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THE ICYNENE® ADVANTAGE

APPLICATION CASE STUDY:
Going Green at the Beach – Green and Sustainable Beach Home

Synopsis:

- ✓ Tight building envelope construction to reduce air leakage
- ✓ High energy efficiency and improved indoor air quality
- ✓ Meeting Green Building Criteria set forth by six major Green Building Programs including LEED for Homes and the National Green Building Standard (NGBS)
- ✓ Low environmental impact

Overview:

How would it feel to give up a beautiful mansion in an upscale neighborhood, a pride-worthy Jaguar in the driveway and an enviable urban lifestyle – all for being more environmentally responsible? It is certainly not easy, especially when you have worked so hard and for so many years to achieve it.

But homeowners Dave and Anna Porter are not ordinary people. Being huge green building advocates, their conscience did not allow them to continue a lifestyle that was contradictory to their views.

Dave has been an ardent speaker on the subject of "Green Building" even before the building industry began to embrace sustainable practices. *"I realized that we were only preaching and not practicing, so we decided that the best way to bring the change is by setting an example and instantly we decided to build the most "Green" home on the beach,"* says Dave Porter.

Their beach property is located on Warm Beach in the King & Snohomish County of Washington. The 100-year old home, originally constructed in 1907, was in a state of disrepair; therefore, it was deconstructed and rebuilt.

Going Green at the Beach home is one of the greenest homes on the west coast, meeting or exceeding the requirements of six major and prestigious Green Building Programs –

- Built Green™
- ENERGY STAR® Home
- American Lung Association® Health House®
- Environments for Living®
- LEED® for Homes and
- ICC 700 National Green Building Standard (NGBS)

The Challenge

Anna was looking for a comfortable living space with a low environmental impact, whereas, Dave wanted this home to not only meet or exceed the toughest of green building standards but also to serve as a demonstration home for green design, systems, and materials so as to educate industry professionals on the merits of sustainable practices.

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80% of the material from deconstruction was diverted from landfill finding a new home in various projects.

Diane Glenn, a Green Consultant from Bellevue, Washington was appointed to oversee and design an efficient, environmentally responsible home that would provide a comfortable living space to meet the family's current and future needs.

The Porters were also aiming to reduce the heating and cooling requirements of their new and bigger home as this would save them significant energy costs as well as save the environment by minimizing the greenhouse gas emissions.

The strategy for creating an energy efficient and environmentally-friendly home included:

- An airtight building envelope
- Incorporating building science principles to minimize heating requirements
- Water conservation
- Durable and low maintenance design
- Improving indoor air quality

The Solution

The Porters hired a deconstruction firm to bring down the old structure. For their commitment to sustainable building practices, 80% of the material was diverted from landfill finding a new home in various projects. Salvaging the building materials helped in gaining Leadership in Energy and Environmental Design (LEED) credits.

The Builder, Chaffey Homes, carefully selected materials that would allow for long term environmental and cost benefits, and qualify for points towards the green building certifications.

To achieve these objectives, Chaffey Homes incorporated eco-friendly building products such as low VOC paints, dual flush toilets, Compact Fluorescent Light (CFL) bulbs, geothermal heating system, photovoltaic solar energy system, Energy Star® appliances, high efficiency windows and more.

One of the building products selected by the Builder as well as the Green Consultant was ICYNENE LD-C-50™†, a proven light density spray foam insulation and air barrier material that is recognized for its energy-efficient and environmentally-friendly benefits.

According to Diane Glenn, *"Icynene was most suitable for the project because of its great air-sealing properties, consistent application in the walls and green features."*

The new home plan included a total of 2,700 sq. ft designed with two bedrooms, a den and a guest-bedroom suite. In addition, a light-house shaped cupola provides a 360° view of the ocean, mountains and terrain as well as natural light and ventilation for the house.

The Icynene Licensed Dealer sprayed Icynene in the walls at 5.5 inches providing an R-value of R-20. The ceilings were insulated at 10 inches providing an R-value of R-36 and the garage ceiling was sprayed at 3.5 inches providing an R-value of R-13. The crew did a remarkable and quick installation job avoiding overfill to minimize the construction waste.

According to the U.S. Department of Energy, approximately 40% of the energy used to heat and cool a building is lost by uncontrolled air leakage. The gaps and penetrations in the ceilings and walls, which are created to accommodate electrical or plumbing work, account for the bulk of energy loss in a home. Icynene, when sprayed around these penetrations, expands to 100 times its volume to create a tight air-seal around them stopping unwanted air leakage.

