

Material Use

The Material Use group of fact sheets examines the economic and environmental cost of various commonly used materials. It identifies and explains various tools available for measuring embodied energy and outlines principles for choosing materials and systems to reduce or eliminate impacts.

Careful analysis and selection of the materials used and the way they are combined can yield significant improvements in the comfort, cost effectiveness and energy efficiency of a home. Consideration should also be given to the lifecycle of materials and the processes adopted to extract, process and transport them to the site.

Informed decisions about materials and construction systems can reduce the environmental impact of a home without adding to the cost.

Quick tips to reduce the total amount of materials consumed and their environmental impact:

- > Design and build for de-construction, re-use, adaptation, modification and recycling.
- > Make more efficient use of existing materials.
- > Use fully recycled materials or materials with recycled content.
- > Choose materials with a lifespan equivalent to the projected life of the building.
- > Encourage development of new, efficient, low impact materials and applications by creating demand.
- > Consider how and where the materials are sourced and the impacts this causes.
- > Minimise the energy used to transport materials by using locally produced material. Use of lightweight material where appropriate also reduces transportation energy.

- > Minimise the energy used to heat and cool the building by using materials that effectively modify climate extremes.
- > Understand how chemicals used in the manufacture of some materials might affect your health.



This well insulated home clad in lightweight fibre cement sheeting has low embodied energy and requires little heating or cooling energy to maintain thermal comfort in a warm, temperate climate.

OVERVIEW OF MATERIAL USE FACT SHEETS

5.2 Embodied energy

Embodied energy is the total energy used to create a product including all the processes involved in harvesting, production, transportation and construction. It can represent a significant proportion of the total energy used during the lifecycle of a home.

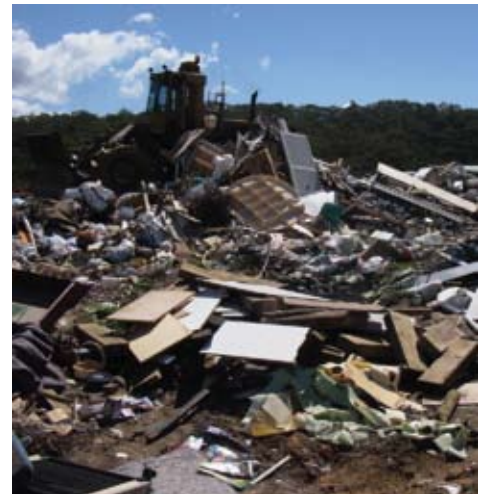
Consequences (or impacts) of particular materials and construction systems are often not apparent because they often occur long distances from where the product is used.

This fact sheet outlines some cost effective ways to reduce the embodied energy of materials. These include using construction systems appropriate for climate, substituting materials with high recycled content, and using materials made from new or non-renewable sources.

5.3 Waste minimisation

This fact sheet examines methods for lowering costs and reducing consumption of materials by minimising waste and recycling or re-using materials.

It focuses on the design and construction phases as these are the stages of the lifecycle where the greatest inefficiencies exist and the greatest gains can be made.



5.4 Biodiversity Off-site

Biodiversity is the variety of all life forms – the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part. Biodiversity is an essential human life support system.

The harvesting of many materials used in building a home may cause many adverse impacts on biodiversity including:

- > Extinction of species.
- > Destruction of natural systems and habitat.
- > Degradation of life support systems.
- > Fragmentation of habitat and populations.

These impacts are rarely apparent at the point of purchase or use. As a result, we continue to specify and use materials that destroy our life support systems, even where alternatives exist.

Use this fact sheet to identify significant off-site impacts, guide your design and material choices, and influence your suppliers to provide biodiversity-friendly products.

5.5 Construction Systems

This fact sheet guides the selection of systems with lowest economic and environmental cost.

It examines the performance of various roof, wall and floor systems in a range of climates and compares their costs and benefits.

Choosing an appropriate system for climate and location will increase thermal comfort, lower construction and maintenance costs and reduce the overall environmental impact.



More detail on construction systems is provided in the following fact sheets:

5.6 Mud Brick (Adobe)

5.7 Rammed Earth (Pisé)

5.8 Straw Bale

5.9 Lightweight Timber

5.10 Clay Brick

5.11 Autoclaved Areated Concrete (AAC)

5.12 Concrete Slab Floor

5.13 Green Roofs and Walls

EcoSpecifier

EcoSpecifier is a guide to selection of individual materials on an 'environmentally preferred' basis. It was developed by the Centre for Design at RMIT University in conjunction with EcoRecycle Victoria and National Integrated Living P/L.

EcoSpecifier explains how materials are assessed as being environmentally preferred based on lifecycle assessment and a range of other factors. It includes a comprehensive list of environmentally preferred generic materials commonly used in Australia.

Use this tool to either select materials with least environmental cost, or to gain an understanding of the principles of selection in order to identify or develop alternative materials.

www.ecospecifier.org.au

ADDITIONAL READING

Contact your State / Territory government or local council for further information on building sustainability and energy efficiency.
www.gov.au

BEDP *Environment Design Guide*
PRO 7 The Environmental Impact of Building Materials.
PRO 8 Strategies and Resources for Materials Selection.
PRO 16 Durability of Building Materials – An introduction.
PRO 35 Building Materials Selection – Greenhouse Strategies.

Hyde, R (2000), *Climate Responsive Design: A study of buildings in moderate and hot humid climates*, E and FN Spon, United Kingdom

Lawson, B (1996) *Building Materials, Energy and the Environment: Towards Ecological Sustainable Development*, RAI, Canberra

Mithraratne, N, Vale, B. and R. Vale (2007) *Sustainable Living: The role of whole life costs and values*, Cambridge: Butterworth-Heinemann

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