Eco-Minimalism

Howard Liddell
Gaia Architects

Eco-cliché versus Commonsense

All clichés are defined as such because they are often applied unthinkingly or inappropriately, and suddenly our patch is awash with them. Albert Einstein said:

"Things should be as simple as possible - but no simpler."

But it’s so much easier to sell a product than a process. Never mind the science - let’s cut straight to the technology. So as well as having the usual carpetbaggers out with their one-size-fits-all, old products and technologies - re-sprayed green, we also have our own bag of goodies that urgently we should start to question. Not least because those now interested in behaving more sustainably, who we would wish to influence, are daunted and confused in equal measure by the perceived complication of something which, although complex, should remain inherently clear and simple - Ecological Design.

Building Eco-clichés

The most ubiquitous sustainability cliché of all is probably the one about solutions being "holistic". It is also probably the most ignored, especially by the new kids on the block, who quite often arrive to the party with mono-technological solutions. What’s needed is to identify the nature of the problem and undertake effective analysis first, then apply good quality scientific thinking, without pre-empting the solution.

It is not unusual for clients to arrive with off-the-peg technology as a starting point for their brief. Photovoltaics currently lead the field, closely followed by reed-beds and then combined heat and power. It used to be heat pumps. It is not unusual for clients to start their conversations with the suggestion that a heat pump would be a good idea, even before defining what it is that they wish to do. If a heat pump is the answer, what on earth is the question?

Technical Fixes

The most prevalent current eco-clichéd technology is the photovoltaic. The best available estimate of payback is 50 years, more common are those that run into hundreds. Ah but .... runs the argument ..... once we get bulk demand and a couple of technological breakthroughs the price will come tumbling down. Almost too cheap to meter perhaps ....? Where have we heard that before?

Then reed-beds. The issue of dilution is significant here - small reed beds are especially susceptible to pollution - a bottle of bleach toppled accidentally into the sink will kill the system stone dead. They are most often merely an expensive form of final polishing after a septic tank. They have a place but not ubiquitously.

Grey water recycling. At a recent expert conference on the ecological design of water and sewage systems not a single speaker expressed any interest in grey water systems. Too much hassle - too expensive - often don’t even work - who looks after them, etc, etc. (their words not mine).
Heat Pumps. If the coefficient of performance of a heat pump does not rise above 4:1 (3:1 is more common) whilst the cost of electricity against gas is 5:1 then, until tariffs change, it is neither an economic nor an environmentally beneficial technology in most, current UK circumstances.

(CHP) - Combined Heat and Power. This is totally context dependent. The most appropriate condition for the exploitation of waste heat from the generation of electricity is where there is a known and constant 24 / 365 demand - as in hospitals or swimming pools. The critical period otherwise is when there is an electrical demand but no equivalent and balanced requirement for the waste heat in summer. Hence it has a value mostly as a base load in a hybrid scheme.

Turf roofs. Most of these are plastic roofs with turf on top. They usually add significant weight to the roof, which then requires additional structural support (ie more resources than a conventional roof). Then they obviate the opportunity to collect and utilise rainwater for the building. Then there’s that whole middle earth aesthetic.

Local materials. What are these - in the centre of Glasgow for example? I presume that the logic is that embodied energy is strictly related to travel distance. Just a wee bit simplistic. More often than not the industrial processing of materials is the highest component.

There is a similar discussion to be had on many other off-the-peg, one-size-fits-all eco-technology solutions, and they will all benefit from project specific review. Conservatories (70% in UK are heated), small windmills (battery systems/storage), Active solar collectors (longevity versus payback), Condensing boilers (cheap ones don’t condense), Living machines (high energy costs), District heating (specific to context), and Recycling of:- Aggregates (strength & certification issues), Timber floors (embodied toxicity, denailing issues), Steel (costs not necessarily optimal), Plastics (toxicity in whole life cycle, eg PVC), etcetera, etcetera

This may appear to be a litany of criticism of eco-technology solutions. It is not. It is a plea for commonsense and rigour to prevail, and for each solution to be the result of clear, efficient and realistic analysis. If it makes sound environmental and economic sense - then use it, but if it is merely an unresearched gimmick and it does not actually save the planet, save money or generally contribute to the environmental agenda, then why do it?

Commonsense

Nature is good at conservation - of energy, water and materials. It is an exemplar of passive design and it looks after its own economy not just locally but globally (Lovelock’s Gaia principle).

