Mick Pearce

There aren't too many architects whose CVs can boast spells in prison, gun running for the Zimbabwean opposition party (later commandeered by Mugabe) and a decade of Maoist collective building in north-east England. Combined with a design philosophy based on the environmental principles of GAIA, exemplified by a building inspired by an ant hill, Mick Pearce is an architect with an expansive attitude to his practice. Determinedly unorthodox and never shy of the bigger picture, if the project doesn't articulate social, environmental and economic conditions, it's under-performing.
First invited to Australia two years ago, on a lecture tour organised by Lindsay Johnson, Pearce has been invited back to work on a building for the City of Melbourne that has 'environmental flagship' written all over it. A collaboration with Design Inc, CH2 (Council House 2) is more than simply a solution to over-crowding next door. Designed from the ground up to exploit a comprehensive array of ESD features, some tried and tested, some ground-breaking, its role is to lift the debate and ambition for environmental outcomes in architecture.

Photography.
Christopher Matthews

Weekly meeting with the entire design team including Design Inc, Lincoln Scott, AEC and the Bonnacci Group.

Many architects here will know something of the culture of architecture in Europe, US and increasingly Asia, but not so much about working as an architect in Africa. What's the architectural climate like in Zimbabwe?

It's very interesting because we are at the leading edge of the decline, if you consider, as I do, that fossil fuels have peaked and are on the descent. Third world countries are the ones that will suffer first and therefore we have to respond first. For me personally, a crucial moment was in 1988 when Bill Mollison turned up in Harare and started preaching the gospel, which happened to coincide with some of the things we were trying to do with our practice. He was a great inspiration.
At the time I was building day and night, because that's what you do in Africa, throwing up buildings at an incredible rate, temples, offices blocks etc and they were getting greener and greener. Two things were responsible for this, the increasing cost of energy and, more immediately important, the cost to import machinery was cripplingly expensive. It made a huge dent in the budget and also, they wear out. Air conditioning in particular was always a problem, especially with the unfortunate legacy of the sixties glass box, which in the tropics just don't work. If the air conditioning breaks, you might as well lock up the building and throw away the keys.
So in this context, I was able to get one of the big developers to let me try out some ideas. I was already designing buildings that needed greatly reduced air conditioning anyway, starting with simple ideas like cross-ventilation, but it had limited success, because in that environment there was too much noise and dust. For Eastgate, I convinced the client that you don't need air conditioning, and it could be done with a mechanically ventilated sealed building. We worked with Mark Facia from London and Peter Gundry from Zimbabwe, both of Ove Arups. They had done early experiments with rock stores – rock cooled by night air, which has the warm air of the next day blown over it, exploiting the rock's thermal mass storage capacity to reduce the air temperature. He was inspired by watching his dog laying on the concrete slab to cool himself. So these metaphors were partly how it started. I was very interested in termites and the way they were able to control their environment in a termitary. So Eastgate used this metaphor from nature, to inspire the design of buildings for human occupation.
The engineers from Ove Arup were extremely good. They did some very early computer simulation modelling to predict the effectiveness of the designs made in the Zimbabwe office and it was encouraging to find these skills 10 years later, here in Australia, with Ché Wall of AEC in Sydney and Lincolne Scott.

A flagship project such as this is not just about building, but investing in the local knowledge base. It's also symbolic. In Africa, the driver for environmental design is clear, but in relative terms we are cushioned from that reality, so it has to be in some way rhetorically expressed.

Yes, but ultimately, what will persuade people here is the larger social issues that are having an impact around the world. In an interesting way, Bali and S11 are shaking up the world in ways that are, in a sense, making it easier for me to preach my gospel.

Perhaps it does both – it accentuates the fortress, but also makes a plea for broad-mindedness, hand in hand.

I'm interested in all of it, which is why I'm interested in the triangle of the social, the economic and the ecological. But I think the key to all of it, is the switch from fossil fuel. What this will mean is dispersal. A dispersal of energy supply, which means we can make our own energy in Africa out of the sun and wind.

Certainly if, as you speculate, the sun delivers in 40 minutes the same energy as we use on the planet every year, one can't help but imagine what that might mean for the world economy, where countries like Africa, or indeed Australia, could be the winners in a burgeoning solar economy.

