



# Why we can't recycle our way out of this problem...

## Designing for a Circular Economy



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### Recycling Introduction

In the strictest sense, recycling of a material would produce a fresh supply of the same material—for example, used office paper would be converted into new office paper or used polystyrene foam into new polystyrene. However, this is often difficult or too expensive (compared with producing the same product from raw materials or other sources), so "recycling" of many products or materials involves their reuse in producing different materials (for example, paperboard) instead. Sometimes this is called downcycling.

Another form of recycling is the salvage of certain materials from complex products, either due to their intrinsic value (such as lead from car batteries, or gold from circuit boards), or due to their hazardous nature (e.g. removal and reuse of mercury from thermometers and thermostats).

### Recycling Facts

- Recycling generally uses less energy and produces less pollution than making things from scratch.
  - Making aluminium cans from old ones uses one twelfth of the energy to make them from raw materials.
  - For glass bottles, 315kg of CO<sub>2</sub> is saved per tonne of glass recycled after taking into account the transportation and processing
  - Making bags from recycled polythene takes one third the Sulphur Dioxide and half the Nitrous Oxide, than making them from scratch.

- In Ireland, we do not have processing facilities to recycle plastic. Approx. 94% of all plastic collected in Ireland to be recycled in 2017 was sent to China for processing.

In January 2018, China brought in additional restrictions on plastic types and quantities that would be accepted – therefore affecting Ireland's processes. For this reason, many soft plastics are no longer accepted in domestic recycling waste collection services.

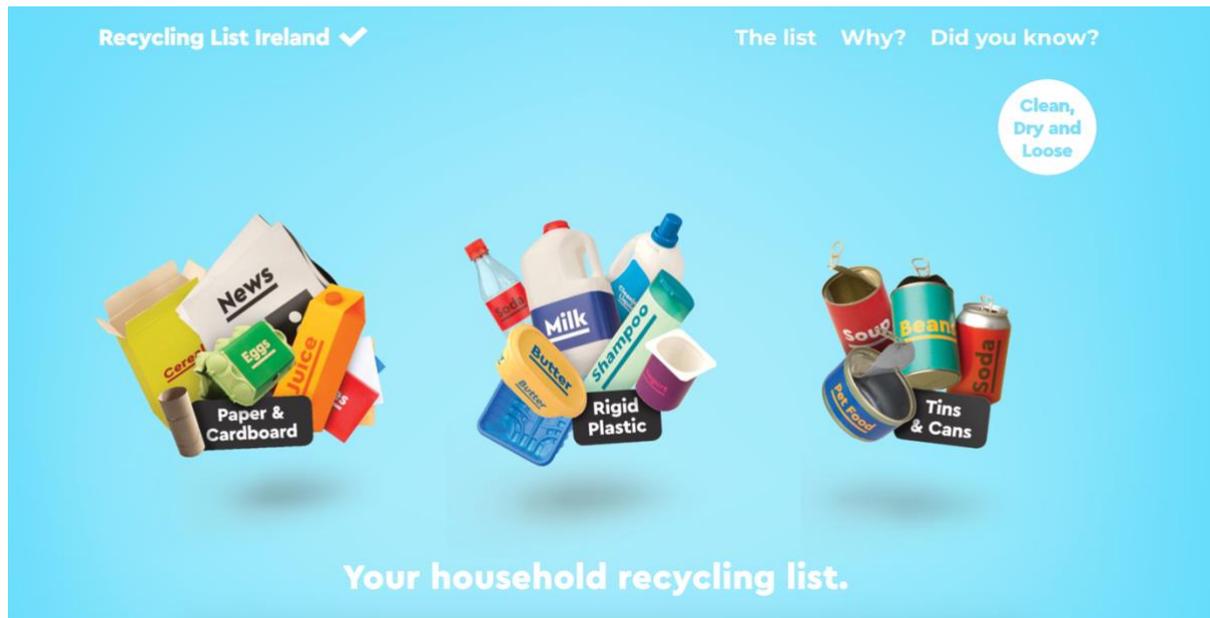
- Plastic waste in Ireland which is not sent overseas to be recycled is instead incinerated or sent to landfill.
- Over the last 3 years, Ireland has recycled enough rigid plastic to fill the Aviva stadium. Unfortunately this is just 35% of the country's total plastic waste (Recycling List Ireland).
- Efficiencies of various recycling processes:  
<https://www.americangeosciences.org/critical-issues/faq/how-does-recycling-save-energy>
- Some recycling facts & figures from the US :  
<https://www.thebalancesmb.com/recycling-facts-and-figures-2878049>



### What Items Can You Recycle in Ireland?

Recycling List Ireland advises what items can be recycled from households.

