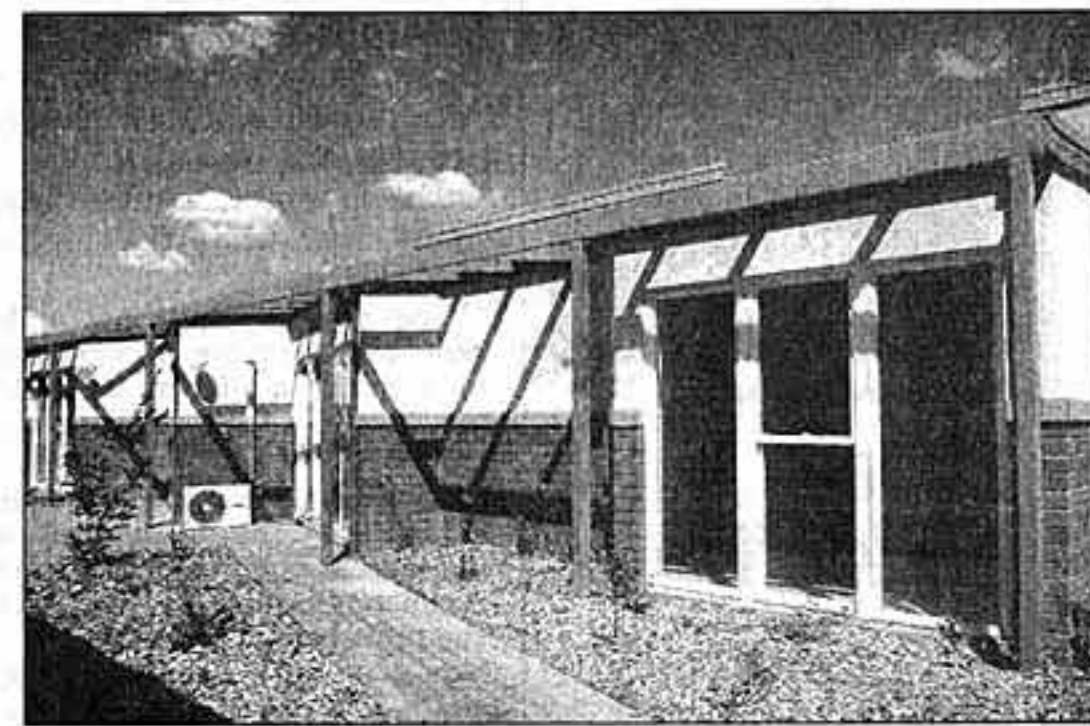
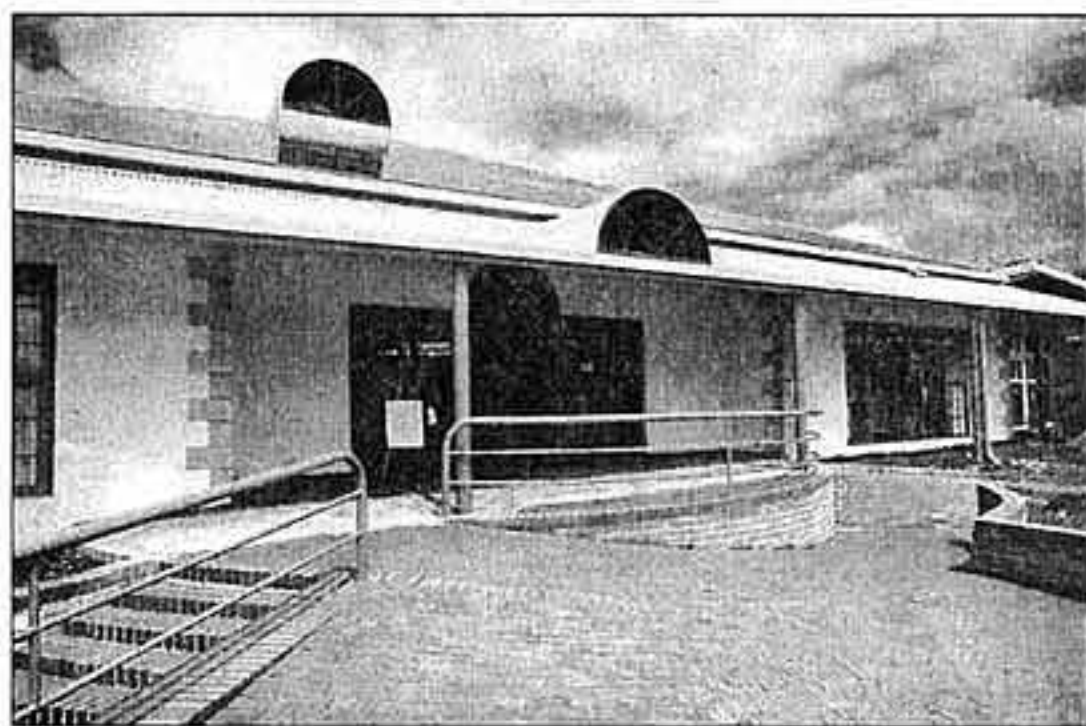
