



Hot-Humid Wash-N-Wear House

Katie Gunsch, Building Science Corporation

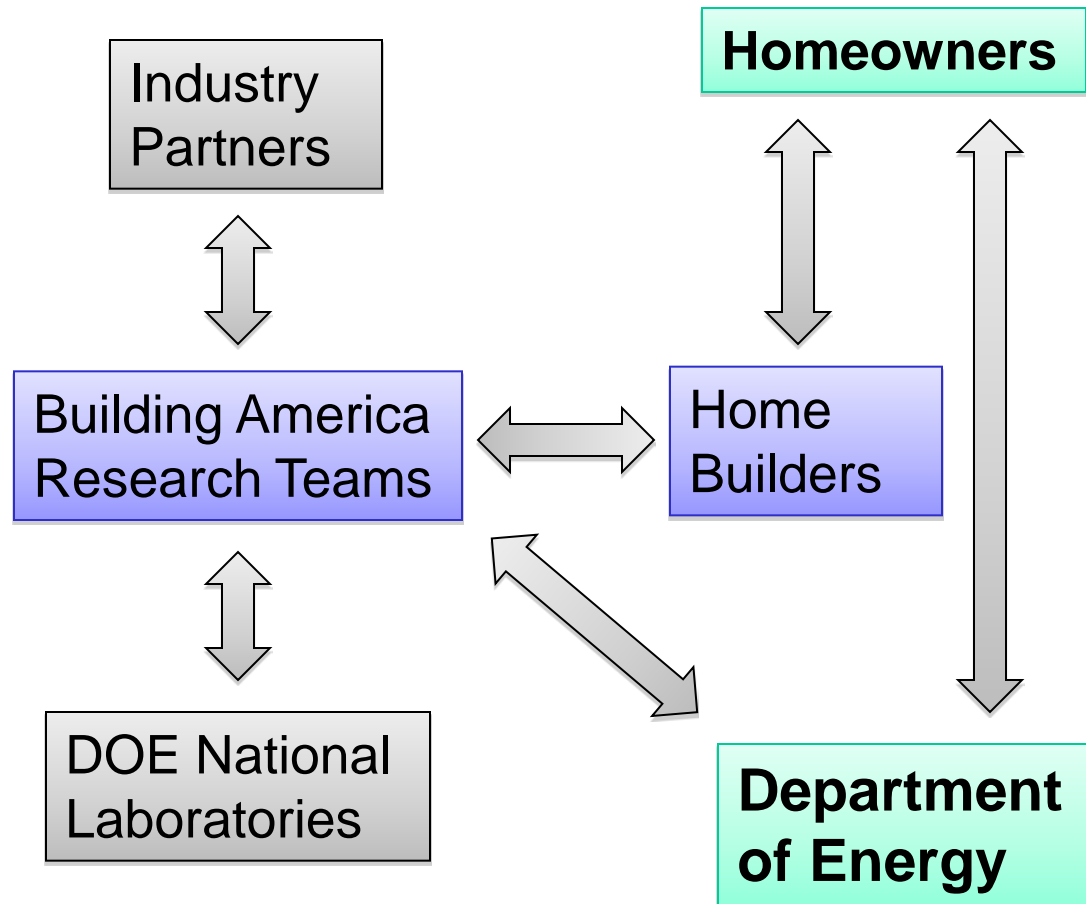
ACI 2010 ENCL 1, 10:30 am – 12:00 pm



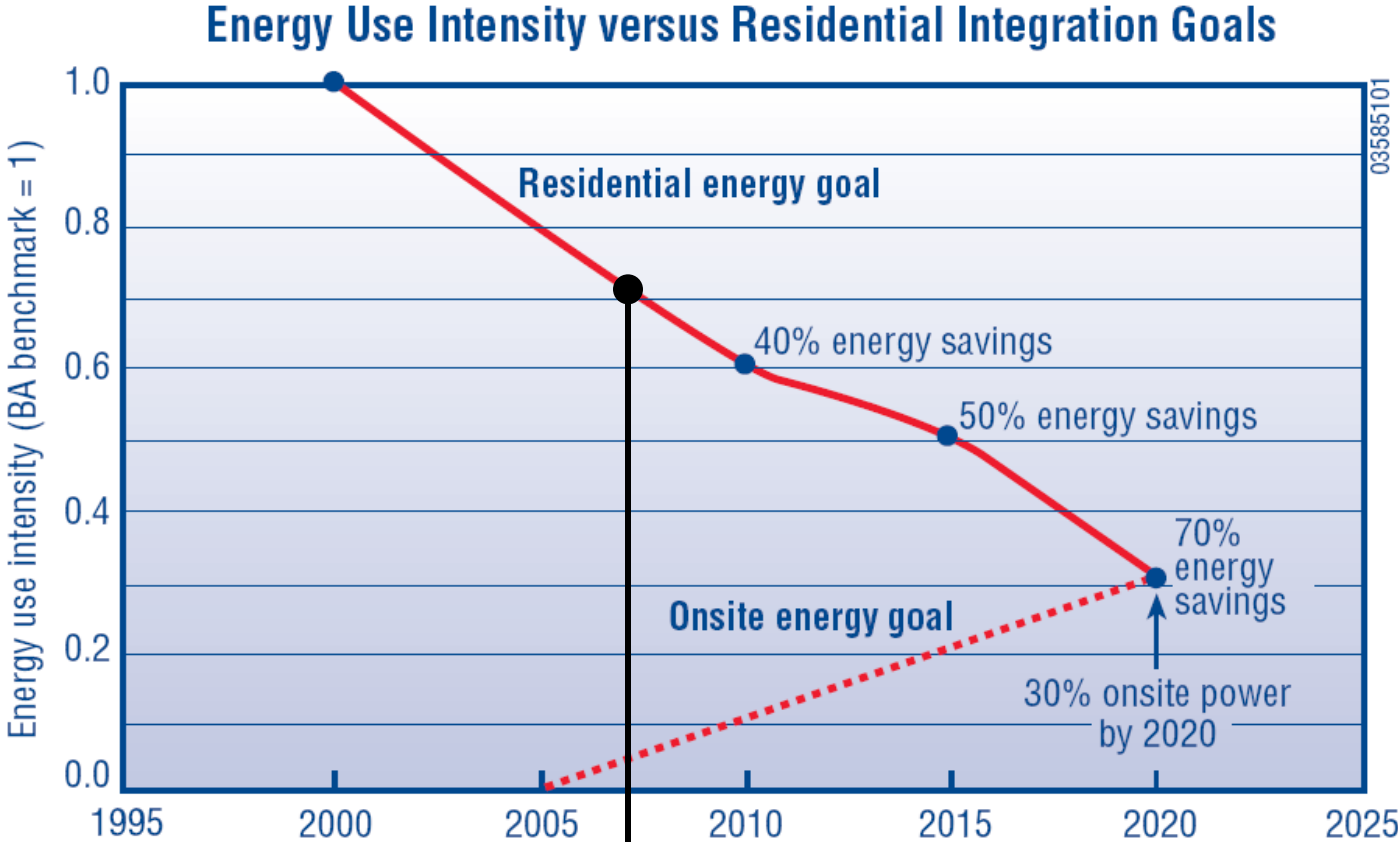
What is Building America?

