

▶ trialised nations, increasingly, residents are charged based on volume (known as “pay-as-you-throw”). To encourage sorting, such schemes often exempt recyclables. In Taipei, the binmen will only accept unsorted general waste in official bags, which come in different sizes at different prices. They inspect recyclables to weed out cheats. The recyclables then proceed to materials-recovery facilities (MRFs) for further triage. General waste is whisked to incinerators or (now rarely in Taiwan’s case) landfills.

In many parts of Europe and America rubbish collection is generally paid for by municipal taxes and the garbage disappears to huge facilities like Newby Island. The plant’s operator, Republic Services, runs 91 MRFs nationwide, next door to landfills (of which it runs 191) or incinerators (of which it owns 114) which burn waste to produce electricity. It receives 156 trucks carrying 1,600 tonnes each day from as far afield as Fresno, 200km to the east. That is down from 2,200 tonnes a day a few years ago. The volume of recyclables has reached 1,400 tonnes a day, a lot by American standards, says Mr Keller.

That should come as no surprise. After all, inhabitants of the San Francisco Bay area pride themselves on their recycling prowess. San Francisco boasts a recycling rate of 80%, one of the highest of any rich-world city. San Franciscans may therefore be shocked to learn that a lot of them, as Mr Keller puts it, “aren’t very good at it”. “A pair of blue jeans can jam the whole line for an hour,” he groans. More than 100 sorters try to pluck such items from the stream before that happens. Even so, a big plant like Newby experiences on average five such stoppages every day. Such disruptions cost the city of Phoenix in Arizona \$1m a year in stalled equipment and repairs.

Scott Smithline, who oversees recycling at California’s Environmental Protection Agency, cites two possible reasons. The first is that many people do not know what is recyclable. Beer bottles and soft-drink cans are, he says. Egg cartons and glossy magazines are not, for there is no market for the materials of which they are made. Some things are recyclable on their own, but not when combined, such as “paper” cups lined with plastic film. It is hard to blame consumers for feeling increasingly baffled, he admits.

The other problem is that residents only have to separate recyclables from non-recyclables (though compost bins for organic

waste have appeared now, too). Cans, bottles and papers are all thrown into one bin. This mix can, to some degree, be sorted at plants like Newby, enabled by clever technology which uses optical sensors and magnets to separate materials automatically. These were no match for humans when it came to sorting, but were good enough for China’s recycling industry, when it took off in the 1990s, to supply the country’s growing ranks of manufacturers hungry for all manner of materials. It snatched up tonnes of imperfectly sorted Western waste, preferring it to the even more impure refuse available at home.

As the volume of recyclables swelled in America and Europe, the quality of recycled output declined because

everything was mixed in together. This did not trouble MRF operators so long as they could offload their increasingly impure stock abroad. Then China announced it would not accept any plastics or cardboard, and American waste-management companies have been scrambling to find what to do with their poor-quality waste.

Efforts are springing up to teach residents how better to sort their rubbish. Some American and European cities now pick up different materials on alternate days. Reverse-vending machines, which accept empty drinks bottles and return money to users, are appearing in supermarkets. More cities are adopting pay-as-you-throw schemes. Consumer habits will take longer to change. Developing countries need to concentrate on getting binmen to the kerb of every residence and help stop people throwing trash into rivers. The developed world needs to relearn how to recycle. The Chinese ban has lent all of this a new urgency. ■

## China

# Exit the dragon

## A Chinese ban on imports of rubbish is shaking up the global junk trade

ON THE FIRST day of 2018, a huge shock hit the global recycling industry. China, which is the world’s biggest scrap importer, stopped accepting virtually any recycled plastic and unsorted scrap paper from abroad, and severely curbed imports of cardboard. The amount of recovered material that America, the world’s biggest exporter of scrap, sent to China was 3m tonnes less than in the first half of 2018 than a year earlier, a drop of 38%. China plans to phase in bans on most other rubbish, of which it imports \$24bn-worth a year. At recycling plants across the Western world, bales of mixed paper and polymers now languish in forecourts awaiting offers.

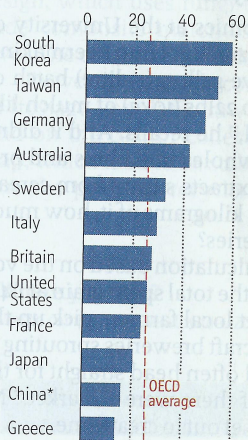
China used to import a significant portion of the world’s scrap. Suddenly, revenues from selling mixed waste to China which waste-management companies used to cross-subsidise collection, dried up, hitting margins for American waste-management companies.

The Chinese ban removed the third leg of the “collect, sort, export” system on which the West had long relied. Improvements to automation could in time sort some of the surplus rubbish no longer sailing to China, but they have been incremental. High labour costs make hiring enough human sorters to deal with Western waste volumes prohibitively expensive. Because they, too, cannot rely on cheap labour, Western reprocessing firms need cleaner inputs than their Chinese counterparts, so shun a lot of what MRFs currently spit out. Even if they did not, their capacity is insufficient to deal with the glut. Incinerators and landfill will take some of the surplus waste. But the capacity of both is limited. Building a new incinerator costs upwards of \$200m. Landfills are being gradually regulated out of existence, with many places, including California and the European Union, mandating cuts to the volume of waste being landfilled.

The prohibition is not the only way in which China is affecting the scrap trade. The trade spat provoked by American tariffs on imported steel and aluminium (which exempt scrap) has already prompted trading partners to impose retaliatory levies (including on recovered metals). If the current tiffs escalate into a ▶▶

### Circular heroes

Recycled waste  
2016 or latest available,  
% of total municipal waste



Sources: OECD; World Bank; Taiwan EPA  
\*2011 estimate