New Home Stakeholder Group

Minutes
Meeting #3 July 23, 2003
Fort Collins Utilities Service Center
8:00 a.m. to 11:30 a.m.

Attendees

Members or member's representative:

- Steve Andrews, E-Star Colorado
- Ken Barr, Hercules Industries
- Jon Becker, SolarGlass Windows and Doors
- Mark Blaskiewicz, State Farm Insurance
- Dan Butterfield, GMAC Mortage
- Steve Byers, EnergySmiths
- Tom Cook, Front Range Community College Larimer Campus
- Traci D'Alessio, Built Green Colorado
- Rob deKieffer, Boulder Design Alliance
- Mark Dieterle, Lennox Industries
- Megan Edmunds, E-Star Colorado
- Jim Evenson, Evenson Enterprises
- Dean Fraley, Allied Insulation / Masco
- Todd Gamboa, Village Homes
- Jack Gustafson, Gustafson Heating and Air Conditioning Inc.
- Terry Heyne, Progressive Living Structures
- Sandy Hicks, City of Fort Collins Natural Resources Dept.
- Paul Higman, Thermal Concepts / Masco
- Michelle Jacobs, Home Builders Association of Northern Colorado
- Reed Larson, Johns Manville
- Felix Lee, City of Fort Collins Building & Zoning
- Kathleen Martinez, Red Rocks Community College / Construction Technology Pgm
- Gil Paben, Aspen Construction
- Jim Sabin, Aspen Homes
- Dave Schrock, Comfort Air Distributing, Inc.
- Mark Shadowen, Northern Colorado Air
- Doug Swartz, Fort Collins Utilities
- Dave Szanto, Northern Colorado Air
- Darrell Turman, Builders Appliance Center
- Steve Volenec, Johns Manville
- Tony Williams, Red Rocks Community College / Construction Technology Program
- Steve Volenec, Johns Manville

Guest participants:

- Duncan Prahl, IBACOS, Inc.

Observers:
- Susan Castellon, CO Governor's Office of Energy Management and Conservation
- Wendy Williams, Fort Collins Utilities
- Dave Wood, Comfort Air Distributing

Staff support:
- Joan Gregerson, Fort Collins Utilities
- Suzanne Jarboe-Simpson, Fort Collins Utilities

Handouts
- Training and Certification Programs for Builders and Subcontractors
- Environments for Living brochure/packet
- Front Range Community College: Guiding Principles of New Building Construction Trades Program, High School level
- Advanced Energy: SystemVision Training Programs to Increase the Profits of Building Professionals
- Red Rock Community College: course catalog

Introduction
Suzanne Jarboe-Simpson, Facilitator, Fort Collins Utilities
Doug Swartz, Fort Collins Utilities
Suzanne welcomed attendees to the meeting. Before turning to the business of today's meeting, she touched base with the group about the stated goal for the New Home Stakeholder Group and the underlying value proposition upon which the process is being structured. She asked members to comment upon these:

- **Goal:** Recommend action plan(s) to improve the "whole-house" performance of new homes - potentially improving occupant comfort, health and safety and energy efficiency while reducing maintenance needs.

- **Value proposition:** Based on examples in Colorado and elsewhere, it is possible to build homes that perform better (more comfortable, healthier, more durable, much lower energy costs) yet don't cost more to own. There are potential benefits for the home buyer, the builder and society at large.

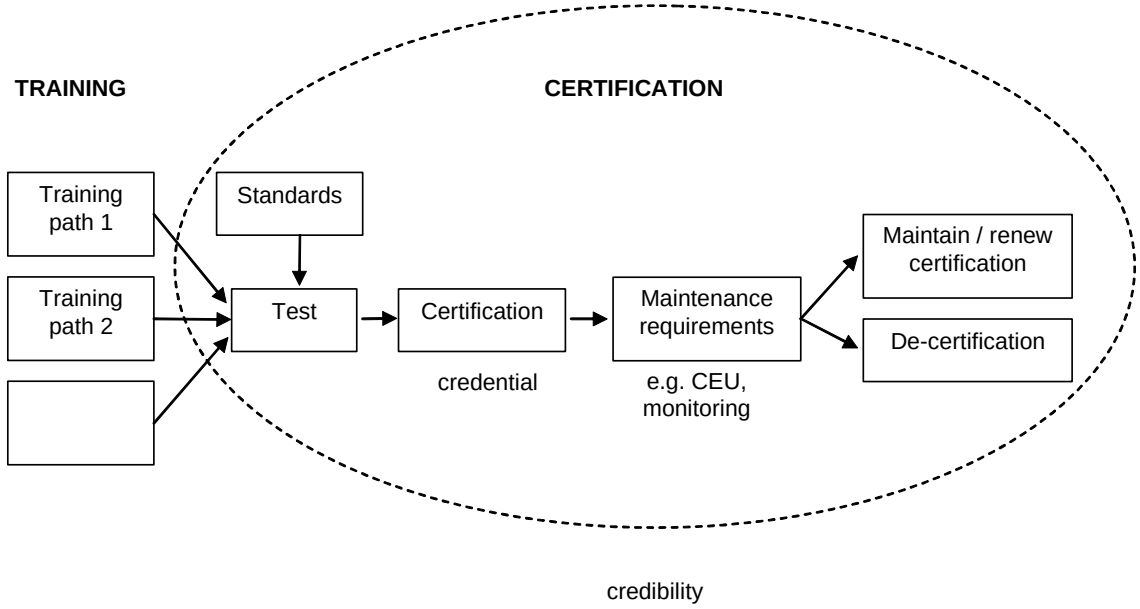
The group concurred with both the goal and value proposition.