That's what I'm trying to encourage, though of course I'll be long dead before then. But what will happen, in America and Europe first, is an energy web, and it'll be as revolutionary as the internet, with similar qualities of dispersal and accessibility. It's happening already in America, where they are going crazy over hydrogen. It's impacting on the car industry, as well as ordinary domestic consumers who pretty soon will have fuel cells in their basements and indeed they will start to supply power back to the grid. So the whole grid system will start working in reverse. This network will be enormously innovative and will completely change the centralisation of our mega-cities, which are currently totally dependent on fossil fuels.
Consider that, to power Manhattan with solar power, even with 100 percent efficient conversion of energy (PV cells work on 14 percent), you'd need an area covering six times that of Manhattan, so it's not on.
The issue with solar energy is that it doesn't fall in one place, you have to harvest it, which means everyone can do it. The southern hemisphere and Australians are potentially the winners, which is very exciting. So when I got the call from Rob Adams at City of Melbourne to see if I was interested in being involved in this building, I said to my partner… "I'm sorry, but I'm buggering off mate..!"
This is, in a way, how I like to work. I don't like getting a job then importing skills or taking it out of the country. I like working in a place with people and building a community. If you don't do this, you don't get the third element. The social cultural element.

I'd like to ask you about this triangle - the social, natural and economic triangle. Are there distinct architectural qualities which lie outside of this system? Do you ever find yourself marvelling at the beauty of a piece of architecture, which is however an environmental disaster?

I would say that you can have beautiful things that focus entirely on the tower of babel. In other words they are entirely social, like perhaps Bilbao. The tower of babel is the social, philosophical and political world. Humans are programmed to invent language to construct this world and as an architect, if you don't work with it you're buggered. It won't read.
Some time ago I had to design a Hindu temple in Africa, which was enormously challenging and took me right out of my own culture. Temples are dominated by forms that mean things and I had to understand these meanings. This relates to Jung's theories of archetypes and the idea of implanted forms and shapes that pass through us almost like DNA, which I am very interested in. With this community, I had to work with these forms and meanings that were deeply embedded in the social fabric. I think this is very important.

So what archetypes have you been looking at here in Australia?

Well I'm working with a team here and I don't want to impose too much. I developed a distinct architectural language in Zimbabwe, a combination of colonial qualities (the settlers who brought steel and mining images with them) alongside the ancient stone architecture of great Zimbabwe, which are totally counterbalanced. These are the aesthetic parameters of what I have been doing in Africa. Here in Australia I get a feeling of an amazing diversity of cultures, though obviously European dominated. I see a lot of what I call 'high energy' buildings, with building sites dominated by remote controls, buttons, levers and all manner of labour saving devices. It's like a great celebration of the machine age, but the problem is we are into a different age. Nevertheless, I find it an amazing atmosphere of democracy and liberalism. Of course much of the expression of the building will be developed with Design Inc, they are a great team.

This raises an interesting question about collaboration. The necessity for highly specialised professions make the collaborative process a determining factor in the success or failure of a building. Given that the architectural canon is one where great architecture equals great architects, how does this collaborative process affect your role as an architect?

For one thing the architect has to know a little bit more about everything. In this sense the architect is the conductor of an orchestra. For me it's not so hard, as I have been interested in engineering and science for many years. I must confess I read many more magazines about science than I do about architecture.

You studied at the AA alongside Peter Smithson, what did you take away from that period.

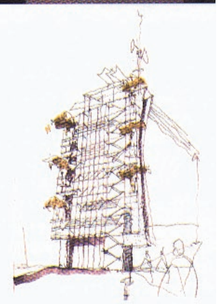
A lot. The great thing about the AA was that it was freethinking. It equipped you with an instant bullshit detector. I spent most of my time rebelling against everything, as we all did. We were called the grunt group, Jeremy Dixon, Michael Hopkins, Richard Rogers had just left, Nick Grimshaw was the year below. We didn't speak very much, just grunted. In fact Peter Smithson just 'ummed' a lot. He always used to start talking with a big 'umm, what, umm, I mean… umm, what is it, ummm, you know…' and everyone waited for the next word.

Is there a legacy of the archigram group in your current work, in the idea of technology motivating design innovation?

