

INDIVIDUAL HOMES

# HOMEBUILDING & RENOVATING

NOVEMBER 1998 ■ £2.50



You don't have to be a lentil eating, sandal wearing earth warrior to appreciate that we all need to be aware of environmental issues, especially when planning a new home. Clive Fewins finds out how you can build successfully with minimum damage to the planet.

We have all heard of 'Eco' housing, but what does the term really mean, and what sort of 'eco' features can the self-builder who is constructing a house to a budget build into his home?

Strangely enough, the very word 'ecology' is derived from the Greek 'oikos', meaning 'house'. In the study of ecology, animals and birds are all said to live in their own 'habitats' and their lives, foods and nests are part of chains, or flows, of material and energy. A house is, therefore, a habitat and, if it is ecological, it should be part of an interdependent chain — in other words be part of the ecological balance.

The contention of modern 'green' building enthusiasts is that houses have become so far removed from this concept, that they are often excessive consumers of energy, with all the implications that has for the future of our planet. In particular, the emission of greenhouses gases, notably carbon dioxide, and the widening of the hole in the ozone layer.

For example, it has been suggested that the 'embodied energy' — the energy used in the manufacture and transport of the materials — of a typical 100m<sup>2</sup> house is about 115,000 kilowatt-hours (kWh). A kilowatt-hour is familiar to us as a unit of electricity. A very well-insulated house might consume about 5,000kWh of primary energy (just under 100 units a week) for space and water heating. This means that it will take 20 years for the house to consume as much energy as was used in its manufacture.

To be 'Eco' in our approach to self-build, therefore, means that we should look just as carefully at the sort of materials we are going to use as we should at ways of cutting down the use of primary energy when we eventually live in our home.

**The Wider Picture:** It has been estimated that about 30% of UK primary energy consumption takes place in private homes, so there is still a huge need to cut down on

unnecessary domestic heating bills. When we look at building materials, the construction industry as a whole accounts for about 7% of the UK's primary energy consumption. About 60% of this is in materials production and in distribution. Energy use means consuming fossil fuels which means pollution, with all the damage that causes to health and the environment.

Is the self-sufficient house really feasible? The answer is 'Yes', according to green building campaigner Keith Hall, who runs the Association for Environment Conscious

Building (AECB) and edits the association's magazine, 'Building for a Future'. He described a house built by 'eco-architects' — Robert and Brenda Vale — in Nottinghamshire. It is a four-bedroomed detached house within a conservation area, so it had to be 'in keeping' with the local style when it was built 5 years ago. The house derives its space heating from passive solar gain, its electrics from photovoltaics or solar electric systems, its water from rain and it turns most of its waste, including that from the dry composting toilets, into useful garden fertiliser.

# ECO

## HOUSE STYLE







▲ Photo voltaic systems convert the sun's energy into usable electric current even on dull days. This Redland system (01306 872000), used here in Germany but now available in the UK, replaces ordinary interlocking slates with PV panels.

◀ Architect Michael Winter's Boundary House makes use of eco friendly glulam beams, passive solar gain and a rainwater harvesting system. It is built on columns that sit on small concrete pads, thus minimising the impact on the wooded site.

Photograph courtesy of John Edward Linden



The only additional heating is the occasional log burned on the centrally-positioned stove on very cold days. More than 80% of the reduction in energy demand was achieved at no extra cost, simply by incorporating certain design features.

These include 250mm glasswool cavity insulation, 500mm of Warmcel (recycled shredded newsprint) in the roof and beneath the concrete beam and block ground floor and small areas of triple-glazed krypton-filled Swedish-made windows with low-E coated panes.

Not all self-builders are likely to go to these extremes — this was, after all, a house built to prove a point. However, there is much that the intelligent self-builder can do if he is starting a house from scratch.

**Power from the Sun:** According to researchers at the Centre for Alternative Technology at Machynlleth, Powys, passive solar energy has been much under-rated over the years. One of the main reasons for this is that it is the only renewable, and, therefore, pollution-free energy source most people are likely to use.