Suzanne then reviewed the process the stakeholder group is following. It is divided into three phases:
- 1st phase: Kick off the process, bring members up to a common level of understanding about new home problems and opportunities, pique interest and set the stage for the rest of the process. (Meetings 1 and 2)
- 2nd phase: "Core meetings" to explore needs and resources and generate ideas to support the kinds of changes noted in the goal and value proposition. Each core meeting will focus on one or more categories. (Beginning with this meeting)
- 3rd phase: Develop action plans. In these meetings, ideas that have been generated throughout the process will be distilled into recommendations.

Suzanne noted that we are now starting phase 2. In this phase we're trying to learn from each other and get ideas on the table rather than make decisions. Decisions will be made in phase 3, integrating ideas and identifying the most effective strategies to support the goal of this group.

Suzanne described the agenda for this meeting that focuses on training and certification needs and resources for people in the building industry. She noted that certification programs for houses will be covered in a future meeting.

Using the following diagram, Doug described some terminology and components that might be part of today's discussion:



He noted that some programs may address only parts of this big picture, e.g. only offering training or certification, while others may provide all components. He also noted that if a certification is to be meaningful, it must have something real behind it.

Panel 1: Building industry needs for training and certification

Suzanne Jarboe-Simpson, Facilitator, Fort Collins Utilities

This panel included representatives from the building industry. Panelists were asked to respond to the following questions, with a five-minute time limit:

- If your business wants to take part in the transition from conventional homes to high-performing homes, what kind of training and/or certification would you, your employees, and others you deal with in your business need?
- For those of you who've already made the transition, what training was most useful?
- For code representative: What training do you need to support builders in efforts to move toward houses that perform better?

The following summarizes background comments and key points about training and certification needs made by each panelist.

HVAC Contractor
Jack Gustafson, President, Gustafson Heating and Air Conditioning
Jack is a long-time metro Denver-area heating contractor who in the past couple of years has teamed with Engle Homes in their transition to building high-performing homes. He noted that he has a lot of experience and has been very successful.

Jack characterized the experience of working with Engle as very cooperative and fun, because the heating contractor has been so much a part of the whole-house design team with the builder. He noted that the HVAC systems his company installs perform well because they are integrated with the rest of the house, they are carefully sized, installed and sealed, and the installed systems are tested for tightness and air flow (he cited very tight duct leakage results as examples). He contrasted this with the past, when too many common HVAC practices were based on inaccurate rules of thumb. Jack noted that he has had calls from several other major builders who have heard about his company's success working with Engle. He said he only responds if he can meet first with the company president, so that they can discuss what needs to change from a whole-house standpoint. If he is asked to meet first with the purchasing agent, he refuses, because the company is not interested in working on jobs where everything is designed around price rather than performance.

Training needs:
- Priority #1: Train the builder and architect.
- Priority #2: Train the heating contractor's supervisory people / designers about design, sizing, duct sealing, testing.
- Priority #3: Test all systems for tightness and flow.
- Lowest priority: Train the installer. If the builder is committed, and the heating contractor supervisor has done his job, it's easy to train the installer to install it properly.

Code Official
Felix Lee, Building and Zoning Director, City of Fort Collins
Felix has overseen the development and implementation of building and energy codes in Fort Collins for many years.

Felix noted that the City is currently working on an update to the 2003 International Energy Conservation Code, and that several NHSG members have been part of that effort. He mentioned that several significant changes from the current code are under consideration, including eliminating the use of building cavities as HVAC ducts, and requirements for HVAC equipment sizing and solar-control windows. He feels the new code will help improve performance yet will not, on its own, create the kind of high-performing home this group is discussing. He understands the need to move from an "Is it there?" focus to asking "Does it work?" as well, but noted that it is a real challenge from a code perspective.

