When considering the issue of green housing, it is useful to review what is meant by the term. At least four national green building standards are currently in use. The oldest is Leadership in Energy and Environmental Design (LEED), which is administered by the U.S. Green Building Council (USGBC). LEED is a program through which buildings are certified as meeting sustainability standards. LEED focuses on specific areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED is applicable to all buildings, including homes. A LEED rating system also exists for neighborhood development and focuses on design that reduces risks associated with obesity, heart disease, and hypertension through protection of the natural environment and development of walkable communities. Since 2004 Enterprise Community Partners has administered the only
The EPA Indoor airPlus program of the U.S. Environmental Protection Agency is an enhancement to the ENERGY STAR Home program. ENERGY STAR homes are certified to perform to a level of energy efficiency that is typically 20–30 percent higher than conventional homes. To be certified as an Indoor airPlus home, over 30 additional construction features are added to the home to provide for healthy levels of indoor air quality.

An important issue pertaining to green housing was recently analyzed by the National Center for Healthy Housing (NCHH) – namely, is green housing the same thing as healthy housing? The U.S. Department of Housing and Urban Development has actively encouraged healthy housing programs for over ten years through its Office of Healthy Homes and Lead Hazard Control. Competitively awarded funds to universities, non-profit organizations, and other groups support community-based efforts to educate the public about indoor environmental pollutants, their health impacts, and methods to eradicate them. NCHH has approached the issue of healthy homes by organizing this information into seven principled action steps: Keep it Dry, Keep it Clean, Keep it Ventilated, Keep it Pest-free, Keep it Safe, Keep it Contaminant-free, and Keep it Maintained. Based on these principles, NCHH examined the four green

...
housing programs above and concluded that green is not necessarily healthy. Specific examples that support this conclusion is that ICC-700 does not require compliance with ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers) 62.2 standard for mechanical ventilation in housing, nor are safety features specified. Indoor environmental problems have been linked to ventilation deficiencies in housing, and a lack of safety features can result in injuries and deaths. ICC-700 is not the only green housing program that overlooks safety features. Safety features, such as lockable medicine cabinets, bathroom grab bars, and scald-protection faucets are missing in all of the programs. Other features missing include the lack of recommendations for avoiding building materials susceptible to mold growth in potentially damp areas of homes. Until these provisions are addressed in green building programs, homebuyers should be made aware that green does not always mean healthy.

References


Background
Radiant floor heating systems are considered the best of all possible choices for home heating. Comfort is probably the greatest advantage of a radiant floor system compared to hot air or other types of hot water systems. Floors always feel warm and the heat is evenly distributed throughout each room. Radiant floor heat systems also cause very little air movement. This minimizes dust particles suspended in the air and contributes to healthy indoor air quality. Since the heating elements of radiant systems are embedded within the floor, more space within a room is available for furniture arrangement compared to hot air and hot water systems where registers and baseboard heaters restrict furniture placement.

Matched with the correct type of boiler, radiant floor heating is also more efficient than typical hot-water baseboard heating, and often more efficient than forced-air heating, because there are fewer distribution losses.

While radiant floor heating may be the ideal choice in terms of comfort, it is also more expensive to install compared to other options. In fact, the initial expense is probably the biggest and perhaps only drawback. Radiant floor systems are much more labor-and material-intensive to install than hot air or typical hot water baseboard systems. More time and material mean more money is required.

How radiant floor systems work:
Hot water is pumped from a boiler through tubing laid in a pattern embedded within or underneath the floor. As the water travels through the tubing it heats up surrounding flooring materials. The heat of the flooring material is then transferred to home
occupants via infrared radiation. An example of heat transfer via infrared radiation is when you feel the warmth from a hot wood stove several feet away from you. With a radiant floor heating system, the entire floor of the home essentially acts as a wood stove, although the temperature of the floor never gets as hot as a stove. The warmth of the floor is delivered to people and objects in each room throughout the house.

Radiant floor systems are divided into the following categories:

- Wet installations are those that make use of the large thermal mass of a concrete slab floor or lightweight concrete over a wooden sub floor. Martin Holladay (Journal of Light Construction, April, 2000) lists the following types of wet installations:
  - **Slab-on-grade:** In a slab-on-grade system, tubing is embedded in a concrete slab poured over rigid foam insulation.
  - **Thin slab over wood framing:** The tubing is attached to the top of the plywood sub-floor and is then covered with a thin slab (usually 1-1/2 inches thick) of Gyp-Crete (very lightweight material).