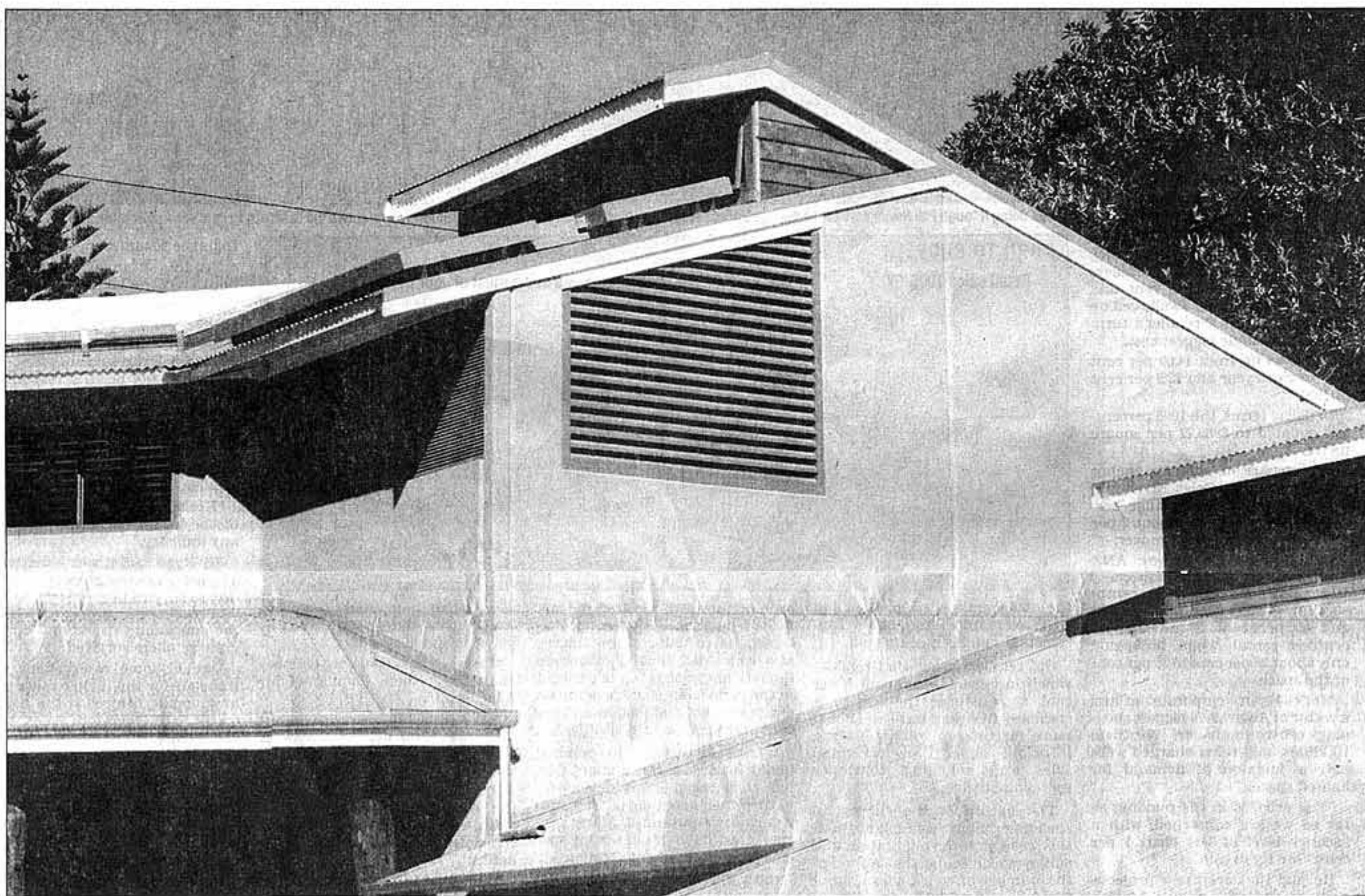