- The U.S. Department of Energy's Building America Program is reengineering the American home for energy efficiency and affordability.
- Building America works with the residential building industry to develop and implement innovative building processes and technologies – innovations that save builders and homeowners millions of dollars in construction and energy costs.
- This industry-led, cost-shared partnership program uses a systems engineering approach to reduce energy use, utility bills, construction time and construction waste.
- www.buildingamerica.gov

Basically...



Building America Research Goals



42,000+ houses in 34 states

Why Go “Towards Zero Energy”?

- For Homeowners
 - Lower energy bills and maintenance costs
 - More money for things other than energy
 - Healthier, more comfortable, more durable homes
- For Everyone Else
 - Wise use of resources through energy savings
 - Healthier environment through reduced emissions

The Houses

GREEN DREAM 1

&

GREEN DREAM 2

Green Dream 1



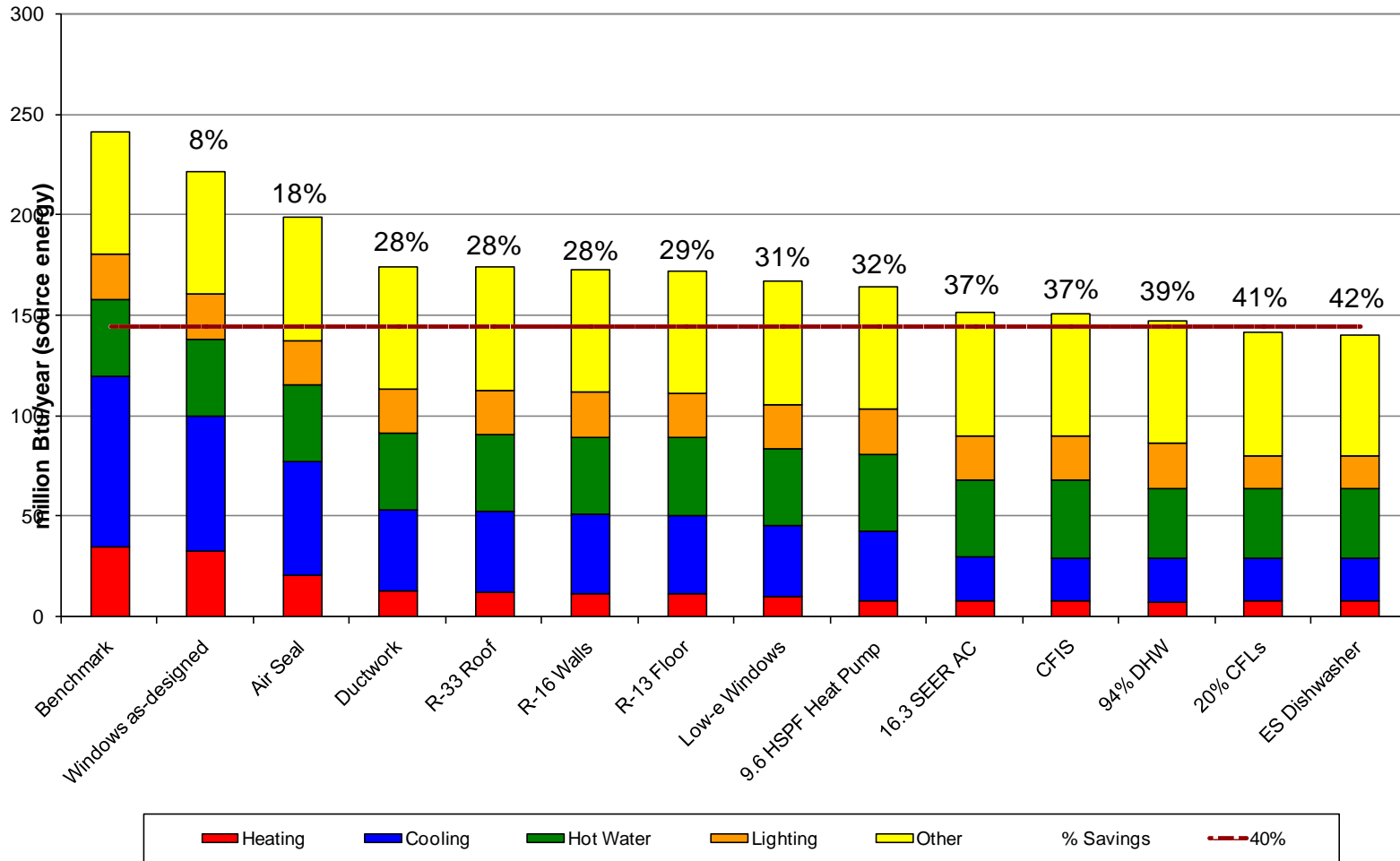
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21 April 2010

Green Dream 1



- Hot-Humid Climate (2A)
- 3 bedrooms, 2 baths, 1,400 square feet
- Completed December 2008
- 42% estimated energy use reduction
- HERS 64
- \$1,000 estimated energy savings
- \$150,000 construction budget

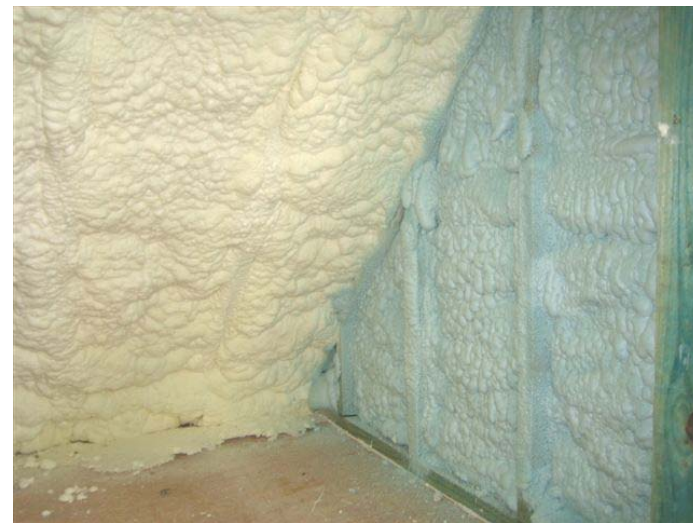
Green Dream 1 Parametric



Green Dream 1



- Enclosure Design
 - R-33 Roof – 9.25” open cell low density SPF
 - R-16 Exterior Walls – 2.5” closed cell high density SPF
 - R-13 Floor – 2” foil-faced polyisocyanurate
 - Low E Windows



