Sustainable Hotel
Siting, Design and Construction

Conservation International

International Tourism Partnership

The industry guide to good practice

8 INTERIOR DESIGN

First published 2005 | Digital Release 2014

INTERIOR DESIGN

It is now generally agreed that providing good indoor air quality is critical to asthma and allergy prevention and the minimisation of other health effects such as headaches and nausea. Some of the synthetic products used in the 1960s and 70s have proved to have adverse environmental and health effects. Examples include paints and varnishes containing high levels of VOCs, which can cause headaches and, when released to atmosphere, contribute to the formation of photochemical smog associated with respiratory diseases.

The Orchid Hotel in Mumbai, India was the first hotel in Asia to win Ecotel certification shortly after it opened in 1997.

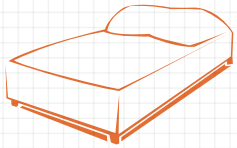
See Case Study 28, Appendix 1.

Since the early 1990s, there has been a move back to the use of more traditional building and decorating methods, not only in historic conservation buildings but also for the most modern 'design' hotels.[68] Not only are they often safer and more pleasant to work with, but sustainable, natural building materials have proved over time that they are more able to respond to the surrounding environment and, in helping to regulate the temperature and humidity of buildings, can make life more comfortable for those inside. With so much emphasis being placed on contemporary and dramatic interiors, natural products can also help play a distinctive part in the hotel's interior design and be a positive talking point among guests.

Natural and sustainable materials are not automatically better for the environment than synthetic materials. It depends on whether there is a sustainable supply of the natural resource (for example, it may be over-harvested due to a popular trend); how the raw materials are gathered, processed and transported; and what emissions may be involved. Ask for information about the environmental impacts of the product during manufacture and use and the implications for its disposal when it has reached the end of its life—i.e. its whole life cycle. Consider too how the material will be fixed to the wall or floor. The effort taken to source a sustainable product can be quickly wasted by using an environmentally-damaging adhesive.

With a little effort, it is possible to find products that are durable, practical and good value that will not damage the environment.

[68] According to the 2004 Design & Hospitality Giants survey, 96% of the top 100 interior design firms in the USA are specifying sustainable products, and 20% specified US$10 million or more worth of green products in 2003. Together the 100 firms specified over US$869 million in green products in 2003, with an average per firm of US$12.8 million. More than half of the time (58%) the initiator of sustainability is the interior designer although clients initiate the concept 34% of the time and it is a joint effort in 8% of projects. The most common green products recommended include carpet, flooring, and wall covering. More than 80% of these firms expect to specify more green products in the future. Interior Design, October 2004.



8.1 Walls

8.1.1 Plasters

A **Clay plasters** are a blend of clay, fine aggregate and plant fibres. Supplied in powder form, they are suitable for internal surfaces and bond well to masonry, clay board, lime plaster and plaster board. They enable buildings to breathe, helping regulate internal humidity. Clay plasters now come in a variety of earth colours such as pink, red and yellow and require no further decoration. Alternatively they can be colour-washed or painted with emulsion.

B For a finer finish, a **sand and clay** plaster can be used. Clay slips are also very smooth and can even be polished to a high sheen.

C **Lime mortar and plaster** was used for centuries until the development of cement in the early 20th century, but its use is now being revived particularly for restoring older buildings. Lime is made by firing limestone to make quicklime. Water is then added and causes a chemical reaction and the mixture forms a putty. Lime plaster is porous and flexible to work with. If left too long it will revert naturally to limestone so it has to be kept damp and covered in hessian in a controlled atmosphere while being worked on.

8.1.2 Paint

A If possible, use paints that contain only **naturally-occurring ingredients**, are solvent free, have zero-VOCs and comply with eco-labels in the countries where these exist. Water-based natural paints, mineral paint and distemper emit no or low VOCs.

