

# Affordable Housing Green Building and Finance



# Credits

- Dr. Robert Fehr, UK
- Dr. Jeff Christian, Oak Ridge National Labs



# Outline of My Presentation

- Who is Kentucky Highlands Investment Corporation?
- Technical aspects of what we have done in making our homes energy efficient
- Financing we are using for homeowners

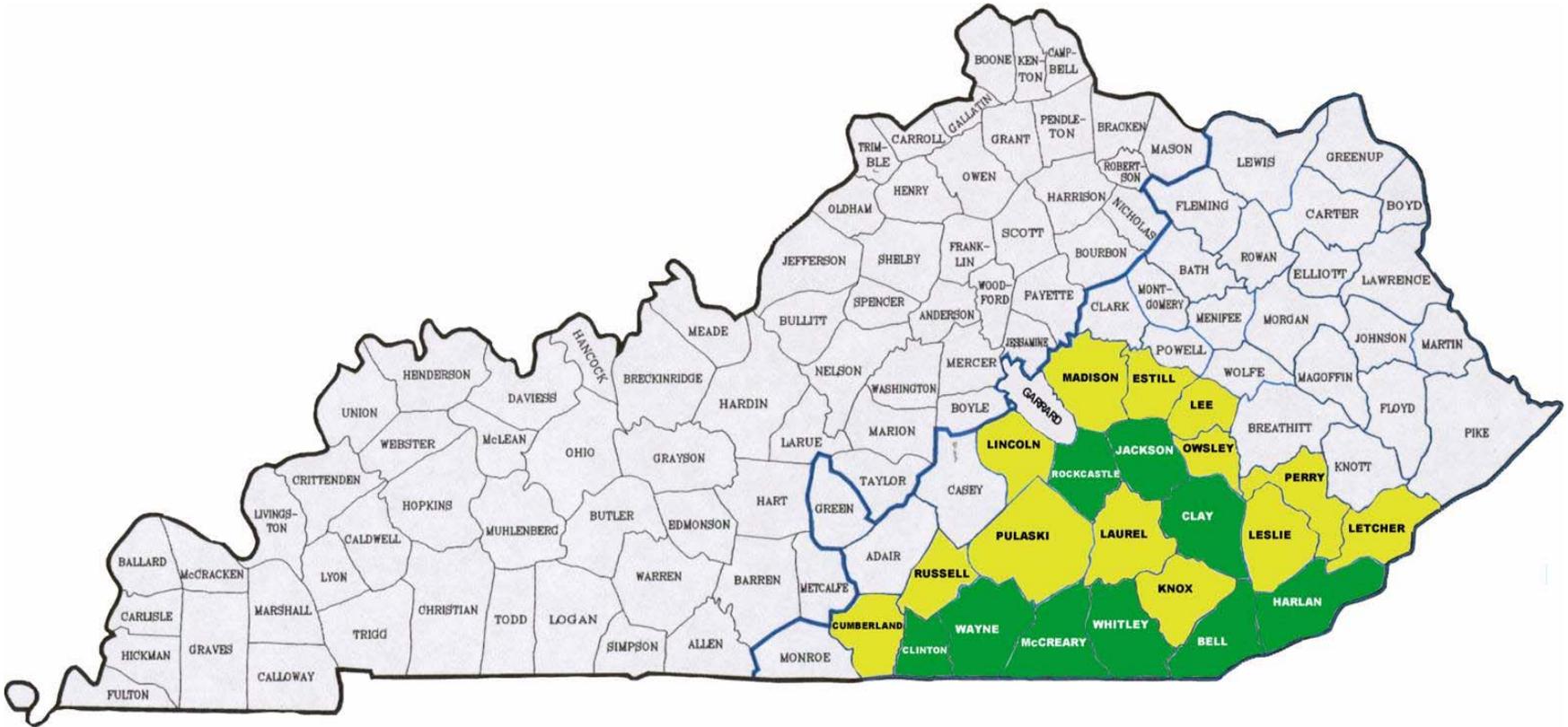


# Who/what is KHIC?

- Located in London, KY
- Has spent the past 40 years lending and investing to create jobs in rural counties
- Jobs created 10,000 plus
- Dollars invested \$180,000,000
- Dollars under management \$137,000,000
- Why housing?



