This document contains all of the signage we put up for Bristol Green Doors 2012 at 7 Berkeley Road, including many web links.

If you have any questions then please contact us via this web site
http://www.gavinspittlehouse.co.uk/contact-details/

Thanks for visiting us. We hope you have been inspired, educated or at least interested!

Gavin and Carrie

Mechanical Ventilation with Heat Recovery (MVHR)

This is a whole house ventilation system which will gently suck damp smelly air from the kitchen and bathrooms and push clean fresh air into the bedrooms and living room. The clever bit is that the outgoing air will be used to warm the incoming air – around 90% of the heat should be saved. Without this either lots of heat would be lost or there would not be much ventilation (typically a bit of both).

I had hoped to have the MVHR unit in time for Green Doors, but the model we selected was discontinued (and replaced with a similar model with features removed and price increased) so I'm about to start product selection again.

How it works:

- house made as air-tight as possible (no vents, air-bricks, drafts, extractor fans, etc)
- air inlet ducting to bedrooms and reception rooms
- air extract ducting to kitchens, bathrooms, toilets
- warm extracted air is used to pre-heat cold incoming air (some models save up to 95% of the heat from the extracted air)
- result: house should be well-ventilated, condensation-free, draft-free and should waste minimal heat
- we'll only run the MVHR in the winter, during the summer we can open vents and windows for ventilation

Things to see around the house:

- in the kitchen:
    - ducting above kitchen ceiling (we've used mainly 110mm pipes normally used for underground drainage; typical MHVR installations use flexible ducting which is easier to fit)
    - brochures and other literature
    - mushroom vents (there will be one of these in every room)
    - steps towards airtightness – use of expanding foam to block gaps where joists penetrate walls
- in the first floor bathroom: lots of ducting
- outside to the side of the house: all the ducting ends here, the MVHR unit will be located in the roof-space of the lean-to garage (an insulated cupboard)

Energy saving lighting

- We've been using CFL (compact fluorescent) bulbs for years but LED (light-emitting diode) bulbs use less energy and can last longer, look better and produce nicer light
- LED downlighters installed in downstairs loo
    - These LED bulbs typically use 1w to 7w of power, compared to 20w to 50w for halogen downlighters (which are regularly also described as "energy saving"!)
    - These are LED bulbs which can be used to replace halogen bulbs in down-lighters (no need to change the light fitting, just replace the bulb; we're using GU10 bulbs but MR16s are also available). Available in some electrical retailers (including Ablectrics on Gloucester Road), some DIY stores, some supermarkets and online. Cost from about £4 per bulb.
    - Lots of options – different LED bulbs have different wattages (power usage), lumens (brightness), beam angles (how wide the beam is), warmth (whether the light is a cold white or warmer yellow – other colours are also available). It's hard to compare without seeing the bulb in use – if you have a lot of downlighters then see the bulb in a showroom or buy one and try it before you commit to larger numbers.
    - We're planning to use LED downlighters in part of the kitchen and several other rooms.

Things to see around the house:

- In the kitchen: LED bulb in kitchen, compared with CFL and incandescent
- In the downstairs loo: LED downlighters
- LEDs for outside lighting
- We're planning to use LED worktop lighting in the kitchen.

Energy-saving LED down-lighters in the downstairs loo

The three lights are different GU10 bulbs (all in standard 240v GU10 down-lighter fittings)

Bulb type	Halogen bulb	LED bulb	LED bulb
Energy usage	50 watts	3 watts	1 watt
Expected life	3,000 hours	50,000 hours	50,000 hours
Bulb cost	£1	£5 (online)	£3 (online)
Running cost per 1000 hours *	£7.33	£0.52	£0.20

* based on electricity at 14p per kWh

The LED bulbs cost a little more (these ones cost £3 - £5 each, bought online) but they use far less energy.

LED bulbs also last longer (50,000 hours is typical) so they pay for themselves easily as well as being more convenient.

Light bulbs in the kitchen

All three are standard bayonet fitting 240v bulbs compatible with standard light fittings.

