

Waste charging system in Taipei

Taipei, Taiwan



Taipei - waste charging system "Per-Bag Trash Collection Fee Program"

Municipal solid waste management remains a challenge for highly urbanized societies [1]. Due to a dense population and limited spaces for waste disposal, Taipei City's local government has implemented several policies for waste management since the 1980s. One remarkable policy is a waste charging system named "Per-Bag Trash Collection Fee Program", introduced in 2000, whereby residents are required to purchase specially designated garbage bags for waste disposal. Since its introduction, waste production has reduced by one-third and the collection of recyclable materials increased significantly.

Country/ City Profile



Country		City	
Population (2015)	23,415,126 [2]	Population (2014)	~2.7 million (city) [3] ~3.6 million (metropolitan area) [3]
Land area (km ²)	35,980 [2]	Land area (km ²)	272.14 (city) [4] 2,500 (metropolitan area) [3]
GDP per capita (est., 2014, current international, at purchasing power parity)	43,600 [13]	GDP per capita (2014, at purchasing power parity, US\$)	46,102 [5]
Region	Eastern Asia	Region	Northern Taiwan

City's physical geography

Location	✓ Northern region of Taiwan (earthquakes, typhoons, challenges in waste and water management, air pollution)
Climate	✓ Subtropical monsoon (average temperature: 23.5°C) ✓ 2,147.3 mm/year annual rainfall

Initiating context

Due to a dense population and limited spaces for waste disposal, policies for reducing quantity, processing of resources - obtained after waste classification at the source - and pluralistic processing were adopted in Taipei City. As a result of a policy combination in the last two decades, the waste situation has been well managed [6]. All the Waste Minimization Policies implemented by the municipality were backed up by one initiative developed in the 1980s when they first faced the waste issue: favoring incineration as the primary waste treatment method and landfill as a secondary option.

In 2012, Taipei City processed an average of 1,724 metric tons of general waste and general industrial waste per day (not including dirt and culvert sludge). Nowadays, Taipei has three municipal waste incinerators in Neihu, Muzha and Beitou, and one sanitary landfill in Shanzhuku. The rate of proper garbage disposal has reached 100%, and the incineration rate of the resources that are not recycled or reused, reached 99.23%.

Aiming to achieve significant waste reduction, a "Per-Bag Trash Collection Fee" policy was put in practice in 2000 - a Pay As You Throw (PAYT) system, based on the polluter pays principle [8]. Different approaches of such a waste charging system can be found around the globe and the positive results obtained by the several countries proves it to be effective and fair, encouraging the waste classification and recycling by population, consequently increasing waste reduction [7]. Basically, the system works by charging citizens according to the weight or volume of generated waste, through the use of specific containers, stickers or garbage bags.

Project description

On July 1st, 2000, Taipei officially launched the "Per-bag Trash Collection Fee Program", combined with other recycling measures. The PAYT system "Per-bag Trash Collection Fee Program" charges the generated waste through certified bags, provided by the City Government Department of Environmental Protection (TDEP). Basically, citizens need to buy certified garbage bags at convenience stores, to dispose the waste before handling it to the waste collection system - recyclable materials are exempted from this obligation. Different types of bags are available, with prices ranging from 21 NT dollars to 216 NT dollars (0.58€ to 5.92€) [9]. As shown in Table 1, the volume of the bags varies from 3 to 120 liters and the number of pieces per pack depends on the bag capacity. Since the beginning of 2013, the price of Certified Trash Bags was lowered in 20%, mainly due to the citizens' support for the policy over the last years.

Table 1 - Details on PAYT in Taipei

Number	Volume (liter)	Capacity (kg)	Style	Price (NT dollars/ pack)	Package (piece/ pack)
1	3	0.6	Portable bag	21	20
2	5	1.0	Portable bag	36	20
3	14	2.9	Portable bag	100	20
4	25	5.1	Portable bag	180	20
5	33	6.9	Flat bag	237	20
6	76	15.9	Flat bag	273	10
7	120	25.1	Flat bag	216	5

Source: Retrieved on [9]

Implementation process

The policy implementation process started in 1991, when Taipei City government began charging trash collection fees [10]. Initially, the amount charged was based on the water consumption per household, under the assumption that higher levels of water consumption are associated with higher volumes of waste. As the fee was not associated with waste reduction it only led to a reduction in water consumption, which motivated a change in the charging scheme. In 2000, the trash collection fee based on water consumption was substituted by the PAYT system, assessed by the volume of waste that is generated.

Right after the establishment of the PAYT system in Taipei City, the citizens demanded an exemption for kitchen waste. In response, the city government started a program, which was expanded in stages, to collect and recycle all household kitchen waste separately. Since 2003, household kitchen waste is being recycled for animal feeding (pig-feed waste) and agricultural use (compostable kitchen waste). It is important to highlight that such complementary measures as the separate collection of kitchen waste were implemented in order to make the PAYT system a successful policy.