Green Dream 1



- Windows
 - $U=0.37$
 - $SHGC=0.33$
 - Low E
 - Vinyl
 - Single-Hung
 - Double Pane



Green Dream 2



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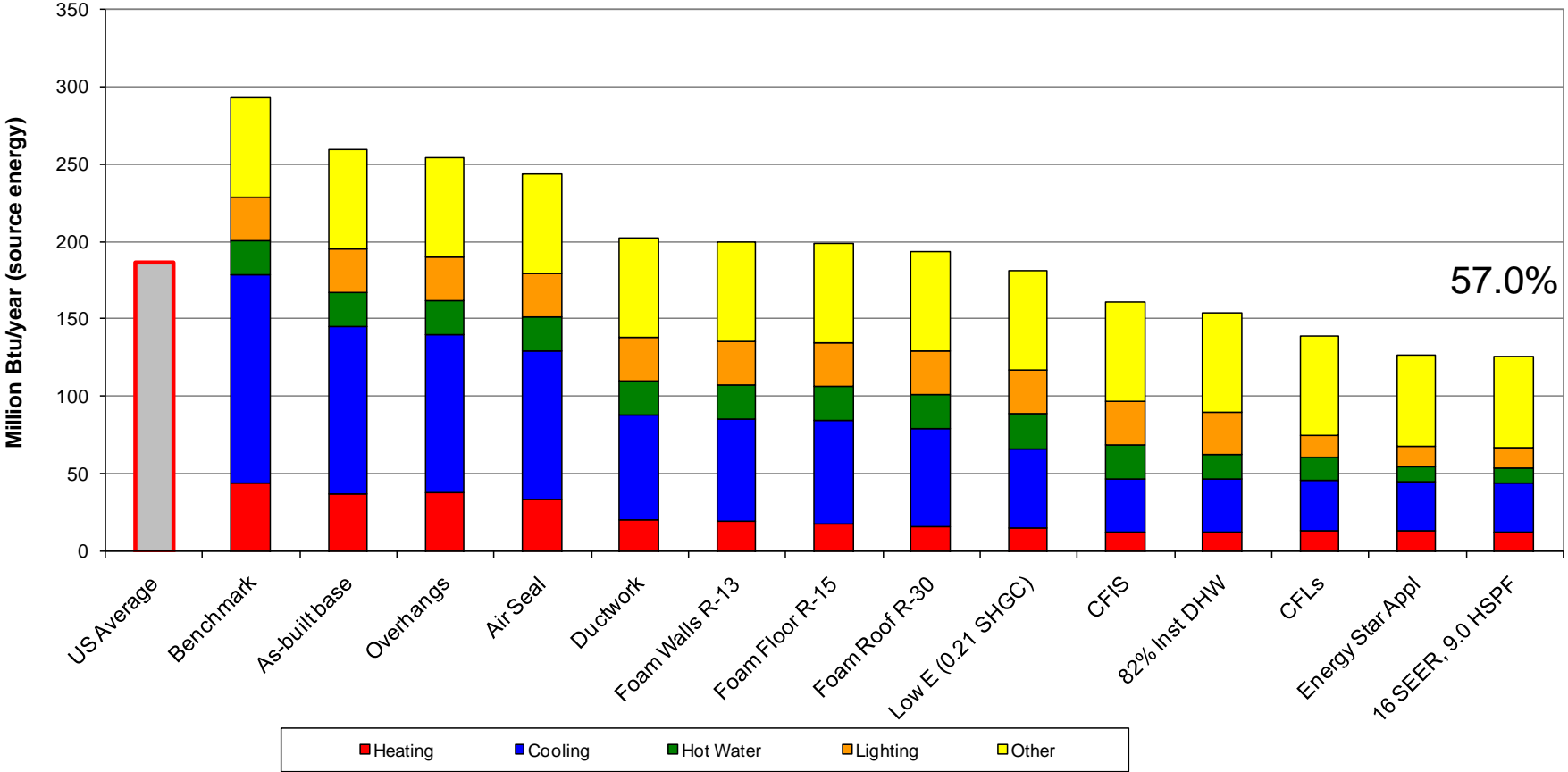
12

Green Dream 2



- Hot-Humid Climate (2A)
- 4 bedrooms, 2 baths, 1,944 square feet
- Future completion May 2008
- 57% estimated energy use reduction
- HERS 56
- \$2,029 estimated energy savings
- \$150,000 construction budget

Green Dream 2 Parametric



Green Dream 2



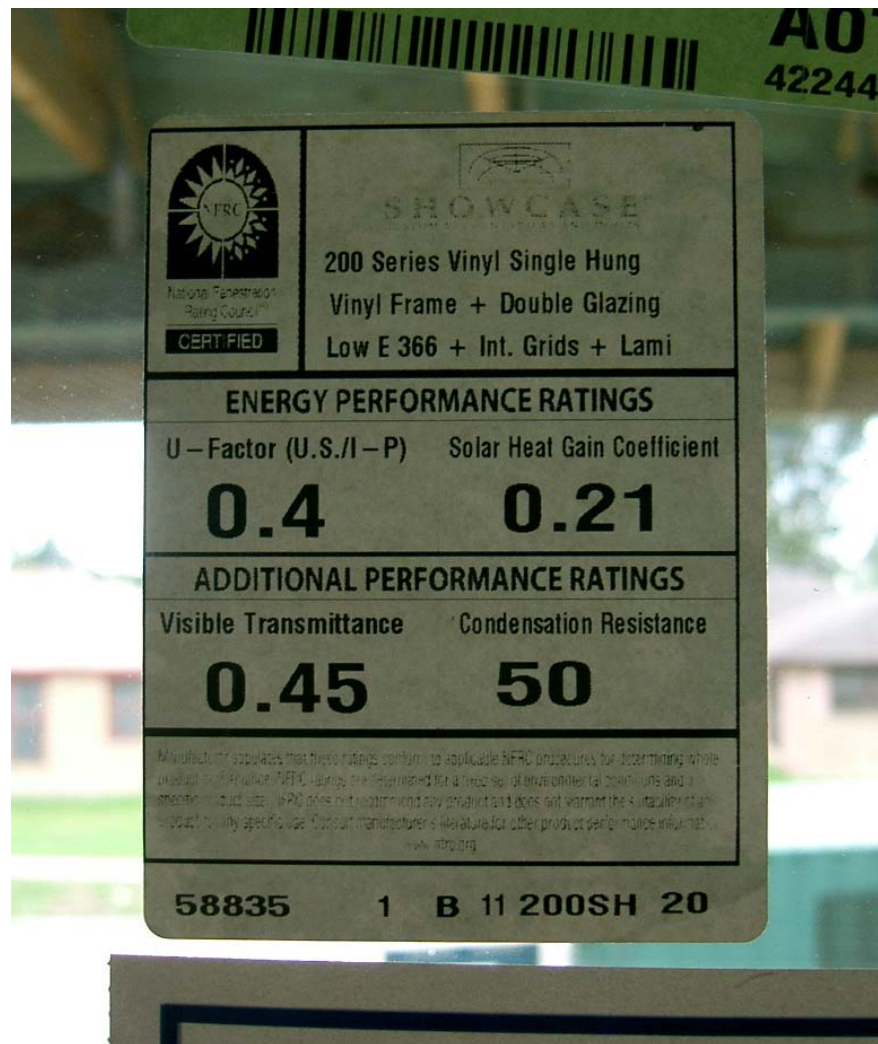
- Enclosure Design
 - R-30 Roof – 7” open cell medium density SPF
 - R-13 Exterior Walls – 2” foil-faced polyisocyanurate
 - R-15 Floor – 2.5” closed cell high density SPF
 - Low SHGC Windows



