

Three-bedroom laboratories — Experiments in energy conservation

NRC's Division of Building Research is using four suburban houses provided by the Housing and Urban Development Association of Canada to study the effectiveness of various energy conserving measures, and to validate a computer model of energy flows in small houses.

The houses, located in a subdivision near Ottawa, are virtually identical, differing only in details that affect their energy consumption. One, built to current standards of insulation, is the experimental control, the yardstick against which the performance of its neighbors can be gauged. In each of the other three the steps taken to retain heat exceed current standards: the insulation packed into exterior walls has almost twice the thickness (6 in; 15 cm) and heat flow resistance (R20) as that in the control house; basement walls are insulated down to the footings on which they

stand; windows are sealed with three panes of glass. By comparing these houses against the control, the amount of energy saved by increased insulation and air-tightness can be measured.

In two of the upgraded houses alternative heat sources — a heat pump, and a solar heating system — supplement the electric furnaces common to all the houses. Much as a refrigerator warms its surroundings with heat extracted from its interior, the heat pump warms a house with heat extracted from the air outside. In the solar system, air flows under dark, sun-warmed panels on the roof, taking heat to living spaces and to a gravel-filled heat storage room. Installed in identical houses, the merits of these heating systems can be exactly compared.

Energy use is influenced by the interplay of many factors, including the temperature at which a family sets their thermostat, the frequency with

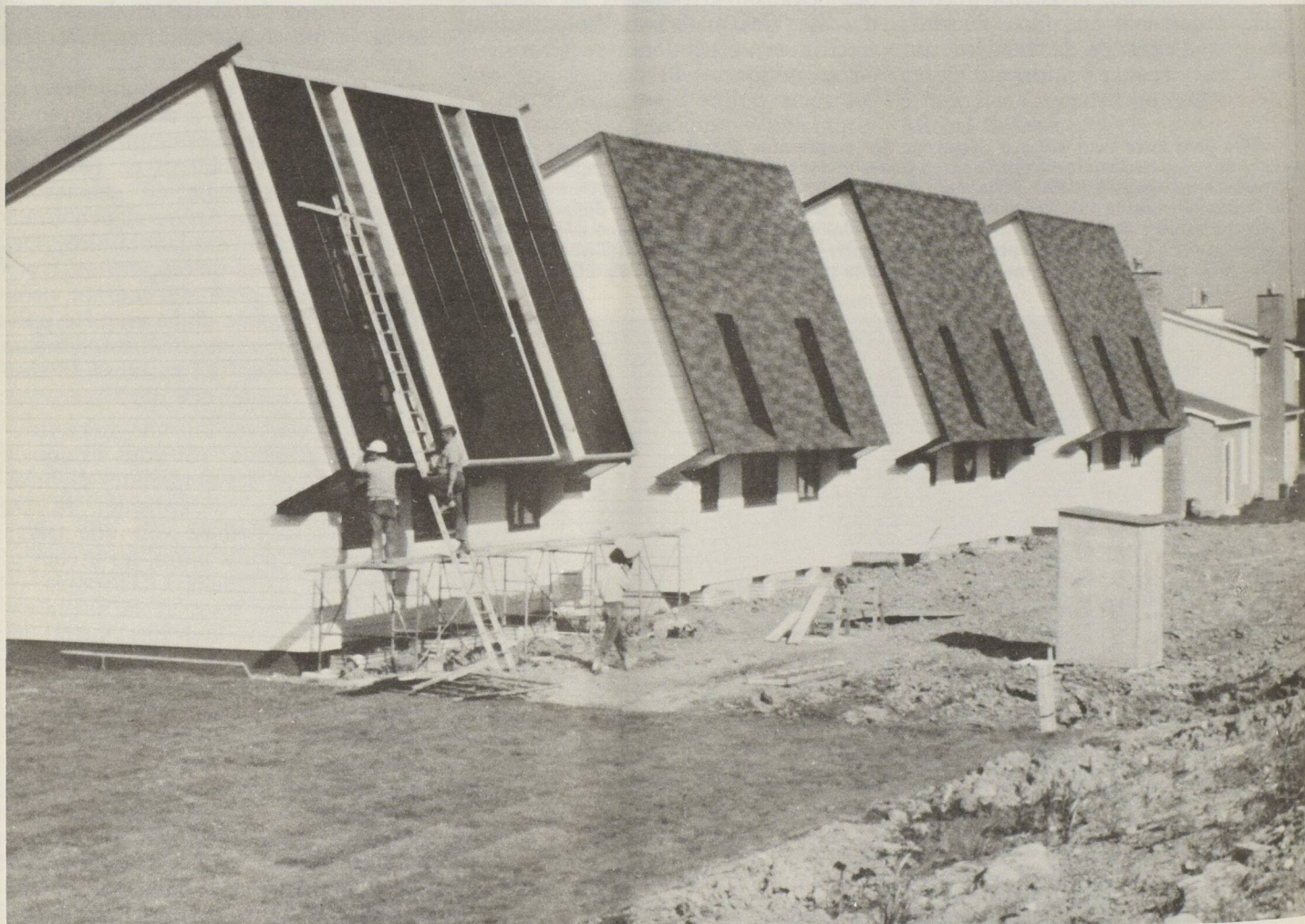
which they open doors and windows, and so on. A network of sensors placed on and in the research houses automatically monitors such things without disturbing the occupants.

The data collected will serve to refine a computer program for simulating energy exchanges in houses. When the program is fully developed, the effect of changing variables such as the color of a house or its orientation — difficult experiments to carry out on actual buildings — can be investigated mathematically. Simpler programs to predict a house's energy efficiency while it is being designed will be verified with this complex model. □

Séan McCutcheon

Mounting solar collectors on one of the four experimental houses.

Installation de capteurs solaires sur l'une des quatre maisons expérimentales.



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