"People forget that solar water heating systems do not need to replace conventional

systems. They pre-heat the water so that conventional heat sources — such as gas or electricity — have less work to do. Basically it will save fuel," said CAT spokesman Paul Trimby. "They are not as site-specific as wind or water power sources, but even on the dullest summer days they will have some effect on the temperature of your hot water. On hot summer days they are capable of providing 100% of your hot water. It is in the winter months, November to February, that they will barely operate. At that time of the year it might be wise to treat them with anti-freeze or even drain them down.

"A passive solar house should ideally 'face' somewhere between south-east and south-west. In winter the principal windows should not be shaded. In the summer months it is essential to shade them."

Paul estimates costs at installing solar hot water panels in a new 100m<sup>2</sup> house at £1500-2,000 — adding about 2-3% to the total cost of the build. He estimates average payback time as seven years — less than that of double glazing. "They are at their most effective when installed as part of the structure of the house when it is built, rather than retro-fitted," he says.

Photovoltaic systems are far more expensive — £5-6,000 per kilowatt of capacity — that is, about £20,000 for an average-sized house. The use of photovoltaics (pvs) is a direct energy-generating technology and will operate on the dullest of days — providing there is some daylight. Silicon cells inside the panels produce instant energy as photons from the sun collide with the silicon and are forced along wires as their only escape route.



▲ 'Hilldrop', built by John Little and Fiona Crummay, is a low impact, low energy home which only cost £35,000 to build. Designed by Architype (0171 403 2889) the roof is planted with wildflower seeds and in the summer is a riot of colour.



"We are watching pvs very closely," Keith Hall of the AECB said, "We feel the price is bound to drop. One way in which you can reduce the cost of installing pvs is to use a system that matches a modern range of roof tiles, such as Redland's 'Solar Watch'."

However, experts advise that there is no sensible reason to go for pvs unless you have opted for solar water heating first and have a low-energy house.

**Insulation:** You do not need to be truly 'eco' to realise the full value of installing roof and wall insulation and double or triple glazing in your self-build house. However, few seem to explore the concept of 'thermal mass' so beloved by eco-architects. Like so many other aspects of eco-architecture, the basic concept of thermal mass is simple. It is merely the capacity of a substance to retain heat — so stone and concrete walls keep warm longer than wooden ones and more massive walls retain heat longer than less massive ones.

The idea has been used to good effect in the house of another eco-architect, Dr Sue Roaf. Again, this is a fairly standard-looking modern house, squeezed between other ordinary looking homes in a quiet suburban road in Oxford. The appearance was deliberate, to reassure people that zero energy use can be achieved without producing a building that is so unconventional to look at that it might be rejected by planners in all but the most out-of-the-way locations.

The difference between Dr Roaf's house and all the other large detached houses in the road is that at the south-facing rear is a roof containing 5m<sup>2</sup> of solar hot water panels and 4kW of photovoltaic solar panels. Apart from two rooflights these cover the entire roof.

There is also a two-storey double-glazed timber structure at the rear which acts as a solar collector, introducing passive solar energy which is stored in the mass of the building.

The walls of the house are relatively conventional — brick and block with high density insulation in between. The ground and first floors are concrete and almost all the internal walls are high density 150mm thick concrete block. Most of these walls are central, enclosing the staircase, giving the house a central core of concrete blocks that adds to the thermal mass of the outside walls and floors.

The walls at the rear of the building are angled so that in winter, sunshine floods in and in summer, when the sun does not get into the house at all, thermal mass helps to keep the building cool. Sue's electricity bill last year was £49. It was spent powering her dishwasher, maximum energy-efficient fridge, microwave and lights. She has opted to do without a freezer. She cooks over gas — her gas bill is about £57 a year — and any additional space heating is via a Scandinavian 'Kakklovnen' ceramic wood burning stove.

**Water:** After insulating your property well, one of the most important areas to look at is the use of water. We all know how easy it is to collect rainwater from the roof and re-use it for garden watering, but it is more difficult to collect this water and recycle it round the house to replace the mains water that feeds the lavatory cisterns and (in a rising main system) upstairs cold taps.