We worshipped the machine age and everything about it. I would certainly have got stuck into the high-tech thing, but I went back to Africa where, for me, everything changed. I suddenly realised that high-tech is supported by an incredibly high-energy cost. In a funny sort of way what I am doing now is entirely opposed to that whole aesthetic. It's too energy consumptive.
After the AA I went to Zambia where I worked with a Danish architect Erhard Lorenz for a while, before the political climate in Zimbabwe next door eventually blew up, given Ian Smith's and my political activities it became too dangerous for us to carry on living in Zambia. I decided to leave and go back to England. I spent a decade up in Sunderland, where I started a construction cooperative with two others called Sunderlandia. I learnt a lot about traditional old building construction and so by the time I got back to Zimbabwe in 1982 my approach had totally changed from those days back in the AA.
Here in Australia I perceive a strong upturn in interest in ESD. Two years ago, when I came here to lecture there was a bit of a stirring, no more. Now it's phenomenal, everyone's talking about it.

CH2

This proposed new building by Melbourne City Council has the potential to be a beacon of environmental innovation.



Lack of knowledge is not the obstacle to environmentally responsive or 'green' buildings. It is the lack of commitment by society that allows the greater part of our cities and built environment to be procured by a method that is driven by short-term dollar gain rather than long-term quality. Quality means good planning, good urban design, good building envelope, good interior environment and ecologically responsible energy and resource use. The market, in its wisdom, only prioritises the economic leg of the three-legged stool, the other two legs being societal and environmental. I have frequently espoused the concept of, what I call, 'Integrated Life Cycle Design'. This, first, demands a life cycle view of design decisions and construction investment and, second, demands an integrated design team modus operandi to realise truly clever solutions. Viewed in a life

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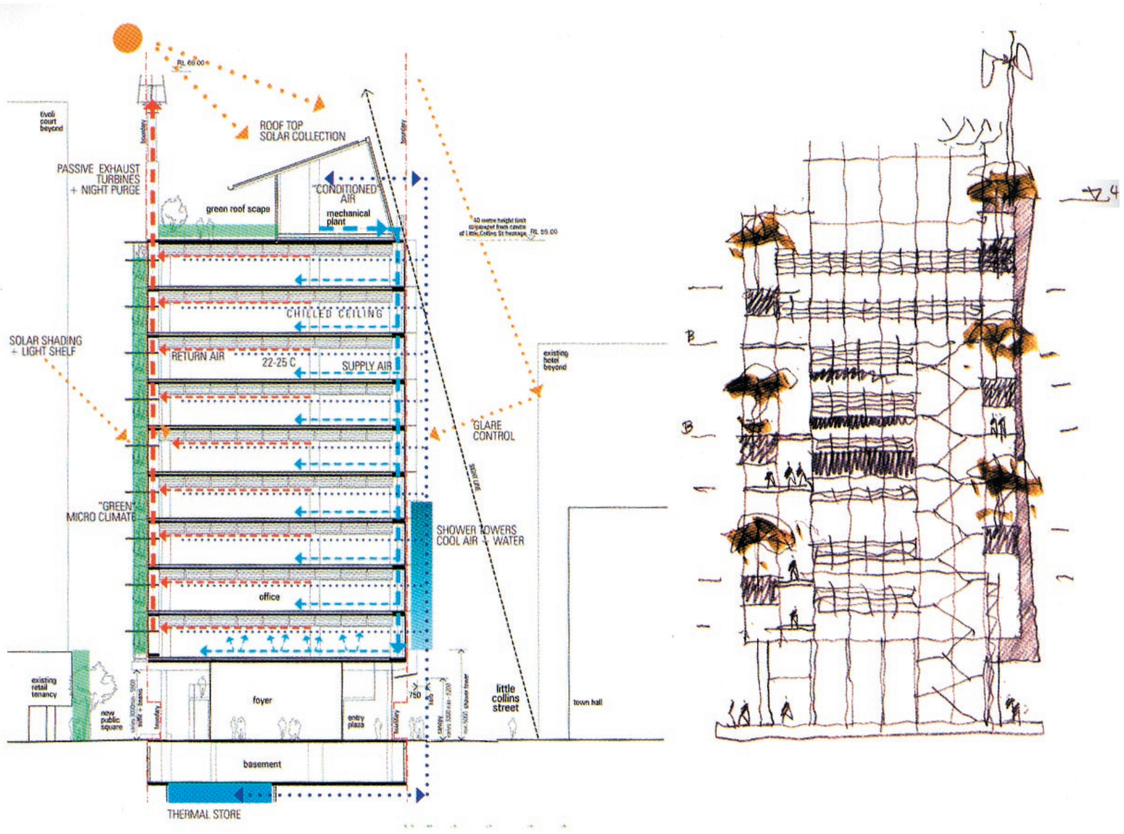
A computer controlled timber louvre screen tracks the sun's movement to maximise shading control.

