

A guide for residents on alternatives to uPVC





Picture courtesy of The Green Building Store

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Since 1998, Hastoe has been committed to an environmental policy which includes the following objectives:

- Reducing the dependence on non-renewable resources
- Promoting the re-use and re-cycling of materials
- Avoiding the use of potentially toxic and environmentally damaging materials and processes.

Use of uPVC windows is not consistent with this policy or with Hastoe's approach to promoting sustainability.

This guide outlines the reasons behind Hastoe's decision and the alternatives available to residents which are preferable to uPVC both in terms of their environmental implications and their practical benefits.

The guide explains further:

1. What is uPVC?
2. Why shouldn't we use uPVC?
3. The global perspective
4. What are the alternatives to uPVC windows?
5. Timber windows - how green can they get?
6. Timber windows - how will they benefit me?
7. Timber windows – are they more expensive?
8. Who uses timber windows?
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1. What is uPVC?

uPVC stands for unplasticised PolyVinyl Chloride.

There are two types of PVC. The plastic used in packaging is soft PVC, known simply as vinyl. It is made soft by the use of plasticisers. The plastic used to make windows and doors is hard because it does not contain plasticisers to soften it, hence 'unplasticised' PVC.

2. Why shouldn't we use uPVC?

Some of the reasons Hastoe is reducing the use of uPVC in the properties it owns and leases are outlined below. They are associated with each stage of the lifecycle of uPVC windows.

Manufacture:

The manufacture of uPVC is an energy intensive process and there are associated environmental risks of oil extraction and global transportation. The manufacturing process requires the use of highly toxic chemicals, resulting in toxic by-products which have demonstrated hazards to health.



Timber windows in new homes at Widecombe, Devon. Hastoe Housing Association.

Durability:

uPVC windows are claimed to last up to 20 years. They have been widely installed in the UK since the early 80s. However, the lifespan of uPVC is as yet unclear, and it is known that low quality formulas degrade over time, breaking up and becoming brittle.

Repair:

It is impossible to repair uPVC windows, and even slight damage requires the whole unit to be replaced.

It is difficult to increase the security of uPVC windows - to repair or replace catches and locks, or to add restrictors.

Maintenance:

It was believed that uPVC would not require painting. But Dulux have developed special paints intended to prolong the life of the product, suggesting otherwise.

Reuse:

Removing a window is difficult without damaging the unit, and so there is little possibility for reuse.

Disposal:

uPVC is very difficult to recycle, and the chemical process of doing so is

environmentally damaging. Most uPVC in use will end up as waste, to be incinerated or sent to landfill.

Landfill of such a bulky product is a problem, and may cause soil and water contamination.

Incineration is contentious, as the potential for releasing harmful chemicals makes it a high risk process. Current belief is that the process of uPVC disposal will become regulated in the same way as asbestos disposal.

Performance in use:

In use, the energy efficiency of uPVC windows is comparable with timber and composite windows. uPVC is relatively inert in use, with no evidence of health risk to occupiers. It is during manufacture and disposal that uPVC can be hazardous.

However, the visual appearance of uPVC windows, and their compatibility with existing windows is a problem on many existing Hastoe estates. It is also often banned by the planners in conservation areas.

3. The global perspective

In 1998 the UK Government, the European Commission, and 14 other countries signed a legal agreement to end all discharges of hazardous chemicals into the environment by 2020.

They created a list of those chemicals which they considered most hazardous and which should be the first to be eliminated. This list specifically targeted chemicals which do not degrade easily in the environment, and those which build up in animals' bodies and become more concentrated over time and are toxic.

This priority list of 15 chemicals includes six chemicals which are involved in the manufacture and disposal of PVC: dioxins, furans, lead, cadmium, mercury and organic tin compounds.

Following growing environmental concerns, a number of major companies including Ikea, Marks & Spencer, and Lego have cut out, or are phasing out, all use of PVC in their products and packaging.

Some European countries have taken the lead in eliminating these pollutants by reducing PVC manufacture. Sweden has a national restriction on PVC manufacture, local authorities in Austria, the Netherlands and the Nordic countries have restricted PVC, and 62 cities in Spain have been declared PVC-free.

Appropriate alternatives to uPVC are available that have been demonstrated to perform as well, with:

- less energy involved in their production;
- fewer toxins involved in manufacture,
- a longer life span;
- simpler maintenance and repair;
- efficient thermal performance and comfort to residents; and
- better recycling opportunities.



uPVC incineration waste awaiting landfill.
Picture courtesy of Greenpeace.

