

Sustainability and the Environment

What you need to know:

- Understand that new technologies need to be developed and produced in a sustainable way
- Be aware of the impact that resource consumption has on the planet
- Understand how the environment can be protected by responsible design and manufacturing
- Understand how waste can be disposed of with the least impact on the planet
- Understand the positive and negative impacts new products have on the environment

Life Cycle Assessment: (LCA)

A company can use a life cycle assessment to assess the environmental impact of a product during the different stages of its life. This is known as 'cradle to grave'. There are 5 main stages.

- ⇒ Extraction and processing—how much energy is used to extract raw material from the earth or produce it through farming and process it for manufacturing.
- ⇒ Manufacturing and production—The energy needed to manipulate the raw and refined materials into a product
- ⇒ Distribution—Packaging and transportation of the product to the end user
- ⇒ In use—The energy that the product and any related consumables used during its working life
- ⇒ End of life—The energy that is required to recycle the product and/or dispose of any waste



A company could then consider:

- Where can energy be saved?
- Where can working conditions be improved?
- Where can emissions be reduced?
- Where can material be saved?
- Where is there a negative effect on communities or natural environments?

Key Questions:

- Give two examples of finite resources and two examples of non-finite resources.
- Why should finite resources be avoided or used in limited amounts?
- What can a company learn by conducting a life cycle assessment?
- What are the 5 stages of the life cycle assessment? What impact can each stage have on the environment?
- Explain what the carbon footprint of a product is.
- Explain how carbon off-setting helps to reduce CO2 emissions of a company.
- Define the term sustainability.
- State two factors that could influence the sustainability of a product.
- Find out what the 6 R's are.
- Research The Paris Agreement of December 2015—the first global climate agreement. Find out the main aims.



How carbon emissions can be reduced...

Reduce energy use and CO2 emissions through more efficient user behaviour

Improve energy efficiency with more efficient appliances and buildings

Incorporate renewable energy

Purchase carbon off-sets

Carbon Off-setting:

It is impossible that goods being produced will have no negative impact on the environment BUT companies can promote their products as sustainable and environmentally friendly if they OFF-SET any negative impact by investing in positive activities that reduce carbon emissions.

A product is considered CARBON NEUTRAL if it produces zero net emissions when the life cycle assessment (LCA) has taken all actions into consideration.

A carbon footprint is the amount of greenhouse gases (Co2) released by making, using and disposing of a product. The more energy required—the bigger the carbon footprint.

Key words: (Find out what these mean!)

- Carbon Footprint
- Life Cycle Assessment (LCA)
- Finite
- Non-Finite
- Sustainability

Sustainability:

Our planet has to provide all of our basic human needs—food, shelter, warmth. We use and manipulate many of the Earth's natural resources to provide these. The sustainability of the planet's resources is at the forefront of responsible designers' minds when new technologies are created or discovered.

Resources fall into two categories:

- ⇒ FINITE RESOURCES: Are in limited supply or cannot be reproduced. These should be avoided or used only in small amounts for important reasons.
- ⇒ NON-FINITE RESOURCES: Are in abundant supply, they are unlikely to run out as they can be grown and replaced at the rate they are being used.

We need to measure the impact that the use of resources has on the planet, this includes:

- CO2 emissions—energy needed to produce materials and while they are in use
- Transportation and the distance travelled
- Impact through mining or harvesting to get the resource/material
- Impact on availability—What will be left to use next time?
- Maintenance and repair costs
- Welfare of workers in supplying the material e.g. fairtrade
- Ethical and Moral issues

POPULATION GROWTH

Population has grown quickly since the start of the 20th century leading to accelerated use of all natural resources. Less than a century ago the population of the planet was less than 2 billion... In 2017 it was 7.5 billion. The impact on the environment due to a larger population using up the resources is increasingly noticeable. New technologies are being developed to try and reduce the negative impact.