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## Combining modular technology and sustainable design earns award

Modular technology recently played a central role in creating a cutting-edge example of how social and environmental goals can be integrated into a successful residential development.

The concept behind the Cambridge Co-housing project was to create 41 energy-efficient units on an urban infill site using passive solar design, energy-efficient heating and cooling systems, and “green” building materials when ever possible.

The resulting 63,000-sq.ft., \$9.6 million multi family structure set on 1.5 acres in Cambridge, Massachusetts, recently earned project organizers, the GreenVillage Company (Cambridge, MA), the 1999 Energy Value Housing Award from the NAHB Research Center in the factory-built home, cold climate category. The GreenVillage partners is a consortium of housing professionals working with the U.S. Department of Energy’s Building America program to make energy-efficient construction more mainstream.

To minimize waste, speed construction and reduce the threat of job-site theft, GreenVillage Co. opted to use modular units created by the Epoch Corporation (Pembroke, NH) to complete much of the structure.

“The modular building process is resource efficient,” says Stella Tarnay with GreenVillage Co. “Well-managed production can produce 30% less waste than on-site stick construction.”

The 41 units are a mix of 29 apartments, ranging in size from 472 to 1,644 sq. ft. and 12 townhomes from 1,540 to 1,892 sq. ft. in size. Prices for the dwellings range from \$80,000 to \$386,000. An added benefit of using the modularity was that since each section has both a floor and ceiling, there is a duplication of joists between floors—which makes for excellent sound transmission control between floors, say project organizers. Exterior walls for the project used 2x6 construction with R-19 fiberglass batt insulation. Other green building materials included floor trusses made of 2x3 members. Pella’s low-e Proline aluminum-clad windows and Hardiplank fiber-cement lap siding—both factory and site-installed. Cellulose insulation was blown-in on-site into the band joist areas and attic areas.

All units underwent blower-door tests before occupancy. Compared to conventional construction, organizers predict the project will use 60% less energy and produce 40% fewer air pollutants over its lifetime, with residents saving about 50% on their annual energy bills.

### **Other environmental features:**

Ground source heat pump taps geothermal energy to obtain warmth in winter by using the constant temperature of ground water to heat air. In summer, the same system cools the building. The EPA estimates that ground source heating/cooling reduces pollution production by up to 70% over standard systems.

The Home Run™ heating system in the townhome units gives occupants fully-zoned and independent room thermostats, which has been shown to reduce energy usage by up to 40%.

Centralized hot water production heats water to 115 degrees by the ground source heat pump before it is fed to a boiler system, where a small circulating pump keeps hot water circulating on demand.

A highly efficient mechanical ventilation system with controlled air regulators allows a fresh air supply to each room and a central exhaust to the outdoors. The innovative system improves indoor air quality without significant addition to the energy load.

High-efficiency catalytic converter fireplaces burn wood at 78% efficiency.

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