



Circular Economy Lab & Observatory

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SUSTAINABILITY

Importance of redesign of products
and processes for sustainability

Italy-6.2



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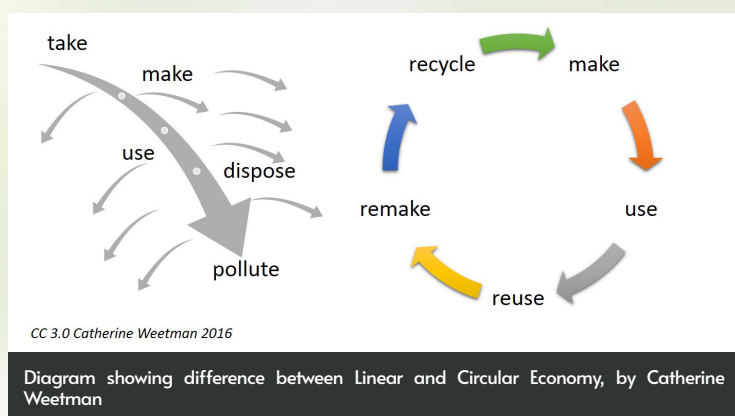
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Most of the pellet used to heat our houses, in Italy, is imported, quite often from poor countries where cutting trees is not regulated, and this contributes to deforestation. Energy is required to produce and transport the pellet. Some companies in Italy are able to produce pellets of good quality using Italian wood and managing the forest correctly. In this process, only a part of the trees can be cut. This helps also to keep the woods clean and to reduce the risk of wildfires.



If a chestnut tree is used, the wood is treated to remove from it the tannine, a compound that is then used in the pharmaceutical sector or for tanning (i. e.colouring) animal hide (animal skin) into leather.

Leathers, at the end of their use, since are tanned without toxic chemicals, can become compost.

The wood chip cleaned from tannine is turned into pellets using high temperatures and some machine that pressed the wood. The process requires energy, but much less than the energy the pellet can provide when burned. ¹⁻²

This is an example of a process that is circular. No waste is produced, and the output of a process is used as input in another one. In our houses there are at least 3 to 4 smartphones and the relative battery charger, plus the old ones. Usually, every charger is different, every battery is different. If something is broken in a telephone (screen, battery,...) we cannot use the remaining and still good parts. We usually throw away the smartphone (and the charger) and buy a new one.

One possibility is that the old one is delivered to a centre that treat it as a WEEE (Waste from Electrical and Electronic Equipment, RAEE in Italian), trying to recovery the plastic and other material it is made of, even if chances are that the most precious material, gold, silver, palladium and other precious metals will be recovered outside Italy and outside Europe ³, probably China.



Another possibility is that we throw the old telephone (after keeping it in a drawer unused) in the bin together with the undifferentiated waste. Production of smartphones this way fits in what is called a linear economy. We extract very precious and rare raw material, with a high environmental and economic cost, we produce something that we use for a certain time, then we again spend money and energy to dispose of it, not considering the ecological impact of the disposal.

It is imperative that we shift toward a circular economy if we want to reduce the impacts on our planet, that is running out of resources and is not able to bear all the waste we are producing.

In the Circular Economy, CE, waste and pollution should be eliminated (first principle of CE), materials and products should be kept in use, or circulate (second principle), and the natural processes are supported to regenerate nature (third principle).⁴



A huddle of wood pellets by D-Kuru
https://commons.m.wikimedia.org/wiki/File:Wood_pellets-small_huddle_PNr%C2%B00108.jpg

In order to achieve that, products and processes should be redesigned. Going back to the smartphones example, little steps are being made towards a circular economy. For example, Europe legislation impose, from autumn 2024, a standard adapter for all smartphone and other electronic devices (keyboards, earphones, etc.): USB type C.

The same will be the universal laptop charger in 2026.⁵

If you buy a new iphone today, you will have it without the needed USB type C charger. You can buy it if you do not have it already, and you will probably use it for many other devices in the future. This saves energy and resources, and reduces waste production.



Waste incineration plant by Ivan Bandura
[https://commons.m.wikimedia.org/wiki/File:Waste_incineration_plant_\(6959781259\).jpg](https://commons.m.wikimedia.org/wiki/File:Waste_incineration_plant_(6959781259).jpg)

The economy that has been in place until now is nowadays identified as linear: the production of a good or starts with the extraction of raw material from the Earth; then a product is made, it is used for a short or long period of time, and eventually it is thrown away as waste.