Bulb type	Traditional incandescent	Compact Fluorescent (CFL)	LED bulb
Energy usage	60 watts	18 watts	2.5 watt
Expected life	1000 hours	8000 hours	50,000 hours
Bulb cost	30p (soon to be discontinued)	£1	£3 to £7 (online)
Running cost per 1000 hours *	£8.70	£2.64	£0.45

* based on electricity at 14p per kWh

Other important considerations:

- Traditional incandescent will shortly be unavailable in the UK, they are being "phased out" by the EU and most of the developed world.
- CFL bulbs contain toxic mercury – it can't escape unless the bulb is broken but they are fragile and even if you don't break it the mercury will escape when the bulb ends its life in the land-fill.

Our Garden

- Guided by permaculture principles.
- Ducks provide us with eggs and manure and eat all the slugs and snails.
- We've designed our garden for growing food.
- Raised beds created with use of a truck-load of manure.
- Fairly low maintenance (lots of trees, bushes and other annuals; no digging).
- Compost heaps for garden waste – we don't burn any garden waste and only diseased plants are disposed of on the bin.
- Crop rotation – each vegetable group is planted in a different place each year, helps to prevent annual diseases and pests.
- Based largely on organic principles (no chemical fertilizers or insecticides or weed killers, etc).
- Wild area around large wildlife pond (which has no fish and is out-of-bounds to the ducks; we get newts, frogs and toads as well as a whole ecosystem of insects).

What are we growing this year

- Horseradish (just planted, new for this 2012)
- Jerusalem Artichoke (self-set from last year's crop)
- Garlic (already growing) and onions (just planted)
- Potatoes (chitting at the moment)
- Runner and French beans
- Peas (mangetout)
- Carrots
- Courgettes
- Asparagus
- Beetroot
- Radishes
- Spinach (and/or Perpetual Spinach)
- Various salad leaves (lettuce, rocket, etc)
- Sorrel (from which Carrie makes an excellent pesto)
- Parsley
- Mint (leaves dried to make mint 'tea' in the winter)
- Fennel
- Kiwi fruit (planted two vines a couple of years ago, no fruit yet but they can be grown outdoors in the UK)
- Apples (two trees) and pears (one tree), all planted in the last 4 years
- Black and red currants (in the fruit cage which we make from the swing frame in the garden)
- Blue berries
- Goji berries (the bush keeps flowering but no berries so far)
- Gooseberries
- Rhubarb
- Cherries (tree in the front garden, if the birds don't get them first)
- Strawberries (limited success in a bed, we're planning to try growing them in a vertical recycled pipe instead)
- Cranberries (not much luck with them planted in the ground last year so we've put them in pots for 2012)
- Raspberries (summer and autumn varieties - we were picking raspberries from summer until November in 2011)
- Blackberries (not cultivated but loads of them around the fringes of the garden)
- Figs (a number of trees taken as cuttings from a heavily fruiting tree, mostly in pots, produce a few fruit)
- We also sprout various seeds (mung beans, alfalfa, etc) on the kitchen window sill. Loads of sproutable seeds available from Scoopaway or Harvest on the Gloucester Road
- Grape vines (two varieties, both taken from cuttings, producing loads of delicious small sweet black grapes)
- We get many of our seeds and bulbs from Bishopston Hardware, just the other side of Gloucester Road. The Better Food Company (Sevier Street, St Werburghs) is also great for seeds, especially hard to find things like green manures

