

# Deep Energy Retrofits with Beyond Green, Energy Audits

Home  
Performance Solutions

for  
total comfort, health, and energy savings

Beyond  
Green Construction is a green building collaborative. We are an integrated team of professional home performance specialists with complementary skills and common vision for intensively energy efficient home renovations and remodels. An "energy-efficient home" is one that is healthy, safe, durable, and comfortable while costing as little as possible to operate.

## The Fundamentals of Home Performance

Your home is  
a system.

We tend to think  
of our homes as unassailable structures that exist independent of their surroundings. Yet, all homeowners know that every house has its own quirks, idiosyncrasies, minor nuisances, and in certain cases, even life-threatening problems. The root of all these problems can be traced to the failure of home to react properly with its indoor or outdoor environment.

The  
following all-to-common complaints, ranging from the inconvenient to the unhealthy, are each symptoms of environmental incompatibility: mold on walls and furniture, musty odors, hot spots in summer, cold spots in winter, drafts, insect or rodent infestations, radon infiltration, and poorly drafting fireplaces. A home that is not properly  
outfitted for the environment in which it is located will invariably suffer one

or more of these problems, and more.

Fortunately, a systematic approach utilizing the latest techniques in building science can solve all of these problems and make your home more comfortable, healthier, and dramatically reduce energy consumption all year round.

To achieve optimal home performance, it is necessary to take a holistic view of the house. First, a thorough home assessment takes into consideration homeowner needs, the characteristics of the site, the goals of the occupants, and how the space is to be used. Then, a systematic workplan is developed to address the following home performance priorities:

- 1) Air seal and insulate the building envelope to reduce heating and cooling loads within the conditioned living space. The "envelope" is the barrier of walls, roof and basement/crawlspace ceiling or foundation walls that separates the conditioned living space from the outside environment.
- 2) Minimize internal loads [electrical, water use, heating, and cooling]
- 3) Provide fresh air
- 4) Control humidity
- 5) Determine heating and cooling needs
- 6) Integrate hot water with other loads

These priorities are acknowledged by nationally renowned building science experts as the best recipe for retrofitting a home to achieve optimal performance within its environment (Wigington 2008). The outcome of this process is total comfort, a healthier living space, and dramatic energy savings.

science professionals acknowledge that the home is a dynamic environment. All of the things that make your home comfortable when properly managed-heat, fresh air, humidity-can, if improperly managed, create an uncomfortable, or seriously unhealthy, environment. Controlling the movement of heat, air, and moisture is fundamental to optimizing home performance.

#### Substantial

indirect air infiltration, through gaps at the seams of conventional stick-built construction, is common in most homes. Even well insulated homes - if they lack comprehensive air sealing around plumbing, electrical wiring, wall framing and external siding - suffer from draftiness.

#### Here

is a common winter season scenario: warm air escapes through gaps into the attic creating negative pressure within the lower elevations of the home. Cold air rushes in from outside to fill the pressure vacuum. As this air warms, it too rises toward the attic and escapes, thereby creating more negative pressure below and drawing in more cold air. Because it turns a home into the equivalent of a chimney stack, this phenomenon is called the "stack effect."

#### Likewise,

inconsistent temperature gradients throughout the home (e.g. cold floors and walls in winter, hot rooms in summer) that may be ignored as minor inconveniences can produce more serious, and often invisible, problems. During the winter a home's indoor air carries moisture from bathrooms, plants, and the respiration of occupants. In the absence of comprehensive air sealing, humid air will seep out of the house wherever it can find a gap or crack. When the warm humid air encounters the cold outer wall it condenses into liquid water.

A buildup of condensation on the outside-facing surface of gypsum board (sheet rock) walls can promote mold growth and produce a telltale "musty" smell.

#### Heat,

air, and moisture obviously cannot be eliminated from a home. They must, however, be controlled. By viewing the house as a system, common home problems can be properly diagnosed and treated. Home performance renovations are inherently complex simply because a change in any part of the house will have an effect on the entire system. Each and every alteration to the house system must be evaluated as to its effect on moisture migration, heat flow, and air quality. This is the only way to achieve maximum occupant comfort and safety, and ensure the efficiency and durability of the house.

#### Home

performance projects, therefore, require an integrated team of professionals with complementary skills and a common vision.

#### Integrated Teamwork

Home performance renovations can simultaneously fix a range of common home problems such as excessive energy bills, drafts, mold, temperature inconsistencies, animal and insect pests, and wet basements. However, unless these improvements are considered in the context of the whole house system, they can exacerbate other existing problems or even create new problems. Anticipating the array of potential problems and their interactions is complicated.

Complicated home performance projects are best accomplished by an integrated team of home performance professionals with complementary skills and a common vision for intensively energy efficient home renovations and remodels. Beyond Green Construction team members include carpenters, air sealing and insulation specialists, roofers, plumbers, electricians, landscapers, LEED-certified architects and designers, and a licensed project supervisor.

Seamless communication among team members ensures maximization of home performance improvements. Each alteration is considered in the context of the whole-house system to evaluate its effect on heat flow, moisture migration and air quality. Plumbers and electricians work with air sealing and insulation specialists to seal the building envelope around pipes and electrical conduit. HVAC systems are properly sized. The result is a more comfortable, healthier and energy efficient home.

#### REFERENCE:

Wigington,  
Linda. Moving existing homes toward carbon neutrality. Affordable Comfort, Inc. September 2008.