Conservation of energy. Instead of starting with a heat pump, a condensing boiler or CHP how about reducing the demand? It is a pity that the SAP ratings do not reward insulation and air tightness relatively more than end of pipe solutions like condensing boilers. The world out there is full of badly insulated, draughty buildings bristling with eco-gimmicks. In fact there is an interesting problem in the heating system world. If we doubled our insulation, glazed appropriately and tested all our houses for tightness, we end up with a heating requirement for most houses around the 1.5 kW mark. The industry does not make boilers that small.

Conservation of water Whilst water conservation is not one of the first things that leaps to mind in rainy Scotland, the need to consider how we might reduce the demand for the chemical and energy rich filtration of water to drinking standard is an issue which is becoming more pressing. It is easy to achieve cost effective reduction in the amount of potable water we simply flush away. Also simple is the management of surface water so that it does not enter the drainage system (or flood plains) and cause problems at the treatment end. Surely we can i l i d i ( i S )
Conservation of resources. Much is made of recycling and, whilst it is essential to start putting in place more effective ways of doing this, there is a serious limit as to just how much can be delivered, and issues of embodied toxicity need to be addressed just as much as issues of primary toxicity. We do also know that we need to design for future recycling. The use of lime mortar instead of cement enables us to reuse masonry for more than hardcore. The use of screws instead of nails allows us to reuse timber for more than firewood.

Passive Design. So much of the ecological agenda can be dealt with by heading problems off at the pass. Many projects end up in solving challenges which are of the client or designers own making. Mitigation is an option at every stage of the process. Such as:- Developing an ongoing client relationship from start to handover and beyond, selecting the right location in the first place, arranging accommodation appropriately on the site, understanding and using topography, landform and landscape, orientating the building to exploit gains and minimise losses, designing the building fabric so it can deal with extremes without having to resort to mechanical systems, selecting materials that are benign to humans and habitat, putting things together in a way which allows them to be disassembled for both maintenance and for ultimate recycling, minimising the usage of resources, energy and water. To say that this is not rocket science is to risk devaluing the extent to which a good understanding of scientific principles can come into play and be effective in making economies and delivering environmentally sound and client friendly solutions. But it does not need rockets.

Materials Choice. In general terms the nearer to natural and the less a material is processed the healthier it is likely to be for both humans and habitat. Embodied energy is not the only thing to consider in a material. Most ecolabel systems cover a number of criteria and these apply through a number of stages in the life cycle of a material (or product). The danger of many systems is that they reward the measurable and ignore the less measurable. This can distort a balanced assessment. For this reason it is as well to seek to establish systems that are as simple as possible ("but no simpler"). I would rather see toxicity as a key indicator than energy. It is not fuels per se that are a problem it is the fact that they are polluting (and non renewable) that is the critical factor.

Local economic benefit. If a project is to benefit the local economy then an understanding of that economy and what makes it work is an essentia prerequisite. Benefits may come in the form of reinforcing a local activity, growing an existing local activity or creating something completely new. The biggest challenge for a building project is to create something which has a life beyond the construction period.

Summary
To return to the beginning of this paper - it is not the fact that the responsibility of delivering sustainable developments and the whole ecological agenda in buildings is "daunting"- it is the fact that it is being made more complicated than it need be. The world is suddenly full of carpetbaggers purveying their eco-goodies and quack doctors with their snake oil remedies, whilst the populace is still insufficiently knowledgeable about the nature of the status quo to be able to resist.

The advice therefore is simple. Trust your traditional instincts to do the straightforward thing first and be wary of strangers bearing gifts.

Much of ecological design lies in the identification and revival of commonsense and good practice - albeit it often requires new knowledge and insight to underpin it. It also needs for us to go back and question all the new man-made and often "magical remedy" materials that have rushed into buildings over the past four decades.

"In technology reality must take precedence over public relations, because Nature won’t be fooled"
## Technical Solution

| Photovoltaics >> | << Payback better than 50 years? |
| Heat Pumps. 4:1 >> | << versus tariffs Electricity:Gas @ 5:1 |
| (CHP) - Combined Heat and Power >> | << Context dependent. Hot water in summer? |
| Conservatory (semi climatic zone) >> | << 70% have heaters in? Embodied energy? |
| Small Windmills >> | << Heat churn or storage/battery system? |
| Active Solar Collectors >> | << Longevity v. payback period? |
| Condensing Boilers >> | << Cheap ones don’t condense. Too Big? |
| District Heating >> | << Specific to context and form |
| reed-beds >> | << Issue of dilution, expensive polishing |
| Grey water recycling >> | << Too expensive - - who looks after it |
| Living machines >> | << High energy costs |
| Turf roofs >> | << Heavier, plastic DPM, furtive aesthetic |
| Recycling >> | << Strength, certification embodied toxicity? |
| local materials >> | << Travel distance v. industrial processing |