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# The Master of Science in Environmental Architecture – An Appropriate Response to Reducing Greenhouse Gasses

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**Abstract.** For the past decade, politicians have applied different shades of “green-wash” to global environmental issues in order to help juggle their positions in the political spectrum. This has created the illusion that effective measures are being pursued in the public interest for both this and future generation(s). The reality is, however, that nearly of all these initiatives are “input focused” and the various States of the Environment reports confirm that, despite decades of endeavour and large financial investment, there is little return on investment and that the rate of environmental degradation, particularly of the global atmosphere, continues to increase. Despite fierce posturing from the global warming sceptics, it seems that finally, the long-term data indices of global warming are being accepted seriously and politicians around the world are responding by investing public funds in the quest for options. This paper contends that with global warming the major trends will be inexorable but the manifestations complex so humans will need to embrace uncertainty and manage change. Innovation and cooperation across all disciplines and the cooperation of the entire political and social spectrum will be required to solve the ecological disasters that have already begun to unfold and accelerate in frequency. It looks from a strategic viewpoint at how specialist education can catalyse change and play an important role in managing the change. The case study used in this analysis is the RISE Master of Science Course in Environmental Architecture. It explores the implications of linking to converging interests from other emerging course streams for Engineering and other Built Environment disciplines such as Planning, Project Management and Interior design as well as socio-economic disciplines and the integrative discipline of Systems Dynamics.

## INTRODUCTION

### The Silver Bullet Solution

The book, “Collapse”, by Jared Diamond aptly illustrates how societies looking for single silver bullet solutions to environmental degradation in the past led to systematic decline and eventual collapse of societies as well as the natural environment that sustained them. Al Gore’s follow up lectures to his book and film “Inconvenient Truth”, makes the point that the “silver bullet solution” will not save the planet, its environment and ultimately human kind from a serious decline. Gore says it is silver buckshot that will be more likely. Flexible, adaptive management will be needed to guide the economy, the culture, the environment itself into a truly sustainable future. Eminent scientists and systems dynamicists can help us establish accountable, rigorous processes to do that.

CP941, *Renewable Energy for Sustainable Development*

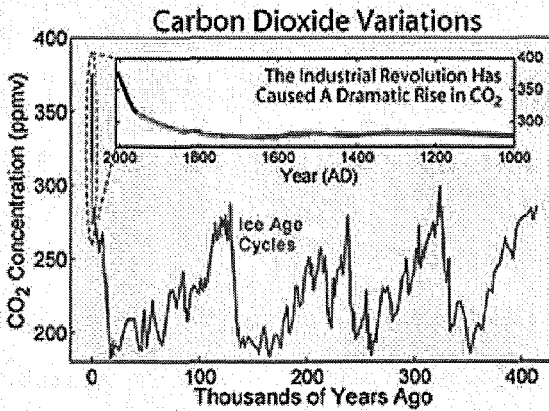
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Architects need to be ready to play a central role in the management of the cultural shift confronting us as the built form is a very significant part of the footprint that humans have made and will continue to make on the planet.

The master program, the Master of Science in Environmental Architecture and its related course streams, provides post-graduate level education and training to architects and built environment specialists that emulates the “silver buckshot” solution. (as defined by Al Gore). Broadening architects experience of sustainable economics, atmospheric science, as well as design strategies and analysis methods to integrate environmental design into architectural and planning solutions, will contribute to solving the greenhouse effect and the degrading effects of climate change, and pollution.

The following graph illustrates how serious the carbon build up has become. It is now close to 400 ppm, 100 ppm higher than any inter-glacial period over the last 400,000 years. Within 20 – 30 years it is predicted to reach 800 ppm! This clearly is alarming for climate change consequences.



This figure shows the variations in concentration of carbon dioxide (CO<sub>2</sub>) in the atmosphere during the last 400 thousand years. Throughout most of the record, the largest changes can be related to glacial/interglacial cycles within the current ice age. Although the glacial cycles are most directly caused by changes in the Earth's orbit (i.e. Milankovitch cycles), these changes also influence the carbon cycle, which in turn feeds back into the glacial system.

