Building America Stakeholder Meeting

2012 RESNET Building Performance Conference

FLORIDA SOLAR ENERGY CENTER®
Creating Energy Independence

Space Conditioning Standing Technical Committee

February 29, 2012

BA-PIRC
Building America - Partnership for Improved Residential Construction

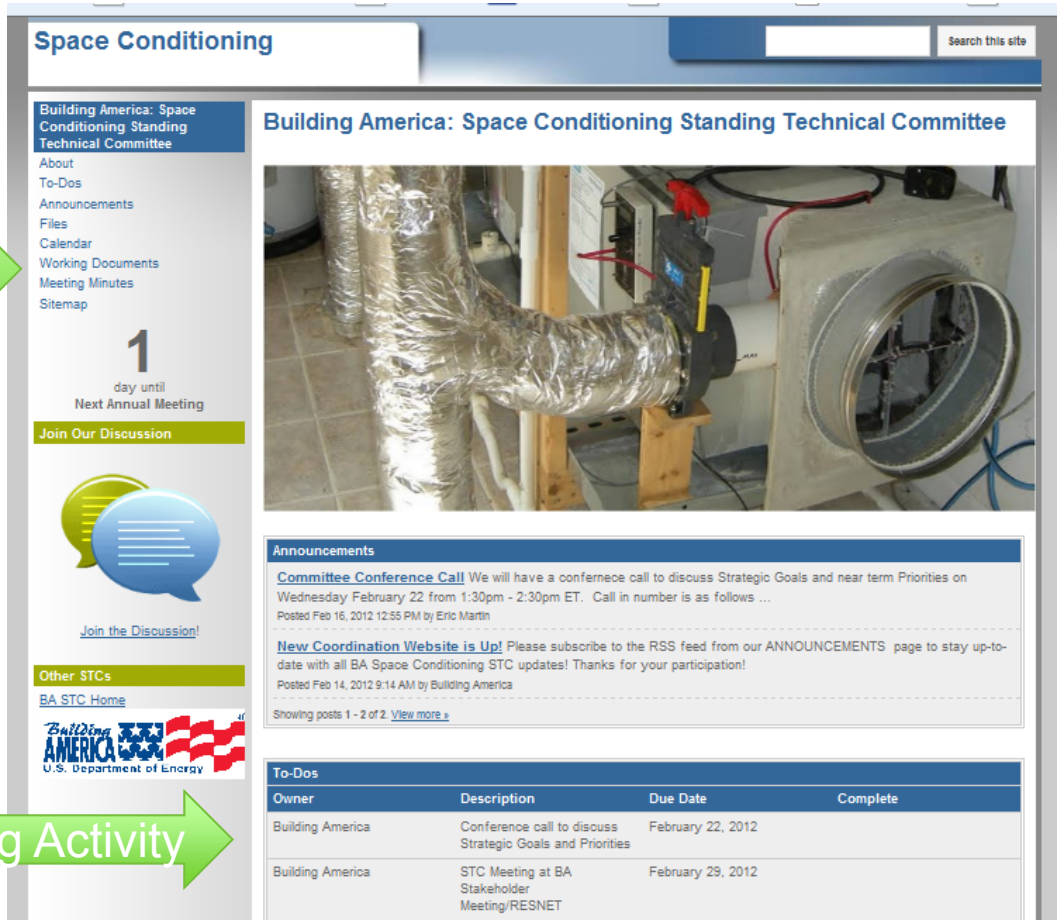
Eric Martin and Janet McIlvaine

Partnership for Improved Residential Construction
Florida Solar Energy Center
Ba.spaceconditioning.stc@gmail.com