<https://recyclinglistireland.ie>



### Coffee Cups

22,000 coffee cups are disposed of in Ireland every hour, that is 528,000 every day or 200 million a year.

Single use coffee cups are not on Recycling List Ireland and cannot be put in the Recycling Bin.

### Case Study: Plastic Bottles

2.5 millions plastic bottles are disposed of in Ireland EVERY DAY!! Just 34% of these are ever recycled (EPA Ireland).

#### Energy Required to Make PET Plastic

According to the plastics manufacturing industry, it takes around 3.4 megajoules of energy to make a typical one-liter plastic bottle, cap, and packaging. Making enough plastic to bottle 31.2 billion liters of water required more than 106 billion megajoules of energy. Because a barrel of oil contains around 6 thousand megajoules, the Pacific Institute estimates that the equivalent of more than 17 million barrels of oil were needed to produce these plastic bottles.

#### Carbon Dioxide Emissions from Consumption of Bottled Water

The manufacture of every ton of PET produces around 3 tons of carbon dioxide (CO<sub>2</sub>). Bottling water thus created more than 2.5 million tons of CO<sub>2</sub> in 2006.

#### Water Required to Make Bottled Water

In addition to the water sold in plastic bottles, it is estimated that twice as much water is used in the production process. Thus, every liter sold represents three liters of water.

#### Transporting and Recycling Bottled Water

More energy is needed to fill the bottles with water at the factory, move it by truck, train, ship, or air freight to the user, cool it in shop / home refrigerators, and recover, recycle, or throw away the empty bottles. The total amount of energy embedded in our use of bottled water can be as high as the equivalent of filling a plastic bottle one quarter full with oil.

### Summary

As the figures show – it is always better to carry a reusable bottle and refill whenever possible, instead of purchasing bottled water. Even when an empty plastic bottle goes to recycling, the entire production process is extremely resource intensive and has a huge environmental impact when repeated on a global scale.

In Ireland you can find your nearest Refill location on the Refill Ireland Tap Map. <https://www.refill.ie/tap-map>.

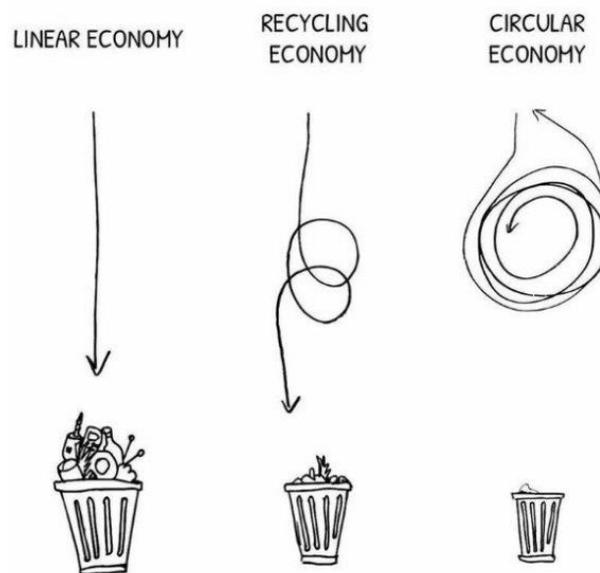
Many countries across Europe run similar initiatives.



### REcycling or DOWNcycling?

The majority of household materials (soft & rigid plastics, mixed materials) cannot be recycled back into the original item. Other materials such as glass, aluminium and steel can be recycled indefinitely once contamination is prevented. When automotive scrap steel is contaminated with other minerals e.g. copper, the steel is no longer suitable for automotive uses, but can be used in a range of processes in the construction industry.

