OR05: 100 Sustainable Homes; Lessons Learned in New Orleans' Project Home Again

The Building Science Side of the Story

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Building Science Corporation | Building America U.S. Department of Energy | U.S. Department of Energy | Energy Efficiency & Renewable Energy

DOE - Building America Program

"The program works closely with industry partners to develop innovative, real-world solutions that achieve significant energy and cost savings for homeowners and builders. Research is conducted on individual measures and systems, test houses, and community-scale housing in order to validate the reliability, cost-effectiveness, and marketability of technologies when integrated into existing and new homes."

– About Building America (web site)

Project Home Again – BA Community

PROJECT HOME AGAIN

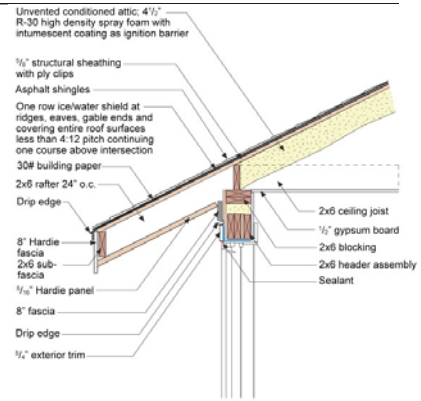
Project Home Again Phases I and II

- Project Overview
  - Location: New Orleans, LA
  - Climate: Hot-Humid (IECC Zone 2A)
  - Type: Single Detached Site Built
  - Plans: 1-2 story, 2-3 bedrooms, 2 baths
  - Utilities: All electric
  - Floor Area: 1016 - 1551 sq. ft.
  - HERS Index: 64 – 69

House Design

- Enclosure Design
  - Phase I Roof – R- 30 Roof (4.5” CC HDSF)
  - Phase II Roof – R- 21 Roof (3.5” CC HDSF)

  Pressure treated borate framing



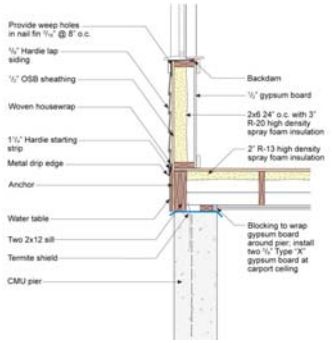
House Design

- Enclosure Design
  - R- 13 Floor (2” CC HDSF under subfloor)
  - R-20 Walls (3.5” CC HDSF 2x6 24” o.c. walls)

  All wood is borate pressure treated
  - Windows

    Phase I: U = 0.36, SHGC = 0.30

    Phase II: U = 0.35, SHGC = 0.23



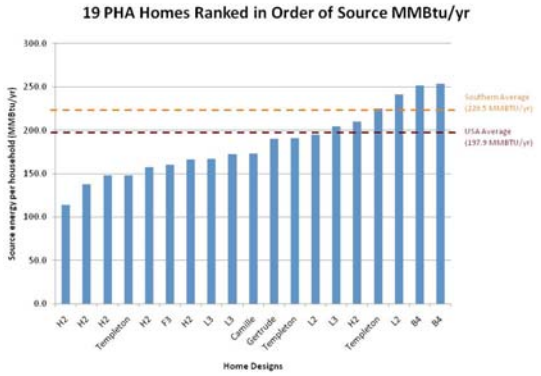
House Design

- Mechanical Design
  - 14 SEER/8.2 HSPF with whole house supplemental dehumidification
  - Electric Tank Water Heater EF=0.92
  - Full Energy Star CFL package
  - Energy Star Appliances

Utility Bill Analysis

- BSC receives monthly electric bills directly from the utility company
- Have full year’s worth of utility data for 19 homes Jan 2010 to Dec 2010

Annual Actual Source Energy Use



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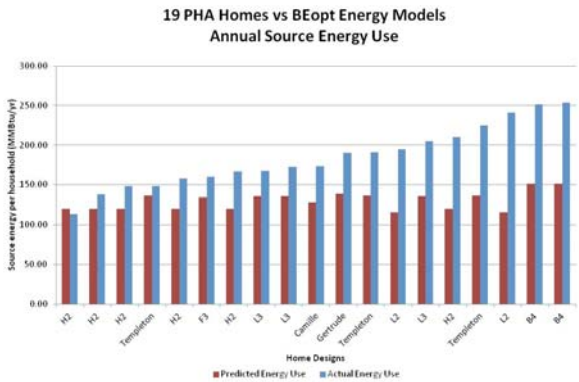
Source Energy - Predicted vs. Actual



