Rob Lisle, a businessman who owns multiple companies in Delaware, initially founded Insight Homes in 2007 as an experimental company. His goal was to build 36 identical houses, three at a time. Energy efficiency would improve with each generation while the sales price remained the same as a comparable home in Delaware.

“After experimenting with seven generations of a single home plan we were able to achieve our goal of a HERS score of 56,” said Lisle. To further refine his building specifications, Lisle began working with the U.S. Department of Energy’s Building America program.

Lisle worked with Integrated Building and Construction Solutions (IBACOS), a Building America research partner, to evaluate building durability and bulk water management details. IBACOS also helped develop duct designs and system layouts for several of Insight Homes’ models to address recurring comfort issues with the heating, ventilation, and air conditioning system (HVAC). IBACOS continues to work with Insight Homes to establish quality assurance measures that will help the company consistently deliver high-quality production houses as they build homes in greater volume.

While Insight Homes has been in business for just four years, the company’s increasing number of home sales indicates that offering energy-efficient homes at the same cost as any comparable home in the Delaware area is a good way to beat a down market. In addition, Insight markets their homes exclusively based on their energy efficiency rather than the great locations or design. They advertise their homes as “the top 1% in the nation for energy efficiency” with an average monthly power bill of $92.68 for the years 2009 to 2010.
One of Insight Homes’ volume projects is a 30-home community called Deep Creek in Seaford, DE. The Deep Creek homes achieved 50% whole house energy savings compared to the Building America benchmark (a home built to the 1993 Model Energy Code). The Jerry model has a HERS score of 50.

Insight Homes is now building 40 to 70 homes per year. They range in size from 1,400 to 3,300 ft², at a price range of $220,000 to $280,000.

Lisle is a frequent speaker at building conferences on the topic of energy efficiency. In 2009, he began hosting a local weekly radio show where he answers callers’ questions about green and energy-efficient building.

“Our company’s mission is to develop systems and approaches that demonstrate to other builders how they can also build energy-efficient, healthy, and durable homes at cost-competitive prices,” said Lisle.

Energy-Efficiency Features

All Insight Homes are built using the energy-efficiency package that Lisle developed through his experimental home building and the refinements developed with IBACOS.

Insight Homes’ standard energy-efficiency features start with a conditioned crawlspace insulated with continuous R-10 extruded polystyrene rigid foam (XPS) on the interior of the walls.

Insight achieves airtight construction and an improved thermal envelope with advanced 2 x 6 framing at 24-inches on center. Walls are insulated with dense-packed netted and blown-in fiberglass to R-23. The attic is insulated to R-38 with loose-blown fiberglass. Blower door tests show a maximum of 3.0 air changes per hour at 50 Pascals of pressure.

The high-efficiency HVAC system includes a 96% AFUE two-stage propane-fired furnace and a 16 SEER air conditioner. The ducts are located in the sealed, conditioned crawlspace and consist of a sheet metal trunk and R-6 insulated flex duct branches. There are two central returns for the main living space with door undercuts at enclosed rooms. The duct blaster test shows less than 3% total system leakage and less than 1% leakage to the exterior.

Integrated bathroom exhaust fans coordinate run time to satisfy ASHRAE 62.2 ventilation requirements. Insight Homes explored several whole-house ventilation strategies before settling on an exhaust-only system. The previous supply strategies required the use of a filter to limit the influx of particles in incoming air. Homeowners who were not replacing the filters according to schedule complained of performance issues. Insight Homes made an effort to teach homeowners the importance of replacing filters during new homeowner orientations, but the problem persisted.
The 0.87 EF tankless gas water heater uses a homerun distribution system, which uses a multiport manifold to deliver water to each fixture through PEX tubing.

The low-e windows are vinyl-framed, double-glazed, and argon-filled, with a U value of 0.26 and an SHGC of 0.19. Flashing tape is used to keep out any air and moisture that gets past the house wrap. Rain troughs built into the window sills are a further precaution.