Training needs:

- Fort Collins B+Z wants to support the builders that are moving toward higher performing homes, by sharing what B+Z staff know. It's a challenge with the diversity of the eight people on staff.
- Insulation knowledge appears to be fairly good
- Air barriers continue to be a challenge, particularly the importance of aligning the air barrier with the insulation.
- It will be hard for inspectors to know if HVAC system and ducts are properly sized unless it's very explicit on the plans.

Builder
Todd Gamboa, Construction Superintendent, Village Homes
Todd has 23 years of experience in the building industry. He started out in the renovation business and saw a lot of moldy walls and energy problems. He now works for Village Homes, a company developing land and building 500 homes a year in Colorado, with a staff of 250 people.

Todd noted that" if you're building to code, you're building an inferior product." He feels that builders want to change the way they design and build homes but are reluctant to do so for many reasons:
- It requires a cultural change that is hard to implement. With a large company, it requires a group commitment; employees will not blindly follow a change in thinking at the top.
- A large builder has a huge number of factors to think about. The energy and performance issues are just one aspect.
- Construction cost is a critical factor; builders must be able to sell their homes. $1200 or $2000 may not sound like a big change but it can be the difference, as there is no guarantee that a buyer will recognize the changes in the home.
- Sales representatives may misrepresent the product.
- Because they can't become the experts in all areas, builders have to rely on the expertise of their subcontractors. But who should they believe? They have had some bad experiences in the past when changes were made based on misdirected subcontractor recommendations. The builder is the one who takes hits from all angles. When there is a problem that results in negative publicity, it's the builder who gets the limelight rather than the subcontractor.

Training questions:
- What kind of training is best?
- How long does it take?
- Who do you go to for the training?
- How much does it cost?
- Who should be trained? Where in the spectrum from top to bottom? (He feels it needs to start with upper management)
- How do you implement the new plans and products?
- How to hire subs with the right expertise?

Builder
Terry Heyne, Vice President for Construction, Progressive Living Structures
Progressive Living Structures builds 100 to 150 homes per year in Northern Colorado. Terry characterized the company as "the hometown boys, trying to do the right thing."

Terry noted several challenges to improving home performance:

- The general contractor is responsible for everything and it's difficult to know every aspect of every trade. Therefore they have to rely on their subcontractors' expertise, and have had mixed success. Even if the HVAC company owner, for example, understands exactly what the builder is looking for, they can't always find qualified workers to get the job done right.
- The workforce is limited in quality, with many tradespeople focused only on the paycheck rather than doing a quality job. PLS tries to find trades with a good work ethic and rely on them.
- Increases in construction and sales costs are a big deal, even if the net cost of ownership for the customer doesn't change. Cost increases make it harder to qualify customers for mortgages.
- Marketing reps see cost increases associated with performance improvements as an obstacle. They have told PLS that buyers would choose a granite countertop over an energy-efficient furnace every time.

Terry stated that "we as a builder will do whatever the market wants." He also noted that the trades are very resistant to certification.

Training needs:

- Marketing agents
- General public

HVAC Contractor

Mark Shadowen, General Manager, Northern Colorado Air

Northern Colorado Air has been in the heating and air conditioning business for about 15 years, following conventional HVAC approaches.

Mark noted that change happens only if there is a driving force. He said that18 months ago, a builder they were working with told NCA they'd better get going with high-performance homes or they'd find another HVAC contractor. It was a shock. NCA tried to implement an overnight cultural change which didn't go well. But they did manage to change and he is proud of how they are currently doing things.

Mark described how the building industry has changed from a HVAC standpoint. For years, houses were very simple with several basic, predictable styles. HVAC contractors knew how to design systems to keep them comfortable. In the 1990's, houses got much bigger, with more complex floor plans and little interior wall space in which to run ductwork, and demand for air conditioning climbed rapidly. But much of the industry continued to do things the same old way. The result: systems often didn't work very well, even when quality equipment was used.

Mark characterized much of what they used to do as guesswork but that NCA has quickly evolved to a much more careful, analytical and testing-based approach that provides systems that work well. In particular, he noted the value of closely coordinating with the builder during the design phase, the value of ACCA "Manual J" for equipment sizing and airflow calculation and ACCA "Manual D" for duct design and sizing, and the importance of testing installed systems.

