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PV Shopping List

Q. I am building a 3000-square-foot passive solar house in Aspen, Colo., 1500 feet away from the local power company line. They want \$11,000 for an underground line to the house. How much photovoltaic power can I get for that much money? My minimum power consumption is around 500 kWh/month; maximum would be about twice that. I have a good solar site and a 5-kW backup generator.—*Tim Howe, Old Snowmass, Colo.*

A. According to *Solar Age* technical editor Joe Kohler, of KLR Engineering, you should be able to buy an 840-peak-watt system, with inverter, charge controls, meters, racks, installation, and 1200 amp-hours of battery storage for your \$11,000 (ignoring tax credits). You could expect to get about 200 kWh from this system in the best summer month, and close to 100 kWh/month in the dead of winter. With a very efficient refrigerator, fluorescent lights, and a gas-powered water heater and stove, you should be able to live quite well.

For another \$4000 you could buy half again as much PV power. With moderate conservation and a 1260-watt system, no one will know you aren't on the grid. Remember that you can expect to get state and federal tax credits of up to \$7000 when you buy the system, so you could spend up to \$18,000 for PV power and still have a net cost equal to what the power company wants to charge. You would need to have large tax liabilities to take all the credits at once.

Also keep in mind that photovoltaic systems are modular and expandable. You could add panels as your budget permits and, at least until the end of 1985 in Colorado, you could take tax credits again for your add-on purchases.

Pool Quandary

Q. I am planning to build an indoor swimming pool that will have a well-insulated building around it. It seems that the pool, which is to be of the vinyl-liner type, should be insulated from the ground, but I have not been able to find any information on how this should be done. Do you have any suggestions?—*J.W. Barta, Barboursville, W. Va.*

A. We put the matter to Doug Root, a Florida expert who has written widely on solar pool heating, including a useful *Solar Age* article (11/83). He points out that the earth itself is a fairly good insulator in most cases, at least once the surrounding earth mass has been warmed up. If cold springs flow near the excavation, you may do well to insulate with 2- to 4-inch-thick sheets of foamed glass insulation, which is

expensive but won't waterlog over the long lifetime of the pool.

Indoor pools create some special heat loss and humidity problems that you should keep in mind as well. Most of them get little direct sunlight—an important heat source for outdoor pools. And, though one might expect them to pick up heat from their heated surroundings, indoor pools actually lose heat to their enclosures, most notably through evaporation. If room humidity is allowed to approach 100 percent, conditions get uncomfortable and, more seriously, walls sweat, metal hardware corrodes, wiring and lamps may be damaged, and mildew may become a problem. On the other hand, if you keep humidity within reasonable bounds through venting or dehumidifying, heat losses mount.

The bottom line is that the pool walls probably won't require insulation, the room will require some kind of moisture control, and the pool will need heating year-round whether or not its walls are insulated.

Tyvek Technique

Q. If a continuous air/vapor barrier is used on the interior of the framing of a house, and Du Pont Tyvek is used on the outside, is it necessary to caulk at sill, sole and top plates, headers, and joists?—*John L. Matheus*

A. In tests conducted by the NAHB Research Foundation, a standard 1976 house—2x4 walls, kraft-paper vapor barrier, asphalt-impregnated sheathing—had a 35-percent reduction in air leakage under pressure after being retrofitted with Tyvek. The Tyvek was lapped at seams and caulked at windows and foundation. The reduction was from 8.6 to 5.6 air changes per hour (ACH) at a pressure of 50 Pascals, (10 ACH at 50 Pascals equals roughly 0.5 natural ACH). According to NAHB researchers, later tests on tighter homes showed smaller reductions, but even "quick and dirty" installations of Tyvek showed some reduction in leakage rates. In a test by Gulf State Utilities of Beaumont, Texas, Tyvek did about the same as caulking with expanding polyurethane foam, but both together did significantly better than either alone.

Du Pont recommends that Tyvek be lapped at seams and caulked at the foundation. It is also advisable to lap it over the top plate and caulk around windows. If these guidelines are followed, we suspect you could be less finicky with other sealing efforts. Many builders, though, appreciate the redundancy of an extra line of defense won at a modest cost through the use of this product. Names of compatible adhesives and other information about Tyvek is available from Du Pont at 1-800-448-9835.