Unfortunately, there are no infinite resources, and there is no infinite space on Earth to place our waste, not considering also that our planet is not able to absorb and degrade all the pollution that goes along with waste production.



It is true that nowadays some materials are recycled (glass, aluminium), but 1. Not all the materials can be recycled, and 2. When we recycle we recover only a part of the value of the good, and the recycling process is sometimes expensive. For instance, reusing a bottle of glass is much better than recycling the glass it is made of. Wastes that are not recycled end up in landfills, creating serious problems, and consuming soil that cannot be used for other purposes for a long time. Another “solution” that is used in many European cities, is the incineration of waste, or, with a nicer name, to treat the waste in the Waste-to-Energy Plants.

At first glance, incinerators have some advantages: they reduce the volume of waste; the residues that will go to the landfills are sterile; they can recover a certain amount of energy from the combustion of the waste.

On the other hand, some scientists and many environmental associations (ClientEarth being one) declare that WtE plants are not so safe for the health of the people living nearby and contribute too much to greenhouse gas emission. So the “energy Recovery” from waste should be the last option after the other R’s (reduce, reuse, recycle).



Unfortunately it could happen that in an area where a WtE plant exists, there are interests in increasing the quantity of plastic burned and diminishing the quantity of plastic recycled.⁶

To reduce the quantity of waste we send to landfills, the governments must tackle the problem and halt the flow of unnecessary plastic production rather than depending on solutions like incineration, says Tatiana from ClientEarth, and adds: “Countries like Denmark have ordered a reduction in their incineration capacity after realising that incineration will not help them achieve their climate goals.

This is done in order to “lower demand for new plastic items and even less combat climate change.” Promotion of these techniques takes focus away from workable solutions like large reuse systems.” In 2018, the European Union unveiled what was considered the world’s most comprehensive package of legislation to encourage reuse and reduce waste.



The law requires the UK, EU and other countries to: Introduce financial instruments to encourage the use of the waste hierarchy, e.g. B. Landfill and Incineration Charges.

Avoid incineration of waste that has been collected separately for recycling and reuse, taking the necessary precautions. Take initiatives to increase the amount of recyclable packaging, such as deposit programs and reuse targets.⁶

The idea of a different economy began in the last decades of the last century. More recently, the Ellen MacArthur Foundation has outlined the economic opportunity of a circular economy, and created a coherent framework, thus giving the concept a wide exposure and appeal.⁴⁻⁸

There are various examples of products and processes that adhere to the principle of the circular economy (CE). In CE, products and materials remain in use for as long as possible, being either reused, repaired or recycled. This contributes to: less use of resources, less or no pollution and waste creation.



In order to move towards the CE products and processes need to be re-designed in a way that can be part of the “loops” of the CE.

There is a category of products that we use more and more as time goes by are electrical appliances.

We also tend to change this kind of equipment, and consequently, large amounts of what we call WEEE are generated.

The term WEEE refers to waste from electrical and electronic equipment (including toasters, mobile phones, and extractor hoods as well as washing machines, refrigerators, and air conditioning units), which of course should not be disposed of with household waste but instead calls for special handling and disposal. to keep dangerous and polluting substances from entering the environment.

For instance, CFCs (chlorofluorocarbons), which destroy the ozone layer, are present in the refrigerant circuits and insulating foam of ancient refrigerators; lead is present in the cathode ray tubes of relatively antiquated televisions; and mercury is present in many light sources. everything that is bad for the environment and humans. Additionally, by properly handling WEEE, you can recycle large quantities of raw materials like copper, steel, aluminium, or plastic, which can be used to create new goods rather than ending up in landfills.

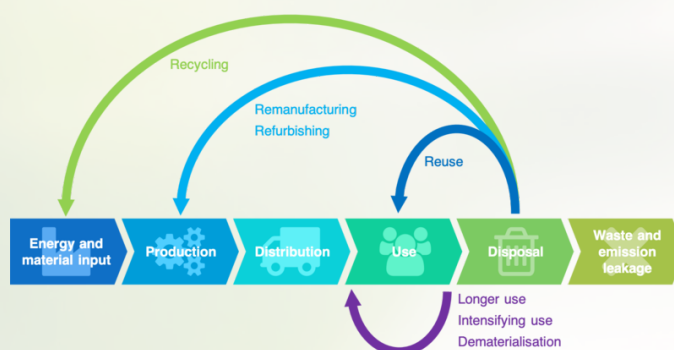


Imagine that one kg of copper can be taken from an old refrigerator, and up to 40 kilos of iron from a washing machine, to get an idea. Sadly, only 25% of WEEE is disposed of properly; the remainder travels down a different path.