Needs:

- Builder training: Builders need to understand what is necessary to provide a HVAC system that performs well. For example, with the original plan, the HVAC contractor might have to install a duct run of 300-400' equivalent length to heat/cool the bedroom over the garage. This won't deliver enough conditioned air to get the job done. But if the builder and HVAC contractor learn to work together, building and duct design changes can be made shorten the equivalent duct length and properly condition the bedroom. Also, for HVAC contractors to do their job, builders must be able to provide accurate data during the design stage about insulation R-values, window U-values and Solar Heat Gain Coefficients, and air leakage. (Mark noted that builders who are making the transition to high-performing homes generally have this data readily available, while those who rely on their heating sub to figure everything out often do not.)
- HVAC contractor training. Mark feels the biggest needs are at the management and design level. He feels installers want to do a good job and will do so with a good design.
- *Manual J* training. Mark described *Manual J* as "a godsend" and reiterated its importance in providing a system that performs well. He noted that contractors can attend *Manual J* training classes, but no certification is available. He feels that since *Manual J* is such an important part of an HVAC contractors job, and since it requires a significant investment in software and training time, certification for qualified *Manual J* users might provide recognition for those who have made that investment.
- *Manual D* training. Mark noted the value of *Manual D* in educating builders about the impacts of design decisions.
- Cost of testing equipment: manometers, duct blasters, air flow hoods. This is a significant investment for a HVAC contractor.
- Consumer training.

Insulation / Air Sealing Contractor

Paul Higman, Environments for Living Specialist, Thermal Concepts/Masco

Thermal Concepts has long been an insulation contractor serving the needs of Northern Colorado builders. In recent years, the company has been acquired by Masco Services.

Paul described that Thermal Concepts has been transformed into a "solutions provider for the building envelope" – a very different approach. He feels the entire branch – management, sales and installation – has bought into this concept. Their goals are quality and performance. They strive to have all thirty installers be quality installers (rather than the old way of thinking, "we'll send the 'good installer' out on that job"). They have one staff member who focuses exclusively on building science.

Paul described the significant investments TC has made in training. Sales staff and lead installers attend "SystemVision" building science training provided by Advanced Energy. Other installers are trained using videos and in the field. They work with the blower door to learn more about when, where and how to seal the building envelope.

TC provides an incentive to advance with a "master installer" position that pays 8% more; people in this position have many of the same skills as a sales/estimator.

Paul described several changes in the way that TC works:

- They no longer just accept whatever the builder provides them; they now work with builders to help them understand what the insulator/air sealer must have to do a quality job. For example, TC will not install a fireplace without insulating and air sealing the cavity behind the fireplace unit first. They will identify framing and access problems that must be corrected before the insulation can be installed.
- Rather than being limited to the materials on the truck, TC equips all installers with radios so they can call in to the warehouse to have the right materials delivered.
- They have learned the value of "inspect, inspect, inspect and test, test, test." Their investment in testing equipment provides quick feedback that helps them correct problems quickly.

Paul noted that these changes mean that TC is not the lowest-cost provider. Additional training, testing equipment and higher quality techniques all cost money.

Needs:

- Builder training. Builders must understand what the insulator/air sealer needs to get the job done. They need to understand the importance of insulation / air barrier alignment.
- Contractor training. Building science training helps people understand why as well as how. Everyone in the company needs training to help with buy-in.

Energy Rating / Performance Testing Contractor

Steve Byers, President, EnergySmiths

EnergySmiths has, for several years, provided E-Star home energy ratings, inspection and testing services in Northern Colorado.

Steve noted that the home energy rating system (HERS) industry is different from some of the other building industry trades because there is more of a national structure. The Residential Energy Services Network (RESNET), in conjunction with the mortgage industry, has established strict guidelines for becoming a HERS provider, a HERS rater, a HERS trainer.

Steve described that energy raters can provide many services. They can help the builder with energy questions, HVAC challenges, moisture management issues, and sales and marketing strategies related to energy efficiency and whole-house practices. As a third-party inspector/tester, energy raters can help builders get what they expect from their subs. He characterized a good energy rater as an "integrator" with fingers in many pieces of the pie.

Needs and questions:

- Rater training. Are the standards adequate? How much is enough?
- Quality control for raters. What are the enforcement mechanisms? Steve feels the RESNET quality control requirements are quite ambiguous and may need to be strengthened.
- Builder and architect training. Steve sees a need to educate builders and architects about the need to modify the house design to support a good HVAC design. He notes that there is increasing pressure from the builder for the HVAC contractor to put in a better system, but that the architect and builder are often unresponsive to the needs of the HVAC contractor (e.g. in providing space for running ductwork to the upper floor of a two-story house).

Panel #1 Discussion
The floor was opened up for general discussion among all panelists and other NHSG members. The following bullets list points that were made, with no attempt to synthesize the information.

- Even for people that are firmly committed to high-performance homes, it can be a continual battle with corporate management. One person here in Colorado almost lost his company's entire high-performance home program because he made a change that increased framing costs by $150. Stiffer codes may be necessary in order to support change on a broader basis.

- Codes can help, especially in hard times, when there's often "a race to the bottom." What people get rid of is the invisible stuff and code can help set the floor higher.

