Can Science Harness SOLAR ENERGY?

IF ALL THE OIL, gas and coal in the earth's crust could be extracted and set to burning in a giant furnace, and if all the world's forests could be set on fire, the energy thus released would barely equal the energy that falls freely on this planet from the sun during any three clear days.

The amount of solar energy streaming to earth each day is 32,000 times greater than the power presently utilized by the world's population during the same 24 hours.

If it could be converted to electricity, the solar energy falling on a rooftop would heat or cool a modern home and would operate all of its equipment.

Like the mirage of an oasis, these calculations tease the minds of scientists who are trying to harness the power of the sun. They know it is only a matter of time before the fossil fuels—oil, gas and coal—are exhausted. They know, too, that even atomic energy is not the answer to man's long-range power needs, for its essential element is also exhaustible, and can use these sources of power—provided by nature during millions of years—but he cannot replace them. Wherever they are presently abundant it is difficult to believe that one day they will be depleted. But while that day is not imminent, it is inevitable.

Eventually the world must depend on other sources of power. Because solar energy could serve mankind as long as life continues on this planet, scientific investigators in some thirty nations are searching for economical methods to trap the sun's rays and put them to work. They are driven not only by the needs of the future, but also by an increasing awareness that many areas of the world must find a new source of energy—and must find it soon.

Before the quest is ended, however, in many instances can inexpensive "banks" be built to store the energy of the sun so that it will be available when skies are overcast for long periods? The answer may be found in a simple blade of grass, which can absorb and store the sun's energy—releasing it as needed for growth. What plants do naturally through photosynthesis, man is trying to achieve through photochemistry. But for the present at least, he has not found a practical way to duplicate the natural process.

By taking a different approach to the problem one group of American researchers has met with more immediate success. One of the most significant contributions in the field has been the development, in 1954 of a solar battery. It resembles a large tray and is filled with wafers of purified silicon, treated with arsenic and boron. Each disk-like cell acts as a tiny electric generator. Light striking the wafers sets up an electro-static charge which creates a flow of direct current, and also energizes dry cells for night operation. One of these batteries, mounted on a pole, has been used for six months to power an eight-family rural telephone system in Georgia. Similar batteries have been used in solar-powered radios and in hearing aids. Unfortunately, refined silicon is still worth its weight in gold and solar batteries are too costly to be commercially practical. But this does not discourage the experts, who point out that fifty years ago refined aluminum was even more expensive.

Until a cheaper refining technology can be developed, the use of solar batteries will be confined mostly to highly specialized scientific projects. The Explorer VI, a U.S. satelite which was launched into orbit late last year is still reporting its scientific findings to the earth by means of recording devices and radio equipment powered by the energy of the sun. Its four "paddle wheel" arms contain 8,000 solar cells which provide a maximum of power with a minimum of weight.

The space program is further indebted to solar scientists for the solar furnaces which are currently being used to determine what happens to rocket materials when they are exposed to extreme temperatures as they streak through the earth's atmosphere. Sooner or later, any child having access to a magnifying glass learns how to focus the heat rays of the sun to burn holes in paper. Solar furnaces are based on the same principle, but instead of glass lenses they employ curved mirrors. One of the largest solar furnaces in the U.S. —in San Diego, California—uses a huge, curved aluminum mirror to gather and reflect the heat of the sun to a focal point. At midday, the furnace can reach temperatures of 4,000 degrees Centigrade—enough to melt a steel bolt in seconds. Because solar furnaces generate extreme heat minus the associated contamination of fuels used in conventional industrial furnaces, it is a particularly valuable research tool. If and when the sun-heated ovens can be mass-produced economically, they will be equally valuable to industries all over the world which depend on the attainment of extremely high temperatures.

USING THE same general principles on a much smaller scale, scientists have been working to perfect solar cookers which could be used in sunny countries where firewood is scarce. One of the earliest of these was developed in North Africa around 1860. In India, which has a long record of achievement in this field, inexpensive solar cookers are now available in villages where the traditional fuel, dried cow dung, can be more efficiently used to fertilize the soil.

The United States has developed two basic types of solar cookers. One is a simple reflector which concentrates the sun's rays on a cooknig pan, the other is a solar oven —an insulated metal box with a glass window surrounded by reflectors. It reaches temperatures of 200 degrees Centigrade—enough to bake bread or roast meat in the same time required for conventional ovens.

Although the solar house, the solar cooker, the solar furnace and the solar battery promise enormous benefits to men and women everywhere, the solar still—which converts salt water into fresh— may have the greatest potential of them all. Many different types of stills have been tried in the last hundred years—in Egypt, Chile, Australia, France and the U.S.

Experimental solar stills have produced about half a liter of fresh water daily per 900 square centimeters of area, and scientists claim that this rate of production should increase in hot and arid climates. A family living in such a climate could depend on about twenty liters of fresh water daily.

The immediate objective of scientists experimenting with solar stills is fresh water produced cheaply enough for industrial and municipal use. The immediate objective of scientists experimenting with solar stills is fresh water produced cheaply enough for industrial and municipal use. The ultimate objective is cheap water for irrigation.

If the world population continues to expand at its present explosive rate, man must have more water to supply his growing cities and to irrigate his wasted, arid lands. As once-abundant supplies of oil, gas, wood and coal are depleted, he must find new ways to power his factories, to move his ships, to bring warmth and light to his villages. Of neccessity, he must turn to the life-giving sun, the source of light and of nature's abundance — the very center of his universe.

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Why are they called "ten gallon" hats?

IT ISN'T *a matter of Texas exaggeration or liquid capacity but of folk etymology. The Spaniards in the old days of the Southweast used to ornament their large-brimmed hats with braid, often silver braid. Very fine hats might have had as many as five or seven or even ten of these braids. And the Spanish word for braid of this kind was "galon".*

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