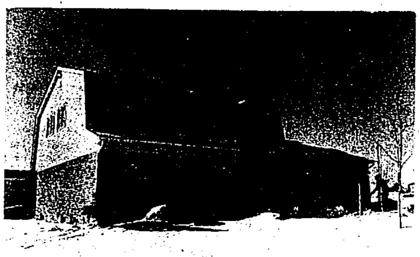


It looks like any other Dutch colonial house, but this Northville four-bedroom dwelling is the first solar-heated home in Michigan. (Staff photo)

A solar home

Hot water, warm rooms, thanks to sun and insulation

By SUSAN TAUBER

"There's nothing particularly unique about his house," said John R. Hamann, president and chief operating officer for Detroit Edison.

"This is a real house. It will be lived in by real people and it was designed to be energy efficient," he added.

The house Hamann was discussing is a 2,300-square-foot Dutch Colonial, four-bedroom, 2½-bath house in Northville.

It will be sold at the end of this year already decorated.

The family who buys it will not only benefit from the extra insulation, double-pane windows and all electric appliances throughout the house, but from the solar energy system built into the house that will help to heat the space and water in the home.

The family will also live in a house that is the first of its kind in Michigan.

Involved in the contruction were Detroit Edison, Builders Association of Southeastern Michigan and Fred Greenspan Development Corporation.

The Jubilee Solar Home is an experiment.

"How reliable is the solar energy system? We don't know. We've never done this before," said Hamann.

DETROIT EDISON didn't dive into building this home without previous research, however.

Its solar energy research team has been studying solar energy exclusively for two years from its Warren location. It has also built two weather stations, one at the Warren solar research center, another in Marysville, west of Port Huron, for gathering and evaluating such data as sunlight availability, cloud cover, wind speed and direction in Michigan.

"We'll be seeking answers to questions," Hamann said at the official opening of the house on Feb. 5. "We'll be looking at the practicality of storing heat from the sun so there will be heat when the sun doesn't shine. The sun doesn't shine in Michigan 80 per cent of the year.

"We'll study cost effectiveness," he continued. "We estimate 30-35 per cent of the total heating energy for the house will come from the sun and will heat 80-90 per cent of the water."

George Murray, supervisor of the solar energy research center, said more engineering studies have to be done. The solar collectors on the south side (back) of the house on the mansard roof already have moisture condensation in them.

"This still requires some engineering to correct this," Murray said. "The cost of the solar collectors, which cost more per panel than a refrigerator, illustrates that they aren't yet mass produced. The 11 solar collectors on the roof of this house add $8,000-$10,000 to the cost."

THERE ISN'T any evidence except in the basement and on the roof that the Jubilee Solar Home has a solar energy system.

All of the equipment is in the basement, except for the heat pump outdoor coil section that's located in the backyard.

In one corner of the basement are typical-looking heating pipes, hot-water heaters and such. The only difference is that each heating element is marked with an explanation of what it is and what it does.

The only unusual-looking piece of equipment is the large white solar energy tank, standing on four skinny metal legs.

The bulbous tank consists of two, 275-gallon oil tanks, covered with a gauze material to make them look like one tank.

The way the solar energy system works, according to the pamphlet from Detroit Edison, is that the home collects, stores and uses heat from the sun.

The 11 solar collector panels, which face south and are angled at 75 degrees from the horizon, soak up heat on sunny days.

The heat is transfered to water circulating through pipes in the collectors, the pamphlet explains. Then the solar-heated water is pumped to the large insulated solar storage tank in the basement.

TO WARM the house, according to the booklet, the solar-heated water is pumped from the storage tank to the solar heat exchanger where the heat is transfered to air. The heated air is distributed by a fan and ductwork throughout the house.

Water is heated much the same way, with preheated water from the solar storage tank pumped to the electric water tank for use in the house.

A heat pump automatically adds more heat to the heating system on winter days when the sun doesn't shine.

During the summer months, when the air-conditioner is in use, the heat pump moves heat out of the home.

