Eco-minimalism
the antidote to eco-bling
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>iv</td>
</tr>
<tr>
<td>Preface</td>
<td>vi</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>viii</td>
</tr>
<tr>
<td>Introduction</td>
<td>001</td>
</tr>
<tr>
<td>The Four Elements</td>
<td>009</td>
</tr>
<tr>
<td>Eco-Bling</td>
<td>011</td>
</tr>
<tr>
<td>Fire Element</td>
<td>013</td>
</tr>
<tr>
<td>Air Element</td>
<td>027</td>
</tr>
<tr>
<td>Earth Element</td>
<td>035</td>
</tr>
<tr>
<td>Water Element</td>
<td>045</td>
</tr>
<tr>
<td>Eco-minimalism</td>
<td>057</td>
</tr>
<tr>
<td>Fire Element</td>
<td>059</td>
</tr>
<tr>
<td>Air Element</td>
<td>075</td>
</tr>
<tr>
<td>Earth Element</td>
<td>085</td>
</tr>
<tr>
<td>Water Element</td>
<td>097</td>
</tr>
<tr>
<td>Capital Cost</td>
<td>107</td>
</tr>
<tr>
<td>Postscript</td>
<td>112</td>
</tr>
<tr>
<td>References/Selected Reading</td>
<td>113</td>
</tr>
</tbody>
</table>
I cannot work up much enthusiasm for designs that are ‘award-winning’ and ‘innovative’ unless there is a positive answer to the question ‘but does it work’? If buildings reflect their zeitgeist then that might explain why 20th century ‘green buildings’ were often applauded but usually proved to be phoney. The difficulty is that, of all the things that might be associated with a building, its impact on the physical environment is, well, physical. This book goes straight to the heart of the issue.

There is surely no need to rehearse the environmental problems that face the 21st century. We need do no more than flick through the Brundtland Report of 1987 that launched the term ‘sustainable development’ into the public discourse. None of the environmental problems listed there have been ‘solved’. Others like climate change and fresh water scarcity have joined the list.

A building’s form can express our concern, may be even our quiet panic, at the emerging crisis – but what emerges is not so much ‘eco-home’ as ‘eco-hospice’. Given that buildings are the point of consumption and impact of about half of society’s problematic flows of materials and energy, that iconographic design philosophy is an uneasy, if not inconsistent, perspective. Indeed substituting substance by image risks making everything so much worse. At the tipping point we would have deluded ourselves for so long that the underlying problems have moved from chronic to acute and our only strategy left is one of denial until Mephistopheles arrives.

In terms of reducing the physical impact of buildings, the last decades have disappointed but have not been entirely wasted. The palette of technologies that could be deployed has been assembled. But what has been lacking is a commitment to learn from feedback and urgently regroup. This book is an important step.

As Howard Liddell writes, ‘Mechanical engineers can only work with what the architect gives them’. That is why, as President of the Chartered Institution of Building Services Engineers, I am happy to offer this Foreword. Moving to address the physical impact of the building, we are forced to take a systems perspective. A page of tick box-free standing issues won’t do. To me Eco-minimalism is a natural consequence of a systems approach. The text raises some big issues for debate. For example it will often require professionals to work in collaboration rather than sequence. But I hope we do not debate for too long because this fine book is aimed to set us off to be effective. Hopefully just in time.

David Fisk
Hons FRAEng, FCIBSE FRIBA (Hons)
Preface

The idea for this book dates from the turn of the century (20th/21st). The first article on the topic, for which I dreamt up the seemingly unlikely title of ‘Eco-minimalism’, was published in 2002 in the SEDA1 quarterly magazine. I then linked up with Nick Grant, a like-minded co-member of AECB2, for a joint article in their journal the following year.

The article was intended for the ‘green insider’ architects and builders (SEDA and AECB members) as a warning that if we didn’t confront some harsh ‘triple bottom line’ realities and crunch some numbers, then our missionary zeal would be undermined by the sceptics who would.

Firstly, I found the approach was anything but a mere insider’s critique. It had mileage out on the platforms of every conference centre and community-hall gathering I attended for the ensuing year and, evidently, its message was bridging the gap between the ‘green-realists’ and the ‘every person’ on the Clapham omnibus.

Secondly, I forgot where I came into this whole game 30 years ago – through ‘alternative technology’ – and that when green eventually became cool (about five years ago in the UK), the novice converts followed the same path and were less likely – not more – to crunch numbers than the OAP greenies. Our cries of ‘Well we did this back in the 70s and ...’ went unheeded as a new, self-confident but blinkered generation insisted on reinventing the green technological wheel.

