Jay and Helen Coughlin are eager to break ground on their new home in Hermantown, Minn., but they are taking their time in selecting a builder. Among their top criteria are experience in constructing energy-efficient homes and ability to meet Minnesota Power’s Triple E/ENERGY STAR® standards. “This probably is the last house we will build, and we want it done right,” said Jay Coughlin, a recent retiree. He and his wife have interviewed several prospects, looking for the perfect fit.

The Coughlins are among a growing number of consumers who take energy efficiency seriously and demand homes that outperform energy codes. They spent months researching materials, comparing foundation and wall systems, evaluating window technologies, weighing heating and cooling options, and developing plans for a high performance, energy-efficient home that will be comfortable, durable and affordable to operate. They also contacted Minnesota Power to review their plans. “It was important to talk with energy experts who understood the big picture before we finalized our plans,” said Helen Coughlin. “Energy efficiency is an investment, and we wanted to know if the payback was reasonable.”

“Getting Minnesota Power involved on the front end benefits both homeowners and builders,” said Dean Talbott, residential program manager, Minnesota Power. “We can offer more and better services so homes meet energy performance goals and qualify for Triple E/ENERGY STAR® rebates and certification.”

The Coughlin’s final design includes walls built with insulated concrete forms, triple-pane windows, an energy-efficient furnace with thermal mass storage and ENERGY STAR®-qualified appliances and lighting—all in a beautiful, contemporary home. They are close to hiring a builder. “We’re looking at a 2,700-square-foot house that could cost just $60 per month to heat and cool,” Jay Coughlin said. “Being on a fixed income, it is important to keep our energy costs down. If I were a contractor in today’s market, energy-efficient construction would be a strategic part of my business. It is the way to go.”
The University of Minnesota’s Cold Climate Housing program introduced the “House as a System” concept more than 20 years ago. This has led the industry to a better understanding of key components of high performance housing and how they interact.

1. Full coverage, optimal thermal insulation
2. Continuous, warm-side air barrier
3. Full-coverage, warm-side vapor retarder
4. Continuous, exterior-side weather barrier
5. Energy-efficient, condensation-resistant windows
6. Effective ground moisture/soil gas control
7. Low toxicity materials, finishes and furnishings
8. Safe, efficient space heating and cooling
9. Managed, balanced mechanical ventilation
10. Efficient, safe appliances and lighting

“Are we using materials and methods that we don’t fully understand? Are we investing in risky designs, systems and materials, hoping for perfect execution? Are we counting on perfect homeowner operation and maintenance?” Huelman asked.

He contends many popular home features and construction practices, like complex wall and roof geometries, tuck-under garages and bonus rooms, interior foundation insulation, ductwork outside the thermal envelope, natural draft combustion and moisture reservoir siding are fragile because they depend upon too many variables.

“We need to move toward robust designs, materials and methods that don’t require perfect execution and operation to perform successfully,” Huelman said. “We can and must do better.”

The quality of products and equipment used to build houses continues to improve, but actual energy efficiency, durability and indoor air quality may not be keeping pace. Has the trend toward bigger and more complex homes led to fragile and unacceptable performance?

The answer is “yes,” according to Pat Huelman of the University of Minnesota’s Cold Climate Housing program. His presentation at the 2008 Energy Design Conference & Expo, The Next Frontier for High Performance Housing, challenged attendees to rethink modern home construction approaches.

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