# KHIC Service Area



# CORE-kitchen/bath unit



We plan to build 20 houses using the CORE and see what happens.

- We built six with partners earlier
- We have built five of the twenty.



# What have we done to build in energy efficiency?

- We have learned that green or energy efficient building is somewhat of a wild, wild west of activities.
- There are about 50 green standards at this time and these need to be winnowed down but some principles are clear and we are staying with those.



# Energy Efficiency Vocabulary

Advanced framing  
U-Value  
SEER Rating  
HERS Rating  
Fenestration  
Conditioned space  
R-value  
Solar energy  
Blower door test  
Geothermal

Conditioned crawl space  
Wind  
Photovoltaic  
Energy Star  
NHBA  
Convection  
Mold and mildew  
Insulation  
Low-e windows  
Radiation  
VOCs

Indoor air quality  
IRC  
IECC  
Off gassing  
Seal the envelop  
South facing

Make up air  
LEEDS  
Conduction



# Whole house design concept.





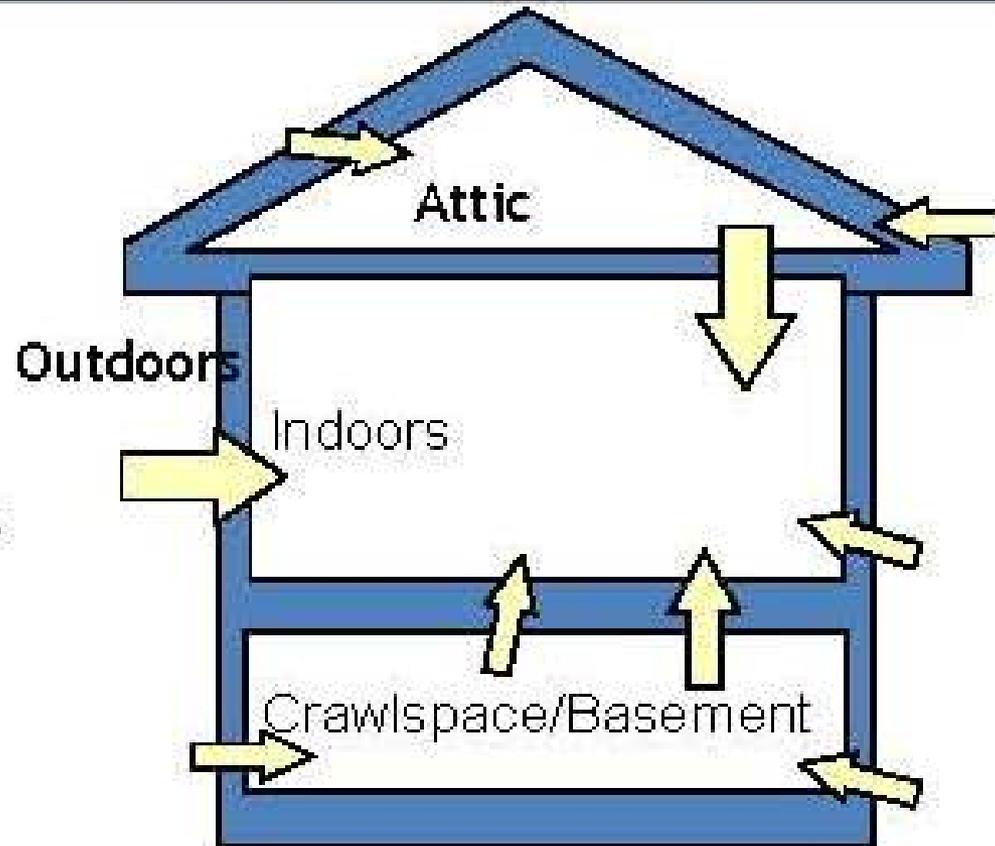
# Systems in a Home

- Electrical
- Plumbing
- Comfort Control (HVAC)
- Structural
- Moisture Control
- Air Infiltration
- Thermal Insulation
- Cable/Internet
- Land Line
- Fire Alarm
- Security
- Radon Mitigation
- Pest Control



