

EMBODIED ENERGY: Interior Materials.



In an information age, where the scope of the internet is endless, researching and finding reliable details about a material or product can be somewhat daunting. With this in mind, we here at Designful have put together a **list of common materials** used in internal fit-outs, providing information from how they are made, to how and if they are bio-degradable. If you are considering (or are currently) building or renovating a home, we recommend you have a read and use this list as a tool to help empower you in your material choice.

"we're not going to ever achieve
the environmental gains we're
seeking while still expecting our
lives to be the same. We're
going to have to give up a lot.
The secret is, that a lot of that,
we're not actually going to
miss."

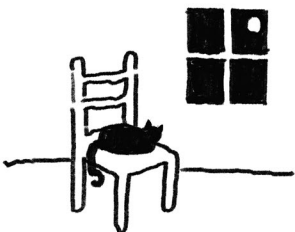
- Jay Austin.

Plasterboard.

- Plasterboard consists of sheets made up of: a core of cast gypsum plaster plus fillers, and a paper lining.
- Gypsum is a mined mineral. 'There is also a potential for damage to local ecosystems during extraction.'
- Cost: low to medium cost.
- Has a **low R-value** and provides little thermal mass.
- Can be recycled, re-used (if not damaged when removed), and is biodegradable when in contact with soil. It releases gas during decomposition, although is not defined as hazardous waste.

Wood Composites.

- Includes particle boards, strandboards, hardboards, and medium density fibre boards (MDF).
- Used as sheet flooring or wall lining.
- Wood composites are manufactured from **renewable forest resources**, and from lower grade wood products or waste wood products.
- Costs: low to medium.
- Generally not recycled, but may be reused if sheets remain intact.
- Generally low embodied energy and stores carbon.



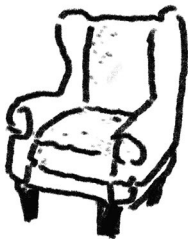
Wood Composites - continued.

- Can be **high in VOC's (Volatile Organic Compounds) and contain formaldehyde (carcinogen)**
- Wood composites are susceptible to moisture damage and are not super durable.

FLOORING

Ceramic Tile.

- Tiles consisting of fired clay with an applied glaze.
- Generally *imported* from Europe or Asia - can have *high travel miles*.
- Input energy does vary with the tile manufacturing process.
- Some glazing materials and pigments may impact on the environment. There are also emissions from kilns.
- Costs range from **very low to high**. Tiles imported from Asia are generally cheaper than tiles imported from Europe.
- 20+ years of durability.
- Generally not salvageable for re-use.



“be less motivated by the outcome and **more motivated by the standard.**”
- *The Minimalists.*

Carpet.

- Carpet can be made from wool, nylon, polypropylene, polyester or a blend of fibres.
- Wool carpet is a natural, durable and premium product. A much more sustainable product than synthetic carpets. However, a key concern with wool production is the environmental impact of the scouring process. **Wool carpet can also be recycled into insulation products.**
- Cost: Wool is more expensive than synthetic fibres.
- Synthetic carpets are derived from petrochemicals, although some are now made from recycled fibres.
- Nylon is the most common of the synthetic fibres. Has a very good wear resistance, however, can stain easily unless treated.
- Acrylic gives a similar look and feel to wool but at a lower cost. Moisture and mildew-resistant.
- Polypropylene carpet is lower in cost. Not easily dyed- so manufactured in the final colour. Does not wear as well as wool or nylon.

“make your growth sustainable
by moving at a **pace that is
challenging** but not
overwhelming.”
- Yung Pueblo.

Carpet - continued.

- Emissions vary, but emissions of CO₂ and other *greenhouse gases are common in the manufacture of petrochemical-based products*. According to manufacturers of carpets that use 100% recycled synthetic fibres- ‘manufacturing these products produces just half as much CO₂ as the manufacture of other synthetic carpets.’
- Both wool and synthetic carpet can be reused (if in good condition). **Wool will degrade, synthetic will degrade very slowly, and may release toxins.**

Vinyl.