Green Dream 2



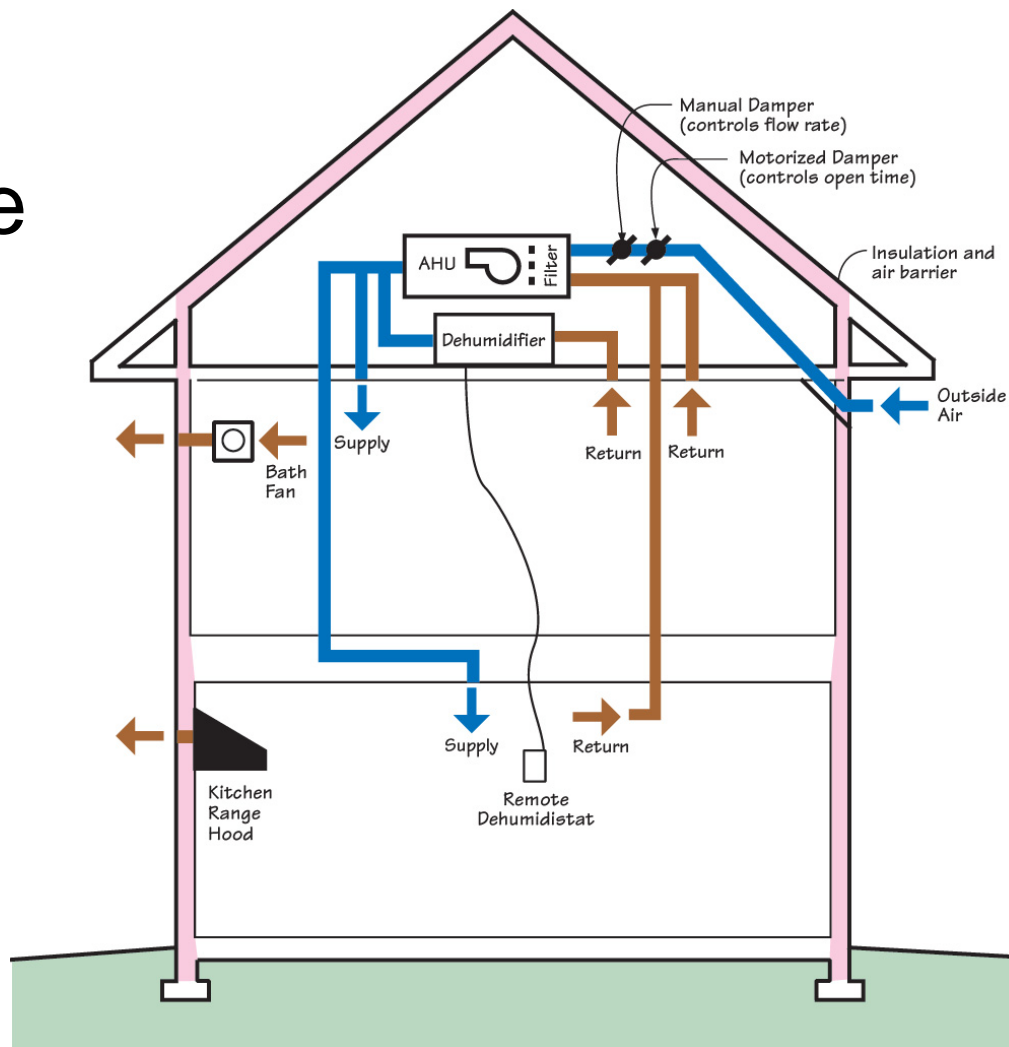
- Windows
 - U=0.40
 - SHGC=0.21
 - Impact Rated
 - Low E
 - Vinyl
 - Single-Hung
 - Double Pane