Space Conditioning Standing Technical Committee

https://sites.google.com/site/bastcspaceconditioning/

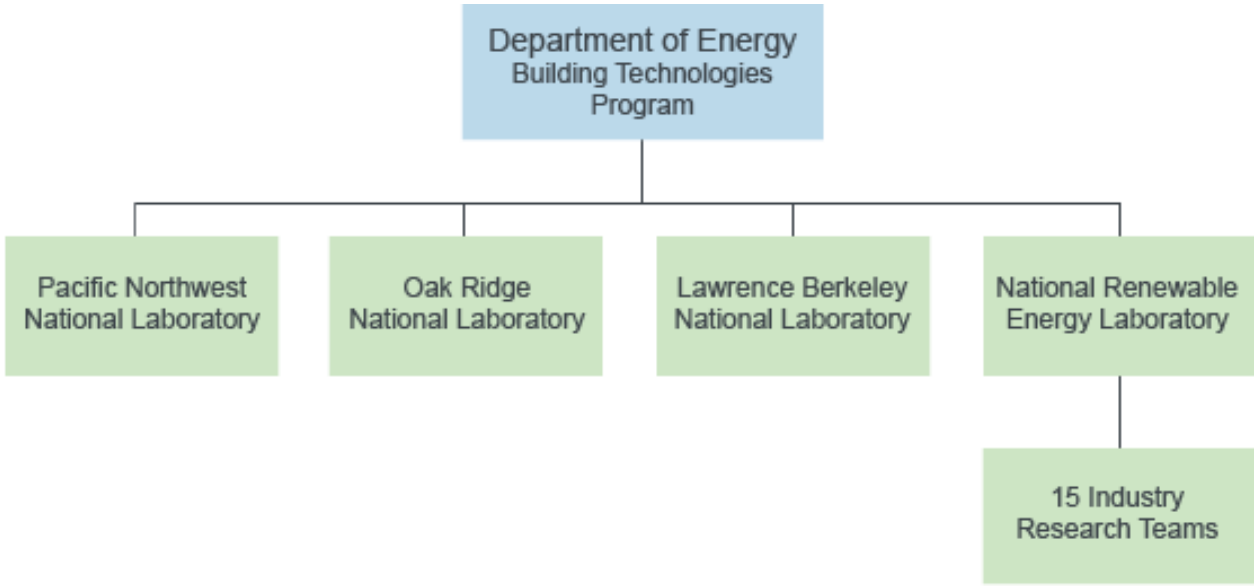
Files, docs, schedule, etc.



Upcoming Activity

Building America Program

- U.S. Department of Energy Building Technologies Program directs the Building America program



- Public – Private Research Partnership
  - Public: DOE funded energy efficiency research community
  - Private: Homebuilding industry stakeholders
- Building America website
  - www.buildingamerica.gov

Building America Goals

- Systems Engineering (House as a System) Approach
- Research-to-Market Approach
- Energy Savings Goal - 30%-50%
  - Compared to 2009 energy codes for new homes
  - Compared to pre-retrofit for existing homes
- Safeguard or improve:
  - Occupant health & indoor air quality
  - Durability
  - Comfort
- Community Scale Solutions
  - Real world construction processes

Building America Efficiency Goals

Whole House Efficiency Goals by Climate Zone
New Homes
Existing Homes

Source Energy Savings	Mixed/Hot-Dry and Marine	Mixed-Humid and Hot-Humid	Cold (Includes Cold, Very Cold, and Subarctic)
Current "best in class"	*2010 (20% savings)* *2011 (15% savings)*	*2011* *2011*	*2011* *2011*
30%	*2011* 2012	2012 2013	2013 2014
50%	2014 2015	2015 2016	2016 2017

New Homes - Savings Compared to Building America Benchmark
Existing Homes - Post-retrofit Savings Compared to Pre-Retrofit
Source: http://www1.eere.energy.gov/buildings/building_america/program_goals.html

Role of Standing Technical Committees

- Building America Question…
  - What's stopping us from achieving the next goal?

- Those hurdles = "gaps or barriers"

2011 Space Conditioning STC Activity

- **Example Gaps**
  - **Market/Supply Gaps** – equipment, components, materials that are not available.
  - **Knowledge Gaps** – how do technologies performance in the field? Why don't we get the rated performance in the field?
  - **Labor Gaps** – training needed to achieve targets
  - **Etc…**
- **Example Barriers**
  - **Barriers to adoption** – code conflicts (real or perceived), lack of code
  - **Barriers to acceptance** – conventional wisdom, bad experiences
  - **Market barriers** –no one knows it's available, high cost, aesthetics
  - **Etc…**