- Codes make it more difficult for builders in some ways, but in other ways they can help people in the company who are trying to champion better quality. "Management might prefer to do it a cheaper way, but I could argue that, for example, we had to do it better in Fort Collins because it was required by code."

- High-performance home building can be pushed by improved code adoption. Tougher codes can help progressive subcontractors because it allows them to say they can't implement lower quality solutions because of code requirement.

- There needs to be training for presidents and CEOs of home building companies. We don't normally think of that level needing "training" but if these ideas aren't supported by the top level, change won't be successful.

- Builders need training that high-performance homes work and that they sell – if so, more builders will be willing to give it a try.

- Most buyers will always opt for low price or spend any extra upgrade $$ on things they can see. However if requirements are the same across the board, then everyone has to build to those specs and it's not a question left up to the marketing agents and buyer choice.

- Consumer education – i.e. educating buyers about what they can't see – is very important if we want to build better performing homes.

- "We used to give buyers the option of an 80% AFUE or 90% AFUE furnace – they always chose the 80% because it cost less. Now our base is a 90% furnace and we offer an upgrade option to a two-stage 90% unit."

- A problem with code is that it varies from one jurisdiction to another. There's a level playing field in Fort Collins, for example, but builders can always move to Windsor which has lower code standards.

- Builders need to look at ALL costs before making decisions. Higher construction costs in high-performing homes are offset by lower callbacks and warranty claims. But many Front Range builders don't track their warranty and callback costs.

- "What does the industry need for certification?"

- Builders must care about certification for subcontractors, because homebuyers are never going to care.

- Some HVAC contractors would like to have a week-long Manual J certification class. They would like to see M certification offered by organizations that they already work with, e.g. NATE or

ACCA. A community college could also provide the training and certification, so it's readily available.

- Cost is a barrier. It's an investment to buy the software, pay for field training, etc.
- Example: a HVAC contractor used to use a rule of thumb of 600 to 800 square foot per ton for sizing air conditioning. Now, using load calculations, they may see 1200 to 1300 sf/ton or even higher, which results in much smaller installed air conditioners. That makes them nervous because they're used to the "old way." Training and certification in Manual J would increase their confidence level.
- Certification could help contractors recoup their investment in training.
- With the insurance and legal industries playing ever-increasing roles, manufacturers and product suppliers are shying away from the term "certification." A word used more often these days is "authorized."
- The market drives the quality. Colorado houses have the poorest quality HVAC systems in the country. In other markets, buyers demand higher quality. Multiple furnaces and air conditioners are typically provided to meet comfort needs.
- In Colorado, the HVAC companies are small compared to other parts of the U.S. A few people in the country have to do it all. They don't have the luxury of having on-staff mechanical engineering or testing departments.
- Would builders and HVAC contractors would be willing to sit on the boards of community colleges and work with them to develop curricula that meets industry's needs?
One HVAC industry representative noted they had tried that a few years ago.
- In instances where credentials do exist, it has been tough to get builder recognition for that and get paid more to do a better job.
- HVAC contractors sometimes take the blame for problems related to poor work on the envelope.
- Comfort is a big item for the public – something that can be marketed.
- "An aspect of high-performance homes that has been a pleasure is to work with builders who are looking at the house as a whole. They are starting to work with their architectural team and they're all working together."
- Detailed specifications and constant re-inspections can catch do a much better job at catching problems than code. One builder uses detailed specs and checklists for everything from the excavators to the cleaning ladies. It helps.
- The Colorado chapter of the International Code Council is becoming more aware of some of the concepts the NHSG is discussing.

Panels 2 and 3: Providers of training / certification

Suzanne Jarboe-Simpson, Facilitator, Fort Collins Utilities

Panel 2 included representatives from programs in Colorado that provide training and/or certification for builders and contractors. Panel 3 consisted of people familiar with programs in other parts of the country, or available nationally, that provided other resources. Panelists were asked to respond to the following question, with a five minute time limit:

- Describe the training and/or certification programs your organization offers that supports the transition from conventional to high-performing homes.

The following summarizes key points made by each panelist. For more information, also refer to the table handed out at the meeting that summarizes training and certification programs for builders and subcontractors.

Front Range Community College
Tom Cook, HVAC Program Director, Front Range Community College Larimer Campus
Tom described that FRCC will be starting a new building construction trade program for high school students in August 2004, located in a 6000 square foot space at the new Poudre School District high school. Capacity is about 350 students. The cost for participation is paid for by the student's school district. Refer to the FRCC handout describing this program for additional information.