Since the Industrial Revolution, circa 1800, the burning of fossil fuels has caused a dramatic increase of CO<sub>2</sub> in the atmosphere, reaching levels unprecedented in the last 400 thousand years. This increase has been implicated as a primary cause of global warming.

Image credit: "Dragons flight" at Wikipedia.org

## The Quest for New Innovators and Researchers

By having a post graduate program for professionals it is anticipated that a growing number of architects, engineers, building scientists and town-planners and associated built environment professionals will be attracted to research and development.

Specialist courses such as Innovation Management and Environmental Building Services will ensure that students will gain a disciplined approach and insight into the process of innovation and the role of research and development in the process.

Before any substantial progress can occur in stabilizing the world environment, cooperative research and development programs focussing on solutions need to be set in place. This is the critical first step for developing adaptive management solutions to the huge environmental problems facing the world.

## Political Background in Australia

The Australian government has not signed the Kyoto Protocols yet but has joined the Asia-Pacific partnership on Clean Development and Climate.

On October 12-13, 2006, in Jeju, Korea, the Policy and Implementation Committee (PIC) of the Asia-Pacific Partnership on Clean Development and Climate endorsed an initial set of projects and activities contained in eight sector-based Action Plans.

Refer to [www.solar-e.com](http://www.solar-e.com) ("who has the answers to my problems?") for a summary of the work done by this committee to date. The following URL will direct you to the complete article on which this paper is based:

<http://www.solar-e.com/answers/architects.htm>

## Existing Opportunities

If nothing changes, there are significant opportunities if a new **Built Form CRC** was established that takes emergent technology and identifies the need for, and develops new water and energy wise technologies needed to retro-fit and future-fit the built form on Australian Landscapes

To establish change through the research and validation of new systems strategies, products and services, we need educated and trained professionals available for the delivery of energy and water conservation in the built environment by way design, project management and construction industries.

## Emergent Opportunities

- We have a major drought, a shortage of water and even Rupert Murdoch has turned green.
- Sixty percent of Australians believe that we should sign the Kyoto Protocols.
- If the next election looks tight, Howard might sign the protocol.
- If the drought pain continues to grow in Australia, Howard will need to sign the protocol.
- If Labour wins the next election, it has committed to signing the protocol.
- If Bush loses the next election, the Democrat President will sign the protocol.

## The Nature of the Climate Change Implications for Australia

Currently there is much speculation about the extent and nature of changes but emergent analyses suggest that with warming, we are seeing yet more warming factors appear that have not to date, been budgeted for e.g. methane loss from the thaw of the Russian permafrost. So there is credible speculation that warming could be faster than previously assumed.

Australia is a weakly buffered landscape system with a stochastically variable climate (as opposed to the equable climates of Europe and North America). Climate change is expected to deal us harsh cards. We will need to show leadership if not

signed up to Kyoto to get other countries to play a part in diminishing climate drivers that will affect us worse than other large countries.

Intended as underpinning a coordinated national approach, will be the RISE Master program for Environmental Architecture and Built environment. It is one way of achieving long term goals, maybe the only way.

## **Sustainable Energy Use in the Built Environment**

Clearly there is a unique opportunity for the RISE Built Environment Program to grow into a specialist CRC. It could be the catalyst for a National framework which could deliver outcomes that bring Australia to the forefront of Climate change action strategies in the Western world and have a large impact on built environment strategies particularly in our corner of the world (Oceania and South Asia particularly).

## **The RISE MSc in Environmental Architecture Course**

This program began in 2006 with 6 enrolments and with a similar or higher intake in 2007. It is offered through Murdoch university but collaboration and cooperation with the Schools of architecture at Curtin and UWA is well underway, with most enrollees emanating from both schools at this stage.