So the need for this piece of work was in 2008 just as pressing as I had originally thought – and perhaps even more so, but for a different set of reasons.

As I amend this second edition it is alarming to realise that the challenge has become even more urgent – the extent of greenwashing with eco-bling has spread like wildfire and clearly this message has not yet penetrated.

Howard Liddell
Gaia Architects, Edinburgh
February 2013

1 Scottish Ecological Design Association.
2 Association of Environmentally Conscious Building.

One of many trusses for Glentress Visitor Centre for Forestry Commission. Whilst the timber is from the forest only metres away, after milling, stress grading, prefabrication, storage and then eventually craning into place its embodied energy (through travel over the length and breadth of Scotland), makes a mockery of using local materials.

Photo Howard Liddell
In terms of the Bruntland definition of sustainability – providing for the needs of the present generation without compromising those of future generations – I hope my children will forgive being deprived of their rightful amount of quality father-time whilst I have tilted at windmills, vainly seeking planetary improvement. If so, thanks to them, and to their much-loved Granny Alys – my late mother – who wasted nothing, recycled everything, adored simplicity and was damn good company. Thanks, also, to Auntie May for saying: “A day without learning is a day wasted.”

As for those from whom I have been learning daily – as this is my first major book, I get the opportunity to thank 30 years’ worth of ‘fellow green travellers’ for their influence, company and (always the most welcome) humour. Indeed, my epiphany into green buildings came about in 1973 through witnessing the knockabout act of an architect duo called Streetfarmers – so, thank you Graham Caine and Bruce Haggart for not being earnest yet having impact. Those early days included many others who became friends and who contributed significantly to my coursework and research group at Hull School of Architecture, where I was learning far more than the students. Amongst the many are: John Seymour, Peter (Jake) Chapman, Robert and Brenda Vale, Gerry Smith, Ken Yeang, Peter Schmid, Kees Duijvestein and staff and student colleagues, Michael Lloyd, Jim Low, Michael Wheeler, Ian Tod, Geoff Whittleston, Per Gustaffson, Dave Hodges, Andy McKillop, Judy Appleby, Clive Watterson and Robin Baker (at Gaia 1993 to 2009).

From the days of my professorship at Oslo (1979–82) until now, I have continued to learn important stuff from those students and colleagues who gave birth to Gaia Architects in 1984: Chris Butters, Frederica Miller, Dag Roalkvam, Wenche Ellingsen, Bjørn Berge, Rolf Jacobsen and Marianne Leisner. Since 1989, when Bjørn and I decided to set up Gaia International, I have been privileged to work with, and learn a whole heap from, Joachim and Barbara Eble, Rolf Messerschmidt, Declan and Margrit Kennedy, Peter Schmid, Gabriella P’al, Eva and Bruno Erat, Varis Bokalders, Paul Leech, Sally Starbuck, Kimmo and Maritta Kuismaanen, Herbert Dreiseitl, Walter Unterreiner and many more beyond the UK.

I must also thank Nick Grant for his shared interest in eco-minimalism; he was collecting what he called ‘limes’ (green lemons) at the same time as I was collecting eco-clichés, and this process encouraged us to write a joint article on the subject. Meanwhile, as well as those mentioned elsewhere, Bill Bordass, Paul Woodville, Barbara Chapman, Kathryn Robinson and John Gilbert have helped keep me from my worst rhetorical excesses with some cold, hard facts as well as good debate.

There is, in fact, a whole book, waiting ‘in the wings’ to be written, about those who have been influential in the sustainable development world over the past 40 years and earlier – many of whom I have been very privileged to meet and talk with. These include Richard Buckminster Fuller, E. F. Schumacher and, now a personal and much-respected friend, George McRobie.
— all of whom have inspired with their passion as much as their wise words. I am particularly grateful to George and also to David Fisk for agreeing to contribute some words for me at the beginning and end of this polemic. And special thanks go to Matthew Thompson for his patience and humour and our endless games of email ‘tag’. Only he and I shall ever know which words of his were slipped into the text, but I was pleased to be a party to his own modest authorship ambitions.

I owe so much to my ‘partner in business and my partner in life’,3 Sandy Halliday, that there is no start or finish. Sandy came into my life at what I hoped would be its halfway stage, and transformed just about everything in it. She has been the sounding board, other half of a ‘365/7’ dialogue and balanced critic for every thought and brainstorm idea I have had over the past 17 years – to the point where I often can’t remember the individual source of many of the ideas about which I now write. For her influence on my world I am eternally grateful, and to her influence on this book I pay enormous tribute.

