Household paint buyers guide

Paint options leaving you with a headache? Daniel Wurm from GreenPainters explains the options available when it comes to environmentally-friendly paints.

In some ways painting is a very sustainable thing to do. After all, it preserves and protects buildings and assets from the damaging effects of rain, UV radiation and corrosion. The problem is that some house paints are an environmental hazard, even if they do help building materials last longer.

Regular paints release low level toxic fumes, causing health problems such as headaches and breathing irritation. Painted surfaces can continue 'off gassing' fumes for months after painting. Considering the fact that the average Australian spends over 90% of their time indoors and that indoor air has 1000 times the pollutants of outdoor air, it becomes apparent that attention needs to be paid to the negative contribution of paint to indoor air quality.

There's also the environmental impact. Many Volatile Organic Compounds (VOCs) react in the atmosphere to form ozone. Ozone compounds in the lower atmosphere are smog-producing and as they rise to the upper atmosphere they react again to form greenhouse gases. Building coatings are responsible for 9% of all VOC emissions, so reducing the VOC amount in paints is one way to reduce ozone formation.

The good news is that there are alternatives. This buyers guide aims to show you some ways to brighten your home without damaging your health or that of the planet. There are low VOC products for the same cost as regular paints, or to lower exposure to synthetic chemical off-gassing, invest in paints that include only natural ingredients.

Painting change

It wasn't until the 1990s that serious consideration was given to the effects paints were having on human health and the environment, although there had been serious concerns prior to this regarding lead content in paint. Solvents, monomers, softening agents and biocides were only some of the components of paints that could cause serious ecological and toxicological effects during their production, manufacture, application, use and ultimate disposal. Painter's Syndrome was identified as a genuine illness that was affecting professional applicators.

Research showed that exposure to chemicals in paints was causing respiratory illness, increased risk of liver and lung cancer and reproductive disorders. Consumers in the European Union started to demand paints made using naturally occurring materials. Legislation in the European Union began to strictly regulate paint ingredients and European manufacturers developed new technologies that drastically cut the levels of VOCs and other toxic chemicals in paints.

Plant-based paints

Today, plant-based paints account for 9% of all paint sales in Europe. Manufacturers, based mainly in Germany, have found ways of replacing petrochemical binders and solvents with plant-derived ingredients. These paints do not form a plastic film but remain a breathable and waterproof layer on the substrate. This means a house can regulate its moisture content which is a bonus—walls are less prone to mould if they can breathe. This property also leads to less blistering and peeling and less mould means better air quality. Plant-based paints are also anti-static, meaning less dust.

Yet the biggest advantage of plant-based paints is the fact they largely con-

tain renewable resources and, because the ingredients are biodegradable, almost all waste products can be composted. They thereby have the lowest environmental impact of modern paints.

Ingredients in plant-based paints are printed on the label or on a technical datasheet so the user can establish whether allergic reactions are a risk. The ingredients can include linseed and citrus oils and these natural VOCs may cause reactions such as watery eyes or respiratory problems in people sensitive to these substances. They also contain plant resins, finely ground minerals and earth pigments.

Drying and cleaning

These paints are simply not as scrubbable as synthetic paints. Do not attack a wall covered in plant-based paint with a scrubbing brush.

Plant-based paints take longer to dry because they don't have the petroleum content to speed up the drying process. They dry by taking in oxygen from the air. Have patience.

Mineral-based paints

Mineral-based paints such as lime or clay paints bond with the substrate, which means they become a sacrificial surface. They gradually wear away until it is time to recoat. However, they generally do not crack, peel or blister and can offer outstanding durability for exterior masonry surfaces.

Timber finishes

A typical conventional option for timber might be to coat it in something containing polyurethane as a base, to provide a hard, glossy finish. Alternatives are natural wood oils, stains and varnishes.

Wood oils

Wood oils work by penetrating deep into the timber and soaking the timber in oil molecules that repel water. The oily molecules do not form a film and eventually wear off, so regular maintenance is necessary. This is achieved by simply cleaning with a pH-balanced cleaner and applying another coat, usually on an annual basis.