Architecture

Buckley's showroom, right and centre right, uses heavy insulation to store heat and large shuttered areas of glass to control light; the demonstration houses in Canberra, far right, maximise efficient use of water as well as energy



Green Machine



RIC BUTT

BUILDINGS from around the world designed to reduce energy consumption were the subject of a recent German exhibition. The Ecological Challenge: Architecture and Urban Design.

What this exhibition showed is that there are enough ideas and technological instruments available, but that the solutions to ecological problems require political change.

We could mount a similar exhibition here, showing Australian energy-efficient buildings and it would be stunning.

There are plenty of one-off buildings where architects have incorporated energy-saving principles which have been in the text books for many years now.

Architects have the ability to reduce by half the energy consumption of buildings over a 20 year life cycle, and this can be achieved with only a small increase in the initial capital cost. Why aren't architects being encouraged, or even obliged, to do it?

To prove the point, here are brief descriptions of four buildings spanning the country from east to west. They encompass both commercial and residential and showcase the level of thought and innovation being brought to the energy question by architects, engineers and other highly skilled experts.

Two buildings in NSW are good examples of applied technology in the past 15 years. In 1983, Buckley's Showroom in Artarmon, Sydney, was designed by Gareth Cole & Associates to be comfortably warm in winter and cool in summer without requiring air-conditioning equipment. This was achieved by applying solar technology in a significant way for the first time in a commercial building in Australia.

The technology was applied to a large section of the roof to allow winter sunlight to penetrate deep into the showroom both for heating and lighting purposes. A newly developed sensor control was included to operate a shutter system which shaded this huge glass room in summer.

All external walls as well as the

Animal spirits The amenities section of Perth Zoo's operations building has no conventional air-conditioning. Its temperature is managed by active night cooling in summer.

roof were heavily insulated, and brick and concrete were used extensively inside to maximise the heat absorption and heat storage capacities of the building. The aim was to develop a building which would maintain stable internal temperatures year round and some passive systems, such as a solar water heater feeding hot water in winter into copper pipes embedded in the concrete floor were also included.

Since its completion 15 years ago, the inside of the showroom has maintained a temperature within the range of 20-22C summer and winter, and reduced energy use to a minimum.

The Science Precinct development at the University of NSW designed by Mitchell Giurgola Thorpe is nearing completion.

Project architect Richard Francis-Jones claims that this building complex will be among the most advanced examples of a new design approach in Australia, which embraces reduced energy use.

The building envelope sets the scene — it is long and relatively narrow, the long sides face north and south respectively, enabling maximum use and manipulation of sunlight to heat and light the building.

Air conditioning will be limited to the computer rooms. The offices, classrooms, studios and lecture theatres will be served by a passive system of cooling, heating, ventilation and lighting developed in close association with engineers Ove Arup.

Air is drawn into the building through low-level vents and propelled through central air-shafts connected to thermal flues. By locating these flues on the north face of the building, the natural heating from the sun assists in drawing cool air from low-level vents.