Icynene addresses the problem of stack effect caused by the rising of warm inside air, a natural process of convection. In traditionally insulated attics, the air permeable insulation in the ceiling allows the warm inside air to pass through it

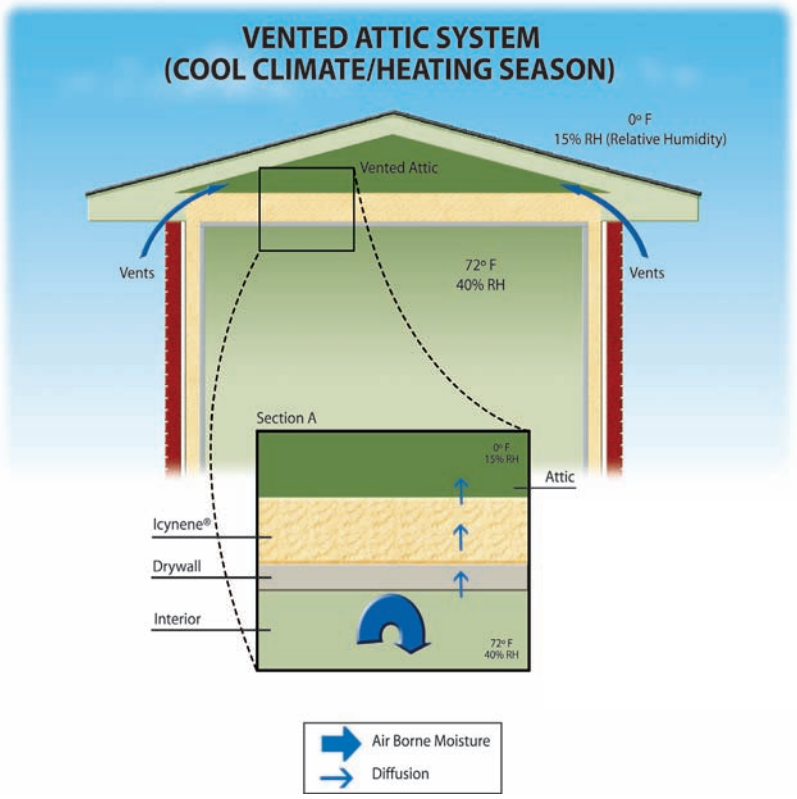
and escape into the attic while pulling cold air into the lower portion of the house. In the Porter's home, Icynene is applied to the attic floor and connected with the wall insulation creating a continuous air-seal, minimizing the stack effect and saving expensive heating energy.

A Holistic Design Approach

With Icynene installation, the builder focused on the following key areas:

Insulating & Air-sealing – Icynene is a qualified air barrier[1] which insulates and air-seals in one step. Dual-performing Icynene fills every gap and crevice in the walls, ceilings, floors and attic and provides improved energy performance over conventional fiberglass insulation.

The R-values of the insulation and the design of the wall system account for about half of the heating and cooling energy use in a building. The other half is lost to air infiltration. As an ASTM E2178-03 qualified air barrier, Icynene is highly successful in controlling air leakage through the building envelope.



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Moisture Control – Dampness and mold exposures could increase the occurrence of a range of respiratory problems by 30–50%[2]. So, for the builder, moisture control was a vital component of home design. *"We like that Icynene is a breathable material and its open cells allow it to breathe and dry out,"* says Bob Chaffey, Co-President, Chaffey Homes.

As per the tests conducted by the Energy & Environmental Building Association (EEBA), 99% of moisture is carried in the air. Icynene delivers effective moisture control by minimizing air movement through the walls. It also reduces the risk of other airborne moisture-related problems such as mold and mildew.

Low Environmental Impact – Icynene was applied in accordance with current building science principles and as per the requirements set out in the Environments for Living® Program. Icynene-insulated homes have lower heating and cooling requirements due to fewer air changes per hour. The reduced heating and cooling requirements help minimize the related carbon emissions of this home.

Moreover, Icynene is an environmentally-friendly product that does not contain HFCs or PBDEs. HFCs, often used as a blowing agent in other spray foam insulation products are considered to be powerful greenhouse gases that have a high Global Warming Potential. Icynene is a 100% water-blown insulation, free from HFCs.

The Results

Construction of this "Deep Green" home was completed in September of 2007 when it opened its doors as a demonstration home for green designs, systems and materials to help others experience its performance.

Careful planning and a commitment to sustainability resulted in a successful project that achieved Gold status under the ICC 700 National Green Building Standard (NGBS), Five Star status for the Built Green™ Program of Master Builders Association of the King and Snohomish Counties, and met the standards of the Northwest Energy Star® and Environments for Living® Program.

To date, the home has won many awards such as the NAHB's prestigious "**Custom Home of the Year 2008**" award at the National Green Building Conference, the "**Green Hammar**" award by Master Builders of King and Snohomish Counties and the "**Gold Nugget**" award for the Sustainable Built Green Home at the Pacific Coast Builders Conference.

The home achieved LEED Gold status upon completion demonstrating economic benefits such as lower energy bills; environmental benefits such as reduced greenhouse gas emissions; and health benefits such as enhanced indoor air quality.

Icynene contributed in achieving LEED credits under the following categories:
Energy and Atmosphere – Air leakage accounts for up to 40% of the energy used for heating and cooling in a typical residence[3]. The U.S. Department of Energy recommends the use of an effective, continuous air barrier system, as well as insulation.

