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# Taiwan's Transition – from Garbage Island to Recycling Leader

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**The world's mountain of waste is growing, but one country once known as 'Garbage Island' has**

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Solid waste produced in municipal areas is expected to rise from around the 2 billion tonnes measured in 2016 to 3.4 billion in 2050. The amount of waste produced, per person, per year, among the world's richest nations far outweighs amounts in all other global regions. On average someone in North America creates 2.2kg of waste per day, compared with just over 0.5kg in South and East Asia. Wealthy countries accounting for just 16 percent of the world's population, create 34 percent of the waste, while low-income countries accounting for 9 percent of the world's population generate just 5 percent of global waste. Not only is this huge amount of waste fuelling climate breakdown, it overwhelms other critical ecological life support systems too.

Tackling waste is critical to tackling climate change. Landfill sites where a lot of household and business waste gets dumped give-off the powerful greenhouse gas, methane, and other emissions. That can be avoided or greatly reduced with more re-use, recycling and avoiding waste in the first place.

In 1987, a small group of 10 Taiwanese women met to talk about their concerns for the environment under the name [Homemakers United](#). Just over 3 decades later, their actions have resulted in huge changes to their country's attitude to recycling and waste. Today Taiwan boasts a world-beating recycling rate of 55 percent and daily waste disposal has dropped drastically from 1.14kg per person in 1988 to under 0.4kg per person by 2015. The island

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waste from being incinerated and started their nation on the path toward zero waste.

In 1993, Taiwan collected just 70 percent of its trash, with the rest polluting the environment through littering or burning. The country was given the nickname “Garbage Island”. Its booming economy and increasing levels of consumption meant its people were producing more and more rubbish. The government’s response was a huge programme of incineration. But Homemakers United responded by taking their statistics and even their trash into Environmental Protection Agency (EPA) offices, to prove that 40 percent of municipal waste could be recycled and 35 percent composted, and to petition for a municipal recycling system.

Today, an integrated system ensures that manufacturers, importers and consumers all pay towards the collection, recycling and disposal of waste. For householders, yellow garbage trucks blasting classical music collect trash several times a week. In Taiwan’s capital Taipei there are more than 4,000 pickup spots five nights a week, with mobile apps that let users track the trucks and alert them whenever a garbage truck is nearby. These trucks are followed by [open-bed recycling trucks](#) to collect households’ raw food waste, cooked food waste, and other categories including plastic and paper for composting and recycling. People must purchase official blue bags for refuse as part of the Pay As You Throw (PAYT) scheme.

Manufacturers and importers contribute under an Extended

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real cost of disposal of any product. Proceeds go into a fund that pays for the recycling scheme itself.

## Wider relevance

The most recent figures put the generation of global municipal solid waste (MSW) at just over 2 billion tonnes per year, and is expected to rise to around 2.6 billion in 2030 and 3.4 billion tonnes per year by 2050. Over one third of waste, 37 percent, is dumped into landfill sites, with one third more being simply tipped in the open. Just under one fifth is subject to composting and recycling with around one tenth being incinerated.

This represents a significant increase in per person waste generation rates. Looking around the global regions, the average waste created per person, per day, ranges from 0.46kg in Sub-Saharan Africa, to just over 0.5kg for South and East Asia and the Pacific, to 0.81kg in the Middle East and North Africa, 0.99kg in Latin America and the Caribbean, 1.18kg in Europe and Central Asia, and a much higher 2.2 in North America. Among the richest within countries the amount of waste per person rises to over 4kg per day.

A rapid transition to a carbon zero economy will require the sophisticated recycling of all resources and a huge reduction in the amount of material left for disposal.

Taiwan's system is complex, well thought out and it works. Although each country will face its own challenges locally, there are some principles that may be useful for all.

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for recycling by forming associations to fund recycling – known as [Extended Producer Responsibility \(EPR\)](#). A recent [study](#) by Zero Waste Europe found that on average, only 45 percent of product and packaging waste within the EU is covered by an EPR scheme. Taiwan's recycling fund anticipates the massive logistical complexity of the recycling process and designs partnerships between public and commercial players to unite behind the singular goal of waste reduction. It does not put the entire burden of action on public bodies.

