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The Green Building Council of Australia's VOC guidelines for Green Star buildings can be found by clicking on the products link at www.greenpainters.com.au.

Breathing easy

Ahh, the heady smell of fresh paint. When it's on the walls you know the renovation is almost complete. But how do those paint fumes affect you and the environment?

HUMAN BEINGS have been beautifying their homes for millennia. Australian Aborigines were applying ochre to cave walls some 40,000 years ago, and the relatively recent Egyptians were prettying their pyramids around 2500 BC. Even early on, though, there was a price to pay for making our surroundings more aesthetically appealing: chemicals in the paint often contained substances toxic to both humans and the environment. It's taken until now to develop paint that sticks to the walls in a pleasing fashion, without the potential to poison you and your home.

Shedding light on heavy effects

The ingredients used to make ordinary paint are a well kept trade secret. Most paint manufacturers will only divulge the four broad categories of ingredients. These are: pigments, solvents, binders and other additives.

Colour comes from the pigment, while the solvent and binder provide the pigment with a base and help paint stick to a surface. In enamel or acrylic paints the solvent is a hydrocarbon (derived from fossil fuels), while in water-based paints the solvent is mostly water. The remaining additives, usually hydrocarbons, are used for purposes like controlling the rate of drying and preventing mildew formation.

The pigments and hydrocarbon solvents can be toxic for the environment, and in landfill can contaminate the surrounding earth for decades. Lead is one such pigment; it's not news that lead is a health and environmental hazard – in fact, humans have known about its toxic effects for around 4,000 years. It can affect children's developing nervous systems, leading »

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» to speech, language and behavioural problems. And in adults, lead exposure can cause effects like high blood pressure, headaches, memory and concentration problems, kidney damage, mood changes, nerve disorders, sleep disturbances, and muscle or joint pain.

So if lead is so noxious, why was it added to paint in the first place? Naturally occurring lead oxide was used in paints as a white pigment as early as the second century AD. And lead has the added benefits of speeding up drying times, increasing durability, resisting moisture and freshening the appearance of paint. For these reasons, Australian house paints still contained as much as 50 per cent lead until 1965. After that time, government regulation restricted lead content to one per cent, and in 1997 the limit was further reduced to 0.1 per cent.

While modern paint contains negligible levels of lead, if your house or apartment was built before 1965 and has never been repainted, then chances are it has lead paint on the walls. Sanding and scraping is the usual method of removing paint, but this can be problematic if it contains significant amounts of lead. Removal by blasting, burning, dry scraping, dry sanding, and using power tools creates the most serious dangers because the particles are small enough to be inhaled or deposited in furnishings or carpet, making complete removal very difficult.

"My advice is to get in contact with the local EPA, but if it's not flaky it may be safe to paint over and encapsulate it," says Steve Williams of The Green Paint Shop in Brisbane. He suggests using a licensed contractor to remove or paint over lead paint, because they have the expertise and tools to deal safely with the hazard. "They have professional vacuums with an industry filter...a HEPA [high-efficiency particulate air] filter," he says.

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One litre of acrylic paint will contaminate 40,000 litres of water.

A volatile nature

With our harsh climate and strong, bright sun, Australians found they needed something to protect their weatherboard homes from the elements. Petrochemicals derived from crude oil made great solvents for holding the pigment until it dried onto a surface, but in the process they gave paint another toxic element.

The solvents in paint evaporate easily because they are VOCs – volatile organic compounds. Some VOCs are carcinogens or nervous system toxins. They are also associated with symptoms like headaches, fatigue, difficulty in breathing, and eye, skin and airway irritation. Paints with high VOC content also present a serious environmental problem. If disposed of incorrectly, their effects range from contamination of groundwater or soil (which may result in the loss of plant and animal life) to fires or explosions.

Even today, many paints and wood finishes still contain VOCs – as much as 450 g per litre. These VOCs are responsible for the heady fumes that fill a freshly painted room, and can persist for years after application.

Recently, however, many companies have wised up and started producing low-VOC paints. Dulux has EnvirO2, an acrylic interior white base paint, and Wattyl has its i.d range. Both have a far lower VOC content than conventional paint, which means low fumes and paint odours.

According to painter Steve Williams, there are more low-VOC paints around today. "But they are still a tiny proportion of the paint that is sold," he says. "It's still lagging behind Europe and the UK. Italy has been doing this for 20 years."

These types of windows not only improve insulation, but can also significantly reduce noise pollution.

But the most affordable way to simulate double glazing is to use shrink plastic, at a cost of just $20 for a 120 x 80 cm window. It works exactly like glass double glazing, but instead of adding a second pane of glass, a sheet of thin plastic film traps a layer of air between itself and the window. While it's designed to be permanent, if applied with removable tape, shrink plastic could even be used in a rental home.

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Unplasticised PVC (uPVC) window frames are more eco-friendly than regular PVC.

Wooden window shutters are twice as effective as Venetian blinds at preventing heat loss.

Pelmets are not only decorative, but effective in reducing heat loss through windows.

Window coverings

Unlike windows, curtains and blinds have no energy rating system, but there are some principles to keep in mind. Like double-glazed windows, the aim of a good window covering is to create a seal around the window that insulates your home from the elements outside.

Timber Venetians might be fashionable, but they won't do much to retain heat in winter. And aluminium Venetians and vertical blinds are ineffective for the same reason – all those slats let air escape. Better alternatives are insulated Roman, Holland or Austrian blinds.

