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HEAT COLLECTOR

A system which combines low cost housing with energy saving heating is starting to catch the eye of local authorities. Matthew Pettipher *reports.*

The image most readily associated with the Isle of Wight is of the traditional British holiday complete with sandy beaches, pink rock and piers. For Alan Ridett, whose family history on the island goes back 900 years, such preconceptions come as no surprise.

But he believes the energy saving heating system he has developed, allied to a low-cost housing system, could recast the island as a hot spot of modern technology.

The idea for the housing system grew out of Ridett's main line of business; he has worked as an architectural consultant for more than 30 years. At the beginning of the 1980s he was asked to design a house based on a harbourmaster's observation post he had completed.

A harbourmaster needs 360° visibility so his post has to be raised and circular or octagonal. To achieve the same for a home he designed a steel frame — which looked like an "undressed lampshade" — around a central core to produce a mushroom-shaped building.

Under the Building Regulations steel frames have to be protected against fire. Ridett met this requirement with a cocktail — water, anti-freeze, anti-corrosive elements — circulated through the frame. This sparked the creative process that culminated in a new heating system.

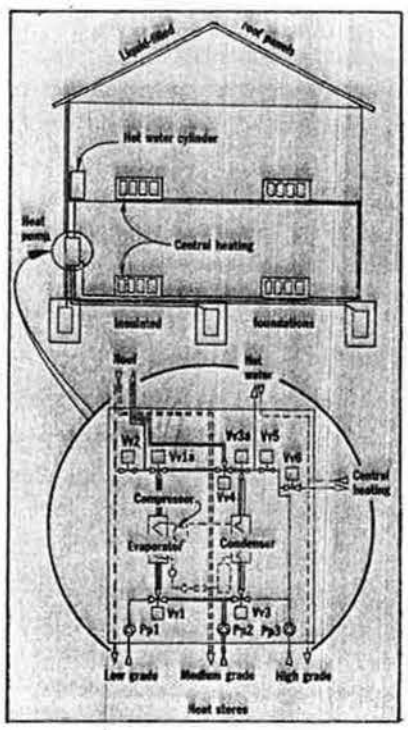
"We had 2t of liquid trundling around the frame and I hit upon the wheeze of dropping its heat and conducting energy from the atmosphere outside into a thermal store," he says.

This process is called endothermic and it works with the building operating like a fridge in reverse. The essential ingredient added by Ridett is a water-to-water heat pump to cool the liquid circulating around the frame. This extracts heat from outside and transfers it to a thermal store located in the core of the octagonal steel building.

All external heat derives from the sun but unlike previous solar-based systems endothermic heating is active which means it operates day or night regardless of temperature. Ridett has found that the frame needs to be only 2° below ambient temperature to provide the energy required to maintain a 2000 litre store at 45°C.

The prototype systems have been up and running for almost 10 years. Ridett says his monitoring has shown them to have a "coefficient of performance in the order of four" — the system generates four times as much energy from the atmosphere as it costs to run the pump — which means it is 75% cheaper than conventional heating.

Although he was quickly convinced of the system's commercial potential he realised the concept would have to be refined and translated for conventional housing before others would be persuaded. "There's only a very limited market for octagonal buildings resting on stalks so we began to look at applying the system to the mass market," he says.



Proud as he is of the "mushroom" houses they have in some ways hampered acceptance of the system. "We had discussions with a number of builders but they didn't fully understand the system. The prototypes planted a seed in their minds that the technology was only suitable for futuristic buildings. With traditional builders it's very difficult to remove the seed," he says.

The reticence extended to the major house-builders. Ridett spent 18 months in discussions with one major contractor which he claims yielded nothing more than a promise that the company would re-examine the idea once it had been further developed.

Lack of foresight is inherent to construction, he says. "The attitude is: 'As long as we can go on selling what we're selling why take a risk with anything else'?"

The risk was considerably reduced when environmental issues and greening came into vogue in the late 1980s. A system using a quarter of the energy of conventional heating has obvious benefits in cutting carbon dioxide emissions and is a natural attraction to the conservation minded.

This greening coincided with Ridett's decision to take advantage of the Enterprise Initiative scheme, sponsored by the Department of Trade & Industry, to advance his product. The DTI employed consultants — Dr Bruce Denness of the Bureau of Applied Sciences and Professor Alex Hardie of the University of Newcastle — to assess the system. "We looked at how best to manufacture the mushroom system for the conventional, mass housing market," Dr Denness says.

His immediate advice was for Ridett to establish a company independent of his architectural practice to market the system. He is now chairman of Suntherm Structures and Dr Denness is director of research and development.

His input has already helped refine the system for conventional housing. In most cases the water will run through hollow steelwork sited in a metal roof with the heat pump extracting energy at the ridge. The whole roof becomes a heat collector in a system integral to the structure with the heat pump working at the optimum point.

The thermal store is located in the foundations which will be specially reinforced prefabricated box culverts. The quality afforded by factory production offers protection against leaks while the reinforcement transforms the foundations into a ring beam thereby protecting against subsidence.

Dr Denness' contribution to the roof design was direct and indirect because additional expertise was provided by DA Design, a company he introduced to Ridett. DA's founding partner Michiel Kousemaker had also developed a low-cost modular housing system ideally suited to the Suntherm so the two joined forces.

The housing units are made of prefabricated steel panels erected on site in the same manner as timber frame. Kousemaker says a standard

DIAGRAM: the endothermic heating system applied to conventional housing.
RIGHT: Dr Bruce Denness and Alan Ridett believe Suntherm's technology will appeal to local authority and housing association clients.