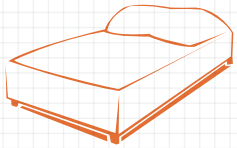
B Where possible, **avoid** alkalyd/oil based paints and those containing titanium dioxide, vinyl, acrylates, formaldehyde, VOCs (organic solvents), chromium, cadmium, nonylphenolethoxylates and lead.

C **Synthetic paints** (alkalyd, vinyl and acrylic) are manufactured from highly-processed petrochemicals, produce large amounts of waste in their manufacture and contain a small percentage of solvent. If a synthetic paint is necessary, acrylic-based water-borne paints have excellent durability, although they still involve an energy-intensive production process and the use of neutralising agents, auxiliary diluents and preservatives. Although only traces of the chemicals remain in the finished product, at least one Swedish nature conservation authority advises that a 40 million-to-one dilution is necessary to render water-soluble gloss paint harmless before entering the sewage system.[69]

D Give preference to paints using **plant and mineral-based** ingredients for the binder, resins, pigments and solvents. Examples include linseed oil-based, wood and vegetable resin-based paints containing plant-based pigments.

E **Casein paint** (or distemper) is a traditional paint that has returned to popularity. Casein is a derivative of milk and the paint is usually made up of a mixture of casein, minerals and white pigments (without the addition of titanium dioxide, a whitener). Being microporous (breathable), it can assist in regulating indoor humidity. Some manufacturers supply it as a base white paint for tinting, others supply it in powder form for mixing with water. Suitable only for interiors, it is usually odour-free, or at least should smell fresh and pleasant, and is suitable for people who suffer from allergic symptoms or headaches. Many manufacturers do not test their products on animals. Pigment (usually in powder form) must be added to obtain the desired colour and the paint dries to a soft, chalky finish. It can be used over wallpaper, wood, stone, clay, plasterboard and plaster. Some formulations are not suitable for ceilings because of their watery consistency, making them difficult to apply.

[69] Environmentalism and paint, Auro, **www.auro.co.uk/natural-paint-faqs/68-principles**



f Water-based, transparent **glazes** can be used on painted surfaces and for fixing powdery or sandy surfaces, protecting them from dust and making cleaning easier. Colour washes are glazes combined with casein paint and stained with pigment. The pigments are finely-ground organic earth and mineral pigments.

g **Lime washes** can be used as an alternative to paint. They consist of lime and water and around 10% tallow, casein or pulverised fuel ash. They are applied by brush and several coats are required, making application more labour intensive than modern paints, but they provide a high-quality, decorative finish.

8.1.3 Non-woven coverings

a Non-woven **wallpapers and coverings** come in many forms including recycled newspapers, wood chips and textiles. Textured covering can be made from cellulose, glass fibre, glue and other binding materials. It is important to find out exactly what they contain as some are more environmentally appropriate than others.

b **Avoid** products that contain or use formaldehyde, vinyl chloride or heavy metals in the manufacturing process as these persist in the environment. Vinyl (mainly PVC) wall covering and vinyl coated paper not only have adverse environmental impacts associated with the manufacturing and disposal processes but, if used in humid climates, can lead to mould growth.

c Non-woven, printed wall coverings can be used as an alternative to vinyl and can be made of either **natural** and **renewable** or **recyclable** materials. Some have designs overprinted in water-based inks (that contain no heavy metals or solvents) and are often washable, stain repellent, light resistant, tear and abrasion resistant, as well as being easy to install.

d Consider Forest Stewardship Council (FSC) **certified paper** that contains a mixture of recycled paper and sustainably-harvested wood.

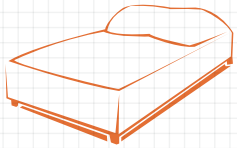
e **Rice paper and parchment** wall coverings are made from natural ingredients and coloured with water-based dyes for a natural look. They may require specialist expertise in hanging.

