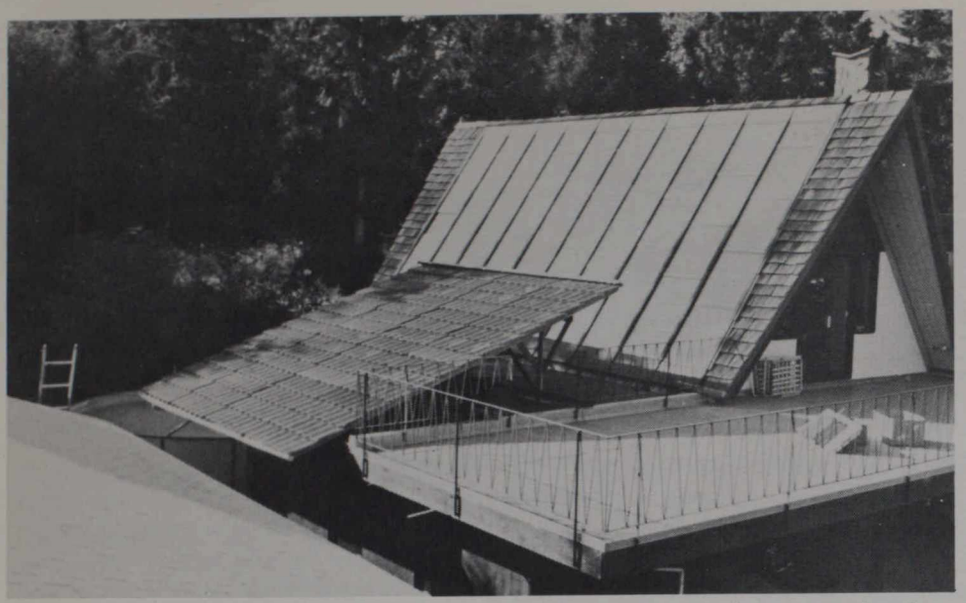

Eric Hoffmann constructed his own solar collectors for this sun house near Vancouver, where he has been living and recording data since 1970.

Thus in winter when the need is at its peak and the supply is poorest, solar heating has to be supplemented from other power sources — though research is working on methods of storage which may soon succeed in bridging the weather gap. For the same seasonal reasons, the ideal and obvious simple use for solar heat is in swimming pools. A number of Canadian families have been experimenting with this. A Beaconsfield family, for example, heats its pool by pumping water up a pipe along the edge of a south-facing roof to pick up heat from the dark roof surface. The water is then collected in the main gutter system and gravity-fed back into the pool after passing through a filter.

More sophisticated experiments than the Hoffmann house are now going ahead, some of them backed by Government grants under the Canadian Urban Demonstration Programme (CUDP). One in Mississauga, Ontario, recently completed and occupied by its architect Douglas Lorriman and family, is being carefully monitored to determine whether its heating system is efficient enough to warrant mass production.

Another project backed by CUDP is a bungalow at Gananoque, Ontario, with an energy-storage system consisting of two tons of molten paraffin wax. Its designer Gregory Allen says that paraffin is cheaper and more efficient to use for heat storage than water — or indeed rocks, which are used in yet another experimental system. Once the wax is heated to 51 degrees Celsius, he says, it will liberate 45·3 million calories before solidifying. The released energy will be used to warm a water-glycol solution to carry heat through the house. Costs have been kept down by using mounds of earth to insulate the north side of the house and sods to insulate the roof.

A more ambitious experimental house with rather high-powered design and financial support has opted for water storage on a much larger scale than has yet been attempted. Dr. Frank Hooper of Toronto University and architect John Hix, backed up by CUDP and the Ontario Government, have designed their house to draw energy from a solar-heated water tank the size of three large swimming pools — all this to serve 1,300 square feet of living space. They have incorporated wind power into the system as well: a wind turbine will provide the electricity to power water pumps and fans to draw heat from the 60,000 gallon reservoir.

The main objective of this experiment, which is at King City, north of Toronto, is to determine whether solar energy can economically provide *all* the heat required by a standard size, single family dwelling. It is believed that the large storage tank will be able to store enough heat to last the home through the winter, so that it will not be necessary to use any supplementary heating by gas or oil. The heat will be distributed within the house by circulating hot water through radiators or by a heat-exchanger converting the water's heat into hot air.

Sun power only

Called "Provident House," this will, if it fulfils expectations, be the first dwelling anywhere in northern climates to be fully heated by solar energy. It may be the first anywhere. The Ontario Government are also sponsoring a multiple-unit solar heated building for old people, on which construction will start this coming spring.

Self-sufficiency in terms of harnessing natural resources is being taken to amazing lengths in an experiment on Prince Edward Island by a small organization of scientists and volunteers called the New Alchemy Institute. Also sponsored by CUDP and appropriately named "The Ark," the venture could have been specifically designed to put heart into the doom-criers who forsee human life grinding to a halt in the near future, simultaneously starved and choked by famine, fuel shortage and industrial waste. It is the ultimate product of that instinct which already has city dwellers in Britain growing vegetables and keeping chickens in their erstwhile elegant gardens.

"The Ark" is also a reminder that sun power is in fact nothing new. Our great-grandfathers, of course, used it to ripen the tomatoes and lettuces in their greenhouses. It has been used for more than 2,000 years to distill liquids — from perfume to fresh water — and to dry agricultural products such as hay, raisins and timber.

A greenhouse 1,000 feet square is incorporated in one end of "The Ark" and three sun-heated fish-growing tanks in the other. Powered by three windmills and designed to be self-sustaining, the C$354,000 building will combine under a house-size roof the functions of generating energy, growing food, recycling wastes and giving shelter.

Dr. John Todd, president of New Alchemy, hopes that the programme of tests to be carried out in "The Ark" will result in a greater selection of cheaper home-grown vegetables and widespread use of windmills for electric power. He believes that structures like "The Ark" could in the future provide people in towns and cities with a measure of self-sufficiency which has until now been limited to farmers.

More tomatoes

The difference between modern solar heating and great-grandpa's greenhouse is, of course, one of efficiency — plus the fact that modern systems can store heat, where the old growing-under-glass method can only make more or less instant use of it. Apart from improving methods of collecting heat, buildings must be designed and sited to avoid heat loss — a problem the Université Laval has been studying in the unpropitious climate of Quebec. A structure designed by them to suit the environment, completed in November 1973, has shown excellent results. After the first winter it required 30 to 40 per cent less heating and by early May tomato productivity had increased to three times that of a standard greenhouse.

Until recently the Government attitude to these developments in the use of timeless power sources has been one of encouragement in verbal rather than financial terms — though this is beginning to change. That they take the matter seriously is evidenced by the existence of a Solar Energy Programme, set up in October 1974 under the building research division of the National Research Council. The Canadian Government has a habit of setting up Programmes about the things it wants to encourage, even if it isn't prepared to spend a lot of money on them.

The Solar Energy Programme is designed specifically to study three uses of sun power: the heating and cooling of buildings, the heating of service water and — branching into a field which is still comparatively undeveloped — the direct conversion of solar energy into electricity. To this last end, limited Government funds have been allocated for basic research only on photovoltaic and photochemistry