There are systems for doing this in new-build, which as a conscientious self-builder, you may care to look into. It is more difficult to purify and recycle 'light grey' water —

water that has been expelled from washing machines, dishwashers, baths and showers — and re-use it for flushing toilets, although systems are available for this too. To convert rain or waste water into drinking water however, is a task for the dedicated. "To produce the extra quality needed for drinking water is expensive and there is a long pay-back time before it becomes cost-effective," said Louise Halestrap, water specialist at the CAT. "In general it is wise to stick to the mains for drinking or 'potable' water as it is known."

Re-use of urine from wc pans, however, is a different issue. Many 'green' gardeners, appreciating the value of urine, when diluted with water as a soluble fertiliser, have means of collecting this valuable commodity. One way to save urine and recycle it to the garden is to install a low-flush loo with urine separation, which channels the urine to a separate tank for diluting with water and using as a garden fertiliser. "These systems can reduce the amount of water used for toilet flushing by as much as 90%, so they are especially welcome if you are on a water meter," said Louise. At his farm in Wales, Keith Hall of the AECB extracts the urine to a place on his land where it is absorbed by straw bales which are ultimately spread as feed around fruit trees.

An alternative is to have a composting toilet. Earlier this year Bill Harvey and Gill Westcott, who farm near Ilfracombe in North Devon and have water supply difficulties, won a fight against their local authority in the magistrates' courts over their composting toilet. It was ruled that the toilet did satisfy the relevant section of the building regulations and was adequate as a sanitary appliance.

At Palgrave in Suffolk eco-architect Neil Winder had no such problems. His toilet is situated in a ground floor lean-to attached to his house. The waste matter falls into purpose-built bins beneath. He has been using it for two years, the first 18 months of which were monitored by the building inspector. Unusually, although he has mains water in his house, he has no back-up flush toilet. "We find it ideal and there are no excessively unpleasant odours," he said.

◀ Dr Sue Roaf built her eco friendly house in a suburb in Oxford, blending it with the other houses in the street. From the front its 'ordinary' appearance aims to reassure that zero energy houses can look conventional.



Photograph courtesy of BP Solar





▲ Norman and Ann Stanier's Dragon House won the Daily Telegraph/IH Eco Award in 1996. Their Taylor Lane timber frame home incorporates many eco features, such as passive solar gain and a wetland sewerage system from Ebb and Flow (01453 836060).



Photograph courtesy of Philip Bier

**Healthy Interiors:** The eco approach avoids the use of materials containing hydrochlorofluorocarbons (HCFCs) and other ozone-destroying chemicals. As well as some forms of insulation material, this includes pvc – widely used nowadays in drainage systems as well as in 'plastic' doors and window systems and for most gutters in new houses.

A more acceptable plastic is high and low density polyethylene (HDPE and LDPE), as it is free from ozone-destroying CFCs and other highly toxic chemicals such as dioxins. Some pipes are made from it but not windows, although GRP (glass reinforced plastic) is now used for some window systems and eco-architects consider it far more acceptable than pvc.

Green building specialists do not advocate the use of conventional oil-based paints and stains and only support the use of environmentally-friendly foams. "HCFC-based foams can achieve exceptional U-values, but apart from the environmental damage they cause, the insulation value reduces when they age as the gasses migrate out of the material," said Keith. "Ultimately they will revert to the same insulation levels as that of expanded polystyrene, which, being fossil fuel-based, is at least preferable to ozone-destroying materials."

Campaigners such as Keith recommend ranges of paints that are plant-derived and,

therefore, bio-degradable. This means oil-based paints are 'out' and all 'approved' emulsions are manufactured to water-based non-vinyl formulas. "Very little pollution is involved in the manufacture and disposal of these paints," he said.

Eco-architects also prefer to avoid chipboard and medium density fibreboard (mdf), in which there is a high proportion of non-biodegradable formaldehyde-based glues which are widely thought to emit a gas that has been associated with 'sick building syndrome', notably itchy eyes and respiratory problems. Plywood and sterling board contain less high concentrations of harmful glues, but the one with the least – only about 3% – is strandboard.