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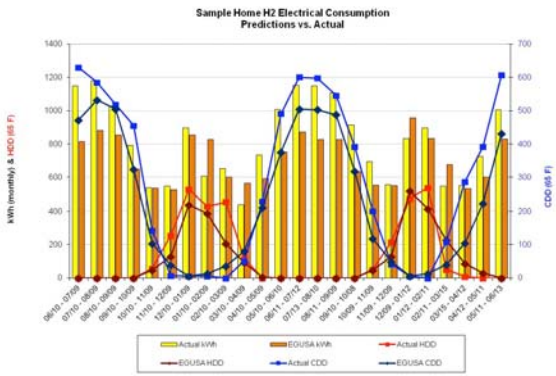
Example Monthly Data Graph



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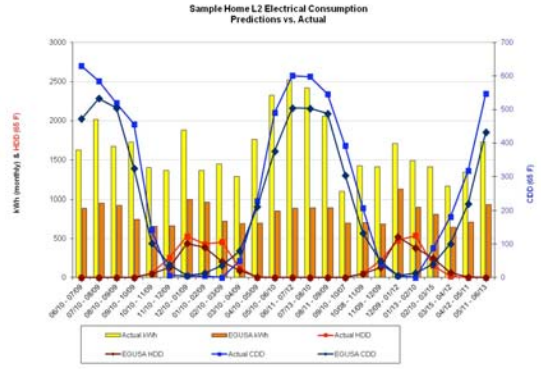
Example Monthly Data Graph



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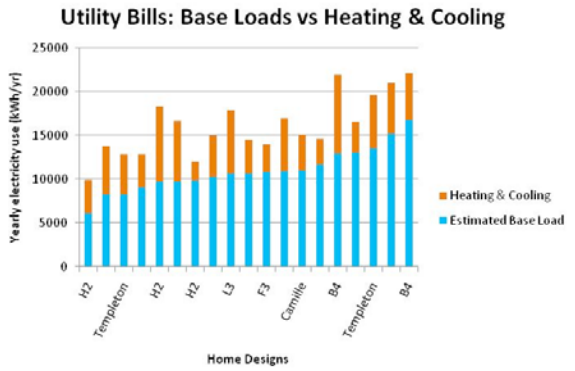
High Energy Use: Possible Causes

- High base loads (non-HVAC electricity use)
- Supplemental dehumidification is using more electricity than expected.
- Some homeowners are operating at lower cooling temperature set points
- Occupancy rates may be different from model assumptions
- 27.4% more HDD during actual year
- 14.6% more CDD during actual year

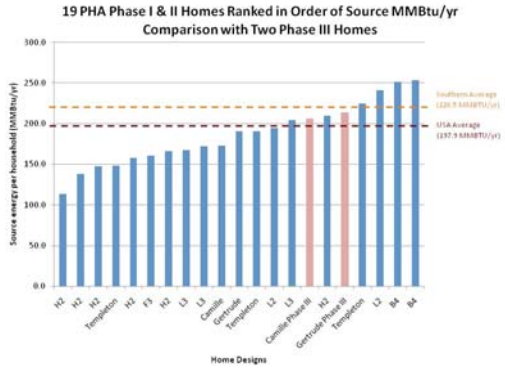
Estimated Base Loads



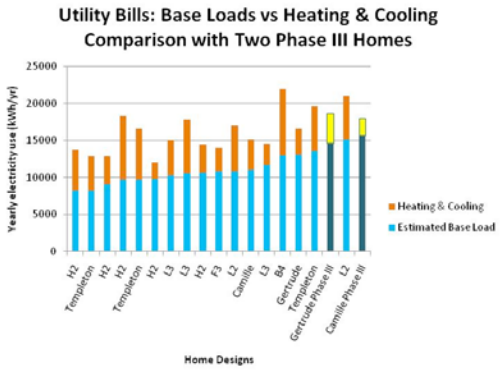
Houses with no Dehumidification

- Phases III and beyond lack supplemental dehumidification
- Phase III has the same floor plans as Phase II
- Only 2 addresses with a full year of utility data are currently available

Annual Actual Source Energy Use



Estimated Prototype Base Loads



Discussion

- High baseline loads
- Actual weather was more severe than TMY3 file
- Lower cooling setpoint setting
- Higher occupancy rates
- Dehumidification is an unlikely culprit for excessive energy use in these homes

Possible Future Work

- Monitor interior conditions (temperature and % relative humidity)
- Monitor energy use of HVAC systems and dehumidifiers (kWh and run times)
- Monitor energy use of other end uses (hot water heaters, energy intensive circuits in homes)
- Perform a homeowner survey to gather data on occupant behavior
- Develop better homeowner education tools to promote energy efficient occupancy

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