Picture courtesy of Rationel



4. What are the alternatives to uPVC windows?

Timber

Wood windows have come a long way. Modern factory-made wood windows are supplied ready finished in the colour or stain of your choice, double-glazed and fitted with security latches. Micro-porous water-based stains or paints allow wood to breathe and minimize water retention and damp penetration. For ease of maintenance, the benefits of wood can also be combined with other materials like aluminium (as above) or be sealed with a laminate. Whereas uPVC once lasted longer than timber, factory-finished, ready double-glazed, softwood windows now often come with a 30 year guarantee¹.

Steel and aluminium

Metal windows are an alternative. However, they do not perform as well in terms of comfort levels as timber or uPVC. The manufacturing process can also be highly energy intensive. This is particularly true of aluminium and even though it is extensively and relatively efficiently recycled the overall environmental impact is still high. In environmental terms however a timber window clad with aluminium is considered preferable to a uPVC window².

Costs for metal windows are comparable with the more expensive timber windows³.

Fibreglass

There is a growing market for fibreglass window-frames. They are low-maintenance, needing no painting for the first 20 years or so. Guarantees of 35 years are offered on the frames, and 15 years on the double-glazed unit⁴. Unlike uPVC frames, they are easy to repair, and they are thought to be less harmful to the environment⁵. The initial cost of the windows is a little more than uPVC, but there should be substantial savings over their life spans.

Other plastics

Window frames are being made from a plastic which is free of some of the more harmful toxins, more easily recycled, and considered to be environmentally safe. They are manufactured in Berlin and used throughout Europe, but these are not yet available in the UK⁶.

5. Timber windows – how green can they get?

Suitably managed, high-performance timber windows with a micro-porous water-based stain or paint can provide the best solution to the long-term requirements of Hastoe and its residents.

The issues to consider in sourcing timber frames are:

- that the timber is from sustainably managed forests.
- ideally the timber is independently certified, by the Forest Stewardship Council or equivalent.
- preferably, timber is sourced as near as possible to the point of manufacture.
- the type of timber treatment and finishes should be as environmentally benign as possible.

Construction Resources, the ecological builders' merchant in London are able to provide expert advice about the green specification of windows: 020 7450 2211 or sales@ecoconstruct.com
www.constructionresources.com



Picture courtesy of The Green Building Store.



6. Timber windows – how will they benefit me?

Will they cost more?

High performance, double-glazed, timber windows need not cost more than uPVC equivalents. In the UK the National Housing Federation⁷ and some local authorities⁸ have found uPVC window frames cost more than timber to buy, and as much as timber - or more - to maintain. For more information, see *Timber windows – are they more expensive?*, on page 11.

Won't they need frequent repainting?

Whatever the type of window, painting may be needed. It is widely accepted that uPVC windows degrade. Over time

they can become brittle, discolour, and develop hairline cracks. A range of protective paints for uPVC have been launched which reflects a market need for this.

uPVC window-frames, unlike timber, cannot be repaired once they have degraded, but have to be replaced.

Developments in design and paint systems allow timber windows to be pre-treated to minimize painting. Most manufacturers now offer factory pre-finished options with guaranteed performance. For example, the UK's largest manufacturer, Jeld-Wen, offer guarantees of up to 8 years on certain factory finishes against blistering, cracking, flaking or erosion of the finish.

All timber used for windows is treated with preservative or is naturally durable and, again, guarantees of 30 years or more are regularly offered against rotting. With reasonable maintenance timber can be expected to last in excess of 60 years⁹.

Does wood last as long as PVC?

A well-designed timber window will probably outlast a uPVC window of comparable quality: The National Housing Federation (1998) gives vacuum treated softwood frames a life expectancy of up to ten years more than uPVC frames.

Timber frames which are damaged can easily be repaired, unlike uPVC frames.

Are wood windows as secure as uPVC?

Security is of paramount importance to householders. As many have found to their cost, uPVC doors and windows are not always as robust as they first appear. Forced entry by cutting out uPVC door panels or springing a plastic casement out of its frame is not uncommon.

Solid timber sections, on the other hand, are considerably stiffer than many corresponding plastic versions, meaning that large casements cannot be twisted or sprung and complex multi-point locking mechanisms are not necessary. Timber also absorbs many impacts without bending or shattering.

In addition, modern timber windows are glazed using adhesive glazing tape behind the beads, meaning that it is almost impossible to remove the glass without breaking it first - no easy task with toughened, double-glazed units!

Unlike uPVC frames, timber frames can easily be upgraded with additional security if required. 'Secured by Design' is a police initiative to encourage the building industry and housing providers to incorporate crime prevention measures at the design stage. Many timber window manufacturers, including a number of those listed under *Manufacturers and Suppliers*, now produce windows that are 'Secured by Design'.

Will they really make a significant difference to the environment?

Yes! See *Environmental Impact*, on page 14.



Timber windows in new homes at Widecombe, Devon. Hastoe Housing Association.