In 1997 the system was changed to form the "[4-in-1 recycling programme](#)", which includes government, manufacturers, consumers and licensed recycling enterprises. Instead of forming associations to fund recycling, manufacturers and importers now had to pay a recycling fee to Environmental Protection Administration Taiwan (EPAT) and offer collection of waste for recycling from consumers. The fees would feed into the Recycling Fund, which subsidises collection and recycling by licensed enterprises. The logic used to determine the fees they pay is deceptively simple: manufacturers must pay the difference between the cost of collecting and recycling their products, and the revenues generated by selling any recovered resources. However, the actual calculations can be quite complex since they also take into account externalities and associated environmental cleanup costs.

Under the 4-in-1 Programme, residents sort waste for collection and community groups frequently mobilise to

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residents, communities, commercial enterprises and others in order to recover commodities from these wastes and generate revenue in the process. Municipalities and local governments collect recyclable wastes from community collection sites and sell it to private recyclers, giving a portion of the income back to local government to fund grants for community waste collection sites.

Taiwan's system includes food waste, which is collected and used for animal feed and compost. According to the United Nations Environment Programme, a third of all food produced worldwide, worth US\$1 trillion, is wasted. If countries around the world were to use effective waste reduction and garbage disposal systems, it could help feed some of the 795 million people in the world who currently do not have enough food.

## Context and background

Taiwan is a mountainous island roughly the size of the Netherlands, with most of its 23 million people packed into five coastal cities. Its economy grew enormously in the 1980s and 1990s, when it was known as one of the "Asian Tigers". The average GNP per head (gross national product, a way of describing the national income) rose in this period to US\$3,993, up from just US\$443 in 1970. Consumption also leapt – and pollution and waste generation rose with it. Steel factories and heavy construction in the capital of Taipei caused significant air pollution, which reached its worst levels in the 1980s. Eugene Chien, Taiwan's first

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office workers would be lined with soot. By the mid 1990s, two thirds of the island's landfills were full or nearly full. Garbage collection peaked in 1998 at 88.8 million tons.

Landfill sites were not suitable for typhoon-prone Taiwan, as they are likely to leak contaminants into soil and groundwater supplies. Landfills containing household and industrial waste have been found to release toxic chemicals and harmful greenhouse gases into the natural environment, potentially destroying whole ecosystems. Recycling garbage helps to reduce the negative impact that landfills sites have, as well as the pollution caused by waste.

Instead, the Taiwanese Environmental Protection Agency (TEPA) responded to mounting political pressure by drafting up a plan to build 21 large incinerators throughout Taiwan in 1990, and an additional 15 in 1996. But the incinerator plan came up against a groundswell of environmental opposition, led by Homemaker's United. They petitioned the government and staged protests up and down the island, voicing their firm opposition to incinerators on the basis of community health and environmental protection.

The government finally relented in 2003 and adopted a 'zero waste policy' as the central tenet of its waste reduction strategy. Ten years later, of the 26 large-capacity incinerators that were actually built, 2 of them are currently offline due to grassroots legal challenges and the remaining 24 are operating at around 72% total capacity.

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In 1989 the Taiwan Civil Associations Act allowed the formation of non governmental organisations (NGOs) for the first time after several decades of martial law. This played a key role in enabling the formation of Taiwan's grassroots environmental movement. The founders of Homemakers United were mostly middle class women who had benefited from new educational opportunities made available by laws enacted in the 1950s and 1960s. They were in a strong position, having the resources and contacts to take action, once the law allowed it.