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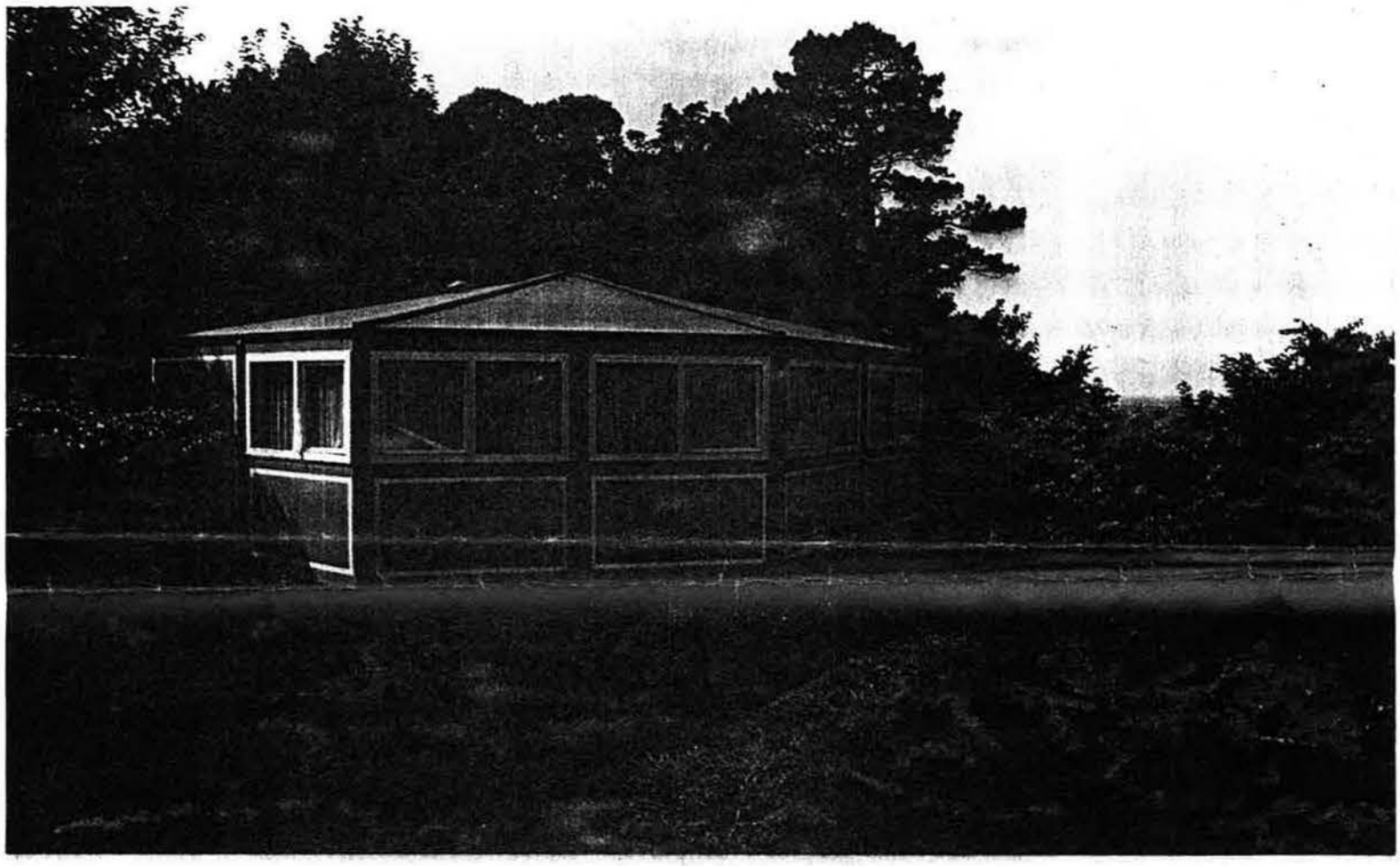

ABOVE: the prototype "mushroom" houses on the Isle of Wight have proved the success of the system over almost a decade.
LEFT: Ridett knew there would be "only a very limited market for octagonal buildings resting on stalks".

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model can be built from start to finish in little more than a month, complete with endothermic heating. It comes to £27 per sq ft which compares favourably with conventional housing at £45 per sq ft.

Ridett believes the economic argument will prove most persuasive to local authority and housing association clients, particularly in conjunction with the Government's "Greenhouse Grant" scheme.

So far the company has had 54 enquiries from councils and Ridett expects many more on completion of two traditional semis awaiting planning permission. The houses will include all the Suntherm technology and will be monitored by the DTI and Southern Electric.

The system is not just suited to new build. Suntherm's first major job is the refurbishment of 214 concrete houses for Oswestry council. The endothermic system will be built into new roofs and the cladding replaced.

Also to be included in the Oswestry homes will be a new air brick for ventilation, again developed in conjunction with Dr Denness and Suntherm. The Seculair brick was actually designed by Dr Denness' colleague on the Suntherm consultancy Alex Hardie who did not live to see its manufacture by Isle of Wight company Advanced Building Components.

The brick differs from the traditional air vent because it has a membrane which allows it to open and shut automatically.

The Seculair has proved ideal for Suntherm because the improved insulation incorporated in the system requires improved ventilation. Dr Denness says the coincidence is typical of the way Suntherm has evolved. "Every time we develop a problem we find other technology running alongside which solves it." nb