Lighting is a combination of screw-in and hardwired compact fluorescent lighting.

Insight Homes has a third party perform blower door, duct blaster, and flow hood tests on 100% of its homes. Each home is ENERGY STAR®-certified and subject to additional third-party inspections.

Innovation

Insight Homes is currently working with IBACOS to build and test two side-by-side houses—one with Insight’s standard energy-efficiency features and the other with an advanced HVAC system that includes a super-efficient heat pump paired with a tankless water heater that can provide backup heating.

“This system does not exist anywhere else in the market,” said Kevin Brozyna, an IBACOS researcher. “We are working with Rob Lisle and manufacturers to develop it as a new product.”

Health, Durability, Sustainability

Insight Homes uses poured concrete wall foundations with an asphalt-based coating to ensure that the crawlspace stays moisture free. The earthen floor of the crawlspace is covered in two layers of poly sheeting, taped and sealed at all penetrations and to the foundation walls. French drains are used to further keep the foundation dry. Downspouts for the gutters are located at the front of the house and piping attached to the downspouts is buried underneath the sidewalks, carrying rain water away from the house and releasing it into the yard, far away from the foundation.

All Insight Homes meet the strict requirements of the American Lung Association Healthy House program, which include a whole-house dehumidifier and central vacuum system.

All Insight Homes achieve not only ENERGY STAR certification but also qualify for ENERGY STAR’s Indoor Air Package.
Dollars and Sense

The representative model for this case study, the 2,140 ft² Jerry, has 3 bedrooms and 2.5 baths. IBACOS analysis showed that the Jerry model uses 50% less energy than the Building America benchmark. The builder estimates that energy-efficiency upgrades cost $7,660 per house, which adds $612 a year to a mortgage (based on a 30-year term and 7% interest). But the homeowner enjoys an estimated $1,405 a year in energy savings, for a net annual gain of $793.

### Table 1. Added Costs and Savings of Energy-Efficient Measures for Insight Homes

<table>
<thead>
<tr>
<th></th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Energy Savings</strong>*</td>
<td><strong>$7,660</strong></td>
</tr>
<tr>
<td><strong>Total Added Builder Costs</strong></td>
<td><strong>$7,660</strong></td>
</tr>
<tr>
<td><strong>Annual Mortgage Payment Increase</strong>*</td>
<td><strong>$611.55</strong></td>
</tr>
<tr>
<td><strong>Annual Utility Savings</strong></td>
<td><strong>$1,405</strong></td>
</tr>
<tr>
<td><strong>Annual Net Cash Flow to the Homeowner</strong></td>
<td><strong>$793.45</strong></td>
</tr>
</tbody>
</table>

* For the Jerry model compared to the Building America benchmark.

** Costs are based on builder estimates, and manufacturers’ data, plus a 10% markup relative to minimum code. These costs do not reflect rebates, incentives, and subsidies.

*** The annual mortgage payment is an estimate based on a 30-year mortgage with a 7% fixed interest rate.

The Bottom Line

One of the keys to Insight Homes’ success was their willingness to experiment with various combinations of system solutions until they developed a cost-effective, energy-efficient, and replicable specifications package. Insight’s standard home is capable of achieving better than 40% source energy savings, compared to the Building America benchmark.

Marketing homes exclusively on the basis of energy efficiency has paid off in Insight’s home sales.

“This may not work for all builders, but it seems to be working well for Insight,” said IBACOS researcher Brozyna.

In 2008 and 2009, Insight had 38 closings on homes at Deep Creek as well as other communities in Sussex County, DE. They sold 54 homes in 2010 and expect to finish building and selling 70 homes by the end of 2011. Insight Homes also has a long backlog of orders for new houses that promises to keep their sales numbers growing.

IBACOS has continued its partnership with Insight Homes to research new energy-efficiency technologies and support development of its business processes and practices.