

Sustainability is.. meeting the needs of our generation whilst protecting the world's resources for future generations

Sustainable design seeks to reduce negative impacts on the environment – by considering what materials we use, the processes used to manufacture items and what will happen to them when they are no longer needed.



Plastics are made from natural materials such as natural gas, oil, coal, and minerals.

300 to 400 million years ago



Dead marine plankton sunk to the ocean floor. Over time, they were covered by layers of silt and sand.

50 to 100 million years ago



Over millions of years, the remains bury deeper. Heat and pressure turns them into oil and gas.



Sand, silt and rock
Oil and natural gas deposits

We drill down through layers of sand, silt and rock to reach oil and natural gas.

Traditional plastics are made from petrochemicals found in crude oil and natural gas - fossil fuels that are non-renewable- or finite.

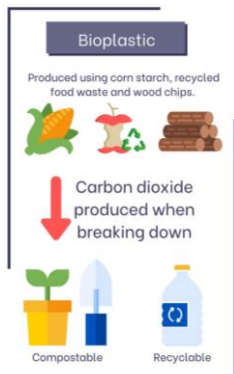
Plastics can take hundreds of years to break down – getting rid of them is very difficult and they pollute our environment. They never totally decompose or disappear- they just break down into smaller and smaller pieces known as **microplastics**.

Some plastics can be recycled, but each of these types of plastic has to be recycled in a different way.

Biodegradable plastics are made from **petrochemicals** but have **chemicals added to them** that help them break down more quickly. However, like traditional plastics, they do not decompose, just break down into smaller and smaller pieces. Most biodegradable plastics can not be recycled.

decompose (verb): make or become rotten; decay or cause to decay (refers to organic matter only)

biodegradable (adj): able to be decomposed by bacteria or other living organisms, therefore avoiding pollution



Bioplastics are made from renewable 'biomass' materials- natural resources such as corn starch, seaweed and wood chips.

PLA (polylactic acid) is one type of bioplastic. Making it only takes one third of the energy needed to make traditional plastics. They do not produce a huge amount of carbon dioxide when they break down.

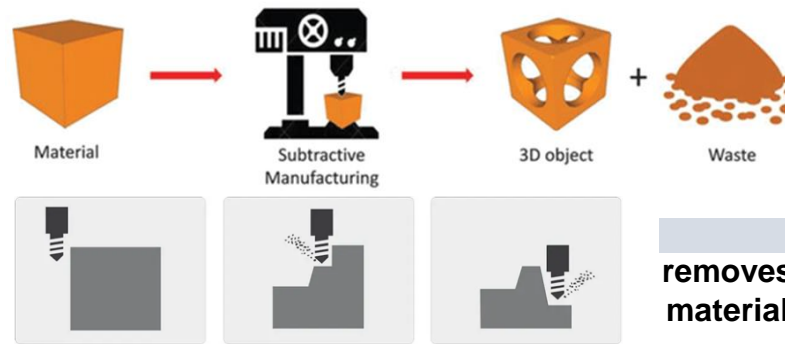
Bioplastics **decompose**. Some bioplastics can break down in a few weeks as they absorb water in the soil. Some however, have to be sent to industrial composters.



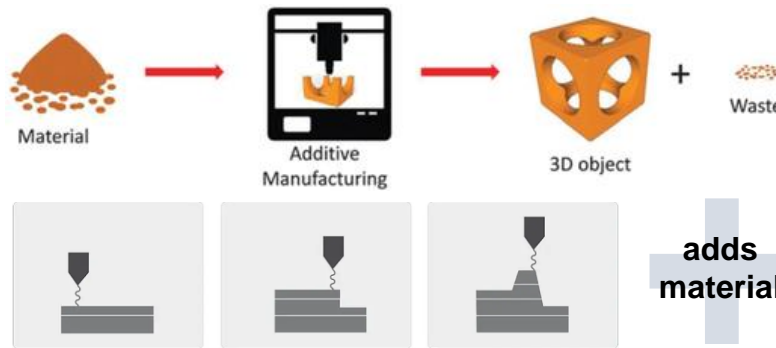


A **lifecycle assessment** measures the environmental impact of a product throughout its life cycle- from the raw materials that are needed to make it to what happens to it when it is no longer needed.

CAD = Computer Aided Design
CAM = Computer Aided Manufacture



Subtractive manufacture removes material to create something. It can be carried out using hand tools or machinery. There can be a lot of waste left after subtractive manufacturing.



Additive manufacture builds up layers of material to create something that has been designed using computer software (CAD). Items are printed on a 3D printer- a type of CAM. There is very little waste left after additive manufacturing.

Different types of **paper and board** are used for different purposes based on their properties.



Paper comes in **stock forms of sheets or rolls**.

Sheets come in standard 'A' sizes, from A10 to A0.

The **weight of paper and board** is measured in **gsm – grams per square metre**. The higher the gsm, the thicker and heavier the product. Standard printer paper is around 80gsm. Above 200gsm it is not paper anymore- it is board (also known as card or cardboard).

Corrugated card:

- a fluted core between two outer layers
- can be printed on
- strong and rigid
- from 250 gsm +

Solid white board:

- high quality bleached surface
- excellent for printing
 - strong
- 200-400gsm

Foil lined board:

- has an added aluminium foil lining to keep flavour in, insulate or keep moisture in or out

Duplex board (carton board):

- one smooth white side
 - tough
- lower cost than solid white board
- might have additives to prevent moisture transfer
 - 230-420gsm