7. Timber windows – are they more expensive?

It is often assumed that timber windows will always cost more than uPVC windows, but this is not the case. Very low-cost windows are available of both softwood and uPVC, but the lower cost windows will usually be of lower quality. A timber window of mid-range quality is likely to be the same price as a uPVC window of comparable quality. In the following examples, the cost of softwood windows is compared with the cost of uPVC windows. Hardwood windows, which can be very expensive, are not considered here.

A study by the Building Research Establishment³ found that the cost of buying and installing softwood windows can be lower than for uPVC windows:

Cost of purchase and installation (BRE Study, 2000)	
Window	Cost
UPVC frame, double glazed	£150-£530
Pre-treated softwood frame, double glazed, painted inside and out	£70-£320

This echoed earlier findings by the National Housing Federation⁷ (1998) which considered maintenance costs in addition to buying and installation. The costs over 30 years were averaged at:

Cost of purchase, installation and maintenance (NHF Study, 1998*)	
Window	Cost
uPVC frame	£258-£274
Softwood frame	£150-£200

* Prices are for solvent-treated timber. Water-based borate treatment is less harmful to the environment and costs about the same. Durable heartwood, at the time of research, cost more than softwood, but does not need any preservative treatment.

Wood windows are easily repairable, look good, and feel good. They do not need to cost more than uPVC, and the cost to the environment will certainly be less.

See *Manufacturers and Suppliers*, page 13, for more information on where to buy them from.

8. Who uses timber windows?

There are plenty of examples of housing association and private housing where timber windows have been specified in preference to uPVC.

The pictures throughout this guide illustrate some examples.

9. Manufacturers and suppliers*

The table opposite includes suppliers of non-uPVC windows and conservatories. For information on building your own hardwood conservatory, visit www.diy-hardwood-conservatories.co.uk

When choosing timber, please consider whether it has been grown in forests which are sustainably managed. Ask for timber certified by the Forest Stewardship Council, or see their website for sources of supply: www.fsc-uk.org



Picture courtesy of The Green Building Store.

Name	Product	Contact
A&M Contracts Ltd	Rational timber/ composite windows and timber doors	01442 891166
Aanco Timberworld Ltd	Timber (and aluminium) conservatories	01642 634664
Andersen/ Black Millwork	Timber windows	01283 511122
Baltic Pine Conservatories	Timber conservatories	0800 269044
BenKoski Ltd	Rational timber/ composite windows and timber doors	
Crown Fenestrations Ltd	Fibreglass windows	01302 738612
Dale Joinery Ltd	Timber windows & conservatories.	01706 350350
Ecomerchant Ltd	Timber windows	01795 530130
Environmental Construction Products (Green Building Store)	Ecoplus System of timber windows, doors and conservatories.	01484 854898
Glyngary Joinery	Timber sash windows	01925 763836
The Loft Shop	Timber roof windows	01903 738 506
Magnet Ltd	Timber windows and conservatories	01535 661133
Rugby Joinery UK Ltd	Timber windows	0870 126 0000
Swedhouse Ltd	Timber windows	01483 284004
Swedish Window Co Ltd	Timber windows	01787 223931
Westbury Conservatories Ltd	Timber windows and conservatories.	01371 876576
Wickes Building Supplies	Timber windows and conservatories	020 8901 2000

*The list of manufacturers and suppliers is not exhaustive, and is not intended as endorsement or recommendation.



10. Environmental Impact

In the UK, almost a quarter of the PVC used is for the manufacture of uPVC windows and doors¹⁰. Around 5.7 million uPVC windows are being sold in the UK annually¹¹.

When these uPVC frames are damaged, disintegrate or are replaced for other reasons, they will contribute to a huge PVC waste mountain, which we will have to deal with. This mountain of waste has been forming since the plastics boom began in the 1960s, as more and more PVC products reach the end of their useful life.

There are about 150 million tonnes of PVC in existence now, mostly from construction, and it is estimated that by 2005 there will be 300 million tonnes of PVC, globally, in the waste stream¹².

What can be done with all this waste? Since PVC does not biodegrade, it must either be buried or incinerated, and both of these options involve more pollution.

The industrial pollutants resulting from PVC manufacture and disposal include: dioxins, furans, lead, cadmium, mercury, and organic tin.

Dioxins are among the most harmful chemicals in existence, and are known to cause cancers in humans and disrupt hormones. PVC manufacture and disposal is the main source of dioxin pollution.

Vinyl chloride has been linked to various cancers, angiosarcoma, increased incidence of liver, lung and brain tumours and both male and female reproductive disturbance. PVC manufacture in Britain releases hundreds of tonnes of this chemical into the environment every year.

