Green Is Beautiful

CEUs available

Beauty, place-making, and even love are motivating many green designers, who see these values complementing core sustainability tenets.

By Paula Melton

In the movie *Monsters, Inc.*, the title characters extract the energy needed to run their city by sneaking out of closets in the night and making human children scream. But the novelty is wearing thin, and as the children become less scared, the community's power supply is threatened. Our monster heroes, whose true nature is more goofy than scary, end the crisis when they discover that human laughter provides ten times the energy of a scream.

Sustainability-focused designers never intended to make people scream, but inspiring joy has not always been front-of-mind for clients in an industry where economics rather than ergonomics is the prime mover. And with many project teams working hard to push the envelope of energy performance, an "added" focus on beauty, wellness, or happiness has often gotten short shrift.

"The emphasis on technology rather than what we need to do to make this a really good habitat for people," is a huge part of the problem for the sustainable design community, argues Judith Heerwagen, Ph.D., environmental psychologist and affiliate faculty member at the University of Washington. While she was interviewing the occupants of one award-winning green building, she told *EBN*, "People said it was like a beautiful corpse. It was so technologically focused; it wasn't humanized in a way that they felt was pleasant and sensory."

Savvy designers are finding ways to create allure that dovetail not only with energy and water performance but also with tight budgets. "Post-recession, we're looking for high design but good value," notes James Timberlake, FAIA, co-founder of KieranTimberlake. "To the extent that the climate allows us to do it, we're also making buildings simpler" by exploiting passive design principles and other low-tech strategies. "I think clients appreciate that because they're not spending money on architectural fetishes" that don't also provide functional benefits.

In this article, we'll explore several ways in which the green building community is trying to bring

To be high performance…

2 - Buildings must “work”

Building Science Translation:

Manage energy & moisture with equal intensity…

How many ways can a building get wet?

- Bulk water
- Capillary water
- Air-transported vapor
- Vapor by diffusion
- (moisture of construction)

- Continuous water barrier (WRB integrated with flashings)
- Capillary breaks
- Continuous air barrier
- Vapor retarders(?)

How many ways can a building assembly dry?

- Free drainage (powerful & easy)
- Convective (Strong & harder)
- Diffusion (weakest & hardest)

- Space
- Pathway and driving force
- Directional drying by moisture gradient

HP Enclosures

- Continuous water control layer (“barrier”)
- Continuous air control layer
- Vapor profile (designated directional drying)
- Continuous thermal control layer

How many layers in this wall?

- Block
- Lathing
- Plaster

How many layers in today's "typical" wall?

