



A NEW LEASE OF LIFE

Thirty years ago, visitors to Taipei would have been met by rubbish-filled streets and a spiralling waste problem. **Chris Fitch** reports on how a new mindset has taken hold and how the locals are embracing a cleaner lifestyle



It's a warm autumn evening in Taipei. The sun is dipping behind the distant, hazy mountains, and the towering Taipei 101 leads a wave of illumination spreading out across the city.

As the city streets and subway fill with commuters on their way home, a familiar sound rises above the rumble of traffic. Instantly recognisable to local residents, a tinny rendition of Beethoven's *Für Elise* fills the air signifying one thing: Taipei's garbage trucks are on the move.

It's a scene that plays out each evening across Taiwan. On street corners all over the country, groups of residents congregate, prompted by the approaching sounds of Beethoven. The music gradually escalates to near-deafening volume as two trucks pull up. They're immediately swarmed by residents, who fling specially-branded bags into one truck and then begin offloading a collection of miscellaneous items into the other.

Moments after their arrival, the trucks are off. As the music fades away, the crowd disperses as everyone returns to their homes. This is waste management, Taiwan-style.

CHANGING TIMES

During the 1980s, visitors to Taiwan would have witnessed a very different scene. Back then, the streets of Taipei were piled high with bags of stinking garbage and the Tamsui River choked on discarded waste as it weaved its way through the city. With no organised system of waste management, city residents simply abandoned their refuse on street corners.

Fast forward to the present day and Taipei is a modern metropolis, with clean streets and effective public transport. Indeed, Taiwan as a whole is now the proud owner of one of the most efficient and comprehensive recycling systems in the world, with more than half of all waste, both domestic and industrial, recycled. Waste incinerators built en masse during the 1990s now find themselves operating below full capacity and the number of new recycling companies continues to climb.

Taiwan's growth during the 1980s as one of the 'Asian Tiger' economies has been well documented, and the high level of environmental degradation brought about by rapid urbanisation, heavy industry and poor waste management was, in hindsight, only too predictable. 'Taiwan is very limited in space,' explains Environment Protection Agency (EPA) spokesman Dr Harvey Houg. 'If you look into the environmental burden that we face, it's extraordinarily high. People living in Taiwan can feel that; that's our daily life. We decided that we have to face it.'

A CLEAN SWEEP

The first solution, put into action in 1990, was to build 21 rubbish incinerators across Taiwan. When that didn't solve the problem, a further 15 were announced. But with public health and environmental degradation escalating, a new



This year, the Neihu 'garbage mountain', like many landfills across Taiwan, will be re-opening as a park

approach was needed. Recycling was seen as the only way forward, but rates across the country were stuck at six per cent. So in 1998, the EPA gambled on a revolutionary new system.

It was called the 'Four-in-One' programme, because of the four different sectors in Taiwanese society that would be actively involved in making the system work. 'We integrated the community, industry, the government and the Recycling Fund Management Board together to form this Four-in-One programme, and everything changed,' says Houg.

The programme uses financial incentives that are paid for out of the so-called Recycling Fund. But as Houg is keen to stress, one of the Four-in-One programme's key principles is that it doesn't cost the government anything. So every time a new product is either built in, or imported into Taiwan, fees are collected from the manufacturer or importer. This money then goes into the Recycling Fund.

'If you see any unwanted appliances, on the street or anywhere,' says Houg, 'you can just report them to the recycling facilities, they will come to claim it - and you will get part of the Recycling Fund.'

More policies quickly followed, starting, in 2000, with the implementation of a pay-per-bag waste-collection system. Under this scheme, non-recyclables are only collected in special tagged bags for which residents must pay. Recyclables, however, can be disposed of for free, encouraging people to separate their recyclable waste. The move led to an immediate 23 per cent drop in non-recyclable waste volume.



Four years later, the government adopted a zero-waste policy. And in 2005, another law prohibited disposal bags from touching the ground, designed to prevent bags being dumped on the street. This was accompanied by strict rules regarding compulsory separation of recyclables from non-recyclables, for which offenders could face fines ranging from NT\$1,200 (£24) up to NT\$6,000 (£120).

And so to today, where, every day, *Für Elise* rings around dense residential streets across Taiwan, calling residents out to dispose of their waste. 'We used to have kerb collection bins,' says Houg, 'but it didn't work because the streets are so narrow and the space is so limited that every time people tried to dump their waste, the bins always filled quickly and created a nuisance. So we decided to go with this "no ground touching" programme, so everybody has to dispose of their waste directly into the garbage truck.'

RECYCLED LAND

The policies had a dramatic impact. By 2012, the nationwide recycling rate had skyrocketed to 54 per cent, while the daily waste disposal per capita, from a high of 1.14 kilograms in 1998, had plummeted to 400 grams, one of the lowest rates in the world. The days of cars and home appliances being left discarded on the street are long gone.

Significantly, EPA surveys show that people in Taiwan have adapted well to the new rules, with

more than 90 per cent of people surveyed saying that they find the mandatory waste-separation laws acceptable. 'I think people here are more disciplined,' says Houg. 'Traditional Asian families care about our future generations. So when we talk about future generations, when we talk about sustainable development, people tend to pay more attention to us.'