However, I take full and personal responsibility for any inaccuracies, errors or omissions in the script. I have sought to amend a few in this second edition, however, I am sure that every reader will find something to question and, indeed, quietly hope so – as this will mean that the text has been truly read, and that will be thanks enough for the effort expended in putting it together.

Howard Liddell
Gaia Architects, Edinburgh, 2013

3 Return quote from Sustainable Construction by Sandy Halliday.
Introduction

‘Man is far too clever to be able to survive without wisdom’

E. F. Schumacher
The original motivation for this book was based on the desire to avoid a feeling of déjà vu. Many of us have been here before – anyone old enough to remember the OPEC oil price rise crisis of 1973 will also faintly recall the rush to all forms of alternative energy as a panacea for solving the world’s problems. We raced to construct (and, fortunately, also to monitor) every device – literally – under the sun, and wind, and wave, and tide (lunar power!). In certain circumstances, some of these solutions even worked – and people were encouraged to develop them further, despite the appalling lack of funding. After all, this was the realm of a few hippies and ‘environmentalists’. Even now the term ‘environmentalist’ still carries with it a sense of disparagement. Funny, really: we thought that everyone should have a (positive and inquisitive) interest in ‘the hand that feeds us’, i.e. the environment.

For many of us, this technical pursuit was also a ‘shop window’ fronting a comprehensive store of healthy ‘pro-planet’ and yet pro-development thinking. The ‘S’ word – sustainability – had not yet come into play, whereas now, of course, it replaces commas in sentences and is used so often in the wrong – or over-simplistic, or one-dimensional – context. As little as 5 years ago the commercial world would freeze at the thought of hinting that anything might be ‘eco-friendly’, whereas now ‘eco-’ is a pre-fixation; sadly it routinely green washes an existing and very ungreen product, where only the sales rhetoric has been changed.

How sad it is to have had to watch a new generation not doing their homework. Not finding out what has and has not worked in the past – and more importantly why. Over these past few years I have had to observe the Merton Rule and its even worse offspring the Scottish Climate Change Act making mandatory useless micro-renewable devices and then – even worse – seeing governments skewing this unyielding energy field with farcical fiscal incentives in order to support inherently unworkable micro-technologies, which are then promoted by gangs of ruthless doorstepping carpetbaggers. At the time of writing the so-called ‘Green Deal’ is still being launched. It is already being called the ‘Green Sub-Prime’, because it has more to do with arranging loans (at 7% Pa interest) than resolving net energy bills (and also uses some optimistic assumptions on what will be delivered). The tragedy is that not only will it never take a single family out of fuel poverty, it will most likely make things worse.
‘It’s not personal’

St George’s School, Wallasey, is the UK’s earliest purpose-designed solar project. It was later monitored and compared to an equivalent neighbour school. It was found that 30 per cent of the reductions were due to the solar gains and the rest to low ventilation, the occupants and high-wattage lighting.

Architect Emslie Morgan 1965. Photo Howard Liddell
It seems that the common response to the realisation that climate change and a concern for the environment are not luxury issues is to take a global perception and then make a highly personal response. We recycle cans, bottles and paper in the office, build an eco-extension, draught-seal an existing dwelling, and so on. Maybe it is because the requisite effective action is at a level so immense that it is necessary to start with what an individual can control, i.e. their own life and behaviour. There is a basic need, born of frustration, to do SOMETHING.

However, it is in our community, professional, commercial and political activity that we can make the most impact: moving on from the ‘autonomous’ house to the low-impact community and, in the case of the designing and constructing professions, to the delivery of what they design and build. The impact of an architect half-filling the office kettle is of miniscule significance set beside the specification of an airtight and highly insulated building, which will also save a lot of money for the building users and reduce its carbon footprint (‘win–win’).

And so it was in the 1970s (in the case of Wallasey School, the 1960s) that, looking beyond their personal behaviour, a whole raft of experimenters (with dress codes ranging from green boiler suits at the Streetfarm to Savile Row suits or brown corduroy at the Cambridge Autarkic House) built things of very varying prices and with equally varying degrees of success. But they built, and that was important, so that we could learn what worked and what didn’t.