# House as a System Issues

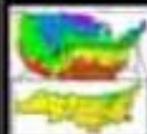
- Air leaks
- Air pressures
- Liquid water
- Water vapor
- Vapor pressures
- Cold surfaces



# Sealing the Envelope



# Seal the envelope



## Plumbing Penetrations

- Plumbing penetrations often neglected
- Allows air infiltration from crawlspace into interior
- Crawlspaces and Basements are often unconditioned
- Air quality concerns



Mold or just wood rot?

# Seal the envelope



## Seal Before You Insulate



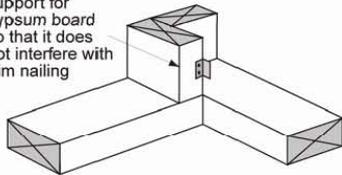
R-value of 38 in ceiling, Energy Trusses,  
R-21 in 2x6 walls on 24" OC



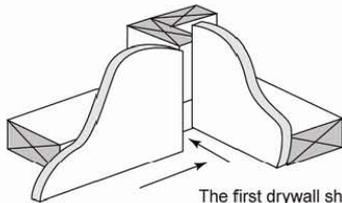
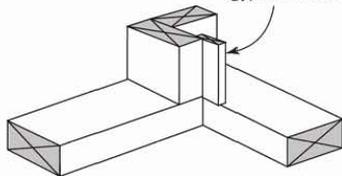
# Advanced Framing Techniques

## INSIDE "TWO-STUD" CORNERS

Position clip support for gypsum board so that it does not interfere with trim nailing



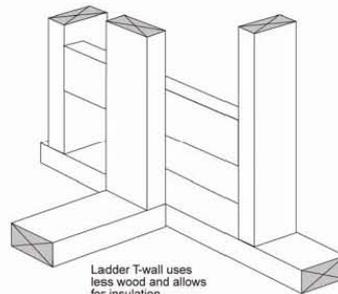
Backer support for gypsum board



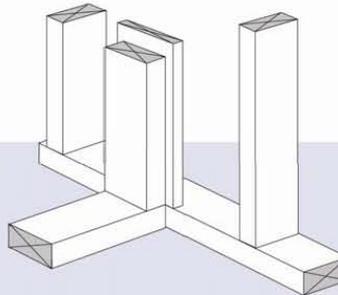
The first drywall sheet is installed against side with clip or backer

