

Energy Efficient Homes: Tight and Healthy

Questions + Answers from the September 10, 2012 Webinar

Q: Polly mentioned some tools for determining solar shading. Where can reliable tools be found (i.e. websites)? Are there any "free" tools by the Federal Gov't? [Daniel Berkhoudt] Q: Please share Ms. Ledvina's website references for shading calculations, etc. with all participants. [Rob Sanders]

A: A good site for overhang analysis is: http://www.susdesign.com/overhang_annual/index.php. The site is free, however, there is a suggested donation.

Q: Where does one find these area-specific "tools" that she is recommending we use? [Michael Gustavson]
Q: To reduce confusion most of us would benefit from this type of education for our specific climate only, because it will be void of the climate information we do not need and is thus added unnecessary complexity. Are there climate specific resources unfettered by all the "other" climate zone information? [Michael Gustavson] Q: What are some of the computer aided programs designers can use to figure out strategies for different climate regions? [Jean Liu]

A: As much as we try to "zone" our thinking about climate, it's rarely that simple. The best way to avoid the "unnecessary complexities" is to understand the basic principles underlying the predominant strategies and apply them as needed, wherever that may be. Area specific tools include:

- On-line Calculator for Cooling and Heating Degree Days (free): <http://www.degreedays.net>
- Solar design tools (free): <http://www.susdesign.com>
- Residential energy modeling, including ground source heat pumps (REM/Design™ or REM/Rate™): <http://www.archenergy.com>

Q: Are you able to send EPA link (re: sick buildings)? [Ferello Croker]

http://www.epa.gov/iaq/pdfs/sick_building_factsheet.pdf

Q: How do these criteria apply to hydronic radiant heating systems? [Raymond J. Kelly]

A: The criteria for a tight house still apply. When energy is being spent to heat or cool a living space we need to make sure that energy isn't wasted due to unintended leaks in the envelope. Stack effect in winter will still be strong with indoor heating but with a hydronic system there won't be any localized anomalies due to leaky ducts. The same criteria for indoor air quality exist but you will need independent strategies to achieve them. A tight home heated with a hydronic radiant system will still need outside air to be brought in mechanically. An HRV would be an appropriate ventilation solution in a hydronically heated home where the indoor air in winter would be expected to be more humid than the outside air. Please see the discussions and references below in the questions about ERVs and HRVs.

Q: Do I correctly understand that if AC is never installed the house need not be tight? i.e. in many parts of Maine, AC is not installed. [Hubert White]

A: Maine is a cold or temperate climate. Insulated and tight walls are design criteria in this climate to prevent the heat from escaping whether you are mechanically or passively heating. The house still needs to be tight -- with operable windows for summer. A good reference is J.B. Clancy's AIA Housing Knowledge Community webinar "Form Follows Energy: Achieving the Passive House Standard for Habitat for Humanity (H12005)" in

which a case study in Vermont was presented.

Q: Can you touch on interlocking an ERV or HRV to the main mechanical system? [Bob Oliszewicz] Q: Mini-splits are typically used as a point source. HVR/ EVR's are typically whole house Thoughts on integration. [Clyde Griest] Q: What are your thoughts on mini splits and hrv/ evr's? [Clyde Griest] Comment RE: ERV introduction: Advantage to connect to system return, just before air handler, incoming air goes thru system filter system BEFORE enter home. [Gary Slutzky] Q: Where would I use an HRV in lieu of an ERV? [John Eloe]

A: HRVs are generally used in cold climates where the primary concern is recovering heat as efficiently as possible while ERVs are typically used in hot, humid climates where indoor humidity levels are a bigger concern. An HRV has better heat-exchange capabilities and is typically cheaper than an ERV. Another advantage in northern climates is that it can serve as a dehumidifier in winter when the humidity level inside the house may be higher than outside. This review from the Minnesota Sustainable Housing Initiative does a good job of describing how both ERVs and HRVs can be used effectively in cold climates and the multiple factors that influence the decision: <http://www.mnshi.umn.edu/kb/scale/hrverv.html>

ERVs and HRVs may be installed with a dedicated duct-work system or integrated with the whole house system. The advantages of the dedicated duct system for ERVs in hot-humid climates are discussed in this article by Bruce Davis: www.advancedenergy.org/buildings/knowledge.../erv.pdf. An independent duct system for ERV/HRV ventilation would obviously work with mini-split and hydronic systems. Filtration of outside air (preferably \geq MERV 8) is something to consider whether integrating with the main system or ducting independently.

Q: How do the new codes treat residential additions? [Don Colangelo] Comment RE: Additions under ResCheck can be analyzed either separately or in aggregate with the entire structure. A tight addition can be dangerous with an old, leaky house. [Rob Sanders]

A: I don't see how a tight addition would be dangerous with an old leaky house; however, I would be concerned about a tight addition with old leaky combustion appliances.

Q: I have used the "Drywall AirBarrier" System for controlling air infiltration and interior moisture for over 30 years along with proper ventilation. Location: Wisconsin. Are you familiar with this approach? [David Peterson]

A: No but I found the article linked below which does describe very sound principles and techniques for sealing a building:

<http://www.finehomebuilding.com/how-to/departments/energy-smart-details/airtight-drywall.aspx>

Several of these methods are also incorporated in the Energy Star v. 3 checklist for Thermal Enclosure: http://www.energystar.gov/ia/partners/bldrs_lenders_raters/Bundled_Checklists_v68_2011-09-01_clean_fillable_508.pdf

Q: We have seen much improved air to air heat pumps in n. climates rivaling geothermal, have you? [Tom Hurd]

A: I don't have personal experience with geothermal in northern climates but I have seen the same in the south. It likely does have to do with improvements in air to air heat pumps as well as a better understanding of the limitations of geothermal.