

SUSTAINABLE DESIGN

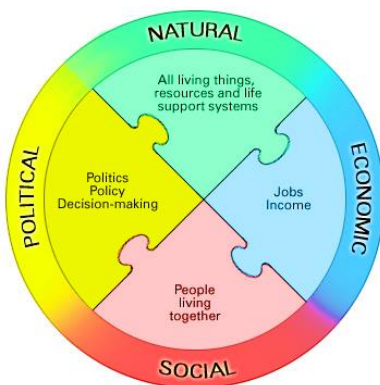


DEFINITION

“Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (*Our Common Future*, released by the Brundtland World Commission on Environment and Development, 1987).

There is a worldwide concern that our planet Earth will no longer be able to sustain us in the future. To combat this, governments are encouraging us to take into consideration social, economic, and ecological sustainability. Today's choices will affect the Earth well into the future in either positive or negative ways.

The push is now on for designers and manufacturers to produce items that are more sustainable. Environmentally friendly products have become a marketing tool.



The basic objectives of sustainability are to reduce consumption of non-renewable resources, minimize waste, and create healthy, productive environments.

UNESCO's model of the interlocking dimensions of sustainability.

“Designers should define their role as agents of good in the world and limit their work to products that are needed and can be made without damage to nature or people.”

Phillip Starck, French designer

WHAT IS A SUSTAINABLE MATERIAL?

Tips to design products that reduce environmental impacts

No material is totally sustainable but some materials fit this category better than others. The following information is provided to assist the student to make informed decisions. Use the following ideas in conjunction with the 6 Rs on page 2.

☯	Low impact materials – require little energy to process. Can recycled materials be used in the product?
☯	Energy efficient – select manufacturing and production processes that are energy efficient, use green, renewable energy and make efforts to reduce inputs such as water and chemicals.
☯	Abundance – the materials can be regrown/regenerated at a sustainable rate. Timber (including bamboo) is once again finding favour in the marketplace. This is a sustainable material that improves our environment while it grows.
☯	Ecological footprint – What effect will the design have on the environment? Is it possible to use biodegradable materials? Evaluate the effects of the manufacturing process, packaging, transport, use and final disposal on the environment. What waste will be produced? Aim to minimise all forms of waste. Are any elements (manufacturing, chemical waste etc.) hazardous to the environment?
☯	Zero waste – Reduce the waste going to landfill. Find ways of using offcuts, scraps and damaged stock so that it minimises waste to landfill. Waste is a costly element of any manufacturing process. Students mark out their pieces prior to cutting to determine the most efficient layout. This way waste is kept to a minimum. Waste offcuts can be used by other students or other projects.
☯	Service substitution – the product is shared by more people to eliminate the need for personal ownership e.g. shared cars.
☯	Bioregional – ideally material should come from nearby. Desirable that the product can be composted when its usefulness has been exhausted.
☯	Product life cycle – Reducing impact of all aspects of the product throughout its life, from packaging to use, and end of life. Select materials and design styles that will promote durability and longer use.
☯	Efficiency – product is efficient to use
☯	Multifunctional – product that has a multifunctional design to promote consumer to do more with less.
☯	Cost is not just related to material cost. The cost needs to be evaluated according to the life-cycle of the product and include disposal costs.
☯	Rare Earth Elements and Platinum Group Metals – are used in important applications e.g. wind turbines, electric vehicles, mobile phones. There is difficulty extracting and processing these materials. They are also difficult to remove at the end of the product lifecycle.



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THE 6 Rs

Designers, manufacturers and consumers make decisions every time they use or purchase anything. The following 6 R's summarise the decisions to be made.

Reduce	<ul style="list-style-type: none"> • Reduce amounts of material & resources used in production. • Reduce packaging & waste • Reduce transport time
Reuse	<ul style="list-style-type: none"> • Product can be reused or refilled • Consumer can sell or donate products so that someone else can use them • Trade in used product so that it can be reused, recycled or made into something else • Reuse shopping bags
Recycle	<ul style="list-style-type: none"> • Select materials that can be easily recycled, or design your product so it has timeless style. • Convert product back to basic materials and remake into a new product. This product does not need to be the same as the original.
Refuse	<ul style="list-style-type: none"> • Consumer chooses to use or purchase product – consider product efficiency, packaging. • Are some materials undesirable for use?
Rethink	<ul style="list-style-type: none"> • Consumer evaluates need for product. • What could be done to improve sustainability?
Repair	<ul style="list-style-type: none"> • Can product be repaired to increase its life or will it go to landfill?