- Exterior finish

Two…

- Exterior finish
- Cladding

Three…

- Exterior finish
- Cladding
- WRB

Four and five…

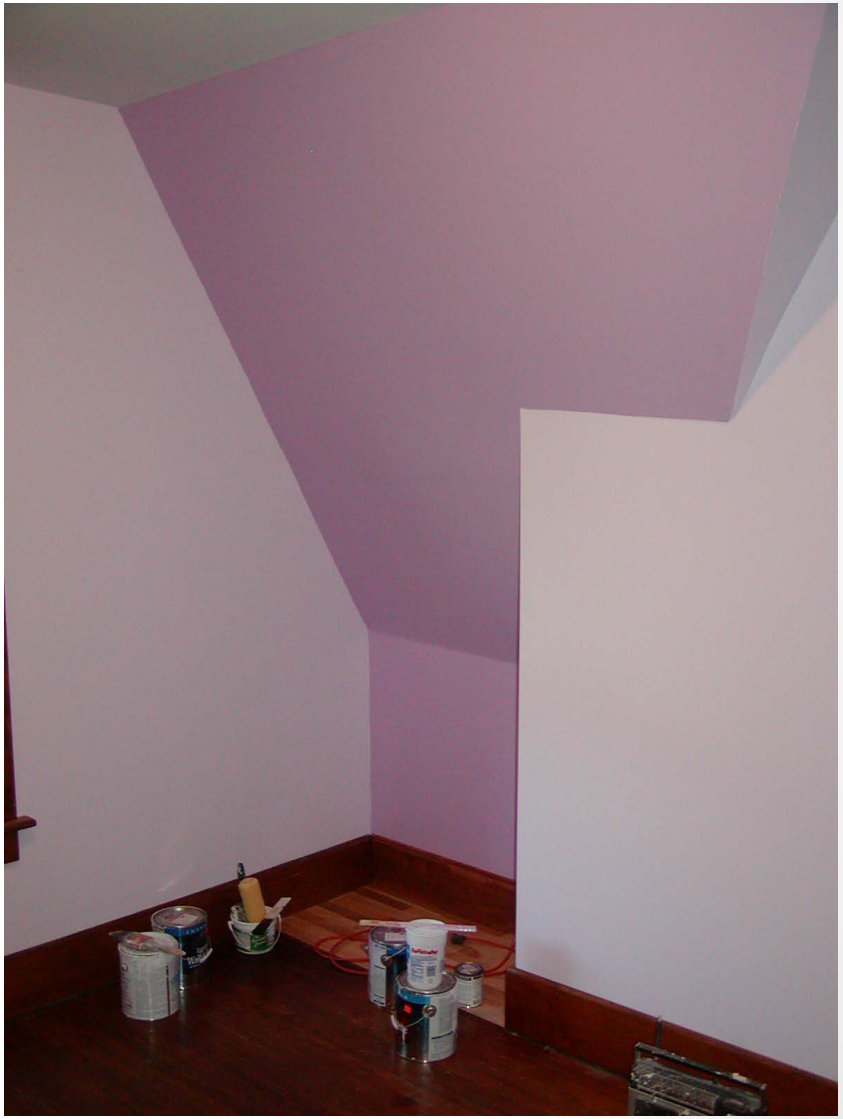
- Exterior finish
- Cladding
- WRB
- Sheathing
- Framing

Six, seven and eight…

- Exterior finish
- Cladding
- WRB
- Sheathing
- Framing
- Insulation
- Vapor retarder
- Gypsum board

Nine and ten.

- Exterior finish
- Cladding
- WRB
- Sheathing
- Framing
- Insulation
- Vapor retarder
- Gypsum board
- Primer
- Interior finish



Once a building assembly gets wet, long term drying comes via diffusion (darn, the weakest and hardest…)

Vapor Profile (Qualitative…)

1. Determine vapor permeability of each component of assembly
2. Identify least vapor permeable component(s)
3. Assess direction and extent of vapor drive: interior/exterior temperature difference, interior/exterior relative humidities (remember always high to low)
4. Identify/assess drying direction & potential

NOTE: Assumes continuous air barrier—no air leaks

Building Science

The nuts and bolts of building

Vapor Profiles Help Predict Whether a Wall Can Dry

To avoid moisture problems in walls, think about the permeability of all the wall's components — not just the "designated" vapor retarder

POSTED ON AUG 5 2010 BY PETER YOST

Today's walls, roofs, and floors are better insulated, tighter, and made with a much greater variety of components than they used to be, making them a lot more susceptible to moisture problems when they get wet. Compared to the old days, today's walls and ceilings are more complicated and can be very slow to dry.

Poorly crafted building codes are blamed for many examples of confusion, and the confusion over vapor retarders and vapor barriers is no exception. To design and build energy efficient and durable building assemblies, following the code is not enough. We need a new approach — such as the vapor profile.

Image 1 of 3

Why did this roof rot? Inadvertent vapor barriers in this 10-year old house had terrible consequences. The moisture came from air leaks through can lights (the Romex wire is the hint). Foil-faced foam on the inside and peel and stick roof membrane on the outside trapped moisture where it rotted the wood. A vapor profile evaluation of this assembly would have saved this roof.

What is a vapor profile?

A vapor profile is an assessment of the vapor permeabilities of each component in a building assembly (a wall, ceiling, or roof). This assessment determines the assembly's drying potential and its drying direction. The vapor profile shows whether the building assembly protects itself from getting wet and how it dries when it gets wet.

