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Title: Environmentally Restorative Architecture
Designing Buildings for the 21st Century

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Abstract

Climate change is a reality. However you analyse the numbers or debate the reasons, global warming, water pollution, deforestation, pollution and toxic contamination is happening and is happening faster than previously thought. Despite the doubters, the impact of the world's 6 billion inhabitants is partly, if not wholly responsible. Allied to all this is the universal human need for shelter. This means the production of the built environment will continue to be a factor in global warming, resource depletion and environmental pollution. Accordingly, we no longer believe buildings should be, or can afford to be, just sustainable. They should be restorative and architecture. That is, buildings should generate more energy than they produce or that was required to produce the elements that made up the building itself. That over the lifetime of the building (say 50 years) the building will have a nett positive energy production and will have processed all air, water and waste on site prior to discharging it beyond its boundary. Maintaining the status quo or even reducing our impact in the face of Third World population growth and First World economic imperatives will not suffice. What we call Environmentally Restorative Architecture (ERA) will allow all countries to reduce their carbon output, improve the health of our people and ultimately our cities, reduce the need for oil based fuels and give the next generation a clear sense of hope. We would also argue that there are strong economic arguments in favour of this approach that will generate wealth and employment for all people employed in the construction industry.

As Peter Cox of Exeter University said "We are like alcoholics who have got as far as admitting there is a problem. It is a start. Now we have got to start drying out." Or, put another way, the worlds' liver needs a break."

1. Introduction

This paper considers the possibility that all buildings designed from this moment on will have to be not only sustainable but actually restore the environment if the continuing environmental impact of humans on this planet continues. It has been inspired initially by the work of Paul Hawken (1993), Michael Mobbs (1998), Robert and Brenda Vale (2000) James Wines (2000), McDonough and Braungart (2002) and Finlay and Fullbrook (2005) who have all argued and in some cases proven that it is economically profitable, socially responsible and environmentally advantageous to design and build buildings that could, potentially, have a positive impact on the environment. The goal of this paper is to argue the direct economic,

social, environmental and spiritual benefits; the so-called Fourth Bottom Line (Inayatullah, 2006) of attempting to design buildings that not only have a reduced environmental impact but actually contribute to the repairing of a world in dire need of restoration.

As Paul Hawken has stated, “Architecture in its traditional role is probably a dying profession”.(Hoffman, 2005 pxii) Architects no longer have the luxury in the early 21st Century, of designing buildings that assume an endless supply of cheap fossil fuel energy will be available without considering the long term impact on this and future generations.

As the scale of the problem has become clearer in recent decades so too has the recognition that we need to better reconcile increased building development with the preservation of the Earth’s natural systems: to be more “sustainable.” The call for environmental sustainability has become louder and more urgent as the consequences of diminishing natural resources and increased pollution become ever more apparent. “Sustainability” now prefaces an increasing number of major political and organizational agenda to a lesser or greater degree. In fact, 45% of the world’s top companies publish triple bottom line reports which report on their economic, social and environmental health. (Colquhoun, 2005)

That’s certainly the case in architecture. “Environmentally Sustainable Design” (ESD) is the catchphrase of the moment. The building industry is awash with any number of developers and consultancy firms playing lip service to the ideal and purpose behind the concept. But we believe that simply designing and building to “sustain” our current environment will not be enough.

In our view, being sustainable in the face of the mounting environmental crisis is the equivalent of re-arranging the furniture whilst the house collapses around us. The common ecological mantra of ‘reduce, recycle and re-use’ is, at best, delaying the inevitable but is not addressing the very real and immediate environmental issues before us.

2. Overview of the Current New Zealand Situation

According to the Worldwatch Institute, buildings in the United States of America use 17 percent of the total freshwater flows and 25 percent of harvested wood: they are responsible for 50 percent of chlorofluorocarbon (CFC) production; use 40 percent of the total energy flows’ generate 33 percent of CO2 emissions, and generate 40 percent of landfill material as a result of construction waste. By any measure, the construction industry has a permanent and lasting impact on the environment. Within New Zealand, there is no reason to doubt our construction industry is having a similar impact.

In December 2006, Dave Fullbrook and Graeme Finlay undertook a study of a variety of Local Government and Government Ministry projects to demonstrate the economic viability of an environmentally sustainable approach to designing buildings over the longer term. All these projects demonstrated that with good architectural design and careful planning, new buildings can substantially reduce their energy use, water use and indeed their overall environmental impact and at the same time provide exciting and vibrant spaces that enhance the built environment and allow human beings to interact, work and socialise.

Yet all these projects had a common theme, they still required significant, yet reduced amounts of energy and water to operate and they represent a tiny proportion of the overall built environment within New Zealand.

Maybe the reason apathy or a wider indifference to sustainability in New Zealand is prevalent is due to our relatively low population density and milder climatic conditions? When we look at the climatic extremes in Australia and their response with efforts such as the Melbourne City Council's new CH2 offices, completed in 2006, it is not difficult to see why. Australia has a publicly acknowledged water shortage issue, especially in Victoria and South Australia. It is just one of the environmental issues it is desperate to overcome whilst maintaining its population and economic prosperity. New Zealand has nowhere near the same problems yet climate change is a global phenomenon and no country, however inured to the extremes of global warming, is safe.

