include the following:

1. Designated industries shall recycle readily recyclable materials.
2. Designated industries shall:
  - a. Label materials to indicate the percentage of recycled materials contained in designated products.
  - b. Label the materials of designated products.
  - c. Label recycling marks on designated products.
  - d. Use biodegradable and/or recycled materials in their products, and design easy-to-disassemble products.
  - e. Use a designated proportion or quantity of recycled materials.
  - f. Use a designated proportion of refillable containers.
  - g. Use specified types of packaging.
3. Considering environmental load of the product in question, EPA may prohibit or restrict the use of certain articles, containers or packaging.
4. If different products or materials meet the same functional requirements, government entities shall implement procurement preferences for government-certified green products, recyclables, or recycled products that contain a specified proportion of recycled materials.
5. Developers shall reserve a specified area for recycling industry activities when developing industrial zones.
6. Barriers to leasing or selling public lands shall be removed for recycling industry activities.

The "Resource Recycling and Reuse Act" would extend and enhance producer responsibilities borne by designated industries. In addition, the Act would provide incentives to recycling industries and related products.

### Conclusion

To promote recycling, the Taiwan EPA regulates and administers producer responsibility programs, while the local governments implement pay-as-you-throw and mandatory sorting programs. At the national level, the Taiwan government plans to expand the scope of producer responsibility to cover the entire product life cycle, if the draft "Resource Recycling and Reuse Act" is adopted as currently planned. At the local level, most governments should adopt mandatory sorting programs by the end of 2001.