The Hidden Science of High-Performance Building Assemblies

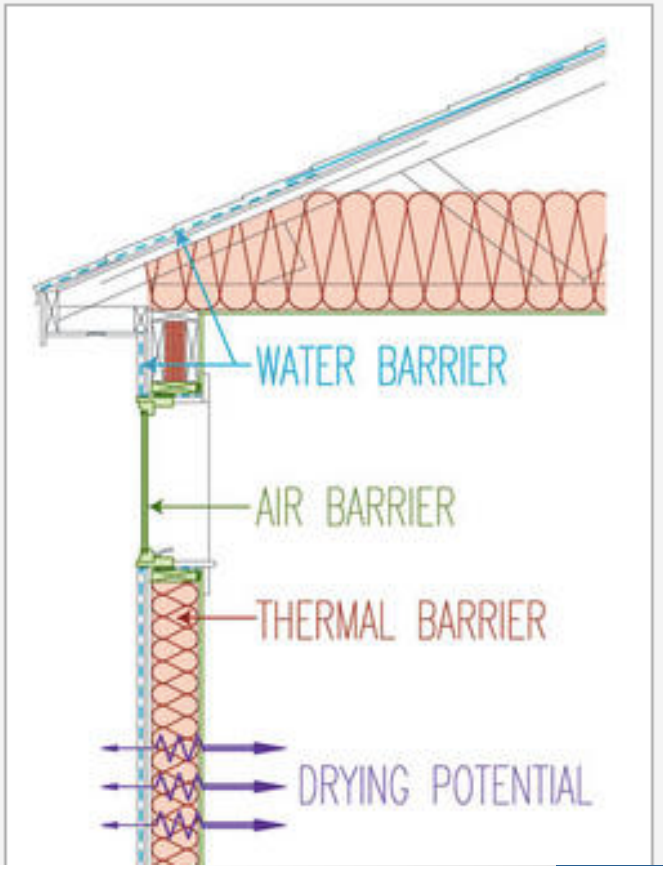
CEUs available

By Peter Yost and Paula Melton

For children, the delicate, fern-like patterns left by Jack Frost on the inside of a windowpane can be magical. But for the owners of a brand new commercial building in the Midwestern U.S., they were more like a nightmare.

"There were 71 punched window openings, all of which had condensation on the inside that turned to frost in the winter," explained a consulting architect who was hired to diagnose the problem and suggest a solution. "They tried lowering the interior relative humidity to get the condensation to stop. That didn't work."

Interior condensation on glazing often indicates a problem with the window itself, but here the culprit was "a poor detail on the architect's part," explained the consultant. "They were trying to do this unique architectural feature where they had a steel element above the window that protruded to the inside." Unfortunately, the steel was a thermal bridge, so no matter how well insulated and airtight the walls and roof might have been, those 71 "unique architectural features" spent the winter relentlessly chilling the rest of the building envelope. In the short term, a problem like this would likely cause major comfort issues and strain the mechanical system; because the condensation was not only on the glass but also on the window frame and the surrounding drywall, the thermal bridges also threatened the durability of the building materials. "The only solution was taking out all of the windows, cutting the steel that was the thermal bridge, and installing some additional insulation," the consultant said. Fortunately, no lawsuit was filed. But with more attention to detail, the architecture firm responsible for this building design could have saved itself a great deal of time, expense, and embarrassment.



High-performance buildings begin with a very complex big picture,

SEON SUSTAINABLE ENERGY OUTREACH NETWORK

Building Science Guild

- Check your business at the door…
- Your competition is not the other building professionals in the room; it's all the building professionals ***not*** in the room…
- *"You must learn from the mistakes of others. You can't possibly live long enough to make them all yourself."* Sam Levenson

To be high performance:

3 – you must be able to sell what you build…

Train everyone, including your sales staff…

Randy Erwin training Ryland Homes sales staff

Put your money where your mouth is —performance guarantees…

An intended consequence of our work: Energy bill guarantees

New home programs:

- Bigelow Homes
- Environments for Living
- Comfort Home
- Artistic Homes
- Tucson Electric Power

Energy bill guarantees for retrofits?

