

BRICK, BLOCK & BEERS



What do you really gain when you insulate the "bejeebers" out of your masonry home?



5 Things About Concrete Block & Energy Efficiency They Never Taught You in School :: Don Beers, PE, GC

So... Who produces all of the information on energy that floats around internet? You might think the government takes it upon themselves to inform us as to exactly what and how to insulate our homes and businesses. But the truth is that businesses that sell energy related products, such as insulation, produce the majority of what you might mistakenly believe is unbiased energy information and recommendations.

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Everyone wants their products to be energy efficient but most are not willing to invest in serious research to learn exactly where they stand in saving energy dollars. Outdated and misapplied research is often "massaged" to present a story that is misleading or, worse, simply not true.

I have spent the greater part of my life wondering about where concrete masonry really falls out in all of the energy rhetoric. I love block as a building product. How can I count the ways – fire proof, rot proof, termite proof, cost effective, strong, durable --- the list goes on and on. But on energy we have gotten a bad rap. Mostly that has come from the poor R or Thermal Resistance value of concrete. Masonry claims thermal mass makes up the difference but thermal mass is complicated in understanding how it actually performs.

Thus, it was great news when the concrete masonry industry finally stepped up to the plate and funded a massive study by one of the top energy labs in the Country, Pacific NW National Labs or PNNL. The research is leading edge in that it moves us past discussions of "R" value to the ability to see the actual kWhs (and thus \$\$) differences between walls with varying mass, insulation levels and insulation arrangements. It brings all discussions on wall insulation levels into clear monetary focus, putting it in the correct perspective.

The research created a huge data base – nearly 22,000 individual analysis were run. Thousands of energy use comparisons can be made on various wall types and climate zones. For the purposes of this article I have picked out 5 eye opening truths that specifically relate to Florida's climate and building types. The PNNL research gives is the REAL answer to residential energy questions that have plagued masonry for the past 4 decades. I am not going to go through the details of the research – for that you can view the two technical reports on our website at www.floridamasonry.com.

Things I always wanted to know about energy and masonry (was not afraid to ask) but could never find the real answer.

What do you REALLY save when you insulate the beejebers out of the exterior walls of a typical Florida home??

Real Answer (as opposed to all of the ridiculousness floating around the internet)

Super high R value wall systems don't pay for themselves anywhere in the Florida climate. The maximum dollar savings that can be achieved by changing the insulation of the exterior walls in a 2000 sf one story home is roughly \$100 per year. That's it. And that is NOT going to pay for the \$4000 plus dollars it is going to take to do it.

In Miami, where we have the largest difference, your igloo cooler wall insulation gets you the equivalent of a Starbucks Frappuccino and lemon pound cake a month. In Orlando you'll have to pass on the lemon pound cake.

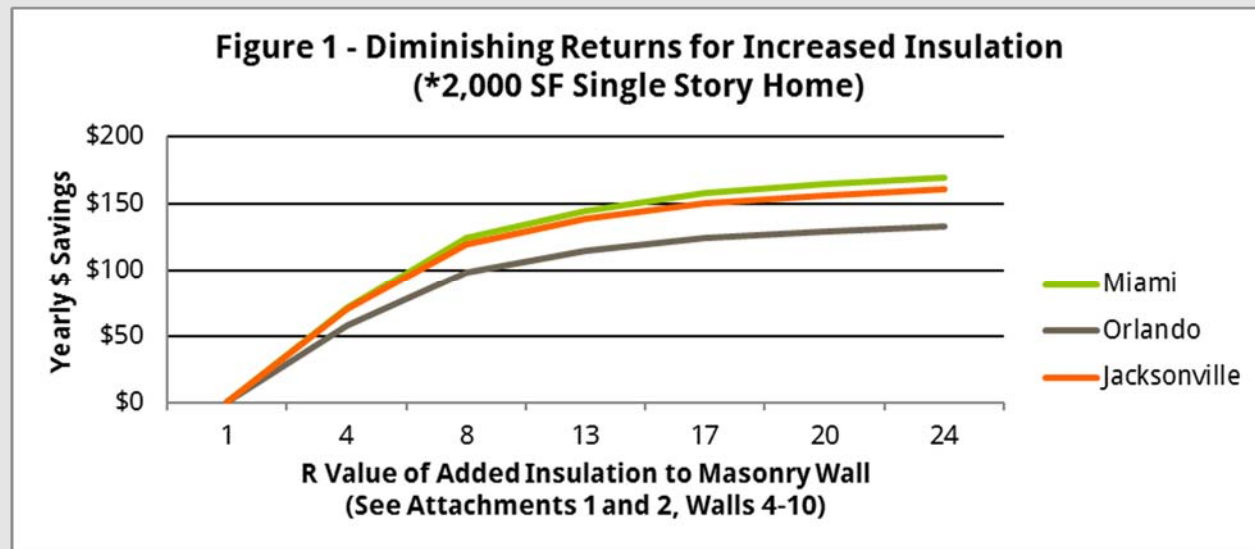
[Table 1: Comparison of Energy Savings of the Least and Most Insulated Walls in Florida]

