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R-TRAC
Meeting # 9
Topic: HVAC Systems and Commissioning
Wednesday September 8, 2010, 3 – 5:30 pm

PARTICIPANTS IN ATTENDANCE

Utilities Green Building Team

Amanda Sutton – Green Building Program Coordinator
Doug Swartz - Green Building Program Manager - Energy Services Engineer
Felix Lee – Green Building Code Project Manager
John Phelan - Energy Services Manager
Kim DeVoe - Energy Services Specialist

Facilitator

Susanne Durkin-Schindler

R-TRAC Members

Company	Representative
Highcraft Builders	Gordon Winner
Aspen Homes of Colorado	Rob Sabin
Dana McBride Custom Homes	Dana McBride
The Green Team Real Estate	Lara Williams
The Group Real Estate	James Mitchell
Sovick Design Builders	Dennis Sovick
Larkspur Homes, LLC	Michael Bello
FCBR	Michelle Jacobs
Crown Jade Design and Engineering, Inc.	Mark Benjamin
Vignette Studio	Terence Hoaglund
National Center for Craftsmanship	Nick Benson
Armstead Construction	Jeff Schneider
Vaught-Frye-Ripley Design	Linda Ripley
The Atmosphere Conservancy	Alex Blackmer
Merten Design Studio	Rob Ross

Building Officials

Jurisdiction	Representative
Larimer County	Tom Garton
Safe Built	Russ Weber
City of Longmont	Chris Allison
City of Fort Collins	Russell Hovland

Subject Matter Experts

Robby Schwarz - Energy Logic
Cory Shortridge - Gary Cooley and Company
Mike Rubala - Platte River Power Authority
Mike Missimer - Robert's Heating and Air

Members of the Public

Alan Cram
Deacon Taylor

Key Points

Announcements:

The 2009 I-code proposal went to council for the first reading and passed by a unanimous vote. The code proposal will go for a second reading on September 21st and be put into effect in October. The green building code will amend the 2009 I-Codes but will not go to Council for a vote until March 2011.

Indoor Air Quality Background - Doug Swartz

Several misconceptions exist about the indoor air quality of homes including: tighter homes have poor indoor air quality, houses need to breathe, if a home is tighter than 0.35 natural air changes per hour then mechanical ventilation is needed, and if people need fresh air they open the windows.

If we want to assure healthy indoor air in a building, a systems approach needs to be taken. It starts with tight construction and pollutant source control which are followed by controlled ventilation, filtration, and detection.

The buildings in Fort Collins are being built much tighter than they used to be. Tight construction can help isolate pollutants from the outdoors, the garage, or the attic. However, tight construction will also slow dilution if not done correctly which is why proper control ventilation is important. Controlled ventilation includes both spot ventilation and whole house ventilation. Spot ventilation is common in homes and is used for

concentrated sources of pollution. Whole house ventilation is used for dispersed sources.

Pollutant source control can also be achieved by tight construction, building material selection, proper selection and installation of combustion appliances, moisture control, and owner education.

Heating and Cooling System Design

The 2009 IRC already requires some structure in the design process around HVAC systems. The green building proposal would require whole house design load calculations as well as room by room design loads. Also, equipment would need to be matched for all components. This all starts on the design end. We want to have a design for the system that is recorded and tested to ensure that the system is operating the way that it was designed.

Committee Comments:

- ENERGY STAR takes into account design temperatures and home tightness in its load calculations. The green building code should do the same thing.

- The software that is used by the system designers allows them to set parameters for different altitudes and temperatures and sensible heat ratios. You have to be able to match the equipment to what the design parameters are.

- It is important to think about how this requirement will impact existing homes. If there is an old house with an older furnace how can the replacement equipment be matched?

Whole House Ventilation

This section would require a whole house, controlled, mechanical ventilation system in all homes. ASHRAE 62.2 was used as a reference for this portion of the proposal. Several different types of systems are available for use with varying costs.

Committee comments:

- If a builder does not build an exhaust only system correctly it could interfere with natural combustion appliances.

- It may be difficult for the builder or owner to set the parameters for the exhaust only ventilation systems. Education would be important for the building owner so they know how and when to operate the system.

- Is the fan going to operate in proportion to how leaky the house is? Ultimately it is up to the occupant. Incorrect operation of the system could result in a negative pressure in the home all of the time.

- If a house is depressurized the air being pulled in will be from the garage if no additional garage sealing requirements exist. Also, the 2009 IRC no longer requires a self closing door for garages. This needs to be addressed.

- ASHRAE 62.2 requires that the exhaust fan runs 24-7 unless the fan runs at a higher cfm. Most homes that are running continuous ventilations systems are at 40-80 cfm.

- If the home is built tight, the builder may need to introduce strategically placed, filtered inlets for air. This method could eliminate the need for a fan if done correctly.

- Energy recovery ventilators (ERV) could be used but it is a higher cost option.

- The market drives how well contractors do the job. PRPA started a program for HVAC contractors and part of that program was to sign a contract saying