8.1.4 Woven wall coverings

a The advantages of **fibre wall coverings** are in their permeability. They are suitable for humid areas because they minimise the risk of mould formation, which has serious implications for indoor air quality. Silk and velvet are the most luxurious and expensive natural fabrics, while wool or cotton are more affordable. Most will come bound to a natural backing to facilitate hanging. Look for fabrics coloured with natural dyes. For a completely natural and more organic look, consider fabrics made from hemp, corn, soy or hessian, which can be used undyed.

b **Glass textiles** are made of woven glass yarns that are woven into various textures and patterns and treated with a natural starch binder so they do not stretch during the hanging process. These fabrics are strong and breathable and can be overpainted many times. Although glass is a natural material made from sand, lime and clay, the firing process is fairly energy intensive.

c More unusual **fibre wall coverings** incorporate coloured flakes (made of calcium carbonate, polyvinyl biodegradable acetate binders and pigments) on a glass fibre backing. The flakes should be non-toxic and free of heavy metals.



8.1.5 Recycled materials

a Particularly suitable for bathrooms, tiles made from **recycled glass** are even stronger than ceramic tiles and are an attractive way of helping to keep glass out of landfill. They can have a matt surface (commonly associated with recycled glass) or a polished finish and are available in clear or opaque forms and a wide variety of colours and sizes. The percentage of recycled glass varies according to the manufacturer and quality of the glass—anything from 55–100%. Their manufacture does not require the use of toxic substances or production of toxic waste and they can be fired at lower temperatures than ceramic tiles.

b Tiles made from **bonded recycled leather** can give a luxurious feel to an interior. The tiles must be treated as leather and allowed to acclimatise for 48 hours at normal temperatures in the location where they are to be used. They can be fixed with special eco-adhesives or dry tape systems. They are low maintenance, and require only dusting occasionally with alcohol-free agents.

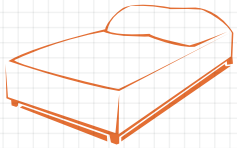
c The potential for using recycled materials for wall coverings is almost infinite—as demonstrated in the American Honda office training and warehouse building in Gresham, Oregon. Its conference room walls are covered in wall coverings made from **recycled telephone directories**, the restroom walls are composed of **recycled wood** and **fibre chips in a resin base** and the tiles are made from **recycled glass bottles**.

8.2 Floors

A range of environmental impacts are associated with floor coverings. The most serious are probably associated with the manufacture of synthetic carpets and vinyl. These rely on energy-intensive manufacturing processes (adding to global warming, acid rain and the production of toxic by-products and photochemical smog). They also use non-renewable resources (largely petro-chemicals) as a basic raw material (especially in the case of nylon carpets).

The initial investment in environmentally responsible flooring products will often be higher than that required for conventional products (with the possible exception of linoleum and some locally-quarried stone). However, there are cost benefits associated with these products. Many environmentally responsible flooring materials can function effectively for tens of years as opposed to the five to seven years associated with some synthetic materials. Cost savings can also be gained through the relatively lower maintenance costs associated with natural materials.

- **Avoid** products containing halogenated plastics, (the manufacture and disposal of PVC can result in the production of highly toxic dioxins, and the phthalate plasticisers used to improve flexibility are suspected of disrupting hormones in human beings).
- Alternative and more **environmentally responsible** products such as natural wool carpets, cork or wood flooring can all have significantly reduced environmental impacts and contribute to biodiversity if they are from sustainable sources. Natural flooring products such as wool, sisal and coir can benefit the internal environment of a building as they absorb and give out moisture, regulating the internal climate. They are also anti-static.