### Timber Frame or Brick and Block?:

Surprisingly, you can build 'green' and use concrete block. This is because the majority of green architects would consider concrete blocks to be energy efficient in terms of their materials and the payback time it takes them to 'earn' their place in the building. Over a 10 year period they have been shown to result in lower energy consumption than the same building using lightweight insulated blocks.

"If you are using timber, it is much more economical to use small sections and lengths, so the thinnings of the forest, laminated if

## Useful Contacts

### I-Beam Systems

Filcrete/Masonite: 01482 223405

CTC: 01925 604141

Truss Joist MacMillan: 01527 854853

### Sustainable or Reclaimed Timber Suppliers

Altham Hardwood Centre: 01282 771618

Charles Ransford Ltd: 01588 638331

Ecological Trading Co: 01427 719009

Mick Jones Timber: 01938 500283

EC Forest Products: 01428 741505

Powys Castle Estates: 01938 552554

Easiwall Natural Partitioning Board:  
01379 783465

DLW Floorings: 01235 831296

Natural Wood Flooring Company:  
0181 871 9771

Forest Stewardship Council: 01686 412176

Old Time Timber: 01787 277390

CFS Floors: 01483 720202

### Windows

Environmental construction products:  
01484 854898

The Green Shop: 01452 770629

Pilkington Glass: 01744 28882

The Swedish Window Company:  
01787 223931

Swedhouse: 01483 284004

'O' Windows (UK) Ltd: 01263 735454

Nor-Dan: 01698 383364

Velfac: 01223 426606

Reddiseals: 01905 779961

Construction Resources: 0171 450 2211

necessary, to form longer sections, can be used," said Cindy Harris, who is in charge of building at the CAT and author of the newly-published 'Whole House Book', available from CAT Publishing. "We are certainly not against concrete blocks and cavity walls, but we do advocate using plastic insulating cavity wall ties because they stop cold bridging through the skins of the wall and are particularly to be recommended if you are using the blockwork in a wall to store heat. We are very fond here of timber frame studding and roof rafters built to the I-beam shape, using a 'webbing' of softboard in between," she said. Products like this use minimal virgin timber and uses large solid timber studs instead of expensive treated imported softwood. They make more use of a tree than log conversion for solid timber and can utilise lower grade faster-growing species.





◀ Green oak timber frames, made from sustainable forestry sources, are a great way to build 'green' as well as a very attractive – albeit expensive – way to build. This frame is from the Green Oak Carpentry Company (01730 892049).

"They are considered green because they close the circle, so to speak, said Cindy Harris of the CAT. "You are replacing soil that you have dug out to construct the building."

The roof covering most favoured by the researchers at the CAT is natural slate. This is because it has low embodied energy, a long life, is recyclable and the production process is not energy-intensive. The counter argument is that it has to be extracted from the ground – but this is considered a fairly efficient and non-wasteful process – and the price is high.

Among metal roofs, aluminium is not favoured because a huge amount of energy is involved in its manufacture. Copper is considered more acceptable, despite having a high energy cost and a production process that involves pollution, because it is recyclable.

**Space Heating:** To maximise savings from your well-insulated house the heating system must be controllable. Controls are usually an excellent investment, but thought must be given to the appropriate placing of sensors.

As electricity is generated with about 30% efficiency and much pollution is created in its generation, environmentalists consider it a premium fuel that is too valuable for use as space heating. Ideally, your well-insulated eco house should concentrate on woodburning for its heat.

If this sounds both unrealistic and idealistic in suburban streets, consider the efficiency of

In interior or exterior walls, I-beams are much less wasteful than using whole timber studs. The effect is very strong and it is a method that also avoids cold bridging – that is, any path of heat or cold spanning the two leafs of the building which results in heat loss – and provides a large cavity to pour insulation into, according to Cindy. They also like to use oak thinnings, cut from local forests, which are cheap and plentiful in Wales.

The form of timber framing they prefer is a 'breathing wall', an attempt to regain the breathing effect of traditional solid wall construction while incorporating high insulation levels. In a timber-framed building 'breathing walls' avoid the need for a plastic vapour barrier. The idea is to allow air and moisture to pass very slowly through the fabric, depending on internal and external conditions, and to provide a filter effect for indoor dust and pollutants as they pass through the wall.