Existing home programs:

- Masco's WellHome

- Tucson Electric Power

- Green Homes of America

IR Digital Thermometers & Cameras

But building professionals can't win the high performance business proposition on their own…

- Realtors
- Appraisers
- Lenders

Realtors – Green the MLS Toolkit

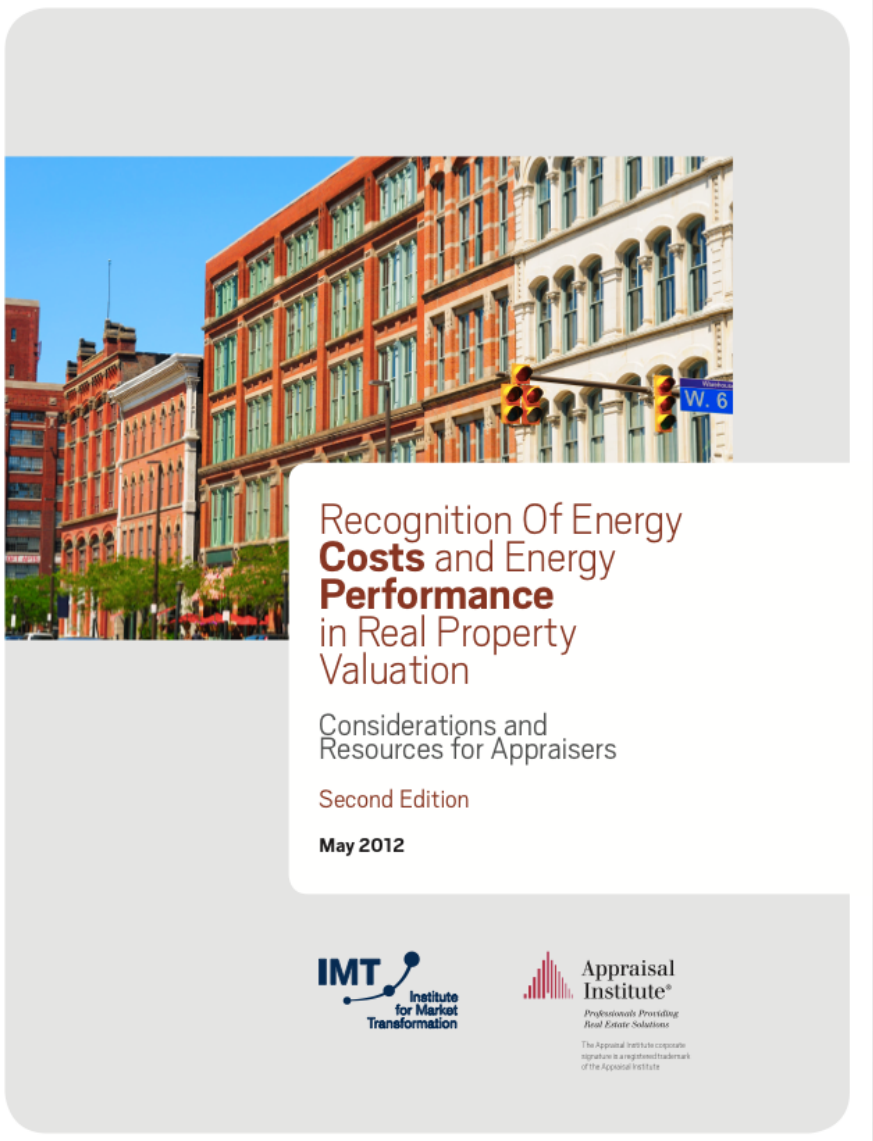
This toolkit addresses the recommended steps from industry experts and early Green MLS adopters to support efficient flow of green home information and value:

Step 1 - Cross Industry Goals & Team
Step 2 - Design for Data Integrity
Step 3 - Design for Ongoing Quality
Step 4 - Create the Green MLS Platform
Step 5 - Educate, Communicate
Step 6 - Track & Publish Market Trends

the Green MLS | TOOL KIT

Appraisers

- The Appraisal Institute's Green Education materials
- Form 1004 addendum: "Residential Green & Energy Efficient"



“Green” Lenders

- Green Street (OR)

UMPQUA BANK

- Laconia Savings Bank (NH)

Laconia Savings Bank
New Hampshire's local bank

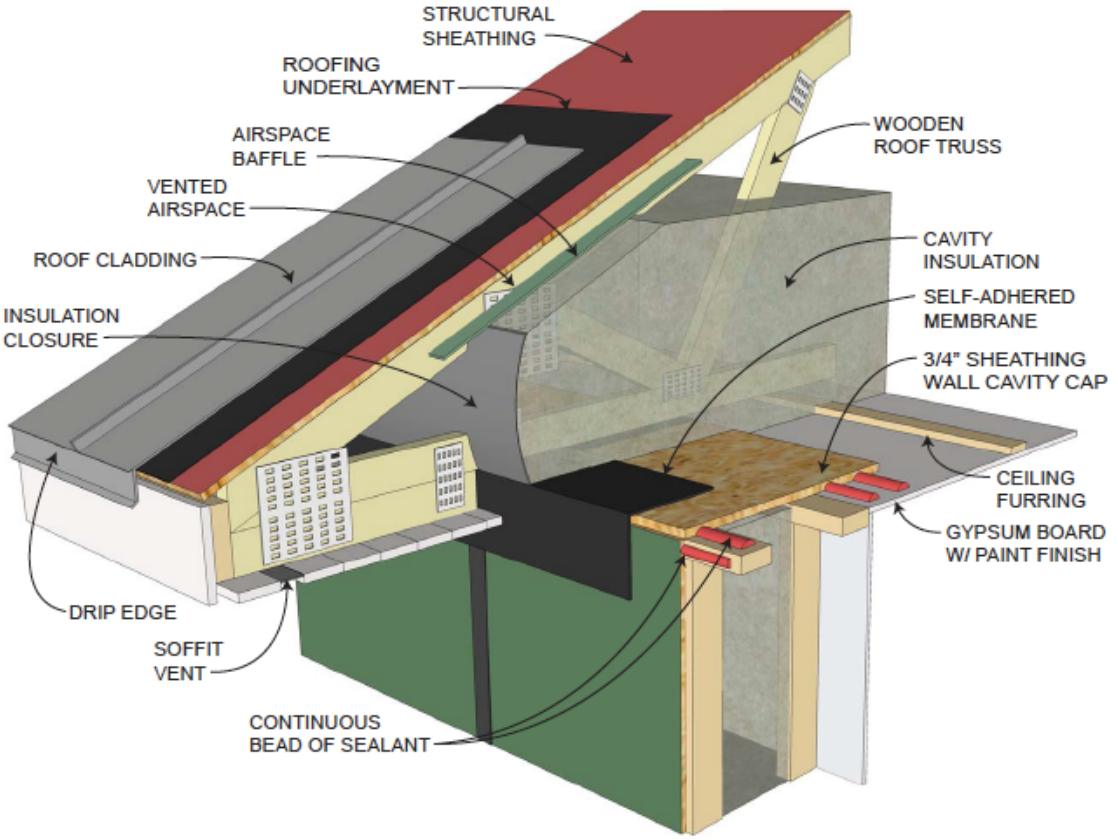
The underlying issue of payback analysis vs. value transfer