Role of Standing Technical Committees

- Gaps and barriers identified through
  - Laboratory and field experiments
  - Monitored field data
  - Test houses
  - Community scale implementation
  - Expert meetings
  - BA Standing Technical Committees
  - Stakeholder input

- Standing Tech Committees help align Building America research with industry needs
  - Prioritize gaps and barriers
  - Strategic Plan
  - Monitor research/industry progress towards goals

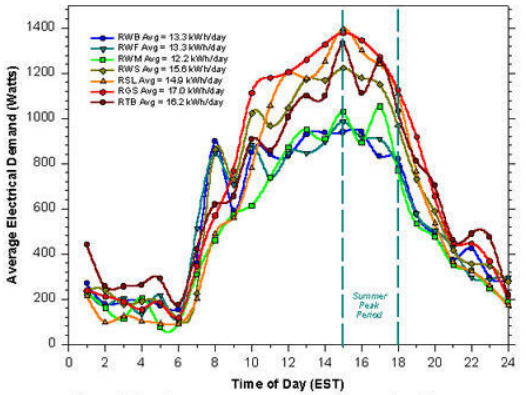


Figure E-4. Average space cooling demand profiles over the unoccupied period.

Industry Research Teams

- Building America Research Teams collaborate with industry partners & stakeholders to identify and address gaps and barriers

Industry Research Teams

- Building America Research Teams collaborate with industry partners & stakeholders to address gaps and barriers

Stakeholders, you are here!

BA Standing Technical Committees

- Organized according to technical topic areas
  - Space Conditioning, Home Energy Management, Hot Water, Building Envelope, Analysis Methods & Tools, Testing Methods and Protocols
  - Also Implementation – others?

- Participants
  - Building America Research Teams
  - DOE National Laboratories
  - Research Partners
  - Industry Partners
  - You

Space Conditioning STC Activity

- **2011 Space Conditioning STC activity**
  - Defining Stakeholders
  - Identifying and prioritizing gaps through a voting process
  - Writing Strategic Plan
- **2012 Space Conditioning STC activity**
  - Recruiting Stakeholders
  - Re-prioritizing gaps - new voting process
  - Revising language gaps/barriers - measurable
  - Revising Strategic Plan

2011 Space Conditioning STC Activity

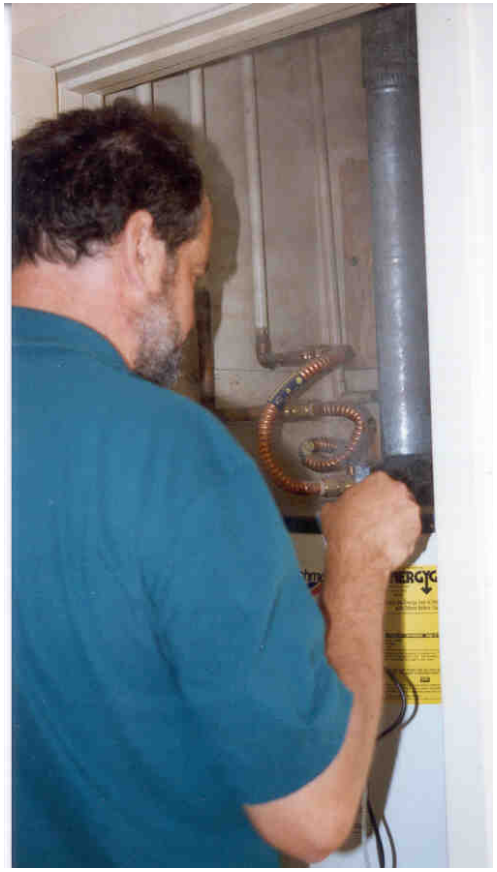
- **Who are the stakeholders?**
- **Those who participate in or are otherwise impacted by BA Research**
- **Including but not limited to:**

  - Occupants (homeowners, renters, dwellers)
  - Builders
  - Contractors (HVAC, GC, home performance) Raters/auditor/energy analyst
  - Architects/designers
  - Building owners/operators
  - Utilities
  - Educators/trainers
  - Simulation/model developers
  - Code officials
  - Manufacturers/product developers
  - Program providers
  - Trade Organizations (AHRI, NATE, ASHRAE, ACCA, Green Programs, NARI, NAHB, ASHI, EGIA)
  - DOE, EPA
  - Home Inspectors
  - Medical Professionals
  - Real Estate agents
  - Appraisers
  - Smart Grid World
  - Research community
  - Retailers/Distributors/Wholesalers
  - Financial community