If the timber look appeals, try wood or polystyrene shutters instead. These are twice as effective as Venetian blinds at preventing heat loss. Shutters can be installed either inside or outside the home but in either case must fit snugly against the window frame, with the louvres closed. Ideal not just for improved insulation and privacy, they also offer an elegant solution for the security-conscious homeowner.

Coming in a close second to shutters are closely woven lined curtains with a pelmet (a cover for the curtain rod), which rate slightly better than standard double glazing. They allow a heat loss of 63 per cent compared to double glazing's 69 per cent. To be effective, curtains must either fall all the way to the floor or be installed so they fit inside the window frame. You can improve the seal even further by applying velcro tape to the outside edges of the curtains and attaching these edges to the wall.

If you like the look of sheer material covers, or other window treatments that provide poor insulation, you could try using a combination of treatments. For example, if you can't live without timber Venetians, double glaze or tuck a Holland blind in behind them. Even more effective is the combination of double glazing with heavy lined curtains and pelmet – this can get your heat loss down to around 47 per cent. Of course, this depends on how well your windows are sealed.

One thing's for sure, though; improving the energy efficiency of the windows in your home will improve your comfort levels and reduce your energy bills. G

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Painting the town

We all need to paint at some time or another. Here are our top 10 eco-tips for low-impact painting.

Most people go through the same paint cycle: a decision is made to paint, colours are chosen, paint is purchased, the job gets done, you decide that you hate painting and will hire tradesmen next time, and finally, you forget about it and do it again a year or two later. Painting can be a 'green' thing to do, since it preserves and protects, making your home last longer. But with about 61 million litres of household paint sold in Australia every year, there is great potential to reduce your ecological impact with a few simple tips.

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Find out more about Good Environmental Choice Australia certification at www.aela.org.au.

Choose environmentally certified products first

Some paint products carry the Good Environmental Choice Australia (GECA) label. While assessment via this scheme isn't mandatory, you can trust the independent certification.

Go natural

Opt for non-VOC paints to avoid the volatile organic compounds that can cause health and environmental problems. (Note, however, that some 'low-VOC' paints no longer meet GECA VOC limits once tinted.) Use natural, plant-based or mineral paints that are made from renewable resources and don't require much processing. Most of these also have low VOC levels since their solvents are not synthetic; some might be high in VOCs, like citrus oil, but these are a lot less toxic than petrochemicals.

Select paint that lasts

If you must paint, use paint 'systems' that have the longest service lives (check manufacturer data). Use the recommended primers and undercoats because most high-quality paints are designed as a 'system' to achieve the best finish and longest life.

Use less paint

Use paint finishes that benefit from weathering and ageing, like 'lime-washes' and mineral silicate paints. Measure the quantity you'll need using the manufacturer's specifications (usually in metres per litre); don't just guess. Avoid thinning down paint to make it stretch further since this degrades the paint and shortens its life. If you regularly repaint to cover graffiti, consider using other control measures (like an anti-graffiti coating) and contact your local council, since most can help you in many ways.

Control waste

Use top-quality equipment and keep it in good condition for a long life – but make sure you clean safely (below). Wrap brushes and rollers in cling wrap between coats to avoid having to wash them too frequently. If you use natural paints, the wastewater can safely be used to water the garden.

Clean safely

Whether you use oil-based (only if you have to!) or water-based paints, use a three-tin cleaning system. Wash the brush in the first tin, then press with a cloth. Rinse in the second tin and press again. Rinse in the third tin (use a tiny amount of biodegradable washing up detergent), dry and store. Allow the first tin to settle, then remove the clear water from the top. When the residue is dry, dispose of it as solid waste. Never dispose

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of the dirty water in the sewer or drain. Instead, pour it on your lawn or garden, which can tolerate small quantities of the wastewater. There are many roller-cleaning systems, so go for one that uses the smallest quantity of water possible.

Make equipment last

Clean brushes, rollers and trays thoroughly and store them away from dust and sunlight. Use a wire brush to remove dry paint from the base of bristles. For best results, wrap the bristles or roller sleeve in paper.

Use it or return it

You can mix several leftover cans of paint (of the same type) to use on surfaces where the exact colour and sheen are not important. However, if it becomes clear that you won't be using your stored paint for the foreseeable future, donate it to a charitable organisation or dispose of it through local waste facilities which will accept paints and used solvents, though fees may apply. Small amounts of unused plant-based paints can be simply composted, as they are completely bio-degradable.

Store well

We all need to store a little paint for touch-ups, but often when you need it you find that the paint has hardened or is tainted by rust inside the can. Store in suitable plastic containers, but NEVER in food or drink containers, as there is a risk of accidental poisoning. Secure the lid, then store the can upside down and mark it with the colour, date and area used. This will stop it forming a 'crust'. There are touch-up kits available, which are specially designed for long-term storage and quick use. It's a lot more eco-friendly to touch-up than to repaint the entire house!

Reduce solvents

Use high-quality, GECA-certified low-VOC paints. VOCs are generally present in paints as solvents. They are implicated in many health issues including asthma and sick building syndrome. Avoid conventional oil-based paints! They contain the highest amount of VOCs (as much as 450g/L), and are now banned in some European countries. Plant-based paints are available with zero-VOC content. These may not be as abrasion-resistant as their chemical-based competitors but they don't peel or flake like oil-based paints and should have long service lives when used indoors.

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Control waste and clean equipment safely using a three-tin cleaning system.