All images by the CH2 design team.



cycle context, which looks at the performance and cost of a facility over fifty years at least, the up-front construction costs and, more importantly the costs of investment in good design, pale into insignificance. In an office building, the costs of operation and maintenance of the facility over a life cycle also pale into insignificance when one factors in the payroll costs of the occupants. Therein lies a 'crock of gold' – if one could reduce sick days or increase occupant wellbeing by even five percent over a life cycle, the financial savings would be enormous, at the same time delivering environmental responsibility and, perhaps, occupant and user happiness.

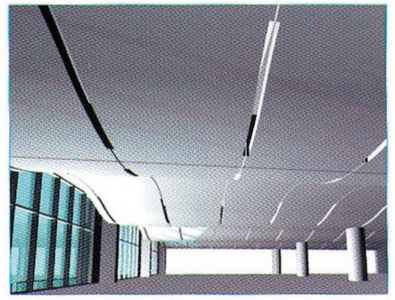
The imminent new 10,000 square metre office building to be built by Melbourne City Council on the Tivoli carpark site in Little Collins Street, for its own occupation, has set off on what I perceive to be an exemplary journey that, one hopes, will realise the stated objective of being "a landmark ecologically sustainable building that will provide a healthy, stimulating workplace supporting organisational excellence and cultural change". MCC, under director of city projects Rob Adams, has assembled a unique and talented design team. Environmental design director is Mick Pearce, whose designs have been internationally published and acclaimed, in particular his innovative Eastgate, Harare, office and shopping project in Zimbabwe[1]. The Melbourne office of Design Inc. has been appointed as architects, this project led by Stephen Webb, and their credentials include the winning entry for the Victoria Sustainable Housing Competition[2]. Specialist environmental consultants Ché Wall and Advanced Environmental Concepts, whose names are a recurring th throughout these *ar* ESD case study buildings, and who are highly respected for t conceptual innovation and sophisticated computer simulation of thermal and ligh performance of buildings.

In a unique and excellent paradigm of 'integrated' design, this hugely well-inforr team was brought together in Melbourne for a two-week design group workshop ses that established a conceptual framework for the project and produced the key strategies the building design – its planning, envelope, structure and services. What a contrast 'cheapo' design solution rushed up by a few recent graduates to accompany a compet fee bid in response to a developer-driven property development.

Mick Pearce has brought to the project a philosophical underpinning that dra from biological synergy and the concepts refer to the 'integrated' or interrelated totali "No one part can be extracted without affecting the performance of the building a whole. Like a living organism, the building requires all of its 'limbs' and 'organs' to f function". US architect Bill McDonagh, author of the book *Cradle to Cradle*, suggests observing the law of gravity is not just a good idea, it is a given, and so it should be for other laws of nature[3].

Bioclimatic section north-south and early design sketch.

Key environmental strategies of the CH2 building



Urban context.
One of the first strategies of 'eco-urbanism' is to maximise use of valuable serviced urban land that is on public transport routes and close to amenities. The vacant site at Little Collins Street is to be wisely developed for expansion of the municipal council staff into the new CH2 building, while allowing retrofitting and resource efficient reuse of their existing office building. At nine storeys over the ground floor and basement, it will be under a 40-metre height limit and of a scale well lower than the existing Tivoli Court Building. At street level, it will develop a pedestrian through site link from Bourke Street and Tivoli Arcade to Little Collins Street and will reinforce the shopping precinct by provision of retail space throughout the ground floor. The upper levels of the building will reinforce and complete the street facade in Little Collins Street and will present an innovative face to Swanston Street, above and behind an existing small café, that may raise eyebrows, but will signal the arrival of an inventive new building that is unusual for worthy reasons.

Building form.
The simple rectilinear form is largely dictated by the site boundaries, but is fortunately presenting a long axis to north and south to maximise solar access and daylight and minimise unwanted heat gain from low hot west and east sun. Good passive design is integrated into the building form and the demand for energy-consuming heating and cooling is minimised through provision of well-considered natural systems.