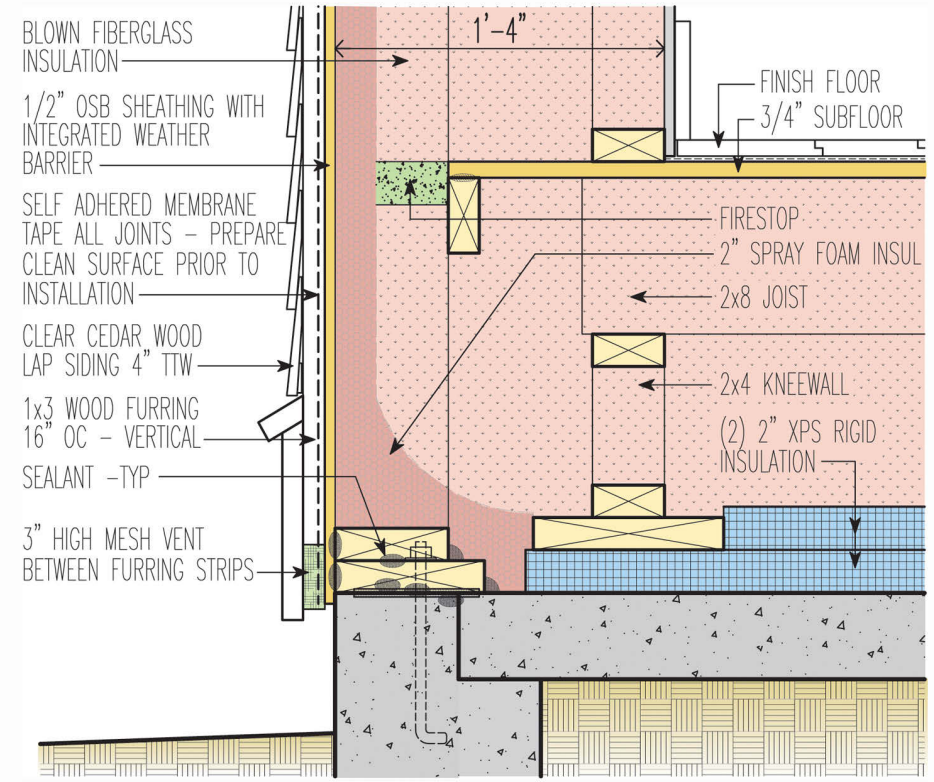
- Payback analysis works for single-owner, short-lived products
- Payback analysis ALONE does not work for multiple-owner, durable products

Take the next logical step – connect quality with value…

The LL Bean approach to products, customer service, the value proposition

- Policy: Return any LL Bean product any time, in any condition—get a replacement free.
  Logic: What could be more valuable than to know how one of our products performed over time?
- Policy: Return any product that you THINK is LL Bean's any time, in any condition—get a replacement free.
  Logic: What could be more valuable than to know how a competitor's product performed over time?


STRUCTURAL SHEATHING
ROOFING UNDERLAYMENT
AIRSPACE BAFFLE
VENTED AIRSPACE
ROOF CLADDING
INSULATION CLOSURE
WOODEN ROOF TRUSS
CAVITY INSULATION
SELF-ADHERED MEMBRANE
3/4" SHEATHING WALL CAVITY CAP
CEILING FURRING
GYPSUM BOARD W/ PAINT FINISH
DRIP EDGE
SOFFIT VENT
CONTINUOUS BEAD OF SEALANT


BLOWN FIBERGLASS INSULATION
1/2" OSB SHEATHING WITH INTEGRATED WEATHER BARRIER
SELF ADHERED MEMBRANE TAPE ALL JOINTS – PREPARE CLEAN SURFACE PRIOR TO INSTALLATION
CLEAR CEDAR WOOD LAP SIDING 4" TTW
1x3 WOOD FURRING 16" OC – VERTICAL
SEALANT –TYP
3" HIGH MESH VENT BETWEEN FURRING STRIPS
1'-4"
FINISH FLOOR
3/4" SUBFLOOR
FIRESTOP
2" SPRAY FOAM INSUL
2x8 JOIST
2x4 KNEEWALL
(2) 2" XPS RIGID INSULATION

Integrating art, science, and business is beautiful.

Steve Baczek, Architect

Thank you.