New things under the sun . . .

Significant progress in solar heating system

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Solar energy used to heat buildings, has been investigated at the Massachusetts Institute of Technology for nearly 40 years. Indeed the first of five solar houses was built at M.I.T. in 1939.

Far from free

Although solar energy was able to heat these houses, it proved too expensive when compared to the cheap price of electricity, oil and natural gas of the 50's and 60's. With the Arab oil embargo, the cost of energy skyrocketed so that solar energy has suddenly become practical.

But why is solar energy expensive; isn't sunlight free? Yes, sunlight is free but the equipment to capture the sun's heat can be expensive.

The situation is analagous to your owning a low-grade gold mine. The gold is yours for the taking but the equipment to dig up the gold is very expensive.

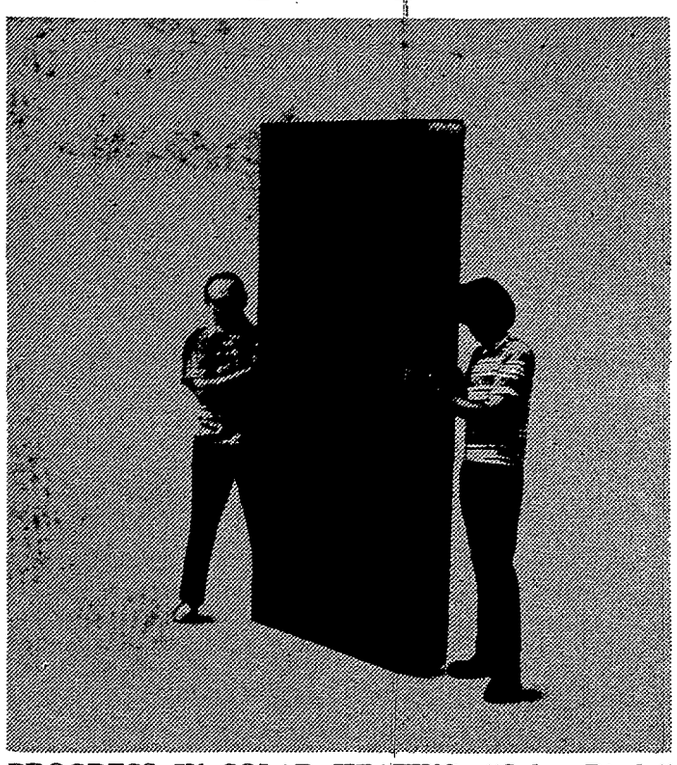
Solar investment

If the price of gold is low you might lose money digging it up. But if the price of gold is high, it becomes worthwhile to invest in gold-digging equipment to help you get at your "free" gold. Similarly, if the price of energy is high, it's worthwhile to install a solar system to let you use the "free" sunlight.

A typical house needs about 500 square feet of solar collectors in most regions of the country—about the same area as five 9' x 12' rugs. A good rule of thumb is that the collectors should cover an area a third the size of the house's floor area.

Southern climates generally need less area and northern climates need more. But the fact remains: to significantly solar heat your house you'll need a big array of solar collectors.

Half the cost of a solar heating system is buying the collectors. Another third is the cost of actually installing the system into a house. The rest of the cost is for overnight heat storage (usually insulated water tanks or gravel bins) and miscellaneous pumps and controls.



PROGRESS IN SOLAR HEATING—"Solar Diode" combines solar collectors and storage in a single unit; it can significantly reduce the costs of installing home solar heating system. The M.I.T. invention is now being tested around the country.

Why are installation costs so high? Since the collectors are on the roof and storage is in the basement, a contractor must spend a lot of time and money connecting the two with plumbing or ducting.

In my research in solar heating at M.I.T., I have attacked the problem of high installation costs. My invention, the thermic diode solar panel, combines a solar collector and its heat storage into a single module.

Compact modules

So instead of stringing the solar system from attic to basement, these modules can be laid out on a roof like linoleum tiles on a kitchen floor.

The "Solar Diode" is four feet wide, eight feet long and about ten inches thick. Inside each one is a complete solar heating system: collectors, storage, controls, heat exchangers and ducting.

In spite of having all these features, a module will cost about the same as a conventional collector. Cost savings result because the units can be installed easily and because they eliminate the added cost of storage and controls.

Natural convection

Our investigations, sponsored by the Federal Energy Research and Development Administration, indicate that a Solar Diode heating system would be 30 to 50 percent cheaper than conventional solar systems.

In simple terms, a Solar Diode is a panel filled with water. The panel collects heat from the sun on its front side, stores it and supplies warmth to a building via the back side.

The sun's energy not only heats the water but also pumps it to the panel's storage tanks. No electricity is needed; the subtle forces of natural convection carry the heat to where it's stored.

An ingenious valve prevents these same natural convection forces from reversing their action and leaking out the precious solar heat at night. The valve—about the size of a thermos bottle—has no moving parts to bind or corrode.

One-way "lock"

A thin layer of oil inside the valve lets the solar heat in but won't let it back out after the sun does down. That's where the name comes from: "diode" is a term borrowed from electronics that means a one-way capability. Just as a turnstile lets people through in one direction, a Solar Diode lets heat flow only one way.

Solar Diodes aren't commercially available yet. Under government grants, they're being tested in five locations around the country to verify our computer predictions of how well they should work.

Something new!

Their modular construction lets Solar Diodes be used in homes, apartment houses, office buildings and even factories; they can be put on walls as well as roofs.

With slight variations, Solar Diodes can heat, service hot water and even help cool your house. So you see, there *is* something new under the sun.

The critical factor in energy saving

Proper insulation is the critical home improvement to effective energy-saving in most American homes, according to the National Home Improvement Council.

Save 50%

It points out the American homeowner can save up to 50% of his fuel costs with the right kind of insulation—half his energy consumption.

Caulking, weatherstripping and storm windows can save an additional 13%.

Insulation provides a barrier of tiny air pockets that slow the movement of heat toward unheated space.

Ways and means

There is a variety of types of insulation and a number of ways to install them. In wide use throughout the country are fiber glass, rock wool, vermiculite and cellulose. These products are set in place, poured, or blown by machine into walls, under floors, or above or below ceilings.

When the homeowner is checking for proper insulation in his home, he should place a thermometer on the wall inside the house. With the room at 68 degrees and outside temperature about 50 degrees, a well-insulated wall should register about 65 degrees. If it's much lower than 65, the wall is in all probability not insulated.

Insulation is rated by its resistance to heat flow. This is called its R value (R for resistance). The higher the R rating, the more satisfactory is resistance.

Ratings

A thickness of about 3 to 4 inches of blanketed fiber glass or rock wool is classified as R-11, meaning that it resists heat transfer as well as 9 inches of lumber or 4 feet of brick.

The National Bureau of Standards recommends R-11 insulation in exterior walls and floors and R-19 in the ceiling. The insulation industry claims a house meeting these standards needs less than 50% of the energy required to heat a non-insulated house.

Repays

Even though insulation represents an initial outlay of substantial funds, the average insulating job should save enough to pay for itself in four or five years, according to the National Home Improvement Council.