**Windows:** PVC windows are avoided at all costs by the eco lobby both because of the chemicals involved in their manufacture and problems with disposal. Likewise aluminium windows because of the high energy cost involved in their manufacture and the condensation problems traditionally associated with them. Steel is also considered thermally very bad.

Timber, on the other hand, looms large as it is the only renewable material that will do the job. The big issue is how long it will last and, therefore, the use of preservatives. Redwood needs to be treated with preservative, so native (not tropical hardwood) timbers are preferred such as oak, chestnut and durable softwoods that don't need chemical treatment e.g. cedar of Lebanon, Douglas fir and larch.

Acceptable wood treatments are plant-derived, biodegradable, and breathable. They usually incorporate inorganic borates.

**Glass:** Low-E glass, such as Pilkington K-glass, that has been treated with a low emissivity coating, improves the thermal performance of a double glazed unit, as does increasing the space between each layer of glass. Filling the unit with an inert gas, such as Argon, improves thermal performance but adds to cost. Triple glazing is another option that will cut energy loss through a building's fenestration.

**Roofs:** As when building timber frame walls, it is 'eco' to use I-beams rather than solid timber to build roofs. They are light, easy to work with, strong, long and it is easy to run ducting through them.

I-beams are perfectly strong enough to support one of the most popular forms of roof with the green lobby – the planted roof. Although this is often referred to as the 'turf' roof, the most favoured form of vegetation nowadays is Sedum, a succulent that needs little water. Nowadays, planted roofs are found in cities, as a means of introducing the 'green factor', as well as in rural locations. This is because they are cheap, they reduce the amount of wasted land taken up by producing other forms of roofing and they are very attractive. However, they do not necessarily provide good insulation and so need plentiful layers of insulation beneath the rafters – although they help keep a building relatively cool in summer. They need a low pitch – maximum 30° – and strong construction, using deeper-than-usual rafters.

Joyce and Mike Embleton's energy efficient ▶ 1,520 sq. ft. bungalow was built for £200,000. The house has a SAP rating of 100 making it a prime example of energy efficient building. It was constructed using the Beco Wallform (01652 651641) system (SEE INSET) which is a quick, simple and thermally efficient building system.





stoves such as the 'Kakkelovnen' — Scandinavian ceramic woodburning stoves — found in Sue Roaf's eco-house in Oxford.

"Sustainably-produced wood is carbon dioxide neutral. The CO<sub>2</sub> produced when wood is burned is taken up by the next generation of trees grown for fuel," said Sue, who heats her home in Oxford using a Kakkelovnen. "Even accounting for all of the fossil fuel used in harvesting, processing and transporting wood fuel, it still results in about 40 times less CO<sub>2</sub> being added to our atmosphere than a fuel like coal. Pollution legislation in Scandinavian countries is extremely tight. The key to these stoves is that they burn to ferocious temperatures, so they burn extremely clean. They only use about 15Kg of wood per load and only burn for about two hours at a time. The ceramic core stores energy from the fire when alight and radiates it around the house when the fire is out, thus creating maximum energy from minimum fuel. A favoured alternative is low-grade underfloor heating using a gas condensing boiler."

▼ Earth sheltered buildings take advantage of the inherent warmth of the soil to insulate and reduce heating costs. Turf roofs are also popular, as they reuse and replace the soil removed during construction and reduce a building's visual impact.



The Association for Environment Conscious Building encourages members to investigate alternative building methods such as this straw bale house. Straw bale buildings impart a high level of insulation and are, surprisingly, fire retardant.

**Flooring:** Concrete floors — they can be solid or beam and block — are acceptable by the eco lobby as they provide thermal mass. If using concrete, consider using insulation beneath made from recycled expanded polystyrene. Some forms can be placed directly on blinding above prepared ground, avoiding the need for more energy intensive foundations.

Wall-to-wall carpets are not favoured as they harbour mites causing allergies, plus a number of unpleasant chemicals are used in their production. Wooden flooring, either reclaimed or sourced from sustainable resources is approved.