Stains

Stains stain the timber to a desired colour, often highlighting the grain and enhancing the natural beauty of the wood. They do not form a coating and are usually overcoated with a longer-lasting oil or varnish.

Varnishes

Varnishes work by forming a water-repellant barrier. They often contain UV-resistant substances, as UV rays from sunlight damage the timber's cells, creating the familiar greying of exposed timber. Molecules in the varnish link up when exposed to air to form a continuous film. This enables them to have high sheen levels and greater water-resistance compared to wood oils, and less maintenance. However, unlike oils, when maintenance is undertaken the entire surface must be sanded.

Heat reflective paints

Paint additives are now available that may significantly improve a building's insulation properties by up to 40%, thereby leading to reduced energy costs and wastage. These products should be considered for their ability to lower greenhouse gas emissions. They contain tiny microspheres—hollow ceramic balls which stop conduction of heat through the paint membrane. On internal surfaces they reduce heat loss, and on external surfaces they reflect heat. They do not affect the paint's adhesion,

A brief history of paint

Over the centuries many substances have been applied to timber, masonry and steel to beautify and protect them. Bitumen, plant oils and mined minerals were the basis for many of these early coatings, with linseed oil, turpentine gum and water often used as solvents.

In the 1930s, the invention of petro-chemical derived plastics led to an explosion of new synthetic substances, produced by chemically altering naturally occurring minerals such as crude oil. It became possible to manufacture coatings that had high resistance to abrasion, high gloss levels and cured to a hard, tough surface. These oil-based coatings contained high amounts of lead, but by 1965 it became apparent that lead in paint was a health hazard and it was progressively phased out of paints. Today, paints rarely contain more than .01% lead content.

The 1960s also saw the development of water-borne coating technology and a new generation of paint became available. Latex water-borne paints were more flexible than oil-based coatings, easier to use, less prone to fading or yellowing and were less hazardous to the applicator and the environment. Hailed as the future of paints, latex paints used acrylic plastics suspended in water, which, once dry, formed a film over the substrate. However, the use of water as a solvent required the use of biocides in the solution to prevent mould and bacterial growth. These biocides have since been discovered to cause the formation of formaldehyde, a proven carcinogen.

Paint manufacturers began to add other chemicals to improve the performance of their coatings. Common ingredients included glycol ethers, acetone and ammonia. Consumers came to expect that their wall coatings should be shiny, flexible, non-fading, UV-resistant, available in any colour imaginable and completely scrubbable. Manufacturers convinced consumers that their surroundings should be coloured to the whims and moods of fashion and the coatings industry experienced an explosion of growth.

useful service life or colour, and are inexpensively applied to maximise the energy efficiency of buildings.

Other heat-reflective paints use special pigments that reflect infrared solar radiation. Because only invisible infrared wavelengths are reflected, the paints improve the energy efficiency of a building, irrespective of how dark the colour is. This property helps the paint membrane maintain a lower temperature, which leads to a longer service life.

Because many of these pigmented heat-reflective paints use regular paint chemistry, rather than natural paint bases, we have not included them in the tables.

Exterior paints and durability

Considerations for exterior paints should include durability (fade resistance, colour fastness, UV resistance), reflectivity of solar radiation, mould resistance, and manufacturing process. There's often some debate about whether it is more important to have durable, long-wearing paints, or paints that are made from renewable materials but which might not last the test of time. Most people fall on the side of durability—after all, it's the home or building that will be damaged, and that's not so sustainable.

The durability of paints is tested by using Australian Standard 1580. Use paints that at least meet this standard. Durability can be measured using tests for abrasion resistance, UV resistance (for exterior paints), washability, fade resistance, colour retention and resistance to saliva, mild acids and sweat. Plant-based paints are not recommended for commercial applications as they offer inferior abrasion resistance and scrubbability. Yet, plant and mineral based paints will not blister or peel and offer higher resistance to mould growth.

Paint tips

- Use natural paints in nurseries and bedrooms of allergy sufferers.
- Always have good ventilation when using paints, even natural paints.
- When using regular paints, adding colour pigments to a low emission light-coloured paint base usually increases the emissions—check with your paint supplier or the manufacturer.