2011 Space Conditioning STC Activity

- **Identifying and Prioritizing Gaps and Barriers**
- **Brain storm gaps/barriers**
  - **Grouped into 4 categories**
  - **Committee voted on top priorities in each category**
  - **Produced 2 page write up for each for the Strategic Plan**
- **Strategic Plan submitted in October**
  - **Discussed at October committee meeting**
  - **NREL provided feedback and direction for next version**

Space Conditioning Technical Topic Areas



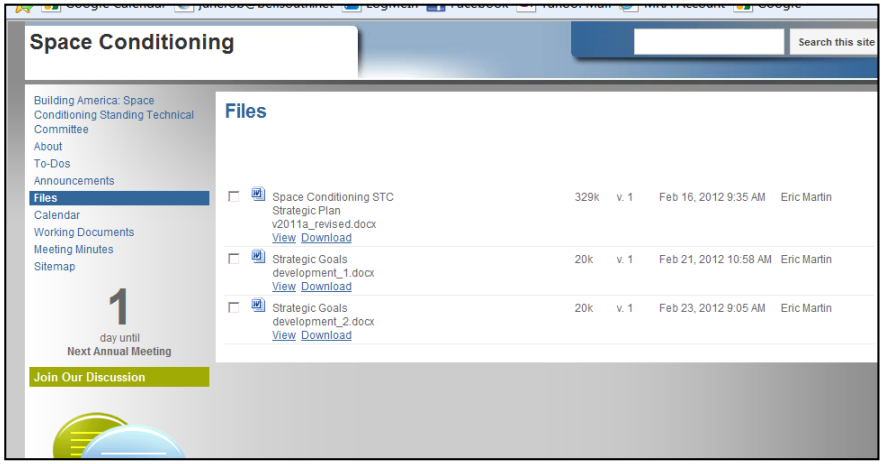
Indoor Air Quality & Ventilation

Heating and Cooling equipment

RH Control

Distribution

2011 Space Conditioning STC Activity



- Access the Strategic Plan
- Website under “Files”

- Contents (Draft 2, 2012)
  - ~50 individual gaps/barriers
  - Ranked within 4 categories
  - 2 page description of each gap/barriers
  - Appendix C “Contributors”

- Living document that the committee develops, maintains, and updates through periodic revisions

- Adding new gaps as identified, closing existing gaps upon conclusion of research.

2012 Space Conditioning STC Activity

- Revise Strategic Plan based on NREL direction…
  - Late summer the committee will re-rank gaps/barriers
  - No categories (all gaps compete against each other) using
  - New standardized voting process from NREL.
  - Make gaps and barriers discrete objectives with measureable outcomes (consider sub-committees)
  - Include strategic goals – See draft handout
    - Overarching, cover all the gaps, the big picture
- Recruit missing stakeholders & and gaps/barriers
  - Gap Identification Worksheet (website in “Working Documents”)
- Track industry/stakeholder progress towards achieving the outcomes (consider sub-committees)

