ORNL HVAC/WH Research Overview

Building America Quarterly Meeting

April 16, 2008

Analysis of DH Options

Evaluation of Near-Term DH Control Options

- BA Cities – Atlanta, Houston, Chicago
- BA Houses – 1800 sq.ft. RSP and ZEH 2-story
- TRNSYS analysis, DB and RH control
  - 76F DB, 55% RH set points
  - 15 min time steps
  - AC sizing based on DOE2.2 design loads
- Equipment
  - Conventional AC of 13 SEER
  - Available Enhanced DH Options
  - Near-Term Development Options

Evaluation of Near-Term DH Control Options -- Equipment--

- **Available Enhanced DH Options**
  - **20% Reduced Airflow when DH call**
  - **Standalone DH (1.3 EF) with Recycler Control**
  - **Carrier Thermidistat (overcooling RH control)**
  - **Lennox Humiditrol (subcooler reheat w overcool)**
- **Near-Term Development Options**
  - **Discharge gas reheat (packaged unit)**
  - **Modified discharge gas reheat (split unit with OD fan control)**

Relative Performance of Selected Enhanced Dehumidification Approaches

Houston, RSP House

DH Equipment	Hrs>60% RH	Rel. kWh
Conventional AC Unit Baseline	4090	100%
Conv. AC with 20% Reduced Airflow w DH call	3080	117%
Standalone DH with Fan Recycler	0	223%
Lennox Humiditrol	352	157%
Discharge Gas Reheat (pkg)	0	169%
Mod. Discharge Gas Reheat (split unit)	0	203%

Relative Performance of Selected Enhanced Dehumidification Approaches

Houston, ZEH Prototype

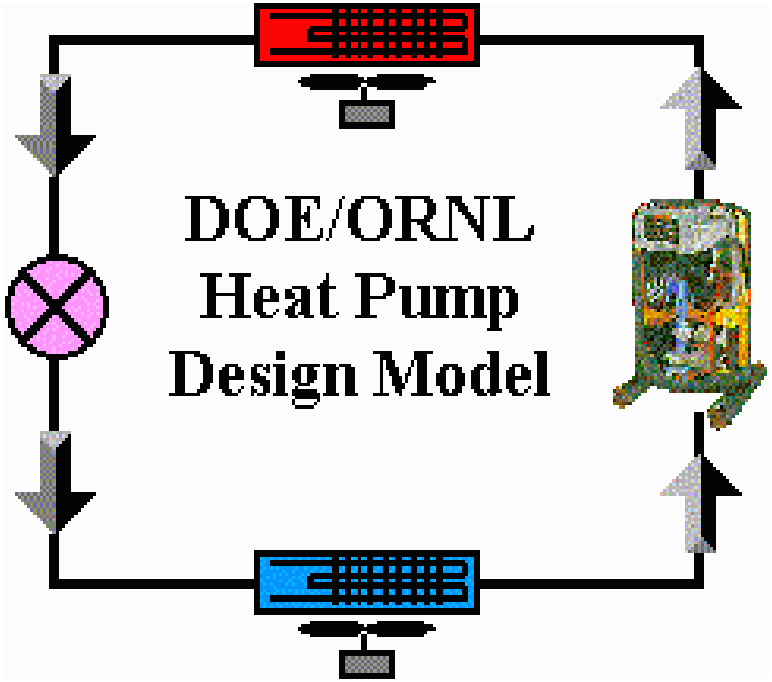
DH Equipment	Hrs>60% RH	Rel. kWh
Conventional AC Unit Baseline	4841	100%
Conv. AC with 20% Reduced Airflow w DH call	4191	111%
Standalone DH with Fan Recycler	0	203%
Lennox Humiditrol	244	153%
Discharge Gas Reheat (pkg)	1	168%
Mod. Discharge Gas Reheat (split unit)	0	203%

Conclusions

- **Current Options**
  - **Lennox Humiditrol with overcooling**
    - **Best balance of RH control and energy use**
- **Near-Term Options**
  - **Condenser reheat for packaged equip**
    - **Best combo of RH control and energy use**
  - **Condenser reheat for split equipment**
    - **Needs further development to reduce energy use**

ORNL Web-Based Dehumidifier Model

- Expansion of HPDM
- Fully Accessible Online from Browser
- Outside Ventilation Air and Return Air Mixing Options
- Operating and Design Parametrics (e.g. DB/RH ranges)



Web Version Available

http://www.ornl.gov/~wlj/hpdm/MarkVI_DH.shtml