Before the implementation of the current PAYT scheme, a "Keep Trash Off the Ground" policy and a "3-in-1 Resource Recovery Scheme" were carried out in 1996 and 1997. The first was created to encourage waste classification at home and also getting the households used to specified times for waste collection by vehicles. The second allowed an integration of waste separation with resource recycling and waste collection, as the waste collection vehicles worked together with the resource recovery vehicles. Currently, the city government offers waste collection and resource recycling services at specified times and venues, five days a week.

Project implementation details

Process	Connected to national initiatives for waste reduction, Taipei City Government developed a waste charging system based on the volume of disposed waste. Combined with previous educational initiatives, the implementation began in 2000. The collection of recyclables and kitchen waste are free of charge to encourage recycling.
Financing	Taiwan Environmental Protection Agency through subsidies [11] and the fees for the certified bags.
Leadership	City Government Department of Environmental Protection (TDEP).

Project implementation details

Involved stakeholders

Operators

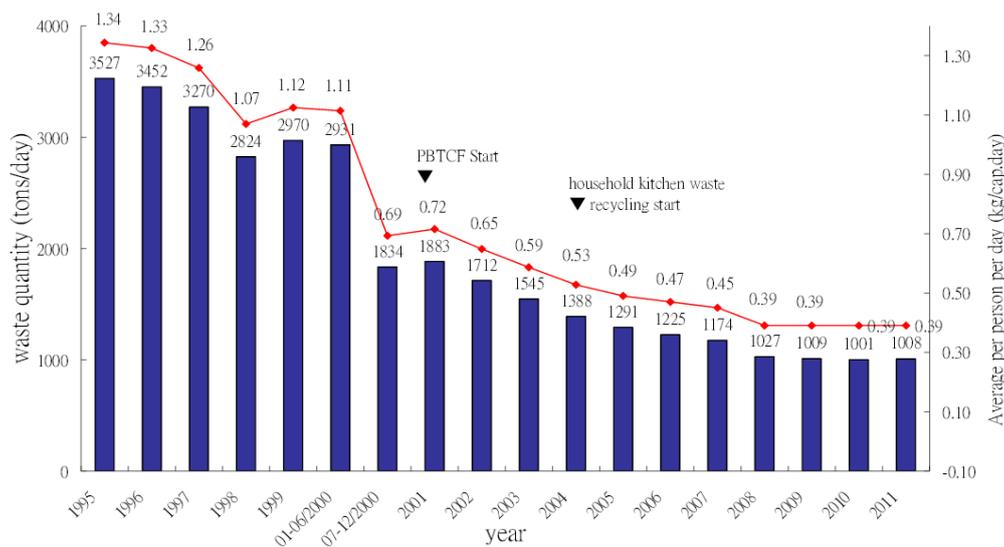
- ✓ City Government Department of Environmental Protection (implementing agency)
- ✓ Private collection companies (operator)
- ✓ City government collection (operator)
- ✓ City government incinerators (operator)

Users

- ✓ City residents
- ✓ Tourists
- ✓ Private sector (recyclables as raw material)
- ✓ Farmers (recycled kitchen waste)

Results

Graphic 1 shows the household waste generation from 1995 to 2011, demonstrating a sharp decrease in the amount disposed daily (in total and per person). In 2000, when the policy was implemented, the total waste generated per day was 2,970 tons. In 2011 these number decreased to 1,008 tons. The waste generation per capita decreased by ~65% in the same period. Due to a combination of several policies, in December 2014, waste reduction rate reached 66.7% and the recycling rate reached 56.38% [12], greatly lowering the volume of trash disposal and contributing to the goal of Taipei's 2010 ambition of Zero Landfill. The recycling rate is therefore very high, as not separating the waste increases the need to buy more certified bags - recyclable materials are collected for free, with no need of certified bags.



Graphic 1- Taipei City PAYT system and changes in household waste volume

Source: retrieved on [10]

Lessons learned

The PAYT system “Per-bag Trash Collection Fee Program” and accompanying measures generate an economic incentive for consumers to reduce consumption and select the products which tend to generate less trash. Additionally, the policy framework promotes waste separation at the source. From Taipei's experience, the waste charging system was successful due to a combination of measures to reduce waste. Moreover, the government's recognition of the problem and the efforts made to develop strategies for waste management in a proper and sustainable manner contributed to its success. The management strategy encompasses the community, private companies, and industry; it combines infrastructure (treatment facilities, collection schemes and widely distributed waste collection points), with a recycling system and financial incentives.

Additionally, before implementing such strategies, educational measures need to be combined in order to encourage waste reduction at the source (households, industry and services). With this first step, waste can be

separated from useful resources and, combined with recycling measures, can lead to a successful circular economy model implementation. In Taipei, the government organized over 340 community briefing sessions and 400 sessions for management and waste collection staff of buildings, before implementing the PAYT fee [6]. Also training was offered in order to promote waste reduction, classification and recycling.

PAYT schemes also demand a legal basis, e.g. for cases of non compliance, and government support for all the infrastructure and new businesses needed (waste treatment and recycling facilities, market development for recycled goods, etc.) as well as to encourage a behavioral change in the society. In this way, waste generated from economic activities can be recycled into new products, which can return to the market with added value.

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