Chipboard floating floors are not favoured because the material contains a high concentration of environmentally harmful glues.

**Site Specific Eco Houses:** This is one of the first considerations that the self-builder should look at even before the design stage. Wind and water power are naturally more site-specific than solar energy. Water power is also obviously very site-specific as is trying to source building materials locally. Eco-architect Michael Winter chose to be very geographically site-specific in his house at Tunbridge Wells. It is only a short walk from the station — ideal as he travels to London to work four days a week. The shape of the site also makes it site-specific. It is an unusually-shaped ½ acre triangular area in woods. Only three small trees had to be felled to take the house, which is long and curved in order to adapt to the shape of the site. It is slightly elevated and stands on deep pad foundations instead of conventional footings, as the latter would undoubtedly have resulted in the felling of many more trees. Michael and his wife Elizabeth opted for a design with a timber frame, timber composite I-joists and a very high level of insulation. The main heating is a centrally-sited woodburning stove. The roof is copper with copper rainwater pipes which take the water to a large tank beneath the garage. The water is purified and used for washing, bathing, flushing the toilets and irrigating the garden. The Winters use mains water for drinking only — last year the bill for this was just over £5.



## Useful Contacts

### General Contacts

Association for Environment Conscious Building: 01559 370908

The Centre for Alternative Technology: 01654 702400

Ecological Design Association: 01453 765575

Timber Research and Development Association: 01494 563091

The Ecology Building Society: 01535 635933

### Wind & Solar Power

Solar Trade Association: 01208 873518

British Photovoltaic Assoc: 0118 932 4418

Scoraig Wind Electric: 01854 633286

Wind and Sun: 01568 760671

TM Environmental Power: 01793 840048

Solar Sense: 01792 371690

Solar Store: 01303 892491

Sundwel Solar: 0191 416 3001

Energy Engineering: 01694 731648

Thermomax: 01344 874747

Redland Roofing Systems: 01306 872000

BP Solar International: 01932 779543

Sunrise Energy: 01245 281122

### Insulating Materials

Cellotex: 0181 579 0811

Energy Ways: 01920 821069

Excel Industries: 01495 350655

Kingspan Ltd: 0800 610061

Owens Corning: 0800 627465

Rockwool Products: 01656 862621

Vencel Resil Jablite Ltd: 01322 626600

### Water Conservation

Elemental Solutions: 01981 540728

Ebb and Flow: 01453 836060

Kiskic Enterprises: 01728 603202

The Green Shop: 01452 770629

Aquasaver: 01288 354425

KSB Hyarain: 01509 231872

Eastwood Services: 01502 478165

Kingsley Clivus Environmental Products: 01703 615680





While they have a timber-framed highly-insulated house, Norman and Ann Stanier have opted for no solar heating in their concrete tiled roof. Instead, they have a massive double-glazed, south west facing 'green space' that extends through two floors. Energy from the sun pours through this, to be stored in the thermal mass provided by the Delabole slate floor and the solid mass of local sandstone beneath the stairs.

The Staniers decided against solar water heating as they were advised the payback period on capital outlay would be about 30 years. They use mains water, but sewage disposal is via a pond and wetland sewage system in the garden. In the roof they have a 100 litre tank filled with water pumped from this system that is used for flushing toilets and garden irrigation. The house was designed by Simon Clark of Creative Individuals.

The house belonging to electrical systems designer Hugh Piggott near Ullapool in north-west Scotland is entirely dependent on wind power. There is also no mains water (it all comes from a spring) and no road access — the approach is by boat.

Another house that is site-specific is the newly-completed David's House in a rural position near Raglan, Gwent. Designed by Andrew Yeats of Eco-Arc, the three-bedroom house is on the site of a brick and timber Edwardian chalet. It is also near to the Buddhist community where the owner, David Johnson, works and previously lived.

## The Ecology Building Society

The Ecology BS is an organisation not to be forgotten by the enterprising self-builder intent on constructing a home with an ecological pay-back. Its policy is to limit loans strictly to properties that fall within this category. Many struggling self-builders and home renovators with a desire to build ecologically sustainable features into their homes have cause to be grateful to the society, which has frequently granted its 'Earth Saver' mortgages on properties which other societies have refused. The telephone number is: 01535 635933.