FRCC has also had a post-secondary HVAC program for more than ten years. The program is growing and they are working to "raise the bar," with a goal of becoming nationally accredited. Program information:

- Format: Classroom and hands-on.
- Facility: The HVAC facility is a dedicated 1,800 square foot classroom/lab, including several types of systems.
- # of people: 12 students per year graduate with a certificate.
- Certification: Students can earn either a one-year certificate or two-year Associates Degree. They are moving to test graduates, using an industry competency exam (ICE) that demonstrates they have a base level of education and is qualified for an entry level position. The program provides preparation for NATE certification, which can be earned after the student has worked in the field.
- Cost: $2500 to $3000

Tom reported that students graduating from this program are getting jobs in the industry. He observed a barrier though: Employers ask for an educated person, but still want "five years of experience." He sees the need for an apprenticeship program to help people make the transition from education to working in the industry.

Comfort Air Distributing
Dave Schrock, Executive Vice President, Comfort Air Distributing, Inc.
Comfort Air Distributing is a HVAC equipment supplier. Dave described how the company got started in training. Equipment changed dramatically in the 1990's and CAD initiated its education program as a "defensive move." As a wholesaler, CAD saw that good contractors would want training.

HVAC contractor training:

- Audience: Mainly HVAC contractors.
- Facilities: For some time they have used a trailer with four different systems. More recently they have built a 2,000 square foot training facility with multiple systems for

hands-on training. They can "bug" the equipment for class participants to troubleshoot and fix. The facility also has 15 laptop computers.

- # of students: Their full-time trainer teaches about 250 contractors per year.
- Example of courses:
  - Heating 101
  - Psychometrics class
  - Comfort Institute: ductblasters, blower doors
  - WrightSoft software for equipment sizing and design
  - NATE preparation class

Other training and certification efforts by CAD include:

- Quality Construction Curriculum: Dave and Steve Andrews train about 60 builders twice a year through this structure provided by the Metro Denver HBA. The goal is to teach builders how to recognize "bad HVAC." As part of this an inspection booklet for field superintendents was created.
- One-on-one builder training: CAD will review builder plans, provide a jobsite walkthrough and make suggestions to improve quality.
- NATE: CAD offers the test.

Dave noted that in the past, manufacturers would train contractors using two-hour slide shows – very boring but got people certified. He contrasts that with the value of hands-on education.

He also noted that when CAD first offered NATE testing, the pass rate was only about 15%. This was what stimulated them to offer a preparation class. Pass rates have since increased.

Dave noted a void regarding load calculations for equipment sizing: there is no requirement to use standard data such as design temperatures. This makes it difficult to check the accuracy of the calculations.

His comment on the effectiveness of CAD's programs was that they seem to be working. He hears about fewer call backs, and they're selling fewer 5-ton and more 2-ton AC units than they used to!

Built Green Colorado

Traci D'Alessio, State Coordinator, Built Green Colorado

Built Green Colorado is a voluntary new home certification program operated by home builder associations in Colorado. Traci noted that requirements for BG are currently changing to offer multiple levels of certification that will support systems-thinking and high-performance homes.

Traci described training offered to support the BG program.

- Built Green University. This has been a two-day training for builders that was centered on program requirements. It included a comprehensive review of all the items on the BG checklist. They encourage purchasing and marketing departments to attend along with people on the building side. In the past this the training has primarily relied on BG staff.

However, as the BG requirements change, BG is exploring partnerships with other organizations with more technical resources.

- BG training for raters. This is a checklist review for E-Star raters who certify BG requirements for builders. Training is needed periodically because program requirements evolve.
- Seminars. Various seminars are offered throughout the year. For example, BG co-sponsored the recent "Houses that Work" seminar in Denver.
- Super-ratings. This one-on-one approach begins with a from-plans rating and on-site performance testing. Builders receive information on callback issues and recommendations on what it takes to move to high-performance building, including a cost assessment. Built Green has had a DOE grant to provide this service for 10 builders over the past two years. That money has been used, however BG plans to continue offering four super-ratings per year.

Red Rocks Community College
Tony Williams, Department Chair, Construction Technology, Red Rocks Community College

Tony reported that Red Rocks Community College's Construction Technology program began in the 1970's. He provided these details:

- Topic areas include: basic construction, residential and commercial electrical, code, facility maintenance, HVAC & controls. See RRCC catalog.
- 36 degrees and 46 certificate programs. Many students take just two or three specific classes; others go on to get degrees.
- Articulation agreements with CSU's construction management program
- Customized curricula can be developed for as few as six students
- RRCC can provide on-site trainings for business
- 2000-3000 students at any one time
- Average student age is about 30 years
- $800,000 to $1,000,000 per year budget
- More square-footage for construction technology than anywhere else in Colorado: 20,000 sf of classroom and lab space, including a lot of HVAC equipment (condensing units, chillers, etc.)
- RRCC has a relationship with the Construction Industry Training Council regarding apprenticeships.