Detroit Edison is monitoring the temperature all over the home with tape recorders and a computer. The equipment will tell the Edison research team such important information as how much sun light is hitting the surface of the solar collectors and whether the system is working.

Detroit Edison representatives will gather data that's on tape once a month for the next three years to further their studies. Once the house is sold, the equipment will be moved outside where it can be monitored without disturbing the occupants.

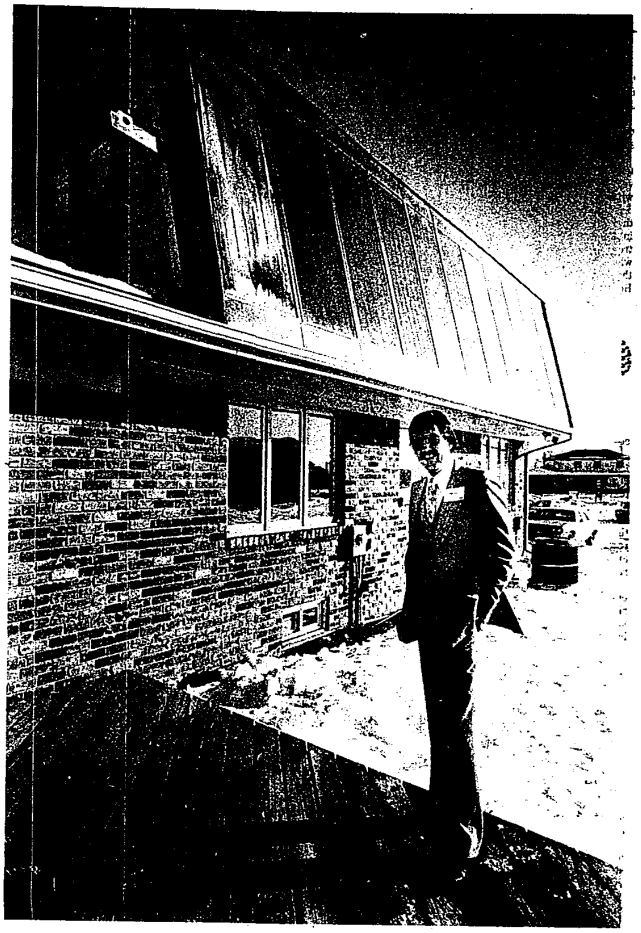
The Jubilee Solar Home was built in Northville, according to Murray, after a number of industry volunteers visited sites and looked at builders' floor plans in different areas.

"There's no hard reason as to why we built here except that we liked Greenspan's floor plan because it could accommodate the solar panels, the site faced south and its located close to an expressway. We wanted the solar home to fit right in with the rest of the homes in the neighborhood, not to look different."

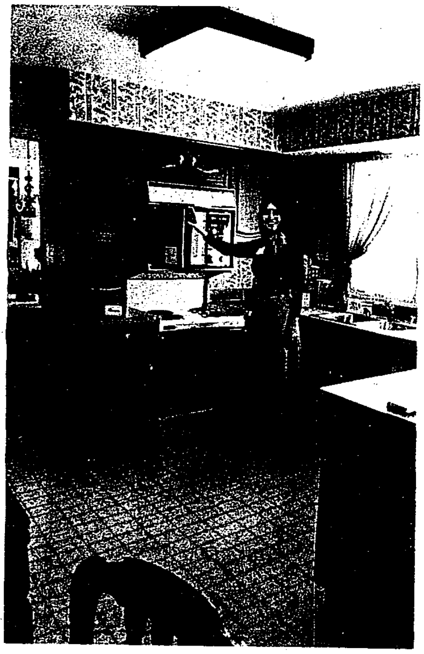
The Jubilee Solar Home will be open for public viewing from 1-7 p.m. on Friday, Saturday and Sunday through October.

Groups may arrange special tours with a guide by calling Detroit Edison solar tour department, 237-7749.

The house is in Northville Colony Estates, one mile west of I-275 expressway on Six Mile Road.