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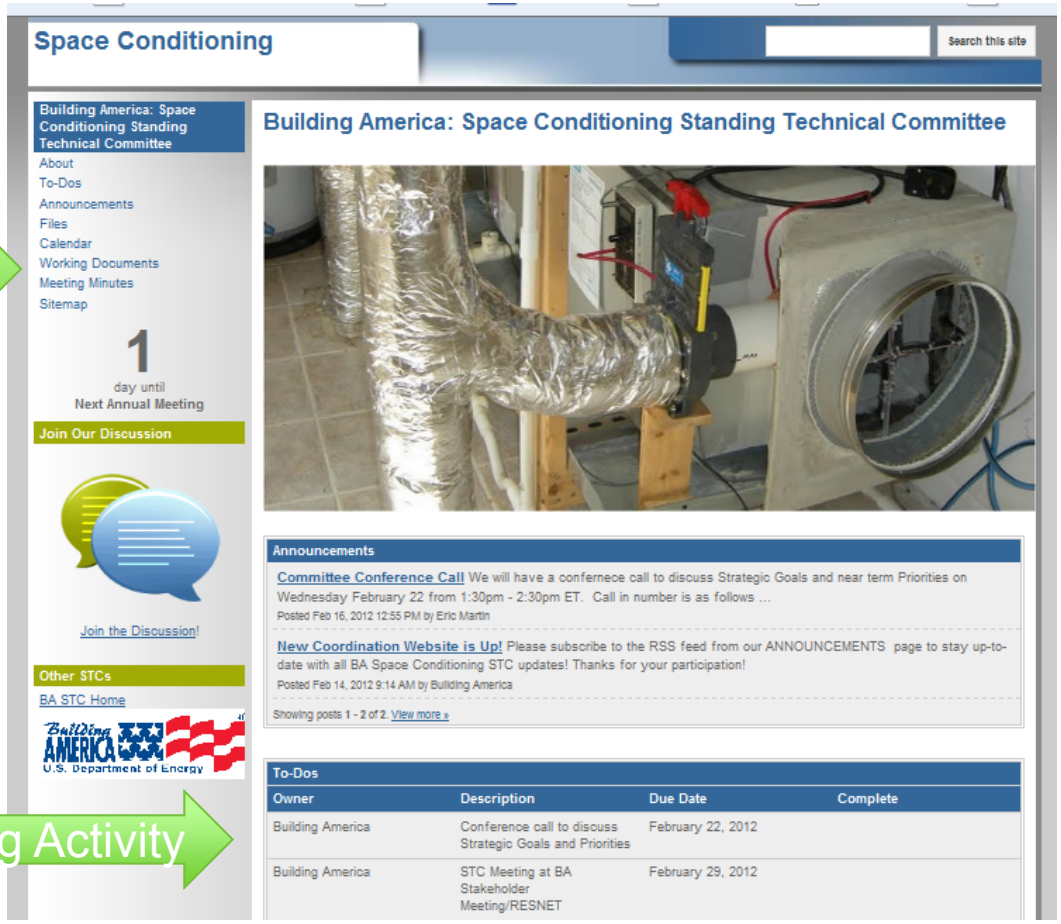


Upcoming Activity

Participation Opportunities

- Monthly conference calls
  - Provide contact information to Ba.spaceconditioning.stc@gmail.com
- 2 - 4 in-person meetings per year – announced on BA website and STC website
- Track industry/research progress
- Help revise gaps/barriers & edit strategic plan (sub-committees)
- Add new Gaps/barriers at Google Site: https://sites.google.com/site/bastcspaceconditioning/

Strategic Goals

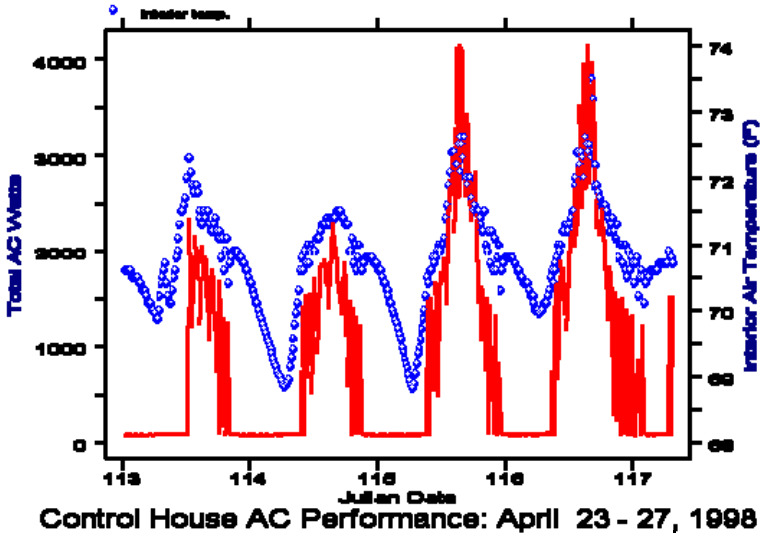
- Draft 1 (2011) based on general review of gaps and barriers in the Strategic Plan
  - Website in Files: Strategic Goals development_1.docx
- Draft 2 (2012) produced during conference call committee meeting on February 22
  - Website in Files: Strategic Goals development_2.docx
- Draft 3 – develop today!