Tony described that part of his job is to learn what industry training needs exist. He has observed gaps between classroom and industry. He said that community colleges need more input from industry to help formulate curricula. He encouraged people in the industry to talk to the community colleges and learn what they're doing.

E-Star Colorado
Steve Andrews, Senior Technical Officer, E-Star Colorado
E-Star Colorado's core business is administering a home energy rating system for Colorado. The rating program was originally developed to address the mortgage industry's need to quantify

energy efficiency. E-Star's mission has broadened to including a variety of efforts related to advancing energy efficiency in housing.

Steve described several training and certification efforts in which E-Star is involved:

- Energy rater training and certification:
  - Length: 5-day training, 1-day testing, 1-day retesting (this has grown, based on experience of what it takes to do a good job, from what used to be a 2-1/2 day training)
  - Format: classroom plus field work. They partner with a HVAC training facility such as SunPower or Comfort Air Distributing.
  - Curriculum: Includes mechanical systems, blower door training, insulation, windows, computer aspects of doing the rating, practice ratings on several houses.
  - Cost: about $1000
  - Number of students: Typically one training per year, with 7-14 students per class. Typically, three or four will be active energy raters one year later.

- Preferred Contractor Program: E-Star, in conjunction with others, is currently developing a training and certification program to provide a means to identify contractors that have house-as-a-system training and expertise.

- Building Codes training. Colorado is one of the few states that doesn't have a state-wide energy code. Beginning in fall 2003, E-Star will begin offering a series of workshops to help a variety of audiences understand codes like MEC and IECC and how building techniques relate to various codes. Multiple formats are designed for different audiences: plans examiners, site inspectors, builders, energy raters.

- Workshops. E-Star periodically offers workshops for builders and others on high-performing home topics.

Steve noted a need for more collaboration with the community college training programs.

Building America
Duncan Prahl, IBACOS
IBACOS is a Building America team under contract with the U.S. Department of Energy. Building America is known for its work with production builders to help them make the transition from conventional to high-performance home building.

Duncan talked about recent shifts in Building America and IBACOS' current focus in the program. Whereas in the past they worked closely with individual builders to support their efforts to change practices, they are now looking at the process of change and how it can be supported on a more widespread basis. They're asking questions like, "What are the barriers to adoption for builders?" and "What are the internal and external mechanisms that can help them build high-performance homes?"

As part of this work, Duncan reported that IBACOS is working with E-Star Colorado in support of the efforts to develop a Preferred Contractor program (see above).

NAHB-RC Certified Insulator Program

Paul Higman, Environments for Living Specialist, Thermal Concepts

The National Association of Home Builders Research Center is an affiliate of NAHB. Paul described that NAHB-RC developed product certification programs some time ago. However, they realized that unless a product is properly installed it will not perform as intended. NAHB-RC began developing contractor certification programs in response. The first trade they addressed was insulation, with help from Certainteed, an insulation manufacturer. HVAC is the next trade they're working on.

Thermal Concepts has been certified under the program. Paul provided these details:

- The program is not tied to any specific insulation manufacturer. Installation specifications are based on typical manufacturer standards, which can be boiled down to no gaps, no voids, no compression, no misalignment (with the air barrier). Blown-in products have to be installed at proper density (with density test requirements).
- Installers go through classroom and field training.
- Certified contractors must have a designated "quality manager."
- Checklists and quality guides have been developed in both Spanish and English, and crews carry them in every truck
- There is a lot of paperwork associated with tracking job quality.
- A third party performs initial an initial audit when a contractor applies to be certified. After that, two audits per year are conducted. These include a review of records and field visits to ensure that the insulation is actually being installed to manufacturer specifications.
- By the end of 2001, there were 138 certified insulation contractors in the country.

Building Performance Institute

Rob deKieffer, President, Boulder Design Alliance

The Building Performance Institute, located in New York State, was created seven years ago to establish certification levels for weatherization contractors. Rob is authorized to administer BPI certification tests and has provided a lot of training to prepare people to see BPI certification.

Rob described BPI and its program:

- BPI establishes standards of performance for technicians and certifications for qualified contractors, based on a whole-house approach.
- BPI works closely with NATE certification for HVAC contractors, but is more hands-on.
- BPI does not provide training.
- There are six certifications currently available for individual tradespeople:
    - Shell Specialist
    - Cooling Specialist
    - Heating Specialist
    - Heating Technican
    - Building Technician
    - Building Analyst

- People applying for any of these categories must demonstrate competence at both a base level (same competence required for all categories) and an advanced level (specialized for each category).
- Both written tests and field tests are required for certification.
- To protect the credibility of the program, BPI has established a de-certification process as well – it is expensive to administer.