About the ducks

- We spend some while trying to decide whether to have ducks or chickens. Ducks need water to play in and aren't as good at eating scraps; they're a bit messier; but they don't damage the garden by pecking and scratching. Duck eggs are bigger, higher in cholesterol (we've read) and have a slightly different taste/texture according to some people. Ducks are said to be hardier than chickens and less susceptible to disease.
- We had never kept poultry before – we relied on books and web sites and advice from friends and suppliers. We didn't have any major problems (buying young adults was easier for beginners like us than buying chicks).
- We bought our three Khaki Campbell ducks (no drakes) aged 15 weeks from Annie Hall's Poultry (in Siston). We picked Khaki Campbells because they're good egg layers and they eat slugs and snails. They are 2½ years old now, we expect them to lay eggs up to the age of 4.
- We built a secure (fox-proof) run containing a wooden duck house and a swimming bath – everything except a roll of weld-mesh was scavenged or reused.
- We're thinking about getting more ducks, probably chicks just a few days old this time (costs about £6 per female chick, about a third of the cost of an young adult duck).
- Three ducks initially started laying 3 eggs per day. For reasons unknown this dropped to 2 – possibly one duck has stopped laying, we haven't managed to find out which one.
- The ducks eat pellets (the same as you would feed to chickens) – we buy them from A Nichols Cow Mills in Yate, which is much better value than local pet shops etc. Organic pellets are also available. Food miles are probably very high as the pellets are soya-based.
- We use straw for bedding, which we buy it by the bale from St Werburghs City Farm. Mucky straw is then used to mulch the garden.
- We use a lot of water for cleaning and for the ducks to drink and play in. A lot of this is saved rainwater (when we finish our new rainwater storage system we hope to use virtually 100% rainwater). Waste water from the duck bath is piped into the vegetable plot.
- We muck the ducks out and refill their water hopper weekly, feed them twice daily, let them free-range in the garden for most of the day but always shut them into their run before dark. We don't need to shut them into the duck house – they often sleep outdoors in the run.
- We can leave the ducks (in their run) for a weekend – we put out plenty of food and fill their water hopper and they are fine. For longer holidays our neighbours kindly look after them.
- In February this year we had fox problems for the first time. I saw the fox and chased him away but only after he'd had two ducks by the neck. They were terrified, had lost some neck feathers and one had a limp – but otherwise unharmed. They went off lay, for a few weeks but have just started laying again. We could avoid fox problems by keeping the ducks shut away in their run when we're not in the garden, but the ducks love their freedom (and they wouldn't be able to forage for slugs).
- Livestock or pets? The ducks do have names but they're still livestock not family pets. We keep them for eggs (we're not intending to eat them). We'll have some decisions to make when they stop laying.

Energy Monitor

This wireless energy monitor was a free gift from our energy supplier a couple of years ago. It monitors electricity usage for the whole house. The other part of the device clips on to the mains supply at the consumer unit (batteries required). These are available from Maplin on Gloucester Road for around £24.99.

The plug-in energy monitor measures electricity usage from a single appliance. Also available from Maplin, around £19.99 (I've seen them cheaper elsewhere).

Energy Assessment

Our energy assessment is a prediction:

Energy Efficiency Rating: 76, Band C

Environmental Impact (CO2) Rating: 75, Band C

Energy Use of 124 kWh/m2 per year

(at 191 metres total floor area, this comes to 23,684 kWh for the whole house for the year)

CO2 emissions of 4.5 tonnes per year

Lighting costs of £74 per year

Heating costs of £1,046 per year

Hot water costs of £74 per year

We think that our energy usage will be lower than these predictions, because of limitations in the assessment and because of lifestyle choices.

Hot Water

We have a solar hot water system, supplied and installed by Southern Solar who are here during the Green Doors weekend to tell you about it.

The government is expected to announce the Renewable Heat Incentive for domestic premises (a subsidy for solar hot water systems, similar the Feed-in tariff). Good Energy have been running HotRocs, a similar scheme, for some while; we're in the process of signing up for it.

We will shortly receive a £300 government grant towards installation costs (from the RHPP scheme which closes this month).

We will have a gas boiler for our central heating which will also boost the hot water in the winter when the solar system isn't sufficient. We hope to get all of our hot water from the solar system, during the summer.

What to see:

- On the roof (visible from the street): an array of 30 evacuated-tube solar collectors
- In the first floor bathroom: hot water cylinder with input coil for solar system
- Top floor – insulated flexible pipes leading from solar collectors (on roof) to hot water cylinder (first floor bathroom)

Solar PV (electricity)

We generate solar electricity from a 14 panel solar array on our roof, installed by Ecocetera in March 2011.