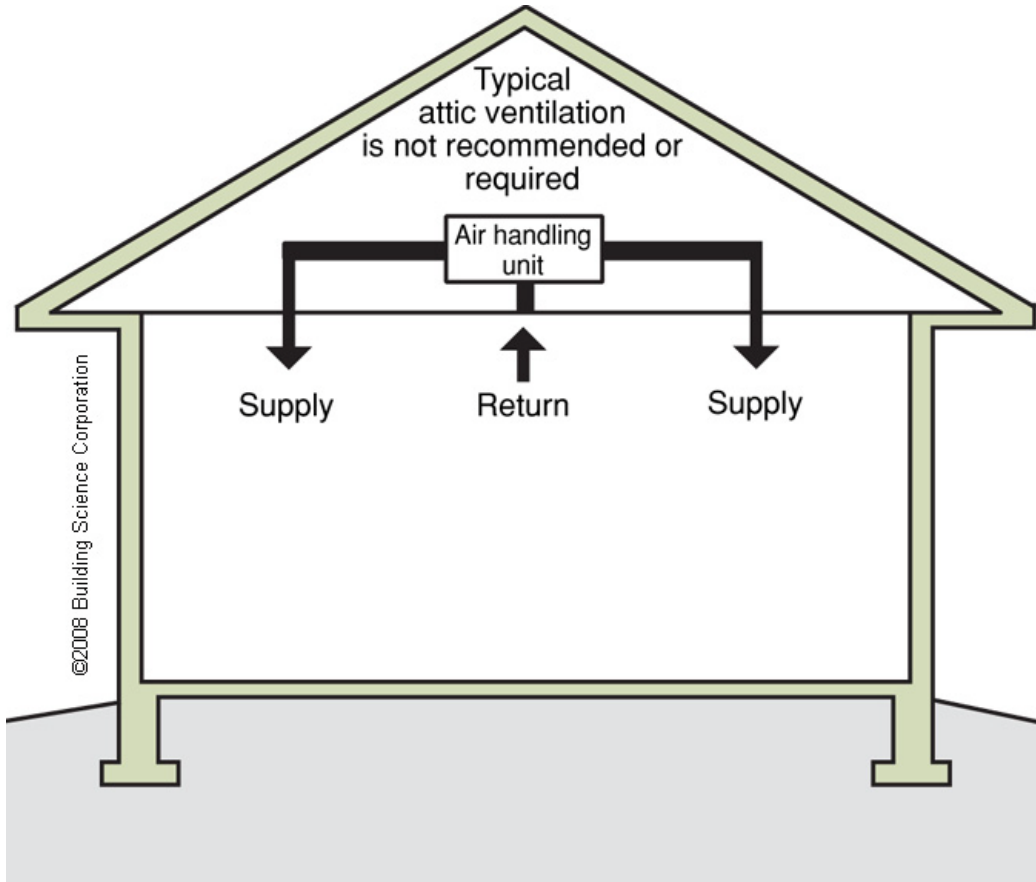
Green Dream 1 and 2



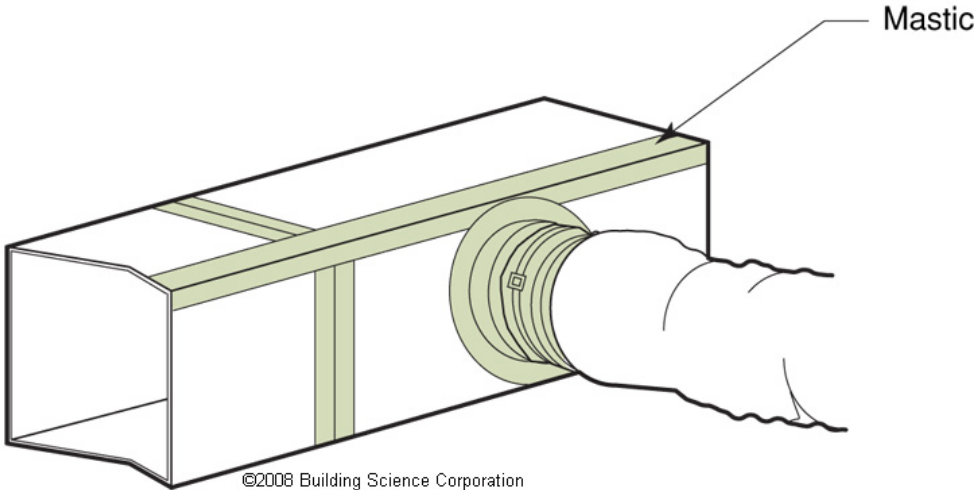
- Ductwork in conditioned space
- Sealed ductwork
- Controlled ventilation
- Supplemental dehumidification



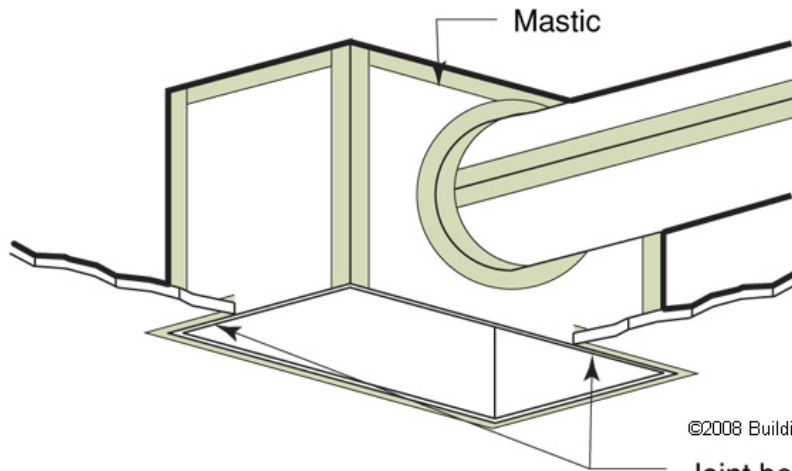
Ductwork...Where Is It?



Ductwork...What Is It?