Yet the closest New Zealand has to an environmentally restorative building is the Landcare Research Building (2006) recently completed is within the University of Auckland Tamaki campus. A more relevant and inspiring example is the above mentioned [Melbourne City Council's CH2 office building \(2006\) officially opened in August 2006](#) which has numerous restorative environmental features including the ability to process 100,000 litres of the city's raw sewerage daily and convert it into drinkable quality water. Yet it is this buildings' dramatic and exciting architectural qualities which makes this a world wide example of the possibilities of architecture in what James Wines called "the new Age of Information and Ecology".(2001 p 235)

More relevant, given New Zealand's large stock of owner/ occupier housing is the example of Michael Mobbs, whose house in South Sydney, Australia is a prime example of a house which has a minimal if not zero impact on the environment. Analysing every element within the house on a cost benefit basis, Mobbs demonstrates the immediate and long term economic benefits of being sustainable.(Mobbs, 1998).

However, whilst we are just starting to make admirable and encouraging progress in New Zealand, we believe being sustainable in the context of the approaching environmental disaster is not going to be enough. Indeed, as James Wines has noted "virtually no form of shelter constructed today can be credited as authentically green" (2001 p 226). Very real and immediate environmental issues confront us as American politician and environmentalist, Al Gore (2006), Australian biologist and writer, Tim Flannery (2005) and British economist Sir Nicholas Stern (2007) have all recently attested. Indeed, most recycling, as Bill McDonough (2002) has pointed out, is really just 'downcycling' waste products into a messy low quality hybrid that reduces its potential re-use over time. Furthermore, population and environmental pressures in the future will make the more radical energy solutions proposed today appear to be absolute models of restraint to the next generations. At present 1 billion people on this planet use up 80% of the worlds energy. The remaining 5 billion are all wanting to come 'on stream', to live at the same level of industrialized comfort prevalent in the so-called Developed Nations. To "sustain" our environment in the face of these numbers is just not going to stack up. Architects and the entire building industry need to address these issues whether they want to or not.

Sustainability as alluded to above is all about treading water. That is not to say that recycling products, reducing energy use and re-using elements is a bad thing. It is a fantastic start and may give the whole world some room to manoeuvre. In effect, by doing all those laudable sustainable things, we are buying the human race some breathing space (quite literally) until we come up with an alternative way of looking at the whole process of manufacture, assembly, distribution, building, use, refurbishment and eventual demolition of our human shelters.

However, architects are in danger of becoming marginalized and irrelevant as the environmental issues become more pressing. Currently in New Zealand, for example, only 2 architects have bothered to attend the Australian Green Building Councils' Green Star Accreditation Course. This course brings to the forefront environmental issues affecting the building industry within Australia and which Australia seems to be far more aware. Does this demonstrate an enormous indifference amongst architects in this country on the environmental issues facing New Zealand and the world? Architects risk being seen as self-indulgent narcissists more concerned with their own egos and self-aggrandizement than addressing the real world around them.

To counter this, the whole way buildings are thought of and designed needs to change and architects have a unique opportunity to be in the centre of that process. And yet ultimately architecture can be a truly restorative act. We believe buildings and architecture can do more than just be sustainable. We call it a new ERA (Environmentally Restorative Architecture). Put simply, buildings have to do more than they ever attempted. They have to enliven, energise, supplement and restore to the environment all the energy it extracted and exhausted, and will continue to exhaust, to build the structures in the first place. We believe architecture can be a restorative, joyful and exciting work of architecture. It is our belief that buildings and architecture should do more than just be less damaging to the environment or that we should get by using less of everything.

3. Our Vision

Our vision is an architecture where the buildings make an exciting, positive long term impact on the environment. We want to design architecture first and foremost where:

- Minimal fossil fuels are needed to run the building
- The building is a net energy provider, using a variety of active solar energy systems such as integrated photovoltaic panels.
- **All hot water required for the building is provided by an array of solar water panels.**
- The building is a net energy provider, using vertical axis small scale wind turbines.
- The building provides a green roofscape where natural vegetation can grow, reducing thermal shock, filtering rainwater and cooling the surrounding atmosphere.
- The building is full of natural light, space and fresh air
- It is naturally ventilated using natural convection and assisted simple mechanical means. In short, the whole building acts as a natural air-conditioning unit.
- It is self sufficient for water where the rainwater collected off the roof is filtered then re-used on site for toilets, laundry use and on site irrigation.
- Excess rain water is stored and cleaned and made drinkable, with the excess water sold back to water service providers.
- The building taps into the wider community sewer system and processes the waste and converts it into drinkable water and fertiliser.
- Each product within the building can be dis-assembled and used as the raw fuel for the same or similar products.
- Waste products from this building and the adjoining properties are exchanged as fuel.

- The indoor air quality is free of toxins, VOC and a host of other airborne chemicals.
- The building is a flexible, adaptable design, able to cope with changing technology and community demands without radical change.
- The building is a source of income to the owners/ tenants which over the 50-100 year life of the building, generates a healthy economic, social, environmental and spiritual profit.

In summary, we want architecture to be part of the restorative economy as defined by Hawken. (1993) It is in this way we will be part of the much wider attempt to re-build our planet.

4. Conclusions

This paper has argued that the concept of sustainability, however poorly defined, plays only a peripheral role in the building industry in this country. However, New Zealand is uniquely placed to benefit from the experiences of its immediate neighbours in terms of learning and implementing the benefits of sustainable design. However it may be a case of too little, too late and that far more drastic and far-reaching efforts need to be made. We believe this applies not only in the building industry, but throughout the New Zealand economy. Every new building should be viewed as a potential source of energy, a processor of waste and a collector and filterer of water. If this were to happen, we believe we could go a long way towards meeting our obligations under the Kyoto Protocol, reduce our dependency on fossil fuels, rejuvenate our economy over the long term, and at the same time showing to the world a new level of global responsibility and leadership.

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