One previously infamous part of the Taipei landscape - the 'Neihu garbage mountain' - has also been transformed. In 1980, the Taipei city government, fearing the mountain might collapse, declared it illegal to continue dumping rubbish on the riverside site. This year, the landfill, like many others across Taiwan, will be re-opening as a public park.

This dramatic transformation from overflowing landfill to grassy hillside is an indication of Taiwan's commitment to change. 'Since 2007, no raw material has been allowed to be disposed of in a landfill site,' says Houg. 'For completed or filled landfills, we are recovering them and restoring them to try to make them into parks or public recreational areas.'

INDUSTRIAL WASTE

Unsurprisingly, the regulations have led to a boom in the recycling industry, with around 2,000 new companies in operation, according to the latest government estimates. 'We initially had to go out and ask all of these major providers to

ABOVE: a man walks among piles of discarded computers at one of Taiwan's largest recycling factories in Taoyuan county, in the country's north; **OPPOSITE:** a worker watches as a truck unloads glass at a local resource recycling centre in Hsinchu, northern Taiwan



‘We are trying to produce a fuel that may contain a lot of organic waste – a fuel of the future’

ABOVE: a construction worker walks past a section of the EcoARK building in Taipei, which was built using recycled plastic bottles

gather together to establish the first recycling facilities,’ says Hounq. ‘But not too long after that, people started seeing the profits, so we’re getting a lot of people joining the business, and now we have more than we need.’

One of the leading groups is the Formosa Association of Resource Recycling (FARR), whose secretary-general, Dr Chen Wei-Hsien, has worked in this field since 1984, when he wrote his master’s thesis on recycling zinc from factory furnace dust, seen at the time simply as a waste product. ‘Now, we have three or four very successful recycling plants working on that special industry item,’ Chen says with a smile. ‘We have analysed that zinc content in the dust is 20 per cent, so we think that it’s worth recycling.’

Home to some of the world’s biggest computer manufacturers, including Asus, Acer, and Foxconn, Taiwan produces more electronics per capita than any other country. Hence, working out how to best dispose of ‘e-waste’ has been one of the country’s biggest challenges.

However, FARR’s goal is to change how people think of e-waste – from something to be disposed of to a source of essential materials, especially precious metals. ‘In the past ten or 20 years, a lot of resources have been thought of as solid waste; they have to be incinerated, we have to landfill them,’ says Chen. ‘We had to do a lot of environmental education. We tried to teach people to ask: “What are our resources? What if the waste became the resources?”’

By collecting precious metals from e-waste, recycling plants in Taiwan can collect fees from the Recycling Fund via the ‘Four-in-One’

programme. They can also sell the extracted metals. Overall, it has proven to be a profitable business, with recycling companies in Taiwan estimated to have combined revenues of NT\$65.8billion (£1.35billion) last year.

With that ‘zero waste’ goal in mind, FARR is now targeting Taiwan’s remaining unrecycled garbage, such as kitchen waste, currently used for compost or pig food. ‘Maybe incinerators will become out of date in the near future, because we won’t have any garbage,’ says Chen. ‘We’re trying to produce a fuel that may contain a lot of organic waste – a fuel of the future.’

BUILDING BLOCKS

In central Taipei, nestled among the glass and steel that forms the city, is a building that seems to embody Taiwan’s recycling revolution. Constructed from 1.5 million recycled PET bottles, the nine-storey EcoARK is a shrine to sustainable construction and effective waste management.

The building, which is situated in what is now the Taipei Expo Park, was built for the Taipei International Flora Exposition in 2010. Today, it’s a popular centre for conferences and other events.

The building was designed by Miniwiz, a Taipei-based company who focus on turning consumer and industrial waste into versatile materials which can be used in a range of construction and consumer products. ‘We specialise in using trash material collected from post-consumer sources’ explains architect Arthur Huang, the company’s managing director and co-founder. ‘That includes everything from water bottles and yoghurt cartons to e-waste. And we turn that into usable materials for architectural surfacing and for consumer products.’

‘Taiwan is an island nation, and 99.9 per cent of our resources are imported,’ he continues. ‘Taiwan is also one of the biggest producers of high-end goods. So if you’re a big producer, and you have no resources, the culture of thrift and recycling becomes crucial.’

Miniwiz’s post-consumer waste products range from chairs and mobile phone cases to building materials such as PET Polli-Bricks. Numerous buildings around Taiwan now incorporate its products, including a new e-waste recycling facility for Super Dragon Technology, one of Taiwan’s leading recycling companies. ‘All of the external surfacing, sun-shading devices, even the solar panels and canopy system are made from e-waste recycled materials,’ Huang says. ‘We aim for 100 per cent recycled. We try to use single materials, so after you use them, they can be re-recycled again and again and again.’

With a dense, urban population, and a strong political will, conditions were undoubtedly just right for Taiwan to implement the policies it did, and achieve the results it has. Will other countries follow suit? If you start hearing Beethoven resonating down your local streets, you’ll know that they’re trying.