DRAFT Strategic Goals

- To provide field performance data for available and emerging equipment and systems to stakeholders so they may accurately characterize actual energy use and savings.
- To optimize ventilation, indoor air quality and relative humidity control systems and strategies to ensure lowest energy options are used while maintaining adequate health, comfort and durability.
- To define best practice installation specifications, commissioning metrics, and critical system interactions and accelerate industry adoption.
- To facilitate validated simulation tools capable of evaluation and comparison of heating, cooling, ventilation, and relative humidity control systems so integrated design decisions can be made based on accurate model predictions.

Strategic Goal

- To provide field performance data for available and emerging equipment and systems to stakeholders so they may accurately characterize actual energy use and savings.

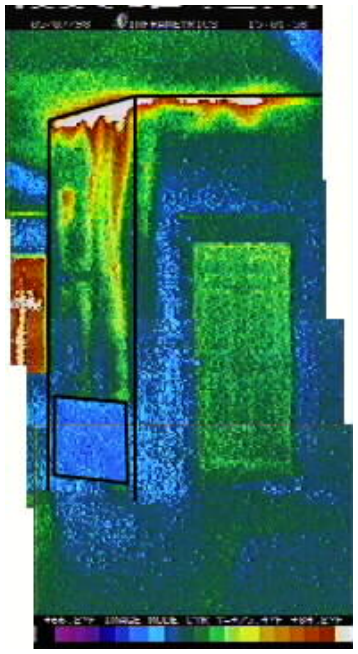


Related Issues

- Improving Equipment Rating Standards
  - Rated conditions ≠ field conditions
  - Variable capacity + leaky ducts
  - GSHP + pumps + wells
  - Including dehumidification performance
  - Comparisons of air and water systems
- Improving industry design standards
  - “right sizing” with variable capacity systems and hybrid systems
  - Distribution system design for low flow (air) systems and hydronic systems (and hybrid approaches)
- Understanding energy use and system integration of heating, cooling, and distribution systems for low load homes
  - Centralized vs distributed
  - Small capacity vs. variable capacity
  - Role of heat pump water heaters
  - Distribution of T and RH
- Example Gap – Effective distribution strategies for low load homes

Strategic Goal

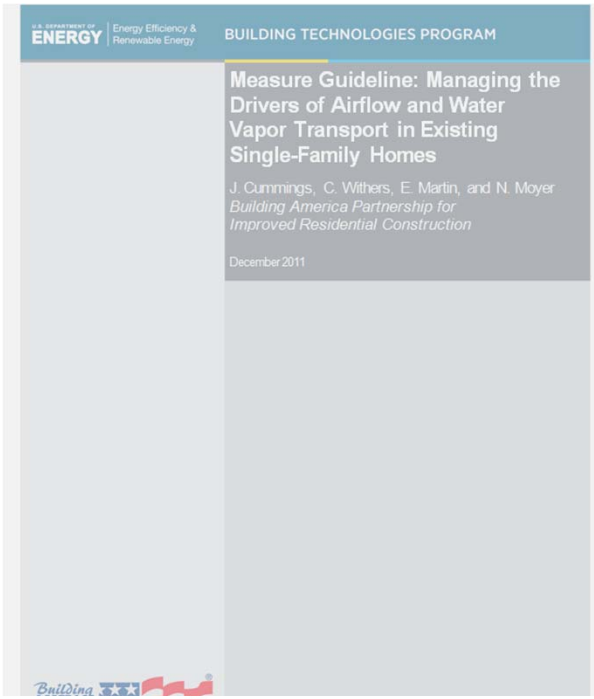
- To optimize ventilation, indoor air quality and relative humidity control systems and strategies to ensure lowest energy options are used while maintaining adequate health, comfort and durability.