George Murray, director of Detroit Edison Co.'s solar research center, stands beneath the 11 solar collector panels that are incorporated unobtrusively into the mansard roof. (Staff photos by Bob Woodring)



Linda Pfeiffer, who works in Detroit Edison's economic development department, stands by the microwave oven in the kitchen of the highly energy-efficient home.

Their solar cell brings costs down to earth

By STEVE RADDOCK

Photovoltaic cells—conversion devices that can turn the sun's rays into electrical current—have been successfully used to power U.S. space vehicles and satellites for more than 20 years.

This conversion process was recently showcased by the Skylab station, which generated enough power through the use of solar cells to serve the needs of a single-family residence.

But, so far, the major constraining factor on the cell's commercial application has been its cost, which has limited the cell to experimental and space program use.

Two Troy scientists, however, may have come up with a way of bringing both the technology and cost of photovoltaic cells "down to earth." Their improvements in the chemical makeup of the cell may soon make it possible for the average consumer to economically tap the sun for his electrical needs.

In fact, Stanford Ovshinsky, president of Energy Conversion Devices on Maple Rd. and his colleague, Arun Madan, feel that within three to five years, their improved solar cell could provide electricity as cheaply as power derived from conventional coal and nuclear generating plants.

To understand Ovshinsky and Madan's new technological wrinkle, a recap of the solar cell's history may be in order.

THE SOLAR CELLS now used by NASA are crystalline, that is, composed of a silicon material whose molecules are structured in orderly, three-dimensional arrays.

Silicon is the second most common ingredient in the earth's crust, with sand being silicon oxide.

The major advantage of crystalline solar cells has been their high energy conversion efficiency levels. Approximately 12-14 per cent of the sunlight striking these cells is converted into electricity.

On the other hand, the crystalline cell's major drawback has been its high cost, since silicon crystals have to be grown and shaped—both expensive processes. In shaping a crystal into the right dimension, over 95 percent of the original crystal is usually scrapped.

According to David Adler, professor of electrical engineering at the Massachusetts Institute of Technology and consultant to Energy Conversion Devices, it would cost a homeowner $120,000 to install solar panels with crystalline cells on a typical home.

Electricity from this source, moreover, would cost about 75-80 cents per kilowatt-hour, compared to the national average of 3.92 cents per kilowatt-hour.

In an effort to find a cheaper alternative, scientists developed a photovoltaic material using an amorphous silicon alloy—that is, where the alloy molecules are arranged in a haphazard fashion rather than the neat, orderly structure of its crystalline counterpart.

THE RESULT WAS a much cheaper cell, since the costly crystal-growing and cutting processes are eliminated.

The efficiency level of the first amorphous cell prototypes, however, were below standard. RCA developed an amorphous material cell with a 5.5 percent efficiency, which, explained Adler, would only provide one-half to two-thirds of the power needs for the average house.

The federal Department of Energy's efficiency standard is 10 percent.

Enter Ovshinsky and Madan.

Using an amorphous alloy of silicon, fluorine and hydrogen developed in their Troy labs, Ovshinsky and Madan have, according to their tests, developed a solar cell material that has a 10 percent efficiency. At this level, enough electricity could be generated to power a two-family home.

Ovshinsky anticipates that a solar cell incorporating the alloy would be able to generate electricity for commercial use at five cents per kilowatt-hour by the early 1980s. But that's contingent on Energy Conversion Devices developing the technology to mass produce such a cell.

To that end, the company is currently seeking funding from the Department of Energy.

If commercially available, what will the new solar energy panels look like?

According to ECD consultant Adler, they would be similar to tile squares, dark grey in color and interlaced with silver wiring. The average home will require about 1,000 panels.

Each panel would generate one volt, with 120 volts required for most household appliances.

But the job of installation will require more than an eager weekend spirit and a quick glance at an instruction sheet. To provide the standard 120 volts, 120 panels will have to be wired together, with the remaining 880 interconnected in parallel circuits.

Stanford Ovshinsky (left), president of Energy Conversion Devices, and Dr. Arun Madan collaborated on developing amorphous silicon-fluorine-hydrogen alloy for solar energy cells. (Staff photo by Mindy Saunders)