Following is the current study program (further information is available off the RISE website, Murdoch university enrolment site, and [www.solar-e.com](http://www.solar-e.com) portal):

YEAR.	SEMESTER 1.	SEMESTER 2.
1.	Energy Efficient Building Design (PEC470) - 4 points.  Sustainable Urban Design (STP545) - 4 points.  Energy Management (PEC494) - 4 points.	Climate Sensible Home Design (PEC472) - 4 points.  Solar Architecture and Health in Buildings (PEC471) - 4 points.  Global and Regional Sustainability (ENV412) - 4 points.
2.	Energy Economics (PEC493) - 4 points.  Greenhouse Science and Policy (PEC532) - 4 points.  Environmental Architecture - Dissertation (PEC573) - 4 points.	Environmental Building Services (PEC575) - 4 points.  Innovation Management (PEC574) - 2 points.  Environmental Architecture - Dissertation (PEC573) - 6 points.

## **CONCLUSION**

It is obvious that doing nothing about water shortages in Australia (and the world for that matter), and to continue not to deliver outcomes on energy conservation are not options if planet earth's eco systems and our quality of life are to be maintained. What is known can now be taught in an integrated manner so that the level of

competency of practicing professionals will improve in the areas of water and energy conservation, as well as improving the ecology and social fabric of human society.

Given that most global warming analysts are saying that what is certain about the future of the earth's climate is uncertainty, our masters students will receive formal tuition in adaptive management, which we define as "a rigorous process for exploring management options in complex systems where there are high levels of uncertainty".

Clearly, all the answers are not known at this stage and so a focus on post-graduate studies and research in to solutions for the built environment is going to be a growing need.

It is certain that professionals with extra qualifications in this area and the capacity to evaluate and research solutions will be in more demand in our society. It therefore represents an opportunity for architects and engineers to become the experts for the next generation of professionals. Career opportunities will expand as the need becomes more focussed and identified by governments and societies throughout the world. It therefore stands to reason that an increasingly networked Masters program started by RISE should grow and become of greater importance in professional education and continuing professional development.

## REFERENCES

1. Ballinger, J. (1982), "Australian Housing Research Council project 107: Design Guidelines for Energy Efficient Housing Estates – The Thermal Performance and Life Cycle Cost Guidelines for Selecting and Developing A Site for Residential Estates", a Study by Solarch, University of NSW.
2. Baverstock, G.F. and Paolino, S. (1986), "Low Energy Buildings in Australia – vol 1 Residential Buildings," Graphic Systems, [www.solar-e.com](http://www.solar-e.com)
3. Baverstock, G.F. (1993), "The Effect of Thermal Mass of a Structure in Energy Efficient Commercial (Air Conditioned Buildings)", Masters Thesis, Curtin University of Technology.
4. BDP, "Environment Design Guide", vol 1, 2 & 3, 1998-2004, Royal Australian Institute of Architects (RAIA).
5. Jong-Jin, K and Rigdon, B (1998), "Introduction to Sustainable Design", College of Architecture and Planning, University of Michigan.
6. Lovins, A.B., Lovins L.H. (1999), "Natural Capitalism, Little and Brown, [www.rmi.org](http://www.rmi.org)
7. Newman, Prof P, Rowe, M et al, (2003), Sustainability, "Hope for the Future: the Western Australian State Sustainability Strategy

### Web Resources:

[www.greenhouse.gov.au/yourhome/index.htm](http://www.greenhouse.gov.au/yourhome/index.htm), (2004)

[www.sustainability.dpc.wa.gov.au](http://www.sustainability.dpc.wa.gov.au) (2003)

[www.solar-e.com](http://www.solar-e.com), 2002, Wise Earth P/L, (generally for case studies, examples, philosophical issues and sustainable urban design)

[www.solartec.iinet.net.au/satellite/architecture/BCAregulations1.htm](http://www.solartec.iinet.net.au/satellite/architecture/BCAregulations1.htm), 2003, Wise Earth P/L, (For archetypal solutions for ESD subdivisions and the impact of the R-codes and BCA changes)

[www.solartec.iinet.net.au/satellite/sustainable/sustainabilitycycle.htm](http://www.solartec.iinet.net.au/satellite/sustainable/sustainabilitycycle.htm), 2004, Wise Earth P/L

[www.eco-development.com/ecocompound/index.htm](http://www.eco-development.com/ecocompound/index.htm) (2004)