- **Smooth flooring products** require the least cleaning and maintenance. Stone, wood, cork and linoleum are therefore often the lowest-maintenance options. They also require the least energy-intensive and/or synthetic cleaning solutions. In heavy-use situations, some types of wood may need sanding and revarnishing (or oil and waxing) after two to five years.
- When choosing flooring materials, consider how they will be **fixed** to the floor as the use of a toxic or environmentally damaging adhesive can undermine the thought that has gone into selecting a sustainable floor covering. *See **Section 5.4.2** The A–Z of building materials.*

Below are suggested natural materials suitable for various flooring applications:

8.2.1 Bamboo

a An **alternative** to rainforest hardwoods, bamboo grows up to 20 metres each year and will achieve substantial thickness in a short time. The mother plant produces new shoots annually with stems maturing sufficiently for harvesting within 3–5 years (as opposed to species such as oak, cherry or maple, which take between 30 and 200 years to reach maturity).

b Bamboo is mainly produced in **controlled forests** in China. The timber bamboo is cut and milled into long, thin strips that are treated with a non-toxic formula to resist pests. After drying, the strips are laminated together into a single-ply veneer. Several layers are then compressed together using high temperatures and pressure to create a multi-layer flooring product that can be milled into tongue and groove planks.

c Bamboo **will not shrink, swell, bow, cup** or **twist** with moisture changes. However, some products are more scratch-resistant than others.

8.2.2 Carpet

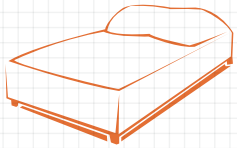
a Carpet is **long lasting**, has excellent **thermal insulation** and **acoustic value** and is also very comfortable to walk upon. It can be made of wool or other natural fibres such as hemp, or from synthetic yarns such as nylon.

b The **best environmental option** (apart from use in damp or humid climates) is pure organic or natural wool (available unbleached or undyed) with hessian backing and underlay made from recycled felt (of sisal or coir). This should be fixed to the floor with tacks and grippers rather than adhesives.

c If it is not possible to specify 100% natural wool, choose 80% wool/20% nylon, which combines **durability** with natural content.

d Wool is naturally moderately stain resistant but may require **protection** to resist dirt, stains or insects. If a chemical treatment must be used, ask the supplier which treatment is the most environmentally preferable.

e Make it a **purchasing requirement that suppliers** take back old carpet for recycling or to be manufactured into new products rather than sending it to landfill.



8.2.3 Ceramic tiles

a Apart from the clay firing process, which is **energy intensive**, the environmental impact of producing ceramic tiles is low, so the tiles have considerable 'embodied' energy.

b Unglazed tiles are able to **breathe** and therefore help to regulate the internal climate.

c Ceramic tiles can usually be treated with **natural linseed oil** as they are laid and then coated with **natural wax** once in place. They are available with 50% recycled ceramic content.

d Tiled floors can be **slippery** when wet. Location and cleaning procedures must be taken into account when specifying tiles. Tiled areas should be cordoned-off during cleaning and should remain so until the tiles are dry.

8.2.4 Cork

a A very **resilient and hard wearing** flooring material, cork tile is derived from the bark of cork oak trees found mainly in Portugal, Spain and Northern Africa. The material is taken from the outer casing of the trunk of trees once it is 25 years old. The stripping of the outer casing is essential for the recovery of the tree, which then regenerates and is further harvested every nine years. Cork floors can provide 30 years of service or more.

b Cork requires little energy in production though the **transportation impacts** of using European cork outside Europe should be taken into account. However, these may be offset by the fact that it is much lighter than many other materials, so more can be transported at once.

c Cork is soft, quiet and warm to the touch and is an effective, naturally-occurring **insulator**. It is easy to lay even over slightly uneven surfaces—cork planks are made from two layers of cork which sandwich a tongue and groove material. It wipes clean and is easy to maintain.

d Cork is **biodegradable** and can be disposed of at the end of its life, so long as it has been fixed with biodegradable adhesives or pins. It is also largely recyclable and recycling programmes already exist in Germany and Japan.

8.2.5 Linoleum

a Often confused with vinyl, linoleum is a **natural, renewable** and **biodegradable** product although the energy required for its manufacture is considered by some to be greater than that of vinyl flooring.

b Linoleum should be considered as an **alternative** to vinyl, ceramic tiles and other products where a durable, hard, waterproof surface is sought.

c It is produced in sheet and tile form which is usually pressed onto a **natural jute backing**.

d During manufacture, almost all rejected material from processing and inspection can be **recycled** back into the product.

e **Low VOC-emitting adhesives** should be specified.