More Duct Sealing

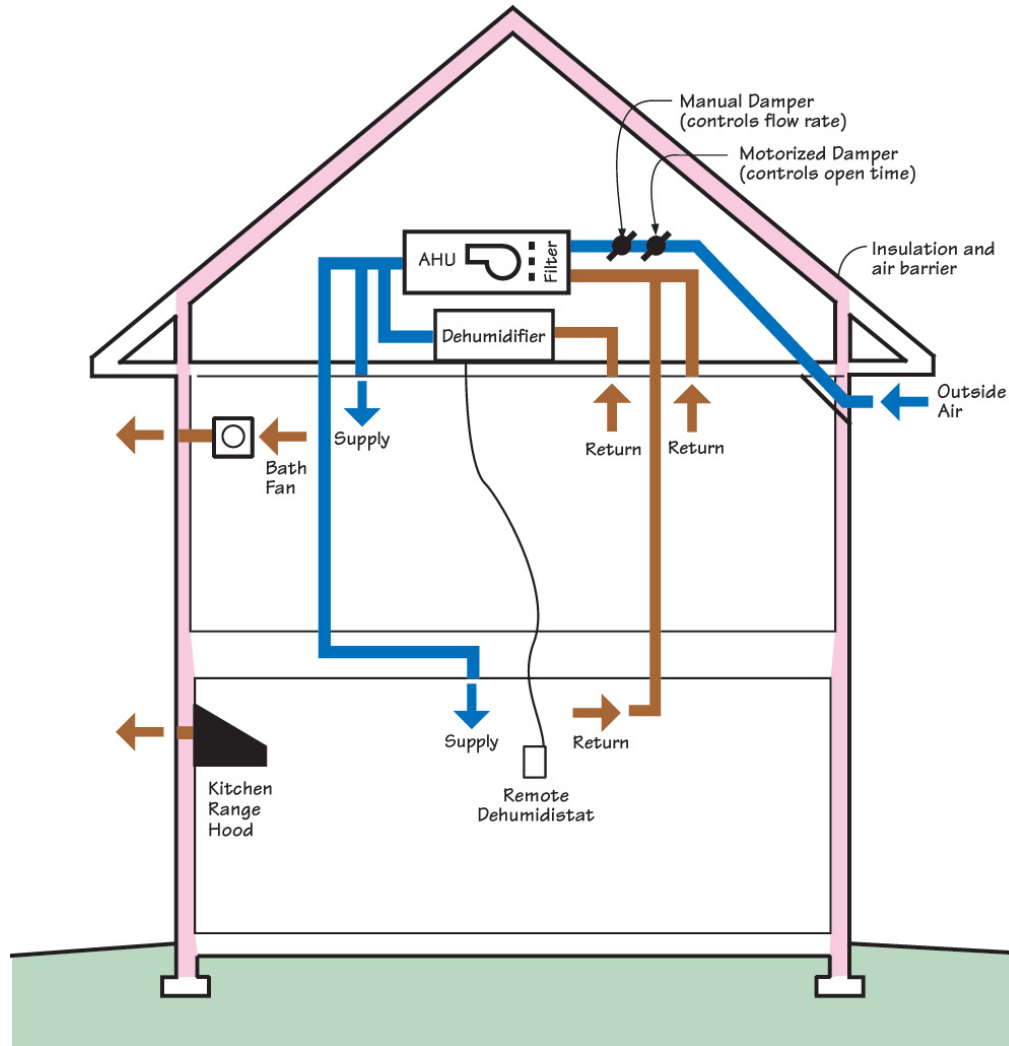


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Joint between boot and ceiling drywall sealed with mastic or fiberglass mesh and mastic or caulk



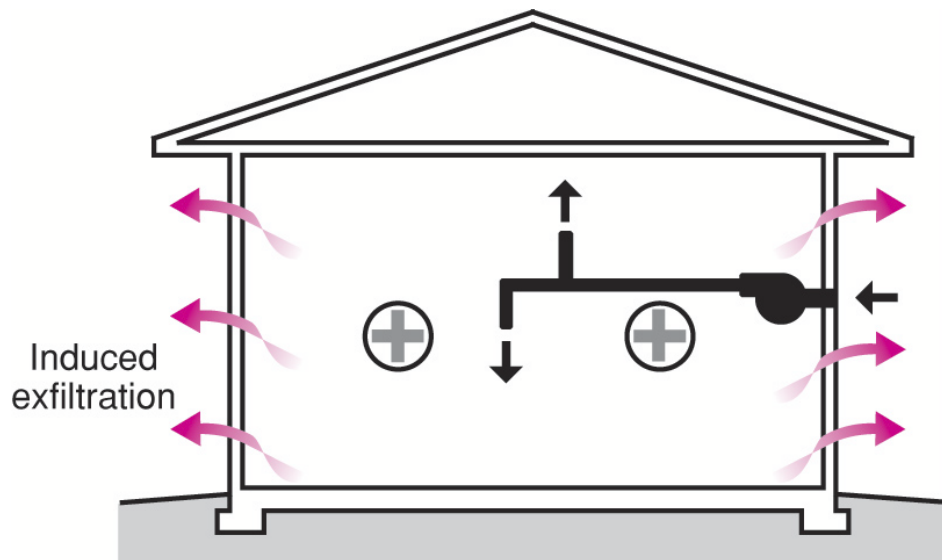
Controlled Ventilation



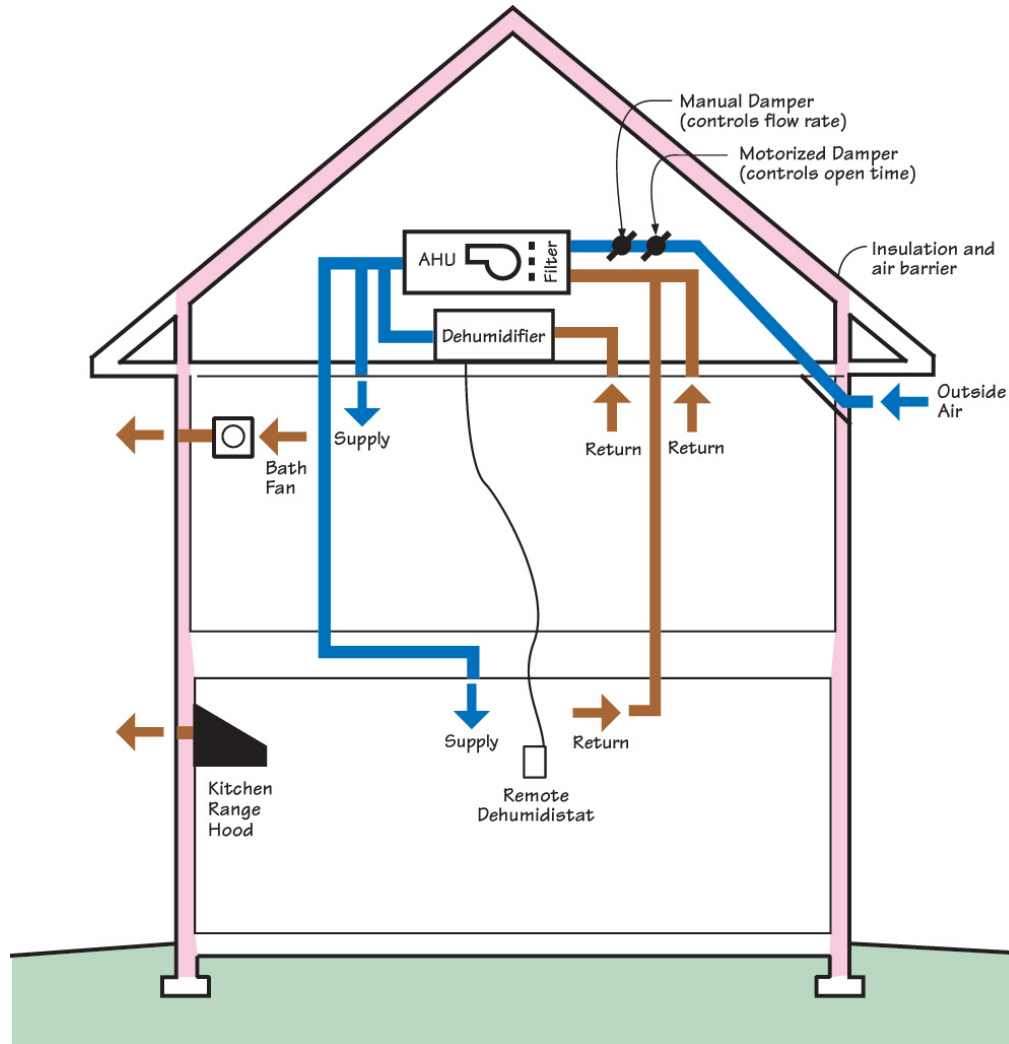
Controlled Ventilation



- Outside air intake ducted to the return side of the air handler, supply only ventilation
- Outside air mixes with return air from living space, moves through the air handler and supplies back to living space
- Ventilation pressurizes house = induced exfiltration



