

# July 2010 Newsletter from Building Diagnostics

Welcome to the July newsletter. This month there is actually something about buildings. More than one thing actually. A bit of educational criticism as well and maybe a lawyer joke.

No lawyers were intentionally harmed in the production of this newsletter.

Under the heading of not a lawyer joke: Regulators at the Federal Housing Finance Agency which oversees Fannie Mae and Freddie Mac, the two quasi governmental agencies that underwrite a huge chunk of the nations residential mortgages, announced that they will not underwrite loans for properties that have liens under the newly enacted PACE (Property Assessed Clean Energy Financing) program. Essentially this is a war over who has first dibs on a property in a foreclosure procedure.

The [statement](#) released July 6<sup>th</sup> calls PACE a "key alteration of traditional mortgage lending practice". There are some legitimate issues but nothing that couldn't be dealt with by a little creative thinking. It might be worth contacting your congress person and senators to let them know that the people at FHFA need to clear this up. PACE could be a real opportunity to get efficiency and renewable energy into the mainstream market.

## **This Month's Topics: #1: Attic fans, solar or electric?**

Nothing gets my blood pressure up like someone spreading bad information. So when an old acquaintance contacted me to vet an answer he read in a [newspaper column](#) about attic fans the blood boiling began.

Now to be fair, the attic fan concept has been around for a long time. And if you only look at part of the situation it sounds like a clever idea, cool the attic and the ceiling will be cooler, cooler ceiling, less heat transmitted into the living space.

However, as I pointed out in my response to the article, if you have a poorly air sealed attic a lot of the air will be coming from the conditioned space. The replacement air will be more hot humid air that needs to be conditioned. Quantifying that is difficult, how much air will come from the living space, how much from outside? Every building will be different so how do you make that case in a way that people will understand? Simple, ignore my point altogether.

If we ignore the air movement part altogether will an attic fan save any energy? I used the house in the column, a 3500 square foot ranch (I assumed a 3500 square foot attic). To cool that area the attic fans I looked at would require two fans. A cheap fan uses 468 watts each, a better fan uses 228, both per manufacturers specs. So we need either 936 or 456 watts to cool that attic.

How much does that fan cool the attic? I've been in a lot of attics with and without fans and my guess is not much. But that isn't a scientifically valid number. In a fit of generosity I decided to say that the air would cool by 30 degrees F. (there may be the occasional short period where that could be exceeded, but mostly not).

All you folks with scientific calculators follow along, the rest of you can trust me on this. I looked at two insulation levels, R 19 and R 30. Lowering the attic temperature 30 F in an R 19 3500 square foot attic reduces the heat transmission by... 5,526.3 Btu per hour. At an expenditure of at least 456 watt hours. Depending on your electric rate that's going to cost you 6 – 9 cents.

Let's remove that heat with an air conditioner. Let's use a unit with a eer/seer of 10, it makes the math easy and it's a reasonable number. EER is Btu's per watt hour so this AC unit requires 552.63 watt hours to remove that heat. *SEE*, there is a savings, unless you bought the cheap fan. Or if the temperature drop in the attic is less than 30 degrees.

But R 19 isn't much insulation, even in Philadelphia. Let's leave every thing the same except we'll change the insulation to R 30 (still not very much). Heat transmission savings with a 30 degree drop; 3500 Btuh. The fan still uses the same 456 (or more) watt hours. But the AC now only needs 350 watt hours to remove that excess heat. Even the better fan loses in this scenario.

If you add the insulation you save on AC costs, not a lot, but some. But for the folks in Philly, they still have a 4800 degree day heating season to deal with. That additional insulation will also save 7,781, 053 Btu of heat over the heating season, or about 78 therms of natural gas not allowing for the heating system losses. Call it 90 therms of actual use, about the same as 65 gallons of heating oil. (I did that last conversion in my head, it's very approximate)

The cost of the cheap fans is about \$100.00 each plus installation (3 - \$400.00?) the better fans are about \$200.00 each and solar fans run over \$500.00 each and you would probably need 3 or 4 in an attic this size, plus installation.

So, when that salesman at the home show or the traveling salesman at your door starts talking about the 30% AC savings you will get with his product hit him with some real numbers. Maybe next year he'll be selling insulation.