It is therefore with a sense of utter frustration that (40 years on) I have had to watch the pre-emptive publicity for eco-developments by certain companies, only then to fall prey to the reality of the actual performance of the moving parts, and the damaging publicity not just to these projects but to the whole momentum of eco-building in their wake.

It is not always clear why something was successful, but it is usually pretty obvious why something failed. In an age of obsession with risk assessment, it is difficult enough to get the opportunity and resources to experiment and therefore doing our homework from precedents – however far back they go – is crucial.
Learning from the past

‘Things should be as simple as possible – but no simpler’

Albert Einstein
The 1970s TV programme *A House for the Future* was a response to its contemporary political situation, which came in the wake of the OPEC action – seen at the time as an ‘energy crisis’.

Inevitably, the focus of the programme was on energy and energy technology, but its demonstration building did get the basics – airtightness and high insulation levels – right, and it did also involve the hands-on Grant family: one of the very first ‘reality TV’ families. In the final two programmes, it also looked at the wider picture – including the author’s solar terraces project in Hull.

For a television programme, the most important aspect was that it should be visual and engage the interest of the audience. For the Grant family, and all those involved in the building, the conversion of their ‘green’ house (a product) into a ‘sustainable’ way of life (a process) was of much more significance.

Geoff Grant was very handy and technically competent, and he and his family kept very good records of the house in use. In going back to the project one year later, with some of the students who helped in the building, we learned a great deal.

In the illustration below is a list of the key eco-technologies used in the house. Over the 13 weeks of the programme, one technology/topic per week would be the focus of attention. Highlighted in red are the ones that really worked.

Once its energy demand had been brought down, the majority of the supply-side technologies were redundant and the whole house could effectively be heated by casual gains from the family, equipment, lights and – especially – by heat recovery from the kitchen.

The simple lesson?
To look at lowering the demand for energy in the first place, before getting excited about alternative energy technology on the supply side of the equation. And save a lot of money and hassle.

**Granada TV 1976 – *A House for the Future*. The conversion of a brick barn in Macclesfield into an eco-house. The selected family got volunteer help – including from the author and Hull architecture students.**

Producer Brian Trueman.
Photo Howard Liddell

---

**What worked?**

- **High insulation levels**
- **Airtight skin**
  - Active solar roof
  - Passive solar greenhouse
  - Rock store under greenhouse
  - Heat pump
  - Wind turbine
- **Heat recovery from kitchen**
  - Energy saving fittings
  - Low emb. energy materials
  - Allotment garden
  - etc, etc
Back in the late 1980s, Peter and Marjorie Bourne, a Perthshire artist and teacher respectively, did not want a standard kit house but an architect-designed house. However, they wanted it on a budget not dissimilar to that of a kit house – a tall order, but that was the brief.

Any technical-fix add-ons would almost certainly have ended up being taken off at the final pre-construction budget check.

The preliminary concepts started, therefore, with a passive design approach, and the envelope had airtightness and insulation levels as high as was considered worthwhile at the time. It worked well with a single 5 kW wood-burning stove heating the whole of its 160 m² floor area.

The two-storey house was designed with a south-facing (passive solar) stairwell, with four half levels, and the building was completed for a cost of £86,000 in 1992. The clients were offered twice that price for the house on the day they moved in.

In dealing with passive solar gain, the building also addressed wider lighting issues – particularly so that the clients could continue with their painting. It was also a house which they found very healthy, and they talked about the positive impact of the smell and the colour of the natural wood and breathable (moisture transfusive) mineral-paint finishes.

The project fought a few battles – actually because (a) it was not like a standard (timber-frame) kit house and (b) because it was clad in timber externally. It started on a separate site in 1989, and, owing to Planning Department resistance to it being granted permission, was finally built in the back garden of the client’s former home and handed over in 1992.

In 1995, and after the house had acquired a number of awards, the local authority, who had resisted the project for nearly two years, included it in their handbook as an exemplar of how to build houses in the countryside.

Twenty-two years later Gaia Architects has repeated this achievement with a Scottish House of the Year Award for Architectural Excellence 2012. The fact that it is the first Brettstapel Passivhaus in the UK appeared to have passed the notice of the judges.
Tressour Wood House for Peter and Marjorie Bourne was the UK House of the Year 1993, a Design Award for a house that happened to be green. No bells or whistles – just simple passive design.
Photo Colin Wishart

Plummerswood is the first Brettstapel (dowelled mass timber), certified Passivhaus in the UK and won the Architectural Excellence award for Scotland’s House of the Year 2012 image Sandy Halliday.