◀ Wood burning stoves are the heat source of choice amongst eco builders. Because of the incredibly high temperatures at which wood burning stoves operate, they burn extremely efficiently. This example is from the Ceramic Stove Company (01865 245077).

The house is 'turned' 90° to face south, gains its electrical power from a bank of photovoltaic panels sited on a framework in the garden and a wind generator sited on a rising hill. Careful calculations were carried out before the decision was taken to invest in the pv panels. A geomantic survey was also carried out before the house was finally aligned. Sugar Loaf mountain, which it faces, is a sacred hill. Experts mapped the ley lines in the area and found the site to be situated where a series of these intersect. "We aimed to create a lovely house as well as one that was ecologically sustainable," said Andrew Yeats.

**But is it Architecture?** Some will say the environmental agenda inevitably ends up with quirky buildings with turf roofs or oddly-shaped glass extensions perched against external walls, but this is rarely the case. This is definitely not so, if the pioneering David's House is typical eco-architecture. The exterior is clad in locally-grown Douglas fir and fits in with the wooded setting. The 1½ storey timber-framed and timber-clad building with steeply-pitched Welsh slate roof dormers and large Scandinavian-style thermally efficient timber windows is 'cottagey', but modern.

It makes a clear statement of how we must begin to design our houses in the future if we are to cease wasting valuable energy while at the same time fitting in with the local vernacular.



▲ Organic paints (these are from Osmo 01895 234899) use no oil-based ingredients, preferring water-based non-vinyl formulas. The results are indistinguishable from ordinary paints, and because they are biodegradable, disposal is simple.

## Useful Contacts

### Eco-Paints

|                              |              |
|------------------------------|--------------|
| Auro Organic Paint Supplies: | 01799 584888 |
| Ecos Organic Paints:         | 01539 732866 |
| Keim Paints:                 | 01746 714543 |
| Nutshell Natural Paints:     | 01364 642892 |
| Ostermann and Scheiwe:       | 01895 234899 |
| Green Paints:                | 01246 432193 |
| The Green Shop:              | 01452 770629 |

### Timber Frame Manufacturers

|                             |              |
|-----------------------------|--------------|
| Green Oak Carpentry Co:     | 01730 892049 |
| Carpenter Oak and Woodland: | 01225 743089 |
| Frameworks:                 | 01934 733536 |
| Treewrights:                | 01360 550873 |
| Christian Torsten:          | 01939 233416 |
| Taylor Lane:                | 01432 271912 |

### Turf Roofs

|                      |               |
|----------------------|---------------|
| The Works Landscape: | 0181 299 6997 |
| Erisco Bauder:       | 01473 257671  |

### Solid Fuel Stoves

|                            |              |
|----------------------------|--------------|
| The Ceramic Stove Company: | 01865 245077 |
| Zschock Ceramic Stoves:    | 01453 833931 |
| Morley Stoves and Cookers: | 01920 468002 |
| Yeoman Stoves:             | 01395 233122 |

### Eco Architects

|                           |               |
|---------------------------|---------------|
| Michael Winter:           | 01892 539709  |
| Constructive Individuals: | 0171 274 2008 |
| Eco-Arc:                  | 01904 46875   |
| Architype:                | 0171 403 2889 |

In Oxford, eco architect Dr Sue Roaf points out that she would not have gained planning permission for her house if it had not looked 'at home' among the traditional large detached houses in the suburban road where she lives. "Sustainability is about performance not appearance, but eco houses can — and are — attractively clad in clapboard or in brick or stone for thermal mass," she said. "If you use the vernacular materials of the area this reduces transport costs. I believe bio-regional materials are going to drive design. However, we have to standardise the expensive bits and reduce costs through economies of scale. Factory-produced photovoltaics and thermally efficient windows are good examples of this. We also need better building warranties and construction practices on site. Building an eco house may at present work out at about 20% more than conventional building — I paid £72/sq. ft — but building ecologically is going to happen everywhere in this country and we might as well face up to that fact now." ■