5 COMMON MYTHS ABOUT **ENERGY**

By DON BEERS
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01 **MYTH #1** Putting heavy insulation in your walls can save you hundreds of dollars PER MONTH – FALSE!

02 **MYTH #2** More insulation is always better - FALSE!

03 **MYTH #3** R13 wood walls are much more energy efficient than R4 CMU – FALSE!

04 **MYTH #4** Insulation is only effective on the outside of CMU – FALSE!

05 **MYTH #5** R4 masonry is not energy efficient enough for use in the North Florida climate – FALSE!

CONTINUING EDUCATION AIA

LEARNING OBJECTIVES:

- Understand what the PNNL energy study is and what information can be obtained from it.
- Learn the truth, as exposed in the PNNL research, about 5 Florida energy myths concerning concrete masonry.

energy research

5 COMMON MYTHS ABOUT ENERGY

This article is a brief introduction to the energy research recently completed by Pacific Northwest National Laboratories (PNNL) and funded by the Masonry Association of Florida (MAF) and the National Concrete Masonry Association (NCMA). This research is ground breaking – but not astounding. The masonry industry would certainly have preferred it showed wild increases in the value of thermal mass across all climate zones. However, it did confirm the value of mass that researchers have verified over the past 40 years on energy use in residential structures. This is, in essence, a very good thing as it also means the research over the past 40 years validates this recent research. Combined with the technical force of PNNL; the proven validity of Energy Plus™ modeling software used in the research; and the carefully documented research development, there is little room for doubt or dissension. In other words the results are rock solid – and favorable to high mass wall systems.

The results are groundbreaking in the breadth and scope of the walls compared - 607 different combinations of concrete masonry units (CMU), wood and insulated concrete forms (ICF). Almost every conceivable arrangement of standard building products compared "apples to apples" across every climate zone in the US. It leaves nowhere to hide.

Additionally, 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 insulation levels into clear monetary focus, putting it in the correct perspective. Quadrupling the insulation in your walls sounds great until you find out that it only saves you a mere $100 a year and will never give you payback for the first cost of the higher R value wall!

The data base is huge – nearly 22,000 individual analyses were run. Thousands of energy use comparisons can be made on various wall types and climate zones. This article discusses five eye-opening truths that specifically relate to Florida's climate and building types. The PNNL research gives the REAL answer to residential energy questions that have plagued masonry for the past four decades. To read the detailed Florida report or the full PNNL Research, please go to the Masonry Association of Florida website: www.floridamasonry.com.

"There are things I always wanted to know about energy and masonry but could never find the real answer."

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

A **The 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. *[See Table 1—Page 15]* Table 1 was generated from the PNNL data and clearly shows the HVAC savings when you change out the walls from R4 CMU to R20 ICF. The overall U value is - well – the overall U value. There isn't room for a detailed answer in this article for U stuff so just consider it the insulation value of the wall with the smaller number having the better insulation. What is clear is that approximately four times the insulation value nets you precious little dollar return. 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.

Q 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?

A **The 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. I always knew this was generally true – but I now know EXACTLY how it is true. Insulation beyond the R4 to R8 range for mass exterior walls is a complete waste of money. *[See Figure 1—Page 15]* Figure 1 shows the savings for various levels of insulation. Going from no insulation to a nominal R4 in Miami

Pictured above: Residence @ 13th Street. 2010 Masonry Excellence Awards Winner—Residential. Central Broward Construction. www.cbcfl.com

makes perfect sense. It costs around $240 and saves you $70 or so per year. Going from R4 insulation to R8 insulation is a marginal return of around $53/year on an initial investment of $770 for the upgraded insulation package. 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.

Q Are R13 wood frame homes really that much more energy efficient than an R4 masonry home?

A **The 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 batt insulation is neck and neck across Florida. Table 2 shows the real HVAC energy savings in Miami, Orlando and Jacksonville. Wood edges out CMU in Miami at $46/year but this lead reduces to $15/year in Orlando. $15 per year ($1.25 per month) is for all practical purposes a dead heat (your monthly allotment is down to free coffee at Publix and a donut.)