The majority of uPVC windows bought each year in the UK - about 80% - are bought to replace existing windows¹¹. Clearly, if people chose to replace windows with alternatives to uPVC, the environmental benefit would be significant.

Toxic chemicals which are involved in the manufacture and disposal of PVC: dioxins, furans, lead, cadmium, mercury, and organic tin



11. For More Information...

Association for Environment Conscious Building
PO Box 32
Llandysul
SA44 5ZA
Tel: 01559 370908
www.aecb.net

The British Woodworking Federation
56-64 Leonard Street
London
EC2A 4JX
Tel: 020 7608 5050
www.bwf.org.uk

The Building Research Establishment
Garston
Watford
WD25 9XX
Tel: 01923 664000
www.bre.co.uk

DIY Hardwood Conservatories UK Ltd.
www.diy-hardwood-conservatories.co.uk

Construction Resources
16 Great Guildford Street
London
SE1 0HS
Tel: 020 7450 2211
www.ecoconstruct.com

Forest Stewardship Council
Unit D
Station Buildings
Llanidloes
Powys
SY18 6EB
Tel: 01686 413916
www.fsc-uk.org



Picture courtesy of The Green Building Store.

The Green Building Store
11 Huddersfield Road
Meltham
Holmfirth
West Yorkshire
HD9 4NJ
Tel: 01484 854898
www.greenbuildingstore.co.uk

Greenpeace
<http://www.greenpeaceusa.org/toxics/solutionstext.htm>

National Green Specification
<http://www.greenspec.org.uk/pages/default.asp>

Sustainability Works
www.sustainabilityworks.org.uk

Sustainable Homes
Harlequin House
7 High Street
Teddington
Middlesex
TW11 8EE
Tel: 020 8973 0429
Fax: 020 8943 2163
Email: info@sustainablehomes.co.uk
www.sustainablehomes.co.uk

Wood for Good
www.woodforgood.com



Timber windows in new homes at West Dean.
Hastoe Housing Association.

References

¹ BRE's *Green Guide to Housing Specification* (2000) (see below) compared a double-glazed uPVC frame and a pre-treated softwood frame (double-glazed, painted inside and out). A typical replacement interval of 25 years was estimated for both.

The National Housing Federation report (June 1998) (see below) gives PVCu frames an estimated life expectancy of 20-25 years and vacuum treated softwood frames 25-35 years.

Manufacturers such as Rugby Joinery, for example, offer a guarantee of 30 years on their timber frames, against rot/ fungal attack.

² *Alternatives to PVC - Suppliers Guide*, 1996. Compiled for Greenpeace by the Association for Environment Conscious Building.
www.aecb.net

³ *The Green Guide to Housing Specification*, 2000, Building Research Establishment.

⁴ Fibreglass windows are fairly common in Canada and the USA. The guarantees quoted are presently offered by a UK manufacturer, Crown Fenestrations Ltd (November 2002).
www.crownfenestrations.co.uk



Timber windows in new homes at Shenley Lodge, Milton Keynes. Hastoe Housing Association.

⁵ The Network Group for Composites in Construction, a part of the Building Research Establishment, are promoting the use of fibre-reinforced polymers in the UK. They have information about fibreglass manufacture, but are unaware of any lifecycle analyses having been carried out to compare the environmental impact of uPVC and fibreglass windows. The Sustainable Composites Network <http://www.bc.bangor.ac.uk/suscomp/> are researching the use of natural products to be used in composites instead of glass.

⁶ Polypropylene windows are listed by Greenpeace as environmentally preferable to uPVC windows. They are presently supplied throughout Europe by Internorm Ltd. (based in Berlin): www.internorm.com

⁷ *Standards in Quality and Development*, June 1998, National Housing Federation.

⁸ Carlisle City Council have carried out a cost comparison (1998) between uPVC and high-performance softwood double-glazed units. It found that uPVC windows

were 25% more expensive initially, with negligible difference in costs over a 30-year period. The cost for timber was based on Carlisle's five-year maintenance cycle at water-based staining and the figure for uPVC also included an allowance for some maintenance.

⁹ www.woodforgood.com

¹⁰ *Life Cycle Assessment of Polyvinyl Chloride and Alternatives: Summary Report for Consultation*, 2001, Department for Environment, Food & Rural Affairs.

¹¹ *UK Market for Residential Windows and Doors*, 2001, MSI Marketing Research for Industry Ltd.

¹² *PVC Plastic: A Looming Waste Crisis*, Wytze, van der Naald and Thorpe, 1998, Greenpeace.

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Web: www.sustainablehomes.co.uk

Please note that information has been gathered together in this guide with the aim of providing helpful advice to residents. The information in the guide is believed to be accurate at the time of writing, but neither Hastoe nor Sustainable Homes can accept any liability arising from it.