Insulation Strategies to Meet Upcoming Code and Above Code Programs
Presentation Overview

- Innovative insulating & wall assembly strategies
  - Typical assembly
  - New innovations
    - Features & benefits of each
Typical Site Built Residential Wall

Concept:
- Site built wood frame wall with exterior sheathing and batt insulation

Components:
- Exterior Finish (bulk moisture control)
- Building wrap
- Exterior sheathing
- 2x4 Studs @16” O.C.
- Batt Insulation (+/- 3.7 R per inch)
- Gypsum board

Benefits:
- Relatively low cost
Typical Site Built Residential Wall

Key performance deficiencies

- Low effective R-value
- Difficulty meeting IECC 2012 R-value requirements with 2x4 stud cavity
- Thermal bridging due to non-continuous insulation
- Air leakage points
- No vapor control layer
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Structural Insulated Panels (SIP)

Concept:
- EPS or Polyurethane sandwiched between sheathing to create a highly insulated wall

Components:
- Moisture barrier control layer
- Wood sheathing
- Rigid foam insulation core
  - EPS - R-3 to R-4.5 per inch
  - or
  - Closed cell spray foam insulation – R-6 to R-7 per inch
- 2x4 or 2x6 Studs

Benefits:
- R-value increases with thickness of SIP
- Minimal thermal bridging
- Panelization creates labor and construction cycling benefits
- Can achieve R-21 to R-55 in the whole assembly
Structural Insulated Panels (SIP)  
Key Performance Metrics

- **Code & Above Compliance:**  
  - Can meet wall insulation requirements for all climate zones at 4 inch thickness

- **Key Control Layer Placement:**  
  - Thermal– rigid insulation
  - Vapor– exterior finish
  - Bulk moisture- exterior cladding
  - Air- rigid insulation

- **Applicability per climate Zone:**  
  - Suitable for all climate zones

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Insulated Concrete Forms (ICF)

Concept:
- EPS blocks are together and filled with concrete to create a highly insulated wall

Components:
- Exterior Finish
  - Moisture barrier
- Rigid foam insulation, R-3 to R-4.5 per inch
- Concrete
- Rebar

Benefits:
- High R-value increases with thickness of ICF
- High resistance to severe weather/ high wind speeds
- Potential for HVAC equipment size reduction
Insulated Concrete Forms (ICF)

Key Performance metrics

- **Code & Above Compliance:**
  - Meets wall insulation requirements for all climate zones

- **Key Control Layer Placement:**
  - Thermal – rigid insulation
  - Vapor – exterior finish
  - Bulk moisture – exterior finish
  - Air – exterior finish

- **Applicability per climate Zone:**
  - Suitable for all climate zones
Innovative Solutions
Hybrid cavity with continuous exterior insulation

Concept:
- Typical site built stud wall with a flash coat of closed cell SPF in the cavity, and your favorite fibrous insulation filling the rest of the cavity

Components:
- Insulated exterior sheathing
  - Integral moisture control layer
  - Separate moisture control layer
- Closed cell SPF
  - 1-2 inches @ R-6.7 per inch
  - Air permeable insulation, avg 3.7 R per inch
- 2x4 or 2x6 Studs
- Gypsum board

Benefits:
- Reduced air infiltration due to air sealing properties of spray foam
- SPF can be vapor permeable or a vapor barrier depending on thickness
- Increased R-value without significantly increased depth
- Potential for HVAC equipment size reduction
- Suitable for walls and ceilings
Hybrid insulation wall
Key performance metrics

- **Code & Above Compliance:**
  - Meets insulation requirements for all climate zones using 2x4 construction

- **Key Control Layer Placement:**
  - Thermal—High density foam, air permeable insulation
  - Vapor—Joint sealed exterior continuous insulation
  - Bulk moisture- exterior cladding
  - Air- Closed cell SPF, Joint sealed exterior continuous insulation

- **Applicability per climate Zone:**
  - Suitable for all climate zones
Example of Optimized Approach

- SIP Roof, 8 inch R-49
- Hybrid Insulation wall, 2x4 R-24
- ICF Foundation wall, 11.5 inch R-25
- Exceeds code and above requirements for all climate zones!
Thank you!

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