The government then developed a long-term waste management plan that incorporated the concept of individual responsibility or "polluter pays" at the individual and corporate levels. They then maintained pressure through a concerted effort to concentrate the population's minds on reducing waste. The Recycling Fund ensured that all this work could be paid for. Taiwan's Recycling Fund collected NT\$7 billion in 2012. Since 1998, the fund had purchased more than 1,300 recycling vehicles for municipalities and financed 273 storage facilities for 326 municipal collection squads. A toll-free line was set up for enquiries about what, and how, to recycle, alongside a website. A national competition was held for a recyclable symbol for Taiwan, which is now used on all products that are recyclable. An e-newsletter for manufacturers and importers was published to update firms about waste initiatives – by the end of 2011, there were 13,144 subscriptions to this e-newsletter – plus recycling manuals,

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communities for specific products such as batteries. They also brought a recycling element into the annual Dragon Boat races, encouraging contestants to use recycled materials when building their boats. The enormously popular Mazu religious festival was used to encourage a zero waste attitude among those taking part in the huge annual procession.

Recycling is taken seriously and repeat offending can lead to public 'shaming' whereby video footage from surveillance cameras is published with the offender's face blurred out. The authorities say that this serves as an incentive to the offender to not violate the rules again. Although, depending on how it is done, other countries may foresee issues to do with civil liberties in adopting similar such systems of shaming, and could be wary about their desirability and possibility. Fines are also imposed on those flouting the system, and up to half the value of fines collected can be offered as incentives to provide evidence of violations, such as rewards for reporting illegal fly-tipping.

Homemakers United continues to hold the government to account on environmental issues and in 2013-2014 the women toured around Taiwan, ranking all 22 cities and counties with respect to environmental cleanliness. This created significant pressure on city mayors to prioritise environmental issues. The current campaign is to reduce wasteful consumption and packaged goods even before it hits the recycling system, with the aim of building a zero waste circular economy.

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- Taiwan was once known as Garbage Island. In 1993, Taiwan had a collection rate for trash of just 70 percent. That meant 30 percent of Taiwan's waste entered the environment either through littering or burning. Now, it has an impressive recycling rate of 55 percent and recycles 73 percent of its plastic. The island only generates half as much waste per person as the US.
- Ten women started Homemakers United in 1987 because they were concerned about their environment.
- In 1988, Article 10-1 of the WDA required for the first time in Taiwan that manufacturers and importers bear financial responsibility for recycling by forming associations to fund recycling.
- Since the launch of Pay As You Throw and Extended Producer Responsibility (EPR), per capita waste generation in Taipei fell 31 percent in 15 years from 1.26 kg per person per day in 1997 to 0.87 kg in 2015.
- Yellow garbage trucks blasting classical music collect trash several times a week. In Taiwan's capital Taipei there are more than 4,000 pickup spots five nights a week, with mobile apps that let users track the trucks and alert them whenever a garbage truck is nearby.
- These trucks are followed by open-bed recycling trucks. People hurry out of their homes when they hear the music and toss their garbage into the trucks, on the basis of general refuse, raw food waste, cooked food waste, and other categories including plastic and paper.
- All non-recyclable waste must be disposed of in

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- Public 'shaming' is used with repeat offenders, with partially anonymised video footage (offenders' faces are blurred) from CCTV being published to serve as an incentive to not violate the rules.
- According to the United Nations Environment Programme, a third of all food produced worldwide, worth US \$1 trillion, is wasted. If countries around the world use effective waste reduction and garbage disposal systems, it could ensure a cleaner environment. It could also help feed some of the 795 million people in the world that don't have enough food to lead a healthy life.
- Taiwan's Recycling Fund collected NT\$7 Billion in 2012. Since 1998, the fund had purchased more than 1,300 recycling vehicles for municipalities and financed 273 storage facilities for 326 municipal collection squads.
- Taiwan's recycling reforms have created new commercial opportunities for companies. Da Fon Environmental Technology, a private company that focuses on recycling plastic, paper, and metals, recorded a profit last year of around US\$100 million.

## Lessons for a rapid transition

1. Take action: a small number of people can start the shift of whole societies toward a lower carbon, lower waste future.
2. Involve everyone: the whole production chain needs to be

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3. Be open to learning from unexpected places: the most effective systems for change may not come from the most advanced economies.

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