The Porters say, *"We initially chose Icynene for its environmentally-friendly composition but we were pleasantly surprised to learn that Icynene can help us reduce our energy consumption significantly which is better for our environment and our pocketbooks too."*

Icynene is an Energy Star® partner and it helped meet Energy Star® performance guidelines, a requirement of the LEED program under the Energy and Atmosphere category. This means that the homeowners will be able to save up to 50% of their heating costs.

The average home in the United States produces 22,000 pounds of carbon dioxide (CO_2) emissions annually[4] – primarily due to heating and cooling. Icynene spray foam insulation will help the homeowners reduce home heating and cooling costs and also the related CO_2 emissions.

Material and Resources – Icynene insulation and air barrier material helped achieve credits by conserving resources. By providing superior air-sealing in one step, it eliminated the need for additional sealing material, thereby reducing construction waste.

As an open-celled material, Icynene is 99% air and only 1% material; therefore, it is easily compacted, dramatically reducing the waste volume in comparison to other insulation materials. Additionally, it is a long-lasting, durable product that will require no maintenance and is warranted to last for the life of the building.

Icynene can also help in achieving credits for the home as it is manufactured on site, by the installation crew in the exact volume required for the job.

Indoor Environmental Quality – Icynene's water-blown environmentally-friendly composition does not off gas in the indoor environment in its cured form. In addition, by air-sealing the building shell, Icynene minimizes the intrusion of outdoor allergens, pollutants and unwanted airborne sounds into the home.

Icynene air-sealed all gaps and penetrations to minimize air leakage and help homeowners save up to 50% on energy costs.

***Going Green at the Beach** home meets or exceeds the requirements of six major and prestigious Green Building programs. Icynene helped the home achieve LEED Gold Status.*

Combined with proper mechanical ventilation, Icynene helps maintain the indoor relative humidity between 35% and 50% – a level at which the growth of mildew can be minimized.

Icynene was sprayed between the floor joists of the bedroom over the garage. Air-sealing critical spaces between the garage and bonus room over the garage helped in minimizing the entry of pollutants from this area into the living space.

Going Green at the Beach home met the American Lung Association®'s Health House® standard of a healthier and durable home.

"We could achieve such results because of the building material performances. I'll buy more Icynene for my future projects too," remarked Bob Chaffey.

Homeowners Dave and Anna Porter say *"We're looking forward to years of sustainable living with the help of Icynene."*

They are so happy with the results from Icynene that they recommend it to everyone who cares for healthy indoor air quality and superior air-sealing and insulation values — both issues that green building projects must overcome.

Icynene puts the homeowners' goals in reach for a sustainable green building project:

- ✓ Insulates and air-seals in one step to eliminate the need for additional sealing materials reducing construction waste
- ✓ Increases the energy efficiency helping homeowners save up to 50% on energy costs
- ✓ Locks out dust, allergens and other outdoor pollutants
- ✓ Minimizes airflow and accompanying moisture reducing the incidence of condensation and related mold and mildew
- ✓ Expands 100 times its initial volume ensuring a complete fill of cavities and providing a continuous air barrier
- ✓ Uses no PBDEs. Does not contain any HFCs that could contribute to Global Warming

Icynene Insulation

Icynene foam insulation products are sprayed into/onto walls, crawlspaces, underside of roofs, attics and ceilings by Icynene Licensed Dealers. They expand in seconds to create superior insulating and air-sealing results. Every crevice, crack, electrical box, duct and exterior penetration is effortlessly sealed to reduce energy-robbing random air leakage. Icynene products adhere to the construction material and remain flexible so that the integrity of the building envelope seal remains intact over time.

Icynene is ideal for residential, commercial, industrial and institutional indoor applications. The products are:

Healthier: Icynene spray foam products are CHPS (Collaborative for High Performance Schools) EQ 2.2 Section 01350 Compliant, meeting nationally recognized requirements as Low-Emitting Materials (LEM) and Environmentally Preferable Products (EPP). Icynene spray foam products are 100% water-blown and contain no HFCs or PBDEs. Icynene seals out dust, pollen and other allergens from entering the structure. As air barriers, Icynene products minimize the potential for airborne moisture build-up and related problems such as mold and mildew.

Quieter: By air-sealing the building envelope, Icynene effectively minimizes airborne sounds. Icynene is perfect for reducing unwanted noises from home theaters, plumbing runs and playrooms.

More Energy Efficient: Icynene delivers up to 50% more energy savings versus traditional insulation.

Information about Icynene insulation can be obtained by calling Icynene Inc. (800-758-7325), visiting the website Icynene.com, or contacting your local Icynene Licensed Dealer.

<u>Endnotes:</u>

1. *Tests Conducted By Bodycote Materials Testing Canada In Accordance With ASTM E2178-03*
2. *Fisk and Berkeley Laboratory Report, June 2007*
3. *Energy Star Air Sealing Fact Sheet*
4. *The Alliance to Save Energy report, www.ase.org*

† The Icynene product installed and addressed in this project example is Icynene's classic formula, ICYNENE LD-C-50™.

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For more information, contact your local Icynene Licensed Dealer

Visit our website: Icynene.com
or call
1-800-758-7325

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