Facades.
There are several design elements that have clear bloodlines back to Mick Pearce's Eastgate project in Harare. For example, the prolific vegetation of the facades to form a 'green' microclimate and – very clever – the windows that progressively narrow higher up the building (computer simulations have confirmed the obvious, that less daylight is required the nearer you get to the sky) to facilitate supply and exhaust air ducts located on the outside of the building that progressively widen towards the top to supply fresh air into and move stale air out of each floor. Other intelligent facade features include a computer controlled timber louvre screen to neutralise western sun and intriguing fabric 'shower towers' that will feed chilled air into the retail spaces.

Computer renders of north and south elevations.

Air movement.
A natural breathing system is integrated into the building envelope. Fresh air to the roof-mounted plant rooms will be drawn through an external atrium-like stair void full of vegetation to be naturally filtered. Chilled or warmed supply air will come from roof plant rooms into vertical 'down' supply ducts located on the cooler south facade, feeding fresh air into each floor at low level. Hot stale air will rise naturally and be discharged into horizontal ceiling voids, integrated into vaulted concrete structural floor elements at each level and then out into vertical 'up' chimneys that rise on the warmer north facade and are capped by wind-driven exhaust turbines – a form of 'whirly bird'.

Ceilings.
The concrete structural vaulted ceilings incorporating the exhaust ducts, also have value in that they present an enlarged soffit area of high thermal mass that can effectively moderate indoor temperatures by transferring 'coolth' into the office working areas – the circulation of cold air during night time through the structure.

Night flushing.
At night, when the external temperature has fallen below that of the interior of the building, windows below the low points of the vaulted ceiling automatically open. Cool night air will flow in and across the ceiling's underbelly to remove the previous day's heat by being drawn up through slots in the ceiling to horizontal ducts which connect to the vertical exhaust flues along the north side. Exhaust air in these flues will be propelled by the chimney or 'stack' effect, assisted by the roof mounted wind-driven exhaust turbines.

Chilled ceilings.
Although outside temperatures in Melbourne are frequently cooler than comfort levels inside a building, cooling will be the primary energy demand as human activity, electronic equipment and lighting creates excessive warmth, even outside the hot summer period. Current thinking is that the most efficient way is to radiate 'coolth' to human occupants through chilled ceilings, in preference to convected or conducted chilled air, and to move 'coolth' around the building by liquid in smaller sized pipes rather than by air in large ducts – thus potentially saving building floor plate and height.

Curved chilled ceilings radiate 'coolth' in a more controlled manner than chilled convection air.

Chill cells.
Significant among the many unique features of this building is the proposed use of 'Phase Change Material' or PCM cells as thermal storage for 'coolth', which will be a world first at this scale using leading edge technology developed in Europe. These large battery-like cells will be located in the basement plant room and, by running the cooling towers on the roof overnight, the cells will be cooled down to 16°C and will subsequently feed stored 'coolth' into the chilled ceilings system during the day – effectively harvesting 'coolth' at night and creating a cold sink, just like a rock store.

Shower towers.
Consultants AEC have had success in the application of natural evaporative cooling of fresh air using shower towers in low humidity climatic conditions, particularly the award-winning Interactive Learning Centre for Charles Sturt University at Dubbo, NSW[4]. An identifiable feature of the south facade will be five tubes of durable lightweight fabric, 13-metres tall and 1.4-metres in diameter, inside which on low humidity hot summer days a water shower will induce air movement and cool and clean fresh air that will be fed into the cooling systems of the ground floor retail areas.

Water systems.
Rainwater is to be harvested and stored in tanks and the on-site purification of black (toilet) water and grey (wash basin) water is proposed, thus providing water for secondary uses such as toilet flushing and irrigation.

Recycled waste.
Provisions have been made for recycling waste and chutes are designed to deliver plastics, paper, etc., from each floor to a central collection area in the basement.

1 Lindsay Johnston, 'Anthill – Eastgate, Harare', ar 074, Summer 2000/2001, pp. 80-85.
2 Lindsay Johnston, 'Sub-Zero – Sustainable Housing, Raleigh Street, Windsor', ar Residential 02, pp. 116-123.
3 Lindsay Johnston, 'Cradle to Cradle – William McDonagh', (inside) Interior Review, No.25, pp.64-67.
4 Lindsay Johnston, 'Bio-regional – ICS, Dubbo', ar 079, Autumn 2002, pp.68-75.

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