The Village Crier

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SOLAR HEATING COMES TO FERMILAB

The Fermilab Solar Energy Club commissioned its first solar energy heating system on Wednesday, January 28 -- a bright, cold, sun-filled day in Illinois. Two-hour operation on two successive days successfully demonstrated that the system is ready to convert the energy of the sun to comfort heat for a Fermilab resident.

The Solar Energy Club is a group of Fermilab employees who have worked as a volunteer group since the fall of 1974 to design and construct a solar energy heating system for an existing residence on Sauk Circle in the Fermilab Village. Working evenings and Saturdays to complete the project, the dedicated researchers are now watching their tailor-made system accumulate data on the use of solar energy in northern Illinois.

The Fermilab solar energy system consists of 24 - 2½ x 8 ft. panels -- or "collectors" -- mounted on a framed stand facing the sun and tilted at an angle of 53° from the horizon. The panels are made of sheets of black aluminum Roll-Bond embedded with small pipes in which water flows. On the outer surface of these sheets are 8 ft. glass tubes placed tightly side by side. Behind the aluminum sheets is a six-inch layer of fiberglass insulation to prevent heat from escaping through the panels.

The sun's rays penetrate through the glass tubes, heating the water which is pumped to and from the house, some 25 feet behind the collectors, through the collector pipes and 1½-inch insulated pipes running at the top and bottom of the 72 ft. collector array.

In the crawl space under the house a 1300-gallon tank, insulated on all sides by four inches of styrofoam, stores the water from the collector panels. A pump system raises the water, about 24 gallons per minute, to a fin coil located in the return air duct of a conventional gas fired forced air heating system on the first floor. Air, moved through

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...John O'Meara, president of Solar Energy Club, opens valve to start flow of solar heated water at Fermilab...

...Heat in water from solar collector panels enters heating system of house...

...120° water temperature reached in first test...

this duct by the furnace blower, is heated in passing the fin coil and circulated throughout the duct system of the house. The water is returned to the collector panels.

The 34' x 28' house (circa 1940) has been given extra insulation -- the ceiling insulation now has a total of 6 inches and the floor has 3½ inches. The heat ducts have 1" of insulation. Windows in the house are double-glazed. Otherwise the house is of conventional construction and insulation.

A conventional thermostat is used inside the house. When this thermostat calls for heat, the pump comes on, bringing the solar-heated water from the storage tank through the fin coil. Other instrumentation will provide performance data for the system, the first such data in the Upper Midwest.

The conventional natural gas heating unit in the house will supplement the solar heat during periods in which the solar-heated water cannot provide adequate heat. It is predicted that as much as 50% of the annual heating load will be supplied by the solar system.

In the test run, the temperature of the water in the system was raised 10° each hour of operation. This represents a more than 100,000 BTU/hour collection rate.

In the two years of working on their project, the Solar Energy Club incorporated several important changes in their design:

Glass for the collector panels was changed after the group learned at the 1975 International Solar Energy Society Conference of the successful use of glass tubing such as that used in fluorescent light fixtures. These provide a low cost method of glazing the collector panels. Club member John Carson will always remember his trip with a van to Logan, Ohio to pick up 800 fluorescent tubes "like packing and unpacking eggs," he says.

Another breakthrough in design followed Dave Cosgrove's suggestion that the collapsible, plastic cattle watering tanks found at mail order farm supply stores could be slid collapsed into the crawl space of the residence, then filled with the water to be circulated in the system. This 1300 gallon tank is sufficiently large to store about one day's heating requirements.

The Solar Energy Club has invested approximately $10,000 in their first installation which includes the materials for the collector panels, the framing and support structure, the water tank and pumps, and the

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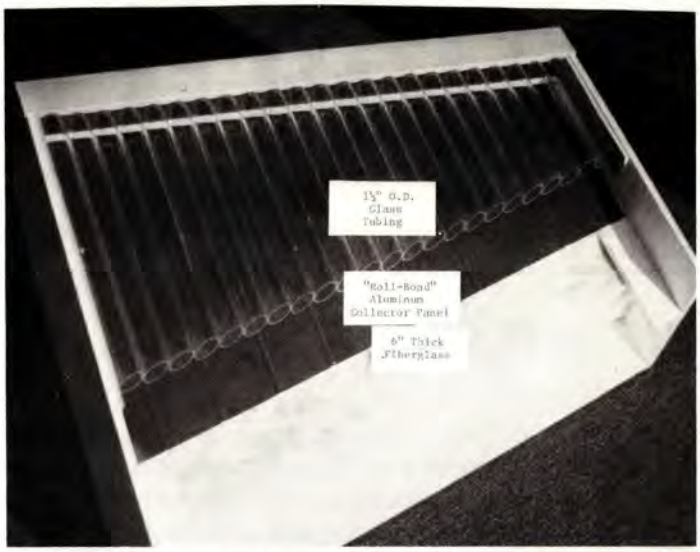

...Cutaway model of solar collector panels...

...J. Lackey, J. Sutcliffe assembling glass tubes...

...J. Sutcliffe, S. Bastian, J. Carson raise panels to outside frame...

fin coil unit. This particular system is too expensive for economic payout at present fuel costs.

The use of solar energy is being studied intensively by many different organizations in the United States, as a serious alternative energy source. As the cost of conventional fossil fuels rises sharply, the solar heating installation becomes competitive as well as energy saving. There are about 200 solar-heated houses in the United States, most of them in the southern and southwestern states where the application's success is more apparent.

