

Building Green in North Pole Alaska

January in North Pole was cold, very cold. A week of -40 temperatures combined with low snow cover drove the frost level deep into the ground. Hundreds of gallons of heating fuel were consumed while families vainly tried to heat poorly insulated, leaking homes. Giant ice dams and stalactites of icicles ooze from roofs all over town. But the Cold Climate Housing Research Center in Fairbanks, Alaska is working to advance Alaska's building industry and is providing solutions to Alaska's housing demands. One of the newest developments has been the completion of the Building America in Alaska program.

Doug and Erica Dvorak and their son Craig enjoyed warmth and energy savings in the first Building America in Alaska prototype house to be built in this challenging northern climate. The project was a cooperative effort involving the Cold Climate Housing Research Center, the U.S. Department of Energy's Build America Program, the Alaska Housing Finance Corporation, the Building Science Consortium, and Alaska's building industry. Based on the DOE Building America Program, which was designed to promote community scale housing that use 30%-50% less energy, cut construction time and waste by half, improve productivity, and increase durability, the Building American in Alaska Program has combined the best of building science and product innovation to design affordable, energy efficient housing suitable for Alaska's sometimes hostile conditions.

The Dvorak's home has a five star plus rating and a number of construction features designed for optimum performance in North Pole's cold dry climate. Built by Steve Bee Construction it received the 2001 Governor's Award for Energy Efficient Design and Construction. Most importantly the Dvorak's love it, with a fuel consumption averaging at 3 1/2 gallons a day for domestic hot water and heat during the coldest part of winter, the house is cheap to run and easy to enjoy.

The builders, architects, and engineers who have come together to create the Building America in Alaska guidelines adapted elements of the National Building America program to meet the additional insulation needs of Alaska's climate. Like all Building America homes, the project uses advanced framing and insulation methods to increase efficiency and comfort while decreasing costs. The plans call for 2 x 6-inch studs instead of 2 x 4-inch studs, set 24 inches apart instead of 16 inches. This framing technique allows more room for thicker insulation, enhances the strength of the house, and reduces thermal bridging through the studs. It also reduces the overall amount of wood used during construction and because 30% fewer pieces have to be assembled, framing takes less time and labor costs are significantly lower. The floor was constructed using engineered floor joists, and the roof with cantilever trusses. These pre-assembled components both conserve natural resources and save time. Oriented strand board (OSB) sheathing was used on the corners, floors, and roof. OSB provides a green alternative for using small trees by incorporating them into durable wood products.

The foundation was built with insulated concrete filled forms. The insulation value of these easy to use materials is R20. In addition a 2" foam skirt was laid around the perimeter of the house. By using materials efficiently, they reduced construction costs and were able to reinvest these savings in additional energy-saving features.

Combinations of taped sheathing systems, airtight sealing of the vapor barrier, and better workmanship lead to lower air infiltration rates and reduce heating and cooling loads on mechanical systems. Mechanical ventilation is added to ensure adequate fresh air for building occupants. The Dvorak's house contains a Lifebreath HRV (Heat Recovery Ventilator) that provides ventilation and climate control in the otherwise closely sealed house. The design also incorporates energy-efficient windows. Low-emissivity coatings and vinyl frames provide much higher levels of thermal insulation than standard windows with clear glass and aluminum frames.

The Building America in Alaska home calls for R-values of 47 in the ceiling and 31 in the walls. This is achieved by adding an additional 2" of foam to the outside of the walls and blowing 17" of fiberglass insulation into the roof structure. The windows have a minimum R value of 4.3. The careful design, engineering and construction of this Alaskan home is sure to keep the Dvorak's and other Alaskan home owners warm and happy well into the future.

As temperatures rise, ice melts, and a new construction season begins, the Cold Climate Housing Research Center is providing designers and builders with valuable information and detailed designs for improving performance, decreasing cost, and protecting our environment for future generations.

By Monique Musick