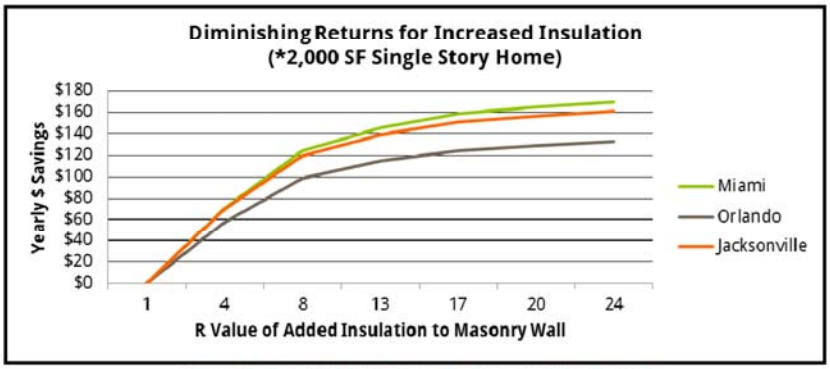
Q Can masonry homes with R4 insulation be energy efficient in Jacksonville with the cold winter weather?

A **The real answer (Not what you hear from the track wood frame builders in Jacksonville)**

We were surprised that mass did not perform better in Miami but 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 annually than CMU masonry homes, more than offsetting any incremental energy savings by 10 to 30 times.

Total Energy $ Savings per Year Over Standard CMU w/R4 Added Insulation (2000 sf Single Story Home)							
Wall#	Wall	Overall R Value	$ Savings in Miami	$ Savings in Orlando	$ Savings in Jax	Cost of Energy Upgrade	Payback Period 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

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



[Figure 1—Diminishing Returns for Increased Insulation]

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

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

Total Energy Savings per Year of Exterior Insulation over Interior Insulation							
Wall#	Wall	Overall R Value	Miami	Orlando	Jax	Cost of Exterior Insulation[10]	Payback Period for Jax
13	CMU Int Insul	10	0	0	0	0	0
14	CMU Ext Insul	10	$14	$17	$22	$3366	153 yrs

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

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

A **The 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.

The comparisons presented in this article were chosen to highlight the amount of bad information and confusion associated with them. When it comes to energy it seems like everyone has a product to sell or a personal "green" perspective to promote. The

5 Common Energy Myths (continued)

real value of this research is being able to quickly and easily get to the cost vs value relationship between virtually all wall systems. Not having the actual yearly dollar differences between walls leaves too much room for exaggeration and the imagination. "If no one knows - then anything goes" and myths on energy efficiency abound:

- Putting heavy insulation in your walls can save you hundreds of dollar PER MONTH – **FALSE!**
- More insulation is always better – **FALSE!**
- R13 wood walls are much more energy efficient than R4 CMU – **FALSE!**
- Insulation is only effective on the outside of CMU – **FALSE!**
- R4 masonry is not energy efficient enough for use in the North Florida climate – **FALSE!**

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 no better information is 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 year 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. The masonry industry undertook this comprehensive study to forcefully counteract the wild claims being promoted in the residential construction arena. Added to these untruthful claims is the increasingly accepted notion that any amount of energy savings is worth any cost. 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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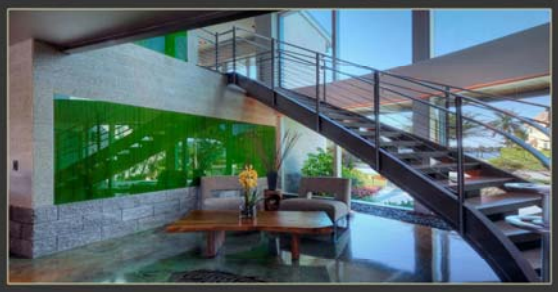

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