The desired look, whether contemporary or classic, can be achieved using sustainable materials.

Pictures courtesy Novotel and Scandic

8.2.6 Natural vegetable fibres

a Natural fibres are able to **store humidity** and emit it when the air is dry. This 'breathing action' promotes a healthy indoor atmosphere.

b Vegetable fibres for floor coverings include **sisal, coir (coconut husk), sea grass** and **jute**. The plant sources for each of these do not need artificial fertilisers, pesticides or herbicides to flourish. Some of these products may be attached to a natural latex backing.

c These floor coverings have **good acoustic** and **thermal qualities**, are **anti-static** (so vacuuming easily removes dirt and dust particles), and are **durable** and **biodegradable**.

d Vegetable fibres may **not be suitable** for areas subject to excessive moisture, spillage and/or excessive wear so it is worth checking with the supplier.

8.2.7 Rubber

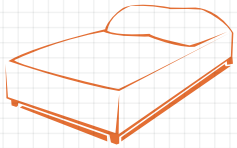
a Rubber flooring is available in **roll and tile formats**, is highly durable, resilient, shock and sound-absorbent. However, rubber is flammable and can have a distinctive odour.

b Rubber is generally considered to be a **low environmental impact** material. Virgin rubber is derived from trees, and the manufacture of synthetic rubber has a comparatively low impact on the environment.

c Flooring that contains **recycled rubber** is cheaper and more durable than synthetic or virgin rubber, and is an even better choice for the environment. Tyre dumps pose a serious environmental hazard and so all recycled rubber tyre products help to alleviate this problem. Some rubber floorings contain between 75 and 100% post-consumer and post-industrial content.

8.2.8 Vitreous tiles

a Vitreous tiles are durable, easily cleaned and **do not support mould and mildew growth** if kept clean. For high-traffic areas where acoustics can be handled properly, tile is comparable to carpet in terms of life cycle costs.



b **Cement installation** is preferable to adhesives for reasons of indoor air quality. Where this is not possible, specify **water-based adhesives** or those with a low VOC content.

c Tiles with **recycled content** are available.

d Tiled floors can be **slippery** when wet so the location and cleaning procedures must be taken into account when specifying tiles.

8.2.9 Wood

*See **Section 5.4** Materials.*

More information

Paints and wall coverings
greenhotelier issue 27, April 2003
www.greenhotelier.org

Environmental Design and Construction
www.edcmag.com

8.3 The green guest room

In creating a green guest room, the aim is to evaluate every component of the room and its relationship with the entire building from a sustainable viewpoint. Many of the concepts articulated here, such as those relating to walls, floors, furniture, fixtures and fittings, are equally applicable to other rooms in the hotel.

Scandic pioneered the concept with their 'eco-guest room' in Norway in 1995. Although a truly sustainable room is probably yet to be achieved, Scandic used the principles of The Natural Step and the Nordic Swan eco-label[70] in defining a standard to follow. Today there are over 10,000 eco-rooms in the Hilton & Scandic portfolio and the Scandic Environmental Construction Standard[71] covers not only the guest room, but all aspects of hotel design and construction.

The materials used in each Scandic eco-room are 97% recyclable. The floors are wood, as is the furniture, and textiles are pure wool or cotton, with as few fittings as possible made of chrome, metal or plastic. The company works closely with its suppliers to obtain the best possible materials for the health of its guests and the environment, selecting materials that are non-toxic, hypo-allergenic and renewable.

[70] A product carrying the Swan label meets extremely high environmental standards. See **www.nordic-ecolabel.org**

[71] See **www.scandichotels.com**

8.3.1 Components of a green guestroom

Guestroom corridors 1

- Install **motion detectors** to demand control lighting except for emergency illumination.