Automatic dampers within the air shafts control the air flow, so that when summer passes, air flow is reduced and the sunshades adjusted for passive heating from winter sunlight. The north facade

has very deep-set windows to provide sun-shading, and two linear narrow, the long sides face north and south respectively, enabling maximum use and manipulation of sunlight to heat and light the building.

The use of natural daylighting has been further developed through clerestories and internal void openings. During daylight hours almost no artificial lighting will be necessary.

In Western Australia, architects Baverstock and Associates designed the Perth Zoo Operations Building to demonstrate a markedly improved building energy performance.

Passive solar design principles were incorporated into the design, supported by carefully planned electrical and mechanical systems. The amenities section has no conventional air-conditioning plant and its temperature is managed through active night cooling in summer.

The office building is occupied

for longer hours and its air-conditioning consists of active night cooling, an indirect evaporative cooling system and a direct expansion cooling system.

This hybrid design, developed in association with Healey Engineering, allows the direct-expansion air-conditioner to be one-third of that typically specified for a building of this size. It is required only on humid days with maximum cooling requirements.

In addition to the passive solar features, heating to the office building is supplied by active solar air-heaters on the roof. Backup for these is supplied from the direct expansion air-conditioning unit operating in reverse.

The result is that Perth Zoo has a building reflecting its commitment to ecological programs and one that reduces energy by 70 per cent.

The ACTEW Corporation has led the way with commissioning designs for resource-efficient houses in the ACT. It has been compulsory since July 1995 for all new houses in the ACT to achieve

four-star efficiency in the energy rating scheme.

Tony Trobe Architecture produced three different house designs focusing on both energy and water efficiency. The houses are very different and target different market sectors, ranging from the average family through to the first home-buyer and the rental market.

They were designed and built to educate builders and owners about how to make the most of available resources and to show the way for future development in Canberra.

All of the houses are equipped with monitors which will feed data on energy performance back to ACTEW for use by the building industry.

Two of the houses have been purposely aligned away from the most desirable sun access to show what can be done in less-than-ideal situations. The focus in Canberra is often on meeting winter needs, but the houses have been designed to provide a comfortable living environment all year round.

All have northerly-facing windows; wall and ceiling insulation; concrete slab floors; metal deck roofs (they allow less air movement in the roof cavity than tiles, which improves insulation value); heat-absorbing ceramic floor tiles; double-glazed insulated windows; weather seals on external doors.

On the smaller, difficult sites, windows have been designed in a zigzag to improve the orientation to northern sun, and one bedroom has been fitted with a trombe wall, which is a low brick wall placed behind a north-facing window, painted black on the window side. This wall acts as a convection heater for carpeted rooms where the floor is not storing heat.

Initiated and driven by ACTEW Corporation, this is an outstanding example of leadership on the road to reducing energy usage, but it, like the other projects, are occurring in a disparate way.

The Government's recent Budget decision to abolish the Energy Research and Development Corporation and to reduce funding for the National Energy Efficiency Program is not well timed.

The Institute's Environment Design Guide was able to be launched through funding and support provided by ERDC.

The Environment Design Guide has been invaluable in broadening architects' understanding and application of the latest technologies in energy reduction in buildings, along with up-to-date information and research findings on a range of environmental issues applicable to architecture.

Australia's high dependence on fossil fuels to generate electricity makes it the main source of greenhouse gas emissions — about 40 per cent of these emissions are caused by energy used in buildings.

John Howard could improve the perception of Australia's contribution to the reduction of greenhouse gas emissions by reviewing the disbandment of ERDC.

What is needed at the moment is strong leadership to bring together the highly creative efforts of architects, engineers and others in the building and development industry.

Without clearer policies, and probably legislation, there can be no concerted effort towards reducing energy consumption — Australian energy consumption equals greenhouse gas emissions.

Reducing greenhouse gas emissions is a tantalisingly close possibility.

Architects, engineers and other experts are well placed to turn proven theories into reality. What is missing is the political edge.

Ric Butt is president of the Royal Australian Institute of Architects.

From next week, Australia's best-regarded writer on architecture, Peter Ward, will appear on this page.