Sustainable manufacture

The production of one tonne of solvent-based paint results in 10 to 30 tonnes of toxic sludge. Even water-borne acrylics can be toxic to the environment, with water commonly used to wash tools after their application. It requires the dilution of 40 million parts to one to render its introduction to the sewer system harmless. Waste-water recycling systems are now available that allow the solids to be taken out of suspension and separated for disposal.

The majority of paint manufacture continues to be petroleum derived water-borne acrylics. Due to the push for Green Star rated buildings, major manufacturers have been forced to lower the level of VOCs in some new products. The Green Building Council of Australia (GBCA) requires that paint used on its Green Star rated buildings meet maximum VOC levels. These levels are based on international models and are also used by several eco-label programs.

Most major manufacturers have wall-paints that meet these guidelines. However, the tints that are used to colour the paints often still contain high levels of VOCs, so colours that require larger amounts of tint will raise the VOC level over the GBCA benchmark. In addition, the glossy water-borne enamels commonly used on timber and steel often contain VOC levels in excess of the GBCA guidelines. Therefore, relatively few manufacturers produce entire paint ranges that have consistently low VOC levels. A plant-based paint will have a more natural tint, perhaps using natural mineral pigments, for example.

Making choices

Just because a paint is classed as low-VOC does not mean it is environmentally preferable. It is important to consider the entire manufacturing process of a product and its environmental impact.

Consumers and specifiers should opt for products which have been independently certified by recognised eco-labeling programs. European products often carry the EU Flower ecolabel, Blue Angel ecolabel or Nordic Swan ecolabel. Manufacturers here in Australia are able to have their products certified by Good Environmental Choice Australia. The GECA program conducts a comprehensive life cycle based assessment of product compliance to voluntary environmental declaration standards and is a member of the Global Ecolabelling Network. Low-VOC paints with the GECA label have excellent durability, comparable to conventional paints.

Paints or products that carry the Energy Star symbol have been independently certified by the Energy Star program as significantly increasing the reflectance of solar radiation by the painted surface. Energy Star certified products can aid a building to reflect unwanted solar energy by up to 50%, reduce its temperature and thereby lower the costs of cooling. Using these products may also help your home achieve Green Star credits.

Using greener paints in sustainable buildings doesn't have to add significant cost to the project. Ultra-low VOC paints are comparable in price with premium paints and plant or mineral based paints only cost fractionally more. As demand for natural paint rises, the cost of sourcing the materials will fall. Futhermore, as the price of oil increases, natural paints will become increasingly competitive with petrochemical-based coatings.

About GreenPainters

GreenPainters was formed in response to the increased demand for environmentally friendly painting solutions and has been operating since 2007. As a non-profit organisation it is working with Sustainability Victoria and Master Painters Association Victoria to help specifiers, applicators and consumers make eco-responsible choices with paint product selection. Certified GreenPainters use environmentally friendly products and strategies to minimise the impact of paint on the environment and the health of individuals.

For more information on green paints, retail outlets, product VOC levels and Certified GreenPainters visit the website www.greenpainters.com.au
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Buyers guide table prepared by *ReNew* staff.

Home-made paint recipes

Milk paint recipe #1

- 1 litre skim milk (room temperature)
- 30gm of hydrated lime by weight (do not use quick lime)
- 450 to 1100gm of chalk may also be added as a filler.

Stir together milk and lime to form a smooth paste. Add colour pigment of your choice and apply with a natural bristle brush. Allow first coat to dry sufficiently before applying another. Finish off with an oil finish if desired.

Milk paint recipe #2

- 4 litres skim milk
- 2 cups builders lime (do not use quick lime)
- 1 litre linseed oil (the boiled type)
- ½ cup of salt
- Dye (colour)—add in as needed

Mix all ingredients together and strain through a cheesecloth. Use within a day or two.

Washing up

Use water and a little soap. Unlike commercial synthetic paints, the residue can safely be poured onto the garden, though be careful not to tip too much lime on one area.