- Dry installations: the installer "sandwiches" the radiant floor tubing between two layers of plywood or attaches the tubing under the sub-floor. Martin Holladay (Journal of Light Construction, April 2000) lists four different types of dry installations:
  - **Tube-and-plate staple up:** Aluminum heat-transfer plates, with a groove designed to accept tubing, are stapled up against the underside of the sub-floor, working from below.
  - **Plateless staple-up:** A plateless staple-up system uses radiant tubing stapled directly to the underside of the sub-floor, without aluminum transfer plates.
  - **Above-floor tube-and-plate:** Aluminum heat-transfer plates are installed between 3/4-inch sleepers nailed above the sub-floor. Hardwood flooring or underlayment is then installed on top of the heat-transfer plates.
  - **Radiant sub-floor panels:** Proprietary radiant sub-floor panels are available from several manufacturers. These systems are basically a piece of plywood or composite panel with groves cut into them to accept hot water tubing. The panels also include an integral aluminum heat-transfer plate. Radiant sub-floor panels are intended for installation on top of wood joists or an existing sub-floor.

Slab-on-grade systems and thin slab over wood framing are best installed during the initial construction of a house. They are not practical to install as retrofit systems in an existing structure.

Tube-and-plate staple up and tube-only staple up systems work well for retrofitting into existing structures if there is access to the bottom side of the sub-floor between floor joists, in a ranch style house with an unfinished basement, for example. Individuals
Condensing boilers best match for radiant
Radiant floor heating systems perform very well with 110°F water entering the piping loop and a return water temperature of about 100°F, exactly the best temperature range to optimize the efficiency of a condensing boiler. Condensing boilers were developed by manufacturers after the energy crisis of the 1970s as a way to extract more of the heat value of the fuel for heating water and thus decrease efficiency losses from the combustion process. When any fuel is burned, water vapor is released as part of the combustion process. Boiler manufacturers learned that significant amounts of heat could be captured if the steam in the exhaust gasses could be condensed within the boiler. But in order for this condensation to take place within the boiler, the temperature of the return water must be relatively low, typically below 130°F. And the lower the return water temperature, the greater the operating efficiency of the condensing boiler. At a return water temperature of 100°F a condensing boiler operates at an efficiency level of about 94%. So the ideal water temperature range for a radiant floor matches the ideal water temperature ranges of a condensing boiler.

Non-condensing boilers can be used with radiant floor heating systems, however they operate at much lower efficiency levels compared with condensing boilers. In addition, non-condensing boilers must have return water temperatures above 140°F because allowing condensation to occur in a non-condensing boiler will destroy the boiler. Therefore non-condensing boilers must deliver water temperatures much higher than what radiant floor systems actually require, making them a poor match for radiant systems. If you are contemplating installing radiant heat in a home, keep in mind that only gas-fueled boilers are available as condensing boilers.

If you are considering installing a radiant floor heating system in a new or existing home, be certain to work with a trained and experienced heating professional. Installing a condensing boiler and accompanying controls, circulating pumps, mixing valves, manifold, and tubing so that the operating efficiency of the system is maximized requires a high level of expertise. Licensed master plumbers possess the training needed to install
these complex systems, but keep in mind that some plumbing firms have more experience installing radiant floor systems than others. Always obtain more than one estimate of the cost of having a system installed, and be certain to ask for and check references.

References:


Radiant Design Institute
http://www.radiantdesigninstitute.com


Federal Lead-Safe Work Practices Law Set to take effect April 22

A new federal rule requiring contractors to become lead-safe certified before doing work on any residence, school or day-care center built before 1978 is set to go into effect April 22, 2010. The law requires contractors such as painters, carpenters, plumbers, electricians, as well as landlords - virtually anyone doing work for pay on pre-1978 buildings that may disturb painted surfaces.

Fines for non-compliance are severe. The EPA, or a state agency enforcing the regulations, can fine a company $37,500 per infraction, per day. The new rules also render companies vulnerable to the threat of a civil suit for noncompliance.

Common renovation activities like sanding, cutting, and demolition can create hazardous lead dust and chips by disturbing lead-based paint, which can be harmful to adults and children. The rule requiring the use of lead safe work practices is aimed at preventing lead poisoning from these activities.