The roof faces around 110 degrees (close to East). A south-facing system would be about 20% more efficient, so our system has to have 20% more panels in order to generate the same amount of electricity. This doesn't make it 20% more expensive.

Since installation (just under 12 months) we have generated 2145 units of electricity, which has apparently saved about 1.1 tonnes of CO2. Our system cost £9534.

What to see:

- information display in kitchen
- solar panels on roof (visible from the road)
- inverter-transformer in 2nd floor loft space (above first-floor bathroom) – not very accessible

Windows

Triple Glazed Windows:

- Our windows come from Velfac
- They are softwood frames, triple-glazing and aluminium external faces.
- They cost us about double what we might have paid for high quality uPVC double-glazing but they should have a far longer life-span
- A local supplier with comparable windows is South West Aluminium who sell windows from A M Profiles

Triple glazed Roof Windows:

- We have nine triple-glazed Velux windows in the house, purchased online.
- Triple-glazing is hard to distinguish from double-glazing but gives better thermal insulation (and probably sound insulation)
- Another manufacturer of high quality triple-glazed roof windows is Fakro (available from Kellaway Building Supplies or many online suppliers).

Sliding Folding Door

- The aluminium sliding-folding door in the kitchen is the only new glazing which is double-glazed (everything else is triple-glazed)
- It comes from Bristol Bifold
- Doors often don't have the BRFC certificate which tells you their energy performance (although most will tell you the u-values of their glazed units). This made it hard to compare. We were particularly interested in good air-tightness (ie. no drafts) in the long term, we picked an aluminium frame door because it won't warp or swell in damp weather.

Heating

We have installed underfloor heating in the kitchen, and plan to extend this to the entire ground floor.

The under floor heating is a water based system. The entire floor will be a large radiator (running at a lower more efficient temperature than standard radiators)

Our builders broke up the existing floor screed, we then laid installation and attached pipes from the manifold on top of the installation. Our builders then laid concrete screed on top of the pipes to a thickness of 90mm.

The pipes are connected to the manifold in the utility room. The manifold is where the water from the boiler heated by the boiler is mixed with the underfloor heating pipes.

The boiler will be a new high efficiency condensing gas boiler (SEDBUK ‘A’ rated, 90%+ efficient).

Insulation

External Insulation

- The back and side of our house has 90mm of insulation underneath the render finish.
- The insulation used is Kingspan Therma TW53, sheets of polyisocyanurate insulation. This is both stuck to the wall and fixed to the wall using specialist Fischer Termoz plastic fixings.
- On top of the insulation is a render system from Parex which consists of a base coat with an embedded reinforcing mesh followed by a traditional sand-cement render.
- Unfortunately the render was applied on a very hot day and cracked as it dried. It was judged to be sound but the cracks needed covering so our builders proposed the Tyrolean finish which you can see.
- The moral to this story: get builders who know what they're doing when it comes to external insulation.

What to see: material samples in the kitchen and insulation on the outside of the house

Warm roof insulation

We will be insulating the pitched roof in the kitchen and under the top floor using sheets of Kingspan insulation between the joists, then further sheets below the joists (total thickness about 170mm). Seams will be sealed using aluminium tape to make the roof air-tight.

Rain-water saving

We considered rain-water saving systems to provide water for toilets. This would entail complex expensive systems with a pump, header tank, various control electronics and underground storage – quite expensive.

We decided to build an above-ground rainwater storage system, based on standard water butts but with an array of inter-linked butts giving a substantial storage capacity.

These will supply the garden (we use a lot of water for irrigation in the summer and for the ducks all year round) and also the flush for the downstairs toilet. It will not supply the upstairs toilets because it will be a gravity-fed system and they are too high up.

What to see: the water butts are in the garden but not in position or connected up yet.

About our building project

- We used a major local building firm to do the main structural work (walls, roof, etc) and some other items. We wouldn't recommend the builders that we used (for lots and lots of reasons)!
- Many of the energy-saving measures we will use are to be fitted after this phase of building work. The main measure included in the initial phase was external insulation – our builders had no experience of this - there were lots of problems which we ended up paying for and the end result isn't as good as it should have been.
- We are project-managing (or doing) the rest of the work ourselves. This includes a lot of the energy-saving measures.

