TECHNOLOGY

Sun Harnessed for Cooking

Millions of families in underdeveloped areas could enjoy a better standard of living with a sun stove. Scientists are at work to build one that these people can afford.

By RICHARD MAGAT
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➤ SCIENTISTS HAVE launched a concentrated effort at harnessing the sun for cooking.

Sunshine is the cheapest available "fuel" for millions of families in underdeveloped areas who cannot afford shiny new stoves or even coal.

A solar energy scientist at New York University, Dr. Maria Telkes, has conceived a practical, economical stove that cooks by sunlight. Now the Ford Foundation is backing the project with a grant of $45,000 to the Research Division of NYU's College of Engineering for detailed research and development of a sun stove.

Why all this activity about one of man's oldest and simplest chores?

First, many areas like India either lack their own fuel reserves or the means to import fuel on a large scale. As a result, low-income families have used the only fuel available—the vegetation around them. The total effect of deforestation and soil erosion from this practice is tremendous.

Secondly, as vegetation became scarce, dried animal dung became the only remaining cheap, available fuel. It is estimated that, in India, 78% of the yearly fuel requirements are filled by dried cow dung.

Besides the health and esthetic drawbacks to this practice, it plays havoc with agriculture in areas that already suffer from food shortages and periodic famines. The natural animal fertilizer now burned as fuel could revitalize the soil and materially increase crop yield. Experts estimate that the use of animal fertilizer for cooking now cuts the productivity of the land by nearly half.

Investigate Social Aspects

The NYU project ranges beyond engineering aspects. Dr. Ethel Alpenfels, professor of social anthropology, is reviewing the social and economic patterns in countries of the Near East and India. Concurrent with the scientific development of the cooker, therefore, the social, psychological and economic effects of introducing and integrating such a new device into the customs of the peoples will be determined.

Also important, and another area of the study, is an industrial and materials survey of these countries. What materials are available for incorporation into the sun stove? What skills are available for its manufacture? What is the country's industry potential for its mass production?

Cost is a crucial factor in introducing solar cooking to underdeveloped areas. The most successful solar cooker developed to date involves a costly parabolic reflector.

Dr. Telkes' stove design eliminates the need for parabolic reflectors. Furthermore it has the advantage of retaining cooking heat for an hour or so after the sun has gone down, the time when the evening meal is cooked. For another thing, its heat-storing feature largely eliminates the necessity of changing the position of the stove frequently to catch direct sunshine.

Her stove is a closely insulated box, roughly triangular in shape. Four ordinary flat mirrors fan out from the tilted face of the stove. At the rear of the stove is a removable drawer through which the food is placed.

The mirrors reflect sunlight down through the tilted face of the stove, concentrating it in the interior, which is filled with special heat-absorbing chemicals.

Principle of the stove is "heat of fusion," or "heat of transformation." All materials when melting require large amounts of heat to change from solid to liquid forms. During melting, the temperature of the material does not change but remains at the melting point. The problem in the solar stove and other heat storage devices is to devise materials with relatively high heats of fusion.

In the sun stove, therefore, the sun's heat produces a succession of changes in the heat-storage salts from solid to liquid state. The changes give off the heat used for cooking.

Preliminary models of Dr. Telkes' stove have developed temperatures up to 300 degrees on days when outdoor temperature was under 70 degrees Fahrenheit.

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SUN-COOKED HAMBURGER—This solar oven is shown here being tested on an October day of moderate sunshine. The oven's temperature gauge is topping 300 degrees Fahrenheit, although it is shirt-sleeve weather. Dr. Maria Telkes, its inventor, is sampling a morsel while a technical assistant, Fatolah Sotoodeh of Iran, prepares to run an independent analysis of sun-cooked food.

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Solar Cooking Stove

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From 250 to 300 degrees is considered ample for average cooking operations. Higher temperatures needed for frying and browning have been developed in the stove on clear days. The areas for which the stove is intended enjoy direct sunlight most of the year.

The New York University research group believes their stove can be developed so that it can be manufactured to sell for $5. This is the maximum sales cost estimated by the Hindu Government and the British Committee for Solar Energy Utilization. There is a potential need for 100,000,000 solar cookers in India alone.

The least expensive solar cooker devised to date sells for about $16. Besides cost and conformity to local cooking custom, the NYU stove will be designed to meet these requirements: durability, ease of operation and cleaning; simplicity and portability; ability to operate in early evening, and little attention required during cooking.

The solar stove is an outgrowth of Dr. Telkes' many years of pioneering in the solar energy field.

Many attempts to develop solar cookers have been made in the last 100 years. Mouchot in France and Adams in India built solar stoves around 1870, but their devices did not become popular despite the fact that Mouchot's work was supported by the French Government. The Smithsonian Museum has exhibited a solar cooking device designed by Dr. C. G. Abbot in 1925.

A cooker being manufactured on a limited scale was designed by Dr. M. L. Ghai in the Hindu National Physical Laboratory, New Delhi. This employs a parabolic reflector, and while it is suitable for boiling, it is not adaptable to baking.

The NYU project is employing trained personnel from the areas where the solar cooker may be introduced. The first of these is Fatolah Sotoodeh, a graduate mechanical engineer from the University of Teheran, who is currently a candidate for doctor of engineering science in industrial engineering in NYU's College of Engineering.

It is anticipated that some assistance may be obtained from the University of Teheran, the American University of Beirut, the Near East Foundation and appropriate United Nations agencies.

Science News Letter, November 13, 1954

ENGINEERING

Sound in Third Dimension Given Drive-in Customers

➤ DRIVE-IN THEATERS, Dr. Ralph N. Heacock of the Radio Corporation of America reported to the Society of Motion Picture and Television Engineers meeting in Los Angeles, can now provide stereophonic sound. One speaker brings sound in on the left, the other on the right.

CinemaScope pictures, which ordinarily would broadcast their sound from four loudspeakers in an indoor theater, can be modified to feed the two-speaker drive-in system.

Science News Letter, November 13, 1954