WHY SHOULD I TEACH SUSTAINABILITY?

Sustainable design empowers students to take responsibility for the choices they make when designing and producing a product.

Teaching aims:

- ☺ Examines design theory and practice, and considers the factors affecting designing and producing in design projects.
- ☺ Develop knowledge, skills and values that empower students to contribute to a more sustainable manner of living.
- ☺ Consider environmental, social, cultural and economic issues.
- ☺ Uses design process in the development and production of design solutions.

- ☺ Uses resources effectively and safely in the development and production of design solutions.
- ☺ Investigates a range of manufacturing and production processes and relates these to aspects of design projects.
- ☺ Develop skills for influencing the future - designing and creating sustainable communities.

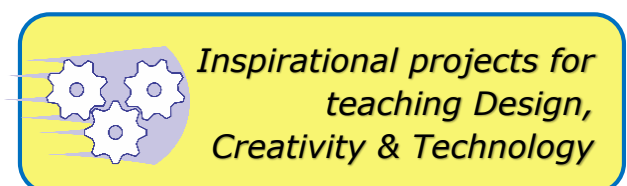
Scorpio Technology encourages the use of sustainable materials and design.

How do we at Scorpio Technology work & encourage sustainability?

- Components are purchased and shipped in bulk from many suppliers to a consolidator. This minimises transport costs and reduces waste.
- The kits are packed in reusable plastic snap lock bags. These can be reused while constructing the model and afterwards.
- Scorpio kit platforms and bodies can be made from reused, recycled, remanufactured or repurposed materials.
- Since 1989 orders have been packed with:
 - reused materials (e.g. newspaper, used envelopes) that can be recycled after use.
 - Foam packaging is reused from our suppliers. (Foam can be reused to make product models etc.)

REFERENCES:

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- https://en.wikipedia.org/wiki/Sustainable_design
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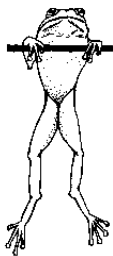
SUSTAINABLE DESIGN



SUSTAINABLE DESIGN – A Case study

Sustainable design requires rethinking how things are done. Sustainable designs are often more expensive to produce but these costs are offset by the environmental and long term benefits.

Eco-tourism is a great example of sustainability. The main idea is sustainability, low environmental impact, education and environmental experiences.



In Bright, Victoria, “**The Odd Frog**” Secluded Studios, are an experiment in architecture and Eco-Tourism. The five studios are environmentally sustainable. Each studio has a different style. The studios provide the holiday maker an opportunity to live among the trees and to experience nature close up.

Their Design Brief addresses environmental, sustainability and other issues.



“The buildings at The Odd Frog are all ‘Designed for Disassembly’. The concept of ‘**Design for Disassembly**’ revolves around the idea of a building being assembled from a group of compatible, standardised components, that are connected together in such a way that they can be easily disconnected or disassembled. Our buildings rarely utilise glues or nails, rather they are bolted or screwed together, so at the end of a building’s useful life, it can be simply un-screwed, or un-bolted to produce the same group of standardised materials and components for re-use or recycling elsewhere.

(<http://www.theoddfrog.com/images/eco.pdf>)

FURTHER INVESTIGATION:

- 🔍 Read and analyse “**The Odd Frog**” Design Brief and determine the pros and cons for the materials chosen for the construction of the studios.
<http://www.theoddfrog.com/images/eco.pdf>.
- 🔍 Make a poster (or other presentation method) highlighting environmental initiatives.
- 🔍 Research other sustainable dwellings, e.g. Prefabricated & modular, Tiny homes Passive solar design
- 🔍 List benefits of factory construction when building.
- 🔍 “**EcoHomes**” investigate what design features are found in an EcoHome. Design your own dream environmentally friendly home. Aspects to cover include:
 - 🏠 Write a Design Brief for your dream home
 - 🏠 Determine the location of the home
 - 🏠 Orientation facing North, South, East, or West
 - 🏠 Types of sustainable materials to be used in construction
 - 🏠 Can recycled or reused materials be used in construction?
 - 🏠 Energy and resource saving initiatives (e.g. solar, water tanks, waste management)
 - 🏠 Size of building
 - 🏠 Features that the home would include
 - 🏠 Present the project to your class. Make a case for why your dream home is sustainable.

REFERENCES:

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- <http://ecoliv.com.au/modular-homes>
- <http://modscape.com.au/blog/eco-sustainable-homes-that-dont-cost-the-earth/>



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