- Vinyl and synthetic rubber flooring are made up of petrochemicals. Vinyl can be **as much as 55% or as little as 11% PVC**, and also contains **fillers, plasticisers, stabilisers and pigments**.
- Because of the plasticisers used in the manufacture of vinyl flooring (to give it flexibility), has concerns as to the potential harmful health effects. Vinyl chloride is a known human carcinogen (causing a rare liver cancer), because the plasticiser contains phthalates which may leach out.
- Re-use is *generally not possible*. Some vinyls may be recycled. Vinyl and synthetic rubber are petrochemical-based materials and release greenhouse gases as they eventually decompose.

Linoleum.

- Linoleum is a **natural flooring product** based from linseed or vegetable oil, compressed cork and wood flour, resin binders and pigments on a jute backing.
- It is a natural and inert material.
- Imported from overseas.
- *Cannot be easily recycled* as it is made from so many ingredients. Linoleum is bio-degradable and doesn't create toxins as it degrades.

Cork.

- Cork can be used for floor or wall finishes.
- Generally imported from Spain and Portugal- high travel miles.
- Cork is a **natural product and comes from sustainably managed forests**. ‘Bark is carefully stripped from the trunks of the corks oak at approximately nine year intervals (without damaging the tree) and ground into granules. The granules are then compressed with special glues at high pressures and temperatures into sheets, planks and tiles.’
- It is *durable and will have 25+ years in domestic use*. Cork that is adhered to a substrate will be difficult to re-use, although may be able to be recycled, and will slowly decompose over time.



Cork - continued.

- Up-front costs are relatively high.
- *Low embodied energy* and stores carbon.

BENCHTOPS / SURFACES

Natural Stone.

- Stone is a **natural product** that is quarried or sourced from gravel areas (such as river beds.)
- Quarrying of stone creates damage to local ecosystems during extraction.
- Stone can be sourced both locally or imported.
- Stone has a *high durability*.
- There are typically no emissions from the stone (granite may emit low level radioactivity).
- Can be **reused if removed carefully**. Stone **can also be crushed** and **reused as aggregate**.

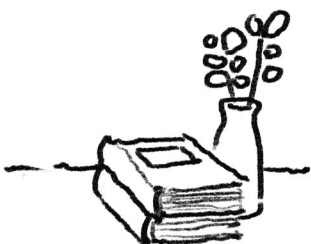
Engineered Stone.

- Made from quartz, other stone and glass with a silicone or resin bonding agent.
- Quarrying of stone creates **damage to local ecosystems during extraction**. However, some engineered stone is made from waste products.
- *Less cost* than natural stone, medium cost.
- More durable than laminate.
- Can be reused.

Laminate.

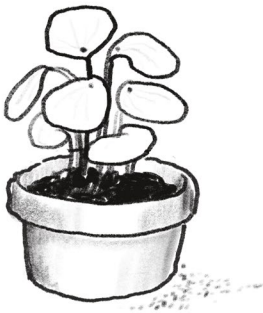
- A manufactured resin impregnated decorative paper, applied to an MDF backing.
- Contains *plastic, resin and often formaldehyde*.
- Less durable than natural stone or engineered stone.
- **Non recyclable**.
- High embodied energy.
- Low cost.

“people do not decide their
futures; they **decide their
habits & their habits decide
their future.**”
- F.M Alexander.



"make it simple, **but**
significant."

- Don Draper (Mad Men).



No material you choose is going to be 100% perfect. Without feeling overwhelmed by this information, *do your best to choose materials that are close to the natural source*, local, and can be reused or recycled. The information provided is to help empower you to make more informed decisions about the materials you choose for your home.

Useful resources to learn more about embodied energy for interior materials:

- www.level.org.nz/material-use/embodied-energy/
- www.yourhome.gov.au/materials/embodied-energy
- <https://greenmagazine.com.au/article/the-innovators/>
- <http://www.ecospecifier.com.au/knowledge-green/setting-priorities/eco-priority-guide-kitchens/>