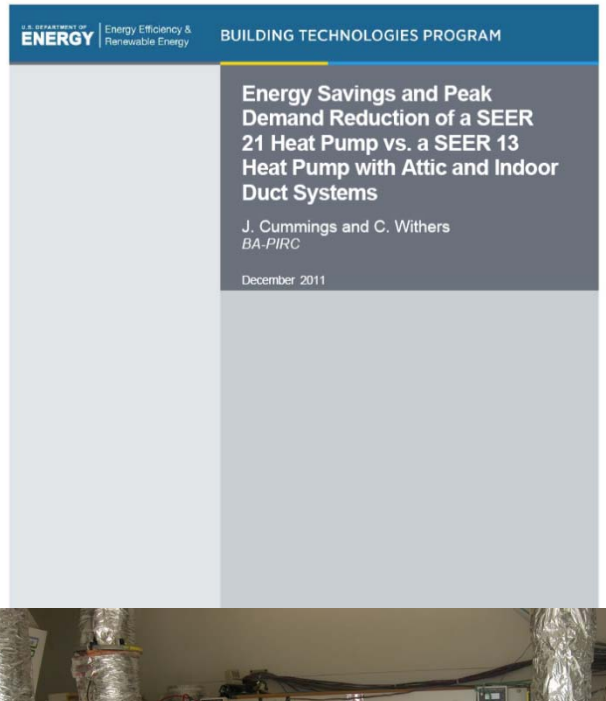


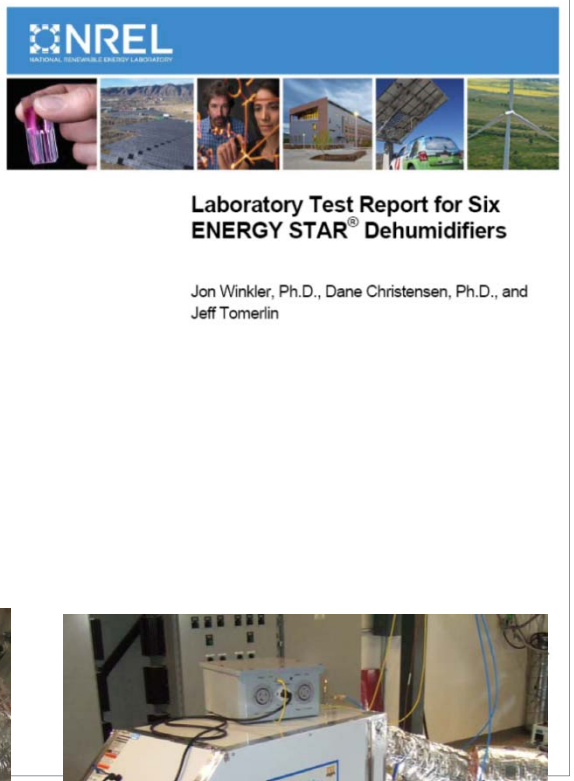
Related Issues

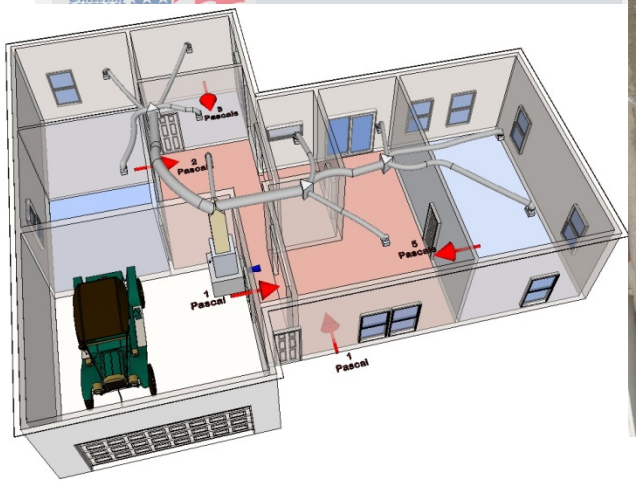
- Optimize energy used for ventilation
  - Understanding contaminants
  - Examining effect of distribution and source of ventilation air
  - Optimizing control of intermittent systems
- Optimize energy used for RH control
  - Evaluating RH control targets
  - Identifying and eliminating moisture drivers
  - Enhancing RH control capability of primary heating/cooling systems and improving accuracy of sensors and controllers
  - Understanding performance of supplemental dehumidification equipment
- Optimize enclosure air tightness
  - How tight is too tight to ensure combustion safety, limit over-ventilation, considering mechanical system failures…
  - Function of balanced vs. unbalanced ventilation system