The rule requires firms to be certified in lead-safe work practices by attending a one day class taught by a United States
The Environmental Protection Agency (EPA) accredited training provider. However contractors who have previously completed the 2003 Joint EPA/HUD Lead-Based Paint Training Program for Renovators and Remodelers are required only to take a half day refresher class.

To locate an accredited EPA training provider in your locality visit:
http://cfpub.epa.gov/flpp/searchrrp_training.htm

Carbon Monoxide Detector Law goes into effect in N Y State

On February 22, 2010 a law that requires carbon monoxide (CO) detectors in all New York residences went into effect. The law is being called Amanda’s Law in memory of 16-year-old Amanda Hansen of West Seneca, New York who was killed by CO poisoning due to a defective boiler in the home where she was spending the night with a friend.

CO poisoning is the number one cause of poisoning deaths in the United States. Carbon monoxide can be produced when burning any type of fuel including gasoline, charcoal, propane, natural gas, kerosene, oil, wood or coal. If any flammable material burns incompletely, carbon monoxide is produced. CO is also a product of combustion, and can be released into the air of a house from a cracked heat exchanger in a furnace or boiler. Carbon monoxide can kill in minutes or hours depending on the levels in the air.

All residences in New York State with combustion appliances capable of emitting carbon monoxide must have a CO detector. Examples of such appliances include fuel-fired heating and cooking appliances, solid fuel burning appliances such as wood, coal, pellet stoves and fireplaces. Garages and other motor vehicle-related occupancies are also included.

The law requires of residential structures built on or after January 1, 2008 that CO alarms be hard-wired into a home’s electrical system. Specifics of the law are listed below.

- Carbon monoxide alarms should be installed in each of the following locations:
  - Within each dwelling unit or sleeping unit, on each story having a sleeping area.
  - Within each dwelling unit or sleeping unit, on each story where a carbon monoxide source is located.
- When more than one carbon monoxide alarm is required to be installed within an individual dwelling unit, the alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all sleeping areas over background noise levels with all intervening doors closed.
In the case of a building constructed before January 1, 2008, battery operated CO alarms are permitted. Interconnected alarms are also not required.

Parts of the law also apply to contractors working in New York State. If any contractor replaces a combustion appliance such as a furnace, boiler, or domestic water heater in a home that does not have a CO alarm, then the contractor must install an alarm before completion of the job.

Only carbon monoxide alarms listed and labeled as complying with UL 2034 or CAN/CSA 6.19 should be used. The alarms should also be installed in accordance with the manufacturer’s installation directions. And they should not be located within or near the openings to garages, bathrooms or furnace rooms, in addition to locations specified as ‘prohibited, or not recommended’ in the manufacturer’s installation instructions.

**In addition to installing carbon monoxide alarms, the following actions can reduce risk**

- Test and/or replace alarms according to the manufacturer’s instructions;
- Have heating systems, vents, chimneys and flues tested, inspected and cleaned by a qualified technician each year;
- Never leave a car running in an attached garage;
- Regularly examine vents and chimneys for improper connections, rust, soot or other debris;
- Never run a vehicle, generator or other fuel-powered motor indoors, even if garage doors are open to the outdoors;
- Never use a gas oven to heat a home, and only use barbeque grills outdoors – never in a house or garage; and
- Remember that carbon monoxide alarms are not substitutes for smoke alarms. Smoke alarms should also be installed on every level of a home, as well as in or outside all sleeping areas.

For the full text of Amanda’s Law, see [http://www.dos.state.ny.us/code/COAlarm.htm](http://www.dos.state.ny.us/code/COAlarm.htm)

**Contributors to this HHE News**
Joseph Laquatra
Professor
College of Human Ecology
Department of Design and Environmental Analysis
Cornell University
3M11 Martha Van Rensselaer Hall
Ithaca, NY 14853
E-mail: jl27@cornell.edu
Mark Pierce
Extension Associate
College of Human Ecology
Department of Design and
Environmental Analysis
Cornell University
3M2 Martha Van Rensselaer Hall
Ithaca, NY 14853
E-mail: mrp6@cornell.edu

HHE News is also posted on the web:
http://dea.human.cornell.edu/DEA/deaxth.htm