Some of it ends up as unsorted waste, particularly small electrical appliances and light bulbs; another portion is subjected to a “informal” elimination cycle (in Italy or abroad) where the only goal is to maximise profits by mining and discarding only the most lucrative components, such as copper, leaving the rest unrecycled. Regardless of how widely environmental pollutants found in WEEE are dispersed. ⁷

All the mechanisms that provide food and transport are influenced by design, as are the foods we consume and the clothing we wear.

The majority of materials are now developed into goods and systems that are landfilled, burned, or distributed in the environment in industries like fashion, food packaging, and plastics.



An illustration of the Circular Economy concept
https://commons.wikimedia.org/wiki/File:The_Circular_Economy_concept.png

When a third of the food produced is wasted, we have never made more garments or utilised less. Material waste also includes the loss of embodied energy, resources, labour, and creativity. Through design, we can rejuvenate nature and stop the production of waste and pollution from the beginning.

The circular economy provides chances for improved growth that not only help build more robust systems but also benefit society as a whole by promoting things like a healthier environment. The circular economy may also lower the price of obtaining products and services. Since 2012, the Ellen MacArthur Foundation and other corporate, policy, and academic research organisations have published extensively on the idea and economic justification for the circular economy.



These articles are well-documented. Today, there is growing support for the shift in business and finance, as more businesses implement circular economy methods to provide value and boost competitiveness.

All levels of government, from local governments to international organisations, are turning to the circular economy as a crucial strategy for economic development.

The circular economy is increasingly acknowledged as an approach that supports policymaker priorities of harnessing innovation, providing a fresh approach to how we produce and consume, and addressing the interconnected challenges of waste and pollution, climate change, and biodiversity loss.

This goes beyond downstream responses, such as better waste regulations. Design can assist realise the lofty goal of a regenerative, circular future along with money and politics.

The three principles of the circular economy—eliminate, circulate, and regenerate—are applied and made possible through circular design.

Circular design employs systems thinking to provide solutions that produce better results for the entire system, whether we are (re)designing a good, a service, or a business model.

This implies:

Using design, get rid of waste and pollution upstream

Think about using materials that are safe for repeated use, using byproducts, or developing new materials and products.

Design materials and goods to be used and at their best value for as long as feasible to circulate them. ⁹



The industrial and economic model that was developed until now was based on some assumptions that we cannot consider true anymore (they never were by the way): that resources are infinite, and that our planet has an infinite capacity to absorb and neutralise wastes, toxic gas, liquid and so on.. Public opinion and the scientific community all know that we need to shift from a linear economy, where we take from our planet limited resources, we use them, and then give back to nature something that is different, and often harmful.

Plastic bottles is an strong example: plastic is obtained from oil, is remains in use in our supermarkets or in our houses for a relatively short time, and if not recycled (ideal situation), ends up in a landfill (most likely) or even in water bodies and finally into the oceans, where it remains for centuries, and even if it degrades, it is turned into microplastic that are eaten by fish and remain in the environment for even a longer period of time. Traces of microplastic have been found in human blood.

In recent times, we hear a lot about circular economy, a model in which resources are used again and again, minimum amount of waste is produced, and nature is kept safe, if not even regenerated. Circular Economy is part of the European Union environmental and economic strategy.



Thai Iced Tea in a paper cup and paper straw
https://commons.wikimedia.org/wiki/File:E-saan_thai_house_-_Sarah_Stierch_-_May_2019.jpg

The European CE Action Plan aims at changing the production for electronic, food, textile, packaging, vehicles... We also see that many companies and startups are moving towards CE. In order to make the circular economy possible, the things we use need to be designed differently. For instance a product should be designed to be easily disassembled and reassembled, so that it can be repaired, and some of its parts can be used elsewhere.



Organic material should be kept, or should be made to be separated from plastics, metals and so on. An example for the textile sector comes from an Italian company that redesigned the production of jackets. Usually jackets with waterproofing and insulation are made from materials that are hard to separate and recycle.



Italian clothing brand Napapijri has simplified its design so that the entire jacket is manufactured from one polymer. The material is durable and high performing, but is also easily recycled. Customers are encouraged to recycle their old jackets with the promise of a 20% discount off future purchases when they return their used garments.

Many companies are moving toward CE, maybe they do it to be liked by their customers or for other ethic reasons; on the other hand, we believe that there could be a resistance from the companies that are selling goods to this shift, because if a product lasts longer, they will sell less and get less money.

For this reason we believe that some criteria for products and process design must be imposed by legislation.



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