

part, to heat lost from ducts where they pass through unheated spaces, slabs, and wall and floor cavities.

Small systems

Heating systems with outputs of 40,000 Btu per hour and less are hard to come by. Most U.S.-made systems start at about 85,000 Btu/hr. To some extent, both gas- and oil-fired heaters can be downsized below their rated capacity. If standard sources don't pan out, try suppliers of mobile homes, motels, and apartments. Their small systems often have closed combustion and through-the-wall venting, both desirable in low-energy houses. While these are generally designed as room heaters, you can sometimes add simple distribution systems.

Another promising approach, developed mostly to promote gas heating in condos and apartments, is to heat with a high-efficiency water heater. This can work with any distribution system: radiant floor, baseboard, or air. While tapping a heating loop off solar or conventional hot water systems is nothing new, only recently have manufacturers sought code approvals.

A good source of information on these systems is the East Ohio Gas Co., P.O. Box 5759, Cleveland, Ohio 44101, which has put together a manual for heating with water heaters. The company's Paul Swenson maintains these systems are safe and reliable and put no added strain on the

water heater. One caution: because the heating loop circulates domestic water, all plumbing must be new and rated for potable water (e.g., brass or stainless-steel pumps are required).

While standard baseboard convectors can be used with a water heater, runs must be longer because water temperatures are lower. You can save wall space by using fan/coil units to transfer heat from the water to air. Single-room fan/coil units (see listing) have been used in solar heating for several years. For larger loads, a new product called Hydroheat is on the market. Hydroheat is a centrally ducted water-to-air system that can accommodate air filters, central air-conditioning, and other air-heating features.

East Ohio recommends heating with water heaters for loads up to about 28,000 Btu/hr, while Apollo rates its largest unit at 45,000 Btu/hr. In general, if you can heat a living space with the same size water heater you would buy for domestic hot water alone, that choice should prove economical. As systems get larger, the economic advantages start to disappear since large, expensive, and inefficient commercial water heaters are needed.

One way to treat larger loads, suggested to me by a fan/coil manufacturer, is to use a gas-fired tankless water heater with an inexpensive hot-water storage tank. Both DHW and space heating could draw off the

tank, which could supply up to 60,000 Btu/hr to the house and have ample capacity left over for showers and appliances. Since storage tanks don't have the up-the-flue losses of gas-fired water heaters, this system might deliver top efficiencies at a reasonable first cost. When the first such system goes in this fall, I'll report back on its performance.

Incidentally, if you install a water-heater heating system, encourage your clients to treat the unit better than the average water heater—they should drain the sludge, and change anodes periodically.

Integrated systems

The ideal system, I think, will combine ventilation, heating, and cooling in one inexpensive unit.

Heat-pump water heaters with exhaust-only ventilation, such as the one DEC International, Madison, Wis., is coming out with, hold promise. Once stored in the water tank, the heat could be distributed any of the ways I've described above.

Another tack is to install a heating element in the ductwork of an air-to-air heat exchanger. With its ductwork serving double duty, a heat exchanger becomes a lot more economical. Several builders have had success heating superinsulated homes with small (4-kW) electric heaters this way. Rhode Island builder Arthur Boyce uses a control strategy that allows the heater and supply fan to work alone as an electric furnace or with the air-to-air heat exchanger as a pre-heater of fresh air. He has a similar system on the drawing board that uses a hydronic coil from the water heater rather than an electric element. Apollo and other manufacturers make hydronic coils of this type.

Integrated systems from Scandinavia may hit the market soon. One I've heard about (from Cherry Building Systems AB) handles air filtering, negative-ion generation, heat recovery, and electric heating in one unit. If it can compete in cost with an air-to-air heat exchanger plus electric strip heating, it should find a welcome market.

When rising demand makes these products more available and less costly, low-energy housing will better meet its promise of low first costs as well as low operating costs.

FOR MORE INFORMATION

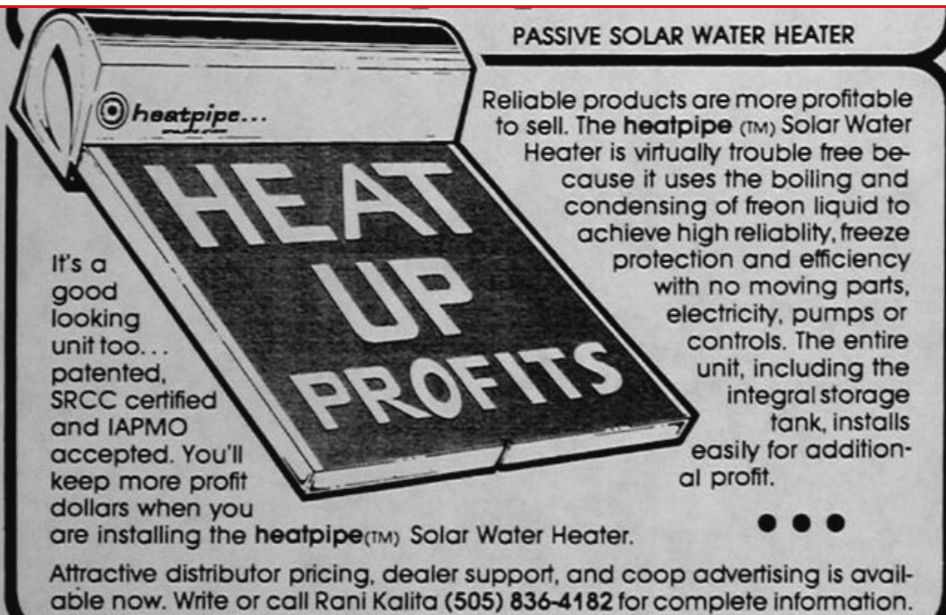
Room-size fan/coil units are made by **Enerspan, Inc.**, 14168 Poway Rd, Poway, Calif. 92046 (Sunvector)

Myson, Inc., Embrey Industrial Park, P.O. Box 5025, Falmouth, Va. 22401 (Solar Vector)

Turbonics, Inc., 11200 Madison Ave., Cleveland, Ohio 44102 (Chill Chaser)

A centrally ducted fan/coil unit is made by **Apollo Industries International, Inc.**, P.O. Box 61056, Raleigh, N.C. 27609 (Hydro-Heat)

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