## **Topic #2: Don't know much about a science book**

(With apologies to Sam Cooke)

For the most part the science in building science isn't very complex. Most of the time we aren't really doing science, we are applying science done by others.

Now a good moisture investigation requires actual measurement, testing a hypothesis or two and, if possible, verification. That is real science, but it isn't complex. If you follow logical steps, get accurate data and apply it properly you should end up with a reasonable answer.

Still, high school physics and algebra one will cover all the science and math required.

You do need to learn about how buildings are constructed, about the characteristics of the materials used and how the equipment operates. But you can develop a pretty good understanding of how buildings function with a generalists knowledge of these things.

So why are there so many builders and tradespeople who are surprised when they take a building science course? Since BPI started blanketing the area with classes I keep hearing remarks like "I didn't know that" or "I never thought about that" from people who have been

in the business a long time. Most of these people have been through at least high school, many have a college degree.

To be fair, this is not a business that has traditionally rewarded innovation. But how did the science these people learned in school become so disconnected from the work they do as adults?

Probably because science, like math, is mostly taught as formulas and rules. It's seldom brought alive for the majority of students. Too bad, because everything involves science, things like hunting, birdwatching, sports and house cleaning. And buildings too.

When I'm working with customers I always try to get them to participate in the analysis a little. It helps me understand how they perceive their building and I hope it helps me communicate more effectively. I keep coming back to the idea that the important part of this business is education.

### **Energy tips:**

That leads very nicely into this month's awards ceremony. Not a ceremony, just a verbal gold star that goes to...Oh, the anticipation....**Gil Richardson!**

That's right, Gil was the only one who I was able to guilt into giving me not one but two metaphors that I shall steal, um, borrow.

*Air is a fluid, your building is a submarine in a fluid of air. Are you happy if your hull is 98% fluid tight in a sub? Not unless you like paying lots of money to run pumps (heating systems).  
And*

*Dress in layers and that goes for your house also!*

*Insulation is like polar fleece or wool – It keeps you warm but not much good when it is windy.*

*Air sealing is like a wind breaker or outer shell clothing - It keeps the wind out but is not much good on a cold day.*

I believe I promised my response to someone who says that air sealing is bad since a house needs to breathe. I've given in and no longer rant and breathe fire and condemn the poor unfortunate to the depths of Hades. The medication is working and I'm able to control myself in the face of such idiocy.

Now I ask them to put their hands on their diaphragm and take a deep breath and then exhale. I ask if they know how the air got in and out of their lungs. Some do, some don't, but in either case once we have established the roll of the diaphragm in respiration I inform them that that is mechanical ventilation.

Sometimes I will continue and ask how much of that air came into their lungs through their ears, or under their fingernails, or, well you get the idea.

Then I will suggest that we should disable their diaphragm (I haven't completely mellowed) and punch random holes through the skin. Do they think that would be effective for them?

This can be modified for individuals or groups. If you do a good job it should have them asking where the air in their houses come from when the windows are closed.

I do think it would be nice if one of the leading practitioners of building science, one Dr. Joe, would drop the habit of using the term breathing when he really means vapor transport, but he usually doesn't call for my opinion on such things.

### **Blatantly Commercial Content:**

I do have to justify the time spent on this effort, so I am charging myself an exorbitant fee to sponsor this newsletter. I get one ad per newsletter and free coffee refills in the kitchen.

Business update: I continue to do a mix of residential and commercial energy consulting work; I'm looking for more of both. Please visit my website, <http://www.buildingdiagnosticsnh.com/> for information on my capabilities and background.

I haven't had an interesting "sick" building for a while. I'm afraid my diagnostic skills will get rusty. If you know a building that has people scratching their heads give me a call.

### **Closing thoughts:**

As mentioned above, I need feedback for this little venture to succeed. I would like to include notices for events that relate to energy, the environment and community building, so if you have any announcements please send them in to [newsletters@buildingdiagnosticsnh.com](mailto:newsletters@buildingdiagnosticsnh.com). I also welcome rebuttals and amplifications for anything I write.

Please forward this to anyone who you think would like it, if you don't like it use the email address above to unsubscribe.

Thank you, I'll see you next month.