Total Energy \$ Savings per Year Over Standard CMU w/R4 Added Insulation (2000 sf Single Story Home)							
Wall#	Wall Disc	Overall R Value	\$ Savings in Miami	\$ Savings in Orlando	\$ Savings in Jax	Cost of Energy Upgrade	Payback Period ⁶ for Mia
1	CMU R4	5.8	0	0	0	0	0
3	ICF R20	21.7	\$101	\$79	\$96	\$4,207 ⁵	41.5 yrs

2. As you continue to increase insulation in the exterior walls of a Florida home is there an optimum level beyond which you are just wasting your money??

Real Answer (as opposed to what your local insulation salesman is going to tell you)

In Florida your return on exterior wall insulation starts to diminish rapidly. Figure 1 shows the savings for various levels of insulation. Going from no insulation to a nominal R4 in Miami makes perfect sense. It costs around \$240 and saves you \$70 or so per year. Increasing your insulation from R8 to R20 costs you around \$4000 and nets you a whopping additional \$48 per year of energy savings. This is a straight payback of over 80 years and not worth the investment no matter how you crunch the numbers.



Are R13 wood frame homes really much more energy efficient than R4 masonry homes??

Real Answer (As opposed to what your local wood distributor will tell you)

The energy efficiency of CMU with R4 insulation and wood walls with R13 bat insulation is neck and neck across Florida. Table 2 shows the real HVAC energy savings in Miami, Orlando and Jacksonville. Wood frame gets you a free coffee at Publix and a donut every month – along with plenty of long term maintenance headaches.

[Table 2 - Energy Differences Between R4 CMU and R13 Wood Walls]

Total Energy \$ Savings per Year Over Standard CMU					
w/R4 Added Insulation					
Wall#	Wall Disc	Overall R Value	Miami	Orlando	Jax
11	CMU R4	5.8	0	0	0
12	4" Wood R13	10.9	\$46	\$15	\$18

Can masonry homes with R4 insulation be energy efficient in Jacksonville with the cold winter weather??

Real Answer (Not what you hear from the track wood frame builders in Jacksonville)

We were elated at how close CMU came to wood in Jacksonville - \$18/year difference – nearly as good as Orlando! (see Table 2). When you factor in the moisture/mold degradation of wood's batt insulation over time we are back to what we always knew – CMU with a minimum of insulation is very energy efficient everywhere in Florida! In addition, insurance for wood frame homes costs \$150 to \$575 (10-20%) more annually¹¹ than CMU masonry homes, offsetting any incremental energy savings by 10 to 30 time.

Do you have to put the insulation on the exterior of a mass wall in order for it to be effective??

Real Answer (Not what you get from self-appointed energy gurus)

As we knew from past research, exterior insulation is more efficient; however, this research allowed us to look at the actual cost savings.

Table 3 is a direct comparison of the same wall with the only difference being insulation on the interior or the exterior of the wall. The research data shows that indeed, exterior insulation is more energy efficient but only at around 4 to 6 cents per day.

At this small savings exterior insulation is just not feasible. The interior insulation location currently being used in almost all CMU walls looks very cost effective. This is a 40-year discussion item solved for Florida – keep the insulation on the inside of the wall.

[Table 3 - Comparison of Energy Savings of Interior vs. Exterior Insulation - Florida CMU Walls]

Total Energy Savings per Year of Exterior Insulation over Interior Insulation							
Wall#	Wall Disc	Overall U Value	Miami	Orlando	Jax	Cost of Exterior Insulation¹⁰	Payback Period⁶ for Jax
13	CMU Int Insul	.10	0	0	0	0	0
14	CMU Ext Insul	.10	\$14	\$17	\$22	\$3366	153 yrs

The energy data from the PNNL research will certainly be dissected by those depending on exaggerated claims of energy savings.

The force of this research is that there is no better information currently available – anywhere.

The Rest of the Story

In addition to energy efficiency CMU has tremendous advantages. Unlike wood walls, CMU is unaffected by water and is not a food source for mold – no rot, no mold and no deterioration over time. Because it does not burn, your home insurance rates for CMU are 10 - 20% lower than for wood homes. Generally, this results in a savings of \$150-\$575 per year¹¹ for insurance alone. Structurally, CMU has proven far superior to wood in hurricanes and wind storms. CMU is unaffected by the catastrophic termite damage to wood structures in Florida. And, getting back to energy, the minor differences in Table 2 are quickly reversed with moisture deterioration of batt insulation over time (the average rainfall in South Florida is 60 inches per year).

Masonry is the proven system for building Florida homes. For 60+ years masonry has quietly dominated the market of exterior wall building systems – for many good reasons – energy efficiency not the least. Knowledge is power and hopefully, with the knowledge provided by this research, home buyers can make an educated decision on the best building material for their new home – concrete masonry.

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