Some state government energy conservation programs require that technicians be BPI-certified. BPI is advocated or required by the states of New York, Indiana and Missouri.

Kansas Building Science Institute
Steve Byers, President, EnergySmiths
Kansas Building Science Institute, in Manhattan, Kansas, provides building science and energy performance training for the weatherization, home energy rating system, utility and building trades. Steve has sent employees to KBSI for training.

Steve reported:
- KBSI offers WrightSuite training for Manual J (load calculations) and Manual D (duct design).
- KBSI offers energy rater training that is comparable to E-Star Colorado's training.
- KBSI is an affiliate with the Building Performance Institute.
- Facilities at KBSI include a classroom and full-scale residential structure that is used as a building science lab and furnace lab.

Southface Energy Institute
Steve Byers, President, EnergySmiths
Southface Energy Institute, in Atlanta, provides many energy-efficiency related services in the Southeast United States.

Steve reported that he received his building science training at SEI and highly recommends the organization. He noted these examples of SEI training and outreach programs:
- The SEI offices are in the Southface Resource Center, a demonstration facility incorporates many energy- and/or resource-efficient features, is open to the public.
- SEI has built public awareness by participating in home shows
- SEI conducts building science training for the EarthCraft House green-building certification program, operated jointly by the Greater Atlanta Homebuilders Association and SEI.
- SEI offers many other training programs for architects, builders, subcontractors and shelter industry affiliates such as real estate agents.
- SEI offers homebuilding classes for consumers (owner-builders)
- SEI offers code training
- SEI offers energy rater training both in their facility and in other locations.

Environments for Living
Dean Fraley, Sales Manager, Allied Insulation / Masco

Environments for Living is a whole-house-based new home certification program operated by Masco Services. It has existed for about six years. Allied Insulation is owned by Masco and is one of the companies that represent EFL in Colorado.

Dean described the EFL training that has been in place for about three years now:

- Training is provided by Advanced Energy (based in North Carolina)
- Format: 3.5 days, including classroom and some field work on construction sites
- Location: Varies; a training session was offered last spring in Denver.
- Topics include: air flow, insulation standards ("zero tolerance"), moisture management, indoor air quality, fans and pressure effects
- Target audience: Masco employees and people that Masco sponsors
- Numbers: now educating about 300-400 people per year. Demand for the class is high
- A very detailed manual has been developed to support the course.
- Participants take an open book test to demonstrate their knowledge.

EEBA Institute of Building Construction Technology
Steve Andrews, Senior Technical Officer, E-Star Colorado
The Energy and Environmental Building Association (EEBA) was formed in 1983. Steve has been an EEBA board member.

Steve described the EEBA Institute, an educational program based on principles of building science and the systems approach to construction.

- Participants can be certified as a "Master Builder." This requires the completion of 100 points worth of training, plus a fieldwork component.
- The core of the training offerings is the "Builders Track" at the annual national EEBA conference. This comprehensive track takes builders and others through: building science basics, envelope, finishes, mechanical systems, testing and commissioning, O&M, business and marketing. Other workshops are also approved for credit, for example EEBA's "Houses That Work" seminar recently offered in Denver. There are also on-line course options.
- The primary audience is builders and contractors. Some courses are approved for Continuing Education Credits for architects, real estate agents, energy raters.

Open Discussion

Suzanne Jarboe-Simpson, Facilitator, Fort Collins Utilities
The floor was opened up for general discussion among all panelists and other NHSG members, regarding all issues raised during the meeting. The discussion was quite limited due to time constraints. The following bullets list points that were made, with no attempt to synthesize the information.

- The hurdle is the market. There are resources and people who want to build houses better, but the market doesn't care.

- A HVAC contractor noted that they don't see Red Rocks Community College-trained people when we are hiring employees. RRCC staff responded that students are typically getting hired before they finish their programs. Companies that are hiring a large number can have flyers distributed to RRCC students. RRCC has a huge job fair annually.

- Community colleges can develop programs without bureaucracy. The community college in Albuquerque (Albuquerque Technical Vocational Institute) teaches house-as-a-system approaches. Students build a high-performance home each year based on Building America standards. Artistic Homes (a well-known high-performance builder) relies on this base of education for employees. They recommend to their contractors to work with the community college.

- "Training is one leg of a multi-legged stool" – it is only one of the components in changing building practice. One builder characterized it as 25% of the effort of making the change from conventional to high-performance building – a critical 25%. He noted training is an ongoing challenge.

- Turnover rates at the management/supervisory level in builders organization are 25 to 35% per year, representing a huge ongoing training need.

Closing

Suzanne Jarboe-Simpson, Facilitator, Fort Collins Utilities

Suzanne thanked participants. The meeting adjourned on time.