## T-WALL ALTERNATIVES

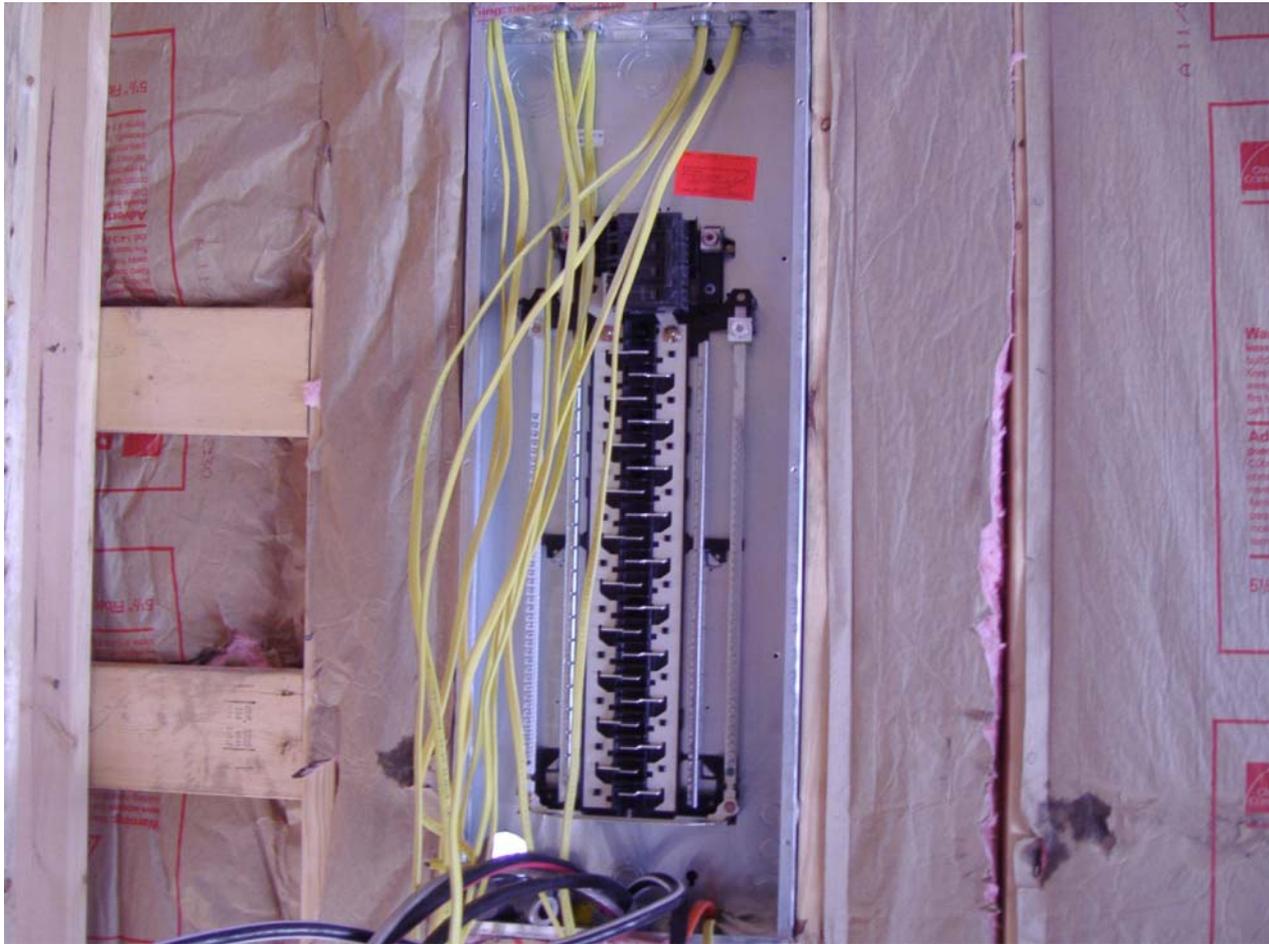
The use of ladder blocking or a full-length 1x6 or 2x6 blocking allows for increased insulation in the outer wall



Ladder T-wall uses less wood and allows for insulation coverage behind partition walls



# Ladder Framing Technique



# Low-e Windows

## Low E Window Review



## Low-E Windows cont...

**Low-emissivity (Low-E)** coatings are microscopically thin, virtually invisible, metal or metallic oxide layers deposited on a window or skylight glazing surface primarily to reduce the **U-Factor** by suppressing radiant heat flow.

# Conditioned crawl space-Saves 32%



# Right Sized HVAC



# South facing walls, Roof overhangs



# Codes and Standards

- Kentucky Residential Code
- IRC-International Residential Code
- IECC-International Energy Conservation Code
- National Association of Home Builders points system



# Homeowner Financing

- Who is the customer?
- 80% of Area Median Income—for example for Clinton County, KY a family of four can have an income of up to \$33,800



# The main issue is credit.

- We spoke with 185 families to find six that qualify.



# Funding Used

- HOME-a HUD program
- AHTF-affordable housing trust fund-a KY program
- Housing Assistance Council
- Federal Home Loan Bank of Cincinnati
- RHED-Rural Housing Economic Development-a HUD program
- USDA-Rural Development 502 loans
- USDA-Rural Development Section 523 grant



# Housing Finance Package



# Cost of House



# Financing Package

- HOME-HUD 10 yr, forgivable \$33,500
- AHTF-KY Money, 5 yr deed restrict \$6,500
- USDA 502 loan, 33yrs, 1% \$42,000
- Total costs financed \$82,000
- Monthly house payment \$225.



THE END