Building materials / waste

- We used some reclaimed materials (utility sink and tap, roof tiles, patio doors, water tank... sources include second hand shops, freecycle, items found in skips, ebay, reused from parts of our house which were demolished, Bristol Wood Recycling Project).
- We recycled some of the building waste (wood, metals and plastics – retrieved from our builder's skip). Various fittings were given away (via Freecycle or to friends) for reuse.
- We could have used more natural / low-impact materials in the house, but often we chose higher performing materials (which we think will save more energy in the end, despite having higher embedded energy) or lower cost materials.
- Lots of wastage by our builders due to damaged materials, over-ordering, spillages, etc.

More Information

How we found out about all the measures we're taking:

- The Create Centre has just opened a Green Library (books for reference and loan)
- There are lots of "green home / green building" events – the biggest and best I've found is EcoBuild (20th-22nd March 2012, free if booked online, London; I'll be there on the 21st)
- Bristol Green Doors has excellent events through the year and resources on their web site
- The Centre for Alternative Technology (CAT) in West Wales has great resources online and to visit.
- Courses run locally such as *Make Your Home Eco* (email makeyourhomeco@gmail.com)
- The web is a great resource for everything!

Accoya

We have used Accoya wood for the decorative fascias on the front and rear of the house. We wanted to use wood but as it will be inaccessible we didn't want anything which would rot or need repainting in a few years time.

> *"Accoya is the world's leading high technology wood. Created via acetylated wood modification, using sustainably grown timber, the Accoya process is non-toxic. It enables nature and creates a wood that matches or exceeds the durability, stability and beauty of the very best tropical hardwoods.*
>
> *The Accoya wood production process takes sustainably-sourced, fast growing softwood and, in a non toxic process that 'enables nature', creates a new durable, stable and beautiful product – that has the very best environmental credentials.*
>
> *Accoya is helping to protect the world's precious hardwood resources and is guaranteed for 50 years in exterior use and 25 years when used in the ground. This long life also provides an added benefit – helping to reduce carbon emissions."*

I buried some off-cuts in our compost heap about 10 months ago, I've extracted a piece and there's no sign of rot.

The wood is sustainably sourced and the processing – acetylation – uses acetic acid (vinegar) rather than impregnating the wood with toxic chemical preservatives.

Our future plans

- Shower water heat recovery – uses waste shower water to warm the cold water before it's mixed with hot water in the shower – for example ShowerSave available from OneWorldSolar in Montpelier.
- Venturi shower in the top bathroom where there will not be enough hot water pressure for a conventional mixer shower. A venturi shower is a power-shower which uses mains-pressure cold water to power the pump for the hot water (instead of using an electric pump).
- Green roof on sun house (also considered this for garages too but will probably not do this as we want to collect the rain water from the garages)
- Reinforced grass driveway (rather than tarmac, concrete or block paving)
- Extend underfloor heating (and floor insulation) to the rest of the ground floor
- Get rid of one of our cars and join car club

Things we considered and rejected

- Green roof on garage – we want to collect rainwater from the roof and not sure whether a green roof will absorb too much rain and/or make the water dirty.
- Rainwater saving for larger scale indoor use – would require a system with underground water storage, filtration, internal header talk, additional plumbing, pumping, electronic controls – high maintenance, complex and expensive. Rainwater would be used by two toilets (not recommended for laundry, showers, baths, etc).
- Ground source heat pump – too disruptive to the garden (need to dig up for horizontal pipes) or too expensive if using vertical bore-hole pipes. Also electric power used to run it is much more expensive (per kWh) and less climate-friendly than the gas we use for our central heating.
- Air source heat pump – as with ground-source, electric power used to run it is much more expensive and less climate-friendly than gas.

Feedback and suggestions please

- If you have any ideas or suggestions we'd love to hear them – either during the event or afterwards