Electrical 2

- Provide a keycard-activated **master switch** at the room entrance that automatically activates room systems and shuts off lights, TV, etc. when the guest enters or leaves the room. Exceptions include the electricity supply to the minibar, in-room safe and socket designated for charging laptop computers.

Lighting 3

- *See **Section 5.1.6**, Lighting.*

Heating, air-conditioning & ventilation 4

- Depending on the class of hotel, provide a **fancoil** or a separate independent unit such as a through-the-window unit or heat pump. They should all be of high efficiency and low noise level.
- **Interface** the unit with the **front desk system** to activate or shut off upon check-in/checkout.
- Integrate a **motion detector** with adjustable time delay to shut off or operate on a higher or lower temperature level (winter/summer). Combine with lighting.
- Ensure that **fresh air provision** to the guest rooms conforms with internationally-recognised standards such as those set by ASHRAE. A suitable rate would be to introduce fresh air at a rate if 90 m^3/hr (cubic metres per hour) exhausted from the bathroom at 85 m^3/hr.
- **Heat transfer** (k-factor) in moderate to cold climates should be at least 1.5 in order to minimise energy losses.
- *See also **Section 5.1.5** Heating, ventilation and air-conditioning (HVAC).*

Walls 5

- *See **Section 8.1** Walls.*

Floors 6

- *See **Section 8.2** Floors.*

Furniture, fixtures & fittings 7

- Choose furnishings made from **sustainably-harvested** sources of wood, which contain **solvent-free** glues and **CFC-free** foam.
- Use **natural fabrics** of wool, eco-certified or organic cotton, linen, silk or hemp (alone or in blends), and window coverings made from natural fabrics, wood slats, woven reeds and grasses.
- Consideration should be given to using **inherently flame-retardant materials** for upholstery and curtains, which require less fire-proofing treatment than synthetics.
- **Avoid** nickel and chrome; leather treated with chrome; paints; varnish and glue containing nonylphenolethoxylates; PVC; brominated flame retardants and synthetics including plastics where possible.

Equipment 8

- The TV should use less than 5 Watts when in **standby** mode.
- **Minibars** should be energy efficient and use the least environmentally damaging refrigerant. *See **Section 5.6.2** Refrigeration and ozone depleting substances.*

Components of a green guestroom/continued

Bathroom 9

- Rather than using granite or marble for surfaces, consider using **recycled granite**, which can have over 90% recycled content.
- Install **refillable** soap, shampoo and shower gel **dispensers**. These need not look 'low budget' as there are now attractive dispensers for wall mounting and a variety of luxury branded amenities that can be purchased in bulk.
- Where standards demand individually-packaged **guest amenities**, ensure these are made from natural, sustainable, biodegradable ingredients and preferably eco-labelled and that the packaging is minimal, recycled and biodegradable.
- Choose **radiators** and taps with a painted rather than a chromed finish. Not only is the chroming process very environmentally damaging, but the radiator will be 10% more energy efficient.
- The larger the **bath or basin**, the more water it will take to fill it. Just using one litre per bath per guest per year less will have a dramatic effect on water consumption.
- Consider installing **programmable controls** to dictate the temperature and maximum fill level of the bath. This enables the guest to press a button to fill the bath, and reduces the risk of it overflowing.
- *See also* ***Section 5.2.2*** *Water efficiency.*

Noise 10

- *See* ***Section 5.5*** *Noise.*

Waste 11

- Provide **waste baskets** with **separate compartments** for paper, glass/cans and other waste to facilitate separation at source by the housekeeping department.
- The compartmentalised waste basket is the first link in a chain involving separate waste areas within **housekeeping trolleys** and **back-of-house** recycling facilities, backed up by **staff awareness and training**.
- *See* ***Section 5.3*** *Waste.*

Main Picture: The eco-guestroom—a model for the future of hotels, with long-term benefits, both economically, and environmentally. Picture courtesy Scandic, photographer: Åke e:son Lindman.

Inset, from top: Corridor motion detector, keycard-activated motion switch, flow-limited shower head, and compartmentalised waste baskets.