It is estimated that in the U.S. some 9,000 trillion kilowatt hours of solar energy are received annually from the sun, the equivalent of power available, for instance, from 1.15 trillion tons of coal, about 2,000 times as much as current U.S. coal production. A recent study made at Madison, Wisconsin shows that the sun's energy falling daily on a horizontal surface at Madison in January is typically 3 kilowatt hours per square meter, rising to 9 in July. The annual average solar energy falling on an acre of ground in Madison in one day is equivalent to 10 barrels of oil. This energy incident on a 200 m^2 house in a day would be equivalent to heating the house with 25 gallons of oil.

Support of solar energy research has become of prime interest in the last two years to such agencies as the Energy Research and Development Administration (ERDA) and the National Science Foundation, and there is also considerable interest in the Congress.

But, as John O'Meara, president of the Fermilab Solar Energy Club, points out, "If solar energy is to have any serious impact as an alternate energy source for residental use, it must be proven in densely populated areas of the U.S., such as the Chicago metropolitan area. This is our most serious purpose in the Fermilab project. It's one thing to have a model, but another thing to collect data from a system in use. Our data will be the first on this type of system for upper midwestern United States, and it will show us which way to go from here."

In addition to this residential solar energy system at Fermilab, an industrial application of solar energy has been designed by Hank Hinterberger, head of Technical Services, who has been an active participant in the residential system project as well.

...Solar Energy House at Fermilab on Sauk Circle...

The Fermilab Solar Energy Club has been boosted by many other people. "It is in large measure due to the creative spirit that is encouraged at Fermilab that we were able to undertake this project, to finish it, and let others benefit from our experience," O'Meara points out.

Members of the Fermilab Solar Energy Club are Steve Bastian, George Biallas, John Bobbitt, Ward Bosworth, John Carson, Bob Condon, Norm Engler, Will Hanson, Howard Hart, Hank Hinterberger, Jim Lackey, John O'Meara, Jean Sutcliffe, Stan Tonkin, and Bill Wisniski.

The Model Shop, under Jose Poces; the Housing Office, headed by Dorothy Carlson; T & M Contracts in the Business Office, headed by Don Smith; Village Services, headed by George Doyle have given the project valuable assistance and cooperation.

Furnishing of the house will be completed in a few weeks, according to Mrs. Carlson, and a tenant will be selected. The one-bedroom house is intended for one couple occupancy and the resident will be a visiting experimenter.

When this work is completed, the Solar Energy Club plans to hold a mini Open House for anyone interested in seeing their unique project.

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PERSONNEL NEWS AND NOTES

"Occupational injuries" -- getting hurt while performing work duties -- are unfortunate, and precautions should be taken by all employees to prevent accidents, no matter what kind of work they do. If an employee is injured at a job at Fermilab, there are certain steps to be taken and some facts that everyone should know about handling such circumstances:

Fermilab, through insurance with Employers Insurance of Wassau, provides basic income payments for absence due to an injury incurred while performing work at the Laboratory. In addition, the Laboratory supplements these insurance payments so that the level of such compensation equals the injured employee's normal pay. Following these steps will insure that an injured employee will receive occupational disability payments:

1. An occupational injury, no matter how slight, must be reported to the Fermilab Medical Office. The employee -- or in the case of a severe injury, the employee's supervisor -- must report the details of the incident to the Medical Office as soon as possible. The employee must permit Medical personnel to conduct an examination at the time of the injury or upon return to work.

2. In the case of some injuries, the Medical Office will determine the need for additional medical follow-up care. If there is follow-up care by an outside physician, the employee must present to the Medical Office at the earliest convenience a written statement from that physician explaining that the injured employee was required to be off the job for a specific period of time.

For further information about the correct way to handle an injury at work, call the Medical Office, Ext. 3232.

COMING UP

Folk Dancing - Special party Friday, February 6, Village Barn, 8 p.m. Everyone welcome, refreshments. Children enjoy also.

Skating Party - Sunday, February 8 - 2-5 p.m. Center reflecting pond, Central Laboratory. Hot dogs, marshmallows, hot chocolate, hot spiced wine. Children must bring parents.

Sleigh Ride - Friday, February 13. Meet at Users Center, 7 p.m. for car pools to Prince Crossing Stables. $6.00 per person. Call S. Rumple, Ext. 3560 for reservations.

Candlelight Bowling - Saturday, February 14, 10 p.m. Tickets at $6.00 include buffet supper. Call Barb Schluchter, Ext. 3991.

Hockey Trip - Wednesday, February 18 - leave at 6:30 p.m. Tickets at $7.00 include bus fare, refreshments. Call Ellery Cook, Ext. 3734.

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Congratulations...to Joy (Purchasing) and Dennis Thomas on the birth of their daughter Jennifer Lynn on January 28.....and to Frank (Physics Department) and Natalie Nezrick on the birth of Tamara Anatola on January 18 at Central DuPage Hospital.

NOTE

Effective immediately, all parking in the horseshoe in front of the Central Laboratory will be for one hour only.

CLASSIFIED ADS

SUBLET - Batavia 2 bdrm. apt. w/w carpet, exercise rm. & sauna, swim pool & tennis. Norm at Users Club or 879-8096. For Sale - Green Daveno & chair, end tables & coffee table, $75. See or call Norm.

FOR SALE - Dacor Scuba equipment, tank regulator, wet suit & accessories, $150. Will sell separately. Call Steve Ext. 3165 or 882-9250.

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