

up clever—and lucrative—ways to manage and reuse it. Multinationals are toying with resource-light business models based on service contracts rather than product sales. And many consumers are adopting leaner lifestyles.

But municipal budgets are tight everywhere. Trade tiffs can dampen legitimate exchange of scrap (as recycled waste is also known). Regulations for handling waste are necessary but can be obscure. Policymakers have yet to devise a way to boost large-scale investment in recycling, which is discouraged by periodic declines in the cost of primary commodities, with which recyclers compete. And some worry that switching to a more circular economy will harm those built on the old model.

These problems are real. But, as this report will argue, they are not insurmountable. In the 1990s, economic growth, rising living standards and soaring consumption outpaced Taiwan's capacity to clean up its waste, earning it the unflattering moniker of "garbage island". As recently as 1993 nearly a third of Taipei's rubbish was not even formally collected and virtually none was recycled. By 1996 two-thirds of landfills were nearing capacity.

In the face of mounting protests the government undertook to erect 24 incinerator plants to burn the waste instead, at a cost of \$2.9bn. It also incentivised the Taiwanese to produce less rubbish in the first place. Under an "extended producer responsibility" (EPR) scheme, manufacturers and brands began to contribute to the cost of their products' disposal, either through paying a fee into a fund earmarked for waste management or sometimes by managing the waste themselves. The less recyclable the product, the more expensive for the company. The scheme continues today. Households are charged for the amount of general mixed waste they produce but not for paper, glass, aluminium or other recyclables. Those caught dumping their trash illegally face hefty fines and public shaming. A typical Taiwanese person now throws out 850 grams daily, down from 1.15kg 20 years ago.

Half a century after environmentalists first began imploring consumers to reduce, reuse and recycle, similar exhortations are now echoing from San Francisco to Shanghai. And the world, drowning in garbage, has begun to listen. ■

## Two worlds

# Down in the dumps

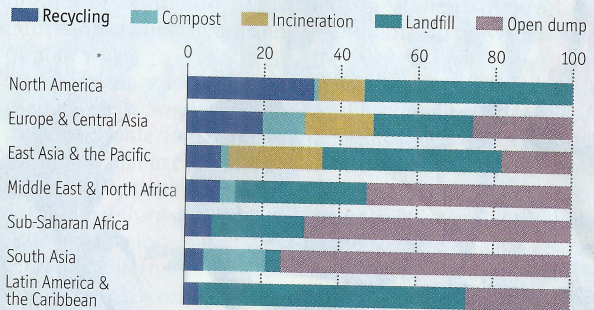
### The poor world and the rich world face very different problems with their waste

EVERY MORNING, JUST before 8am, a digger stretches out its steel limb from the bank of the Ciliwung river in central Jakarta. It claws load upon load of stinking rubbish from a barrier stretched across the stream and deposits it into the back of an orange lorry. A city employee stands by, one of 5,000 people working in *pasukan oranye* (orange teams), which dredge hundreds of tonnes of waste every day from the filthy waterways of the Indonesian capital. A rag-picker, treading precariously, sniffs for plastic bottles and other recyclables. Once full, the lorry departs for Bekasi landfill. There, amid more stench, dozens of waste-pickers mill around beside the swinging arms of the machines that unload the dripping rubbish. Their bounty is divided meticulously and sold on to scrap dealers or reprocessing facilities. The remaining trash is rearranged into landfill.

In many parts of the developing world formal collection is

## Sorted

Waste-disposal methods, 2016, %



Source: World Bank

expanding. There are now some 6,000 community waste banks in Indonesia, where residents deposit recyclables in exchange for cash. Once rubbish makes it to the waste-management site, the systems can be relatively efficient. The problem is getting a nation's refuse to such sites in the first place, when door-to-door collection is still rare, and households and businesses seldom sort their garbage.

More than 14,000km from Jakarta, in San Jose, California, trash is arriving at the Newby Island waste-management plant. As in most developed nations, getting it there is not the problem. Domestic and commercial waste is collected from homes and offices efficiently. The difficulties start when the rubbish arrives. With labour costs high, there are no rag-pickers to sift through everything and work out what is worth recycling. The problem here is in the sorting. Aluminium cans are easy to deal with because they are all the same. But different types of plastics cannot be recycled together and machines do not have the sophistication to tell one type from another. So a lot goes to landfill or incineration, mixed with the remaining worthless waste. And now, suddenly, China has stopped accepting imports of low-grade plastic and paper, so Newby Island no longer has a place to send the mixed garbage that it lacks the hands to separate.

Both processes—in the developed and the developing world—are part of a global system that has improved substantially in recent decades as patterns of consumption, and therefore waste disposal, have changed. But both are under strain, as the volume of rubbish has increased with economic growth and as the global garbage industry has changed.

The improvements at Bekasi are part of a broader trend of developing-world governments finally grasping that proper rubbish collection is more than just keeping your streets smelling nice. It is a vital part of public health. Stinting on rubbish means paying more for hospitals. Numerous studies have shown that life in areas with patchy collection increases the risk of diseases as well as neurological conditions. In 2016 consultants at McKinsey calculated that burning, dumping or discharging a tonne of rubbish into waterways cost south Asian economies \$375 through pollution and disease, against \$50-100 required for basic systems to dispose of that same tonne properly.

In the poorest countries, especially in Africa, rubbish is still just dumped anywhere, and management is limited. But there is also comparatively little of it. A typical citizen of Lesotho produces 110 grams a day, one-fortieth as much as a typical citizen of Iceland (the country with the highest rubbish-generation rate per person). It is the economies that are booming that present the challenge. Many are now pouring money into dealing with trash. Narendra Modi's government has earmarked \$9.5bn for