QUESTIONS & ANSWERS

Ceramic Insulation

Q: We are about to reinsulate our cathedral ceiling and have only the 2½-inch depth of the purlins for insulation. In September 1980 *Popular Mechanics* had an article on a ceramic insulation that claimed an R-value equivalent of 70 for 3 inches. Do you have any evaluation of this product?—*Peter Slavish, New Hope, Pa.*

A: The ceramic insulation written up in the article is a variation on perlite, an insulation material that has been around for years. Perlite is made by heating silica ore to 1600°F, causing it to expand. The *ASHRAE Handbook of Fundamentals* says expanded perlite with a density of 5 to 8 pounds per cubic foot has an R-value of 2.7 per inch.

P.D.I., St. Anne, Ill., the manufacturer of the ceramic insulation, has patented a process for coating the perlite. The firm claims this boosts its equivalent R-value "in the radiant mode" into the R-70 range. A vented attic space and moving air above the insulation layer are needed for it to work. If the ceramic insulation is placed in a sealed space with no air circulation above it, P.D.I. says, its R-value drops back to the "conductive" R of 2.7 per inch.

We contacted Oak Ridge National Lab in Oak Ridge, Tenn., for an expert opinion. The lab's David McElroy says thermal tests on ceramic insulation "indicate the material behaves very much like perlite, and does not have the high thermal resistance the manufacturers claim." Oak Ridge had insulation makers with accurate test facilities test the ceramic insulation. Their results came in at or below the Oak Ridge levels. National Research Council of Canada also confirmed these findings. Asked if the "radiant mode" explanation sounded plausible, McElroy said "No."

Remote Power System

Q: I have a cattle ranch along the Amazon River in Brazil. It gets two meters of rainfall a year. Often the sun shines even during rainstorms, and the midday temperature is usually around 100°F. The only thing we lack is electricity, which I need for a small refrigerator and a room air conditioner. Could you tell me what equipment I need and what it will cost?—*F.M.S. Shu, Los Altos, Calif.*

A: You imply that sunlight is a more reliable resource in your area than wind, so a photovoltaic system may be your best bet. You can either buy a complete preengineered system or gather components and build your own system. *The 1985 Spec Guide* lists 17 manufacturers of PV panels, and 14 makers of PV systems. Typical prices range from $196 for a 7-watt panel to $559 for a 43-watt panel.

System prices have an even greater spread. *The Guide* lists several in the $3500-to-$4500 range. A typical complete system would include panels, mounting racks, controls, batteries for storage, and possibly an inverter for ac power. The size system you need depends on how much sunlight is available, and how much power your appliances consume. See "Sizing Photovoltaic Systems," *Solar Age*, 9/84.

Conventional refrigerators use a lot of power, so it makes sense to use low-voltage, high-efficiency models designed for remote power systems.

Arctic-Kold Refrigeration (Bloomfield, Conn.) sells complete refrigerators as well as conversion kits. Polar Products (Torrance, Calif.) sells refrigerators/freezers. Zeopower Co. (Natick, Mass.) makes a refrigerator that uses a solar panel as the power source and zeolite as the heat transfer medium. It requires no electric power. Sun Frost (Arcata, Calif.) recently introduced a 4-cubic-foot refrigerator that uses roughly one-tenth the power of a comparable conventional model. It can be powered by one photovoltaic panel—presumably a large one—and costs $1250 to $1400. All of these are small units. Another option is a propane-powered model.

Dinh Co. (Alachua, Fla.) makes a 1-ton PV-powered air conditioner with dehumidifier that should meet your needs. Complete system cost is $6350. For more on cooling options, see this column, 3/85.

Commodore 64 Solar Software

Q: Are there any heat loss and heat gain calculation programs for superinsulation design that will run on a Commodore 64 microcomputer?—*Ed Bond, Washington, Mass.*

A: Most software for passive solar design calculations should work just fine for superinsulated houses. Of the 50 programs for solar calculations listed in *The 1985 Spec Guide* five are heat loss/heat gain programs that will run on a Commodore 64. They are available from Compusolar (Gum Springs Rd., Jasper, Ark., 72641), and Solarcon (602 Church, Ann Arbor, Mich. 48104). Another possibility is Canada's HOTCAN program, devised specifically for highly insulated, tightly sealed houses. It is available from Hotcan Energy Software, P.O. Box 7081, Station J, Ottawa, Ont., Canada K2A 3Z6.

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