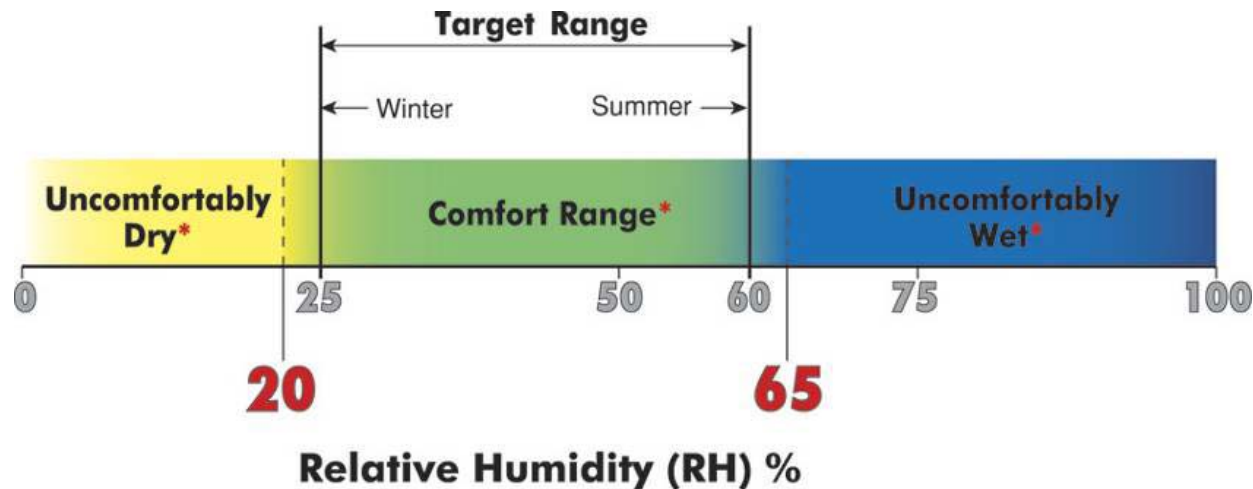
Dehumidification



Dehumidification



- Good energy efficient design reduces sensible cooling loads – insulation, good windows, airtightness
- Latent load remains the same!
- Mechanical cooling unlikely to provide humidity control alone
- Need supplemental dehumidification



How Does This Work?



- High efficiency supplemental dehumidification (one option: standalone ducted boxes)
- Unit draws air through dedicated ducted return in main space and supplies dehumidified air to supply duct plenum
- Humidistat control located in main space (likely near thermostat)



Green Dream 1 Test Results



- Overall Air Infiltration

Maximum: 839 CFM 50

Results: 612 CFM 50

- Duct Leakage to Outside

Maximum: 40 CFM 25 (5%)

Results: 11 CFM 25 (1.4%)

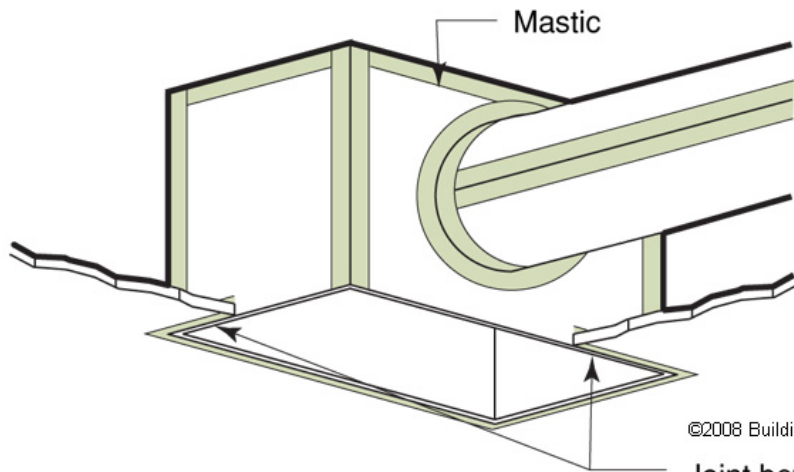
- Total Duct Leakage

Maximum: 80 CFM 25 (10%)

Results: 308 CFM 25 (38.5%)



More Duct Sealing!



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Joint between boot and ceiling drywall sealed with mastic or fiberglass mesh and mastic or caulk



Green Dream 2 Test Results



- Overall Air Infiltration

Maximum: 1590 CFM 50

Results: 1079 CFM 50

- Duct Leakage to Outside

Maximum: 40 CFM 25 (5%)

Results: 0 CFM 25 (0%)

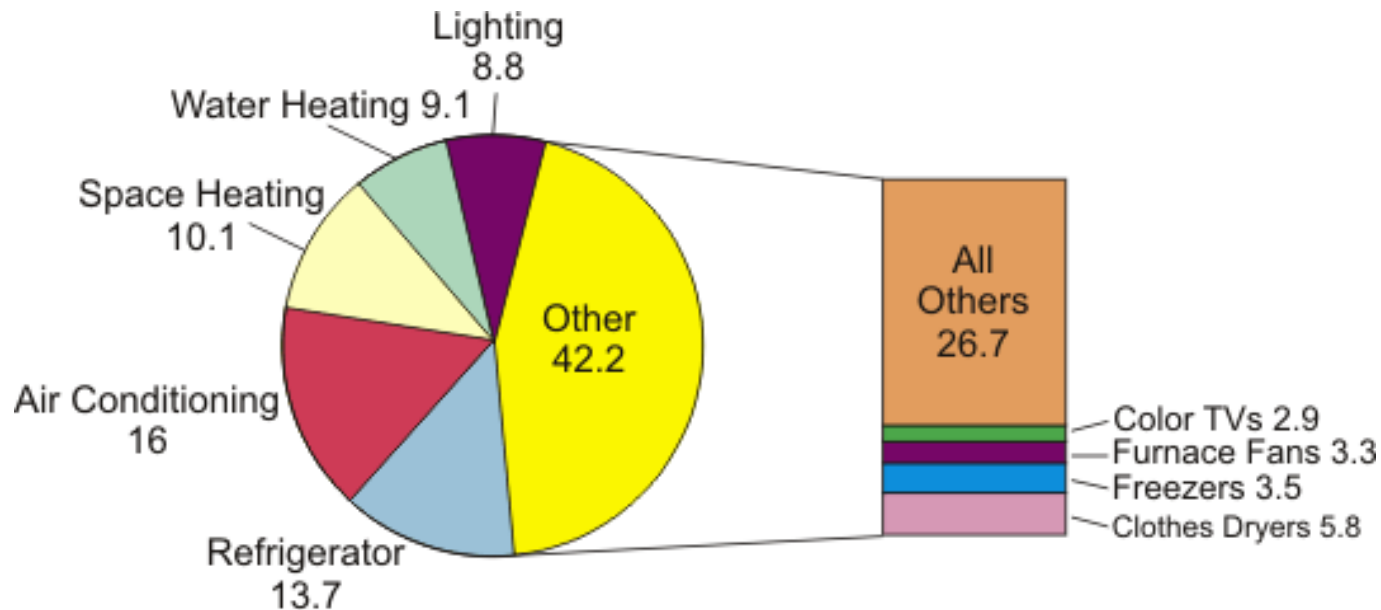
- Total Duct Leakage

Maximum: 80 CFM 25 (10%)