For items that cannot be recycled directly, their value lessens slightly through each process. This allow plastic PET bottles to be remade into synthetic clothing for example. At the end of life of the piece of clothing, there are limited options for recycling further.



**Almost no plastic bottles get recycled into new bottles.**

**Coca-Cola** sources just 7% of its plastic from recycled materials. A [Greenpeace report](#) found six of the largest soft drinks companies, excluding Coca-Cola, use a combined average of just 6.6% recycled plastic globally.

### Recyclable ≠ recycled

After a single use, nearly every bottle either ends up going straight to a landfill or becoming some other sort of plastic — mainly textiles like polyester and fleece for clothes and carpets.

### What is a circular economy?

A circular economy is an alternative to our traditional linear economy (make, use, dispose), which allows us keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.

It is based on three principles:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems



The design of products is an important aspect of a circular economy. The circular economy approach addresses material supply challenges by keeping materials in use much longer and eventually returning materials for new use. The principle is that waste must be minimised. Products will be designed to last longer. They will be easier to Reuse, Repair, and Remanufacture. The product will eventually be broken down and Recycled.

Another important aspect is to try and simply avoid production of items that are not completely necessary. Can single-use packaging be a reusable material? Can disposable goods be replaced by reusable products? Can a product be upcycled for another purpose when it has reached the end of its life cycle?

### Videos:

- **Rethinking Progress – The Circular Economy**  
<https://youtu.be/zCRKvDyyHmI>
- **TED Talk: Leyla Acaroglu – Rethinking Environmental Folklore**  
[https://www.ted.com/talks/leyla\\_acaroglu\\_paper\\_beats\\_plastic\\_how\\_to\\_rethink\\_environmental\\_folklore](https://www.ted.com/talks/leyla_acaroglu_paper_beats_plastic_how_to_rethink_environmental_folklore)
- **The Circular Economy: From Consumer to User**  
[https://youtu.be/Cd\\_isKtGaf8](https://youtu.be/Cd_isKtGaf8)
- **Intro to Zero Waste** (short animation by Irish student)  
[https://youtu.be/p\\_Zmrh0iBxo](https://youtu.be/p_Zmrh0iBxo)



### Further Reading:

- 1) **The Story of Stuff** - <https://storyofstuff.org>
- 2) **Ellen MacArthur Foundation** - <https://www.ellenmacarthurfoundation.org/circular-economy/infographic>
- 3) <https://www.theguardian.com/commentisfree/2018/jun/09/recycling-plastic-crisis-oceans-pollution-corporate-responsibility>
- 4) <https://www.theguardian.com/commentisfree/2018/mar/28/plastic-crisis-urgent-recycling-bottles-no-fix>
- 5) <http://www.container-recycling.org/index.php/factsstatistics/plastic>
- 6) edX Free online courses:
  - Intro to Circular Economy:  
<https://www.edx.org/course/circular-economy-an-introduction-0>
  - Engineering Design For Circular Economy:  
<https://www.edx.org/course/engineering-design-for-a-circular-economy>
- 7) IDEO & Ellen MacArthur Foundation – Circular Design Guide:  
<https://www.circulardesignguide.com>
- 8) <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/>



# Our plastic pollution crisis is too big for recycling to fix

*Annie Leonard*

Since the 1950s, some 8.3bn tons of plastic have been produced worldwide, and to date, only 9% of that has been recycled. Our oceans bear the brunt of our plastics epidemic – up to 12.7m tons of plastic end up in them every year.

Some 322m tons of plastic were produced in 2015, and that number is expected to double by 2025. The good news is that we are at a turning point. All over the world, people and businesses are waking up to the dangers created by single-use plastic. Now, we must demand a new era that prioritizes people and planet over profit and convenience.



# The plastics crisis is more urgent than you know. Recycling bottles won't fix it

*John Vidal*

A deposit scheme for bottles won't make a scrap of difference. This stuff is in our food, our clothes - and in us



▲ Illustration by Eva Bee

In the 1950s the world made about 2m tonnes of plastic a year. Now that figure is 330m tonnes a year – and it is set to treble again by 2050. It's not enough to return a few plastic bottles, or even to pick up an old mattress on a beach.