Example - Optimize energy used for RH control



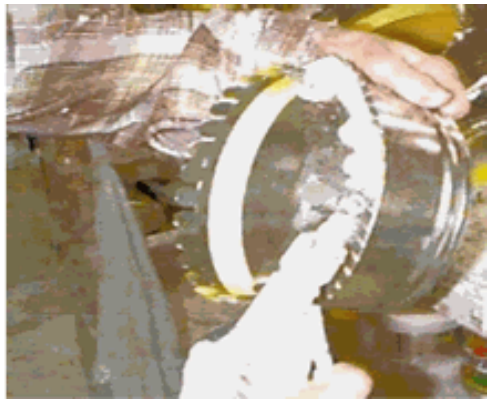






Strategic Goal

- To define best practice installation specifications, commissioning metrics, and critical system interactions and accelerate industry adoption.



Related Issues

- Assessment, repair, replacement of leaky and poorly insulated ducts
- Effective commissioning and tune-up
- Combustion safety in tight houses
- Industry adoption of efficient fan blades, fan motors, and pumps.

Example

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BUILDING TECHNOLOGIES PROGRAM

Measure Guideline: Sealing and Insulating Ducts in Existing Homes

R. Aldrich and S. Puttagunta
Consortium for Advanced Residential Buildings (CARB)

December 2011

Building America U.S. Department of Energy

Progression Summary

Inspect the duct systems. Are the ducts visibly sealed and insulated? Are they in need of any repairs? Repairs should be completed before sealing and insulating efforts.

If ducts appear to be well-sealed and insulated, further efforts may not be cost-effective.

Inspect the home and duct system for significant risks: Risks may include, but are not limited to:

- Structural problems
- Exposed or knob-and-tube wiring
- Severe water or mold problems
- Severe insect or rodent infestations
- Asbestos (or asbestos-like material)
- Other toxic materials
- Erratic or dangerous occupants
- Occupants with health conditions who may be sensitive to work being performed

If significant risks are not present:

If significant risks are present:
DO NOT PROCEED WITH WORK

Assess accessibility of the duct system. If ducts are not accessible, conventional sealing

1. Ensure that the metal collar is fully accessible (may need to cut back main trunk insulation). Roll the outer insulation layer back off the inner liner of the flexible duct.	
2. Apply mastic directly to the collar (*best practice, but optional*).	
3. Slide the inner flex liner over the collar to embed into mastic.	

Strategic Goal

- To facilitate validated simulation tools capable of evaluation and comparison of heating, cooling, ventilation, and relative humidity control systems so integrated design decisions can be made based on accurate model predictions.

Related Issues

- Determining internal moisture generation rates.
- Simulation / prediction of relative humidity and dehumidifier performance.
- Modeling existing heating/cooling equipment.
- Understanding hydronic system distribution efficiency.
- Data for models and options of evaporative cooled condensers
- Example Gap: need improved modeling of zoned systems in existing simulation software

Strategic Goals – Further Discussion

- Do we need another goal to identify/propose new equipment, systems, techniques that don't exist yet but could fulfill needs?
- Does "cost effectiveness" need to be specifically mentioned in our goals, or is that covered via the mission of Building America?
- Simulation Tools
  - Is our committee's job to facilitate the validation of tools, or do develop the algorithms, or do collect the data on which the algorithms are based?
  - Specify that our goal involves accurate model predictions for space conditioning integrated with building enclosure.
  - Should we even have this as a specific goal?

General Committee Upcoming Activities

- Recruit missing stakeholders & and gaps/barriers
  - Gap Identification Worksheet (website in “Working Documents”)
- Track industry/stakeholder progress towards achieving the outcomes (consider sub-committees)
- Revise Strategic Plan based on NREL direction…
  - Late summer the committee will re-rank gaps/barriers – no categories (all gaps compete against each other) using new standardized process from NREL.
  - Review existing gaps and re-structure where necessary to focus on discrete objectives and measureable outcomes (consider sub-committees)
- Finalize strategic goals

Participation Opportunities

- Monthly conference calls
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