Results: 50 CFM 25 (6.25%)



Typical Electrical Use Pie



Source: Energy Information Administration, Form EIA-457A, B, C, E, and H of the 2001 Residential Energy Consumption Survey.

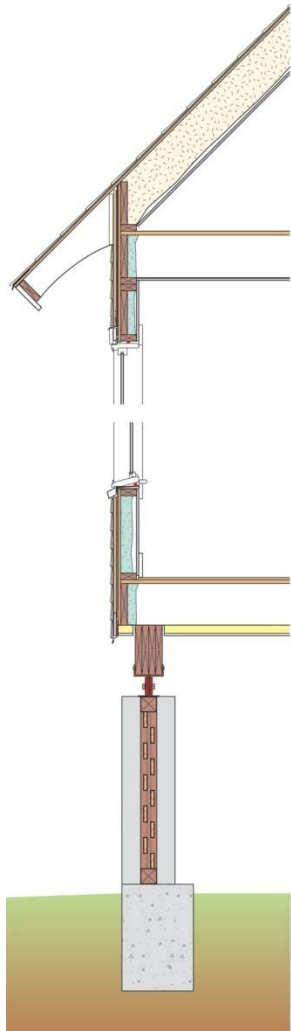
Lighting and Appliances



- Choose appliance models carefully
- Choose ENERGY STAR
- Choose CFLs
- Educate homeowner

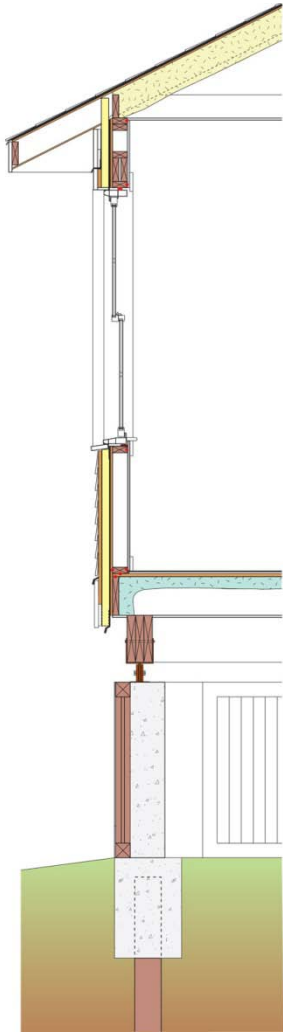


Lessons Learned & Learning Curves



- Structural versus non-structural framing
- Duct sealing
- Air sealing of polyiso below floor joists
- Mechanical equipment under stairs
- Window installation
- Transfer grilles
- Exterior unit security
- **SEQUENCING!**

Lessons Learned & Learning Curves



- Furring strip and cladding attachment
- Treated lumber – borate and ACQ
- Duct sealing
- Porch design – tongue and groove versus open decking
- High-wind connectors
- Window installation
- Truss design
- **SEQUENCING!**

building science.com

The screenshot shows the website's homepage with the following elements:

- Browser Header:** "Welcome to building science.com -- Windows Internet Explorer" and the address bar "http://www.buildingscience.com/index_html".
- Navigation:** "Home" link and a search bar.
- Main Content:** A paragraph stating: "building science.com provides objective, high-quality information about buildings. This resource combines building physics, systems design concepts, and an awareness of sustainability to promote the design and construction of buildings that are more durable, healthier, more sustainable and more economical than most buildings built today." Below this is a search bar and a "Search Database" button.
- Left Sidebar:** "Browse New Documents", "Advanced Search", "Documents by Type" (listing digests, insights, primers, reports, case studies, etc.), and "Are you looking for..." (listing retrofits, low energy buildings, etc.).
- Right Sidebar:** "Or click an option below:" with sections for "Building Science Corporation" (providing consulting services), "Building Science Press" (publishing related to building science), and "Building Science Seminars".
- Bottom Section:** "new documents" with a list of recent articles including "Info-312: Vapor Permeance of Some Building Materials" (2010/04/08), "BSI-038: Mind the Gap, Eh!" (2010/02/22), "BSI-037: Mold in Alligator Alley" (2010/02/22), "BSI-036: Complex Three Dimensional Airflow Networks" (2010/02/19), "BSI-035: We Need to do it Different This Time" (2010/02/19), "BSI-034: Arrhenius and the Mayor—Dezincification" (2010/02/19), "BSI-033: Evolution" (2010/02/18), "BSI-032: Extreme Heat—A Tale of Two Cities" (2010/02/16), "BSI-031: Building in Extreme Cold" (2010/02/16), and "BSI-029: Advanced Framing" (2010/02/16).
- Taskbar:** Shows "Done", "Internet | Protected Mode: On", and the system clock "10:50 PM 4/20/2010".

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21 April 2010

building science.com

Hot-Humid Climate: Crescent Green Dream 1, New Orleans, LA — - Windows Internet Explorer

http://www.buildingscience.com/documents/case-studies/cs-ba15_LA_New_Orleans_Green_Dream_1/view?topic=/doctypes/casestudy

information consulting bookstore seminars
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Home → Available Documents → Case Studies → Hot-Humid Climate: Crescent Green Dream 1, New Orleans, LA

Download File

Hot-Humid Climate: Crescent Green Dream 1, New Orleans, LA

The "Crescent Green Dream 1" House is an example of best practice energy efficient and environmentally responsible homebuilding that is flood recoverable and affordable.

[Click here to get the file](#)

Size 2.0 MB - File type application/pdf

Related content

- BSP-032: Designs that Work: Hot-Humid Climate (New Orleans, LA)

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Downloading picture http://www.buildingscience.com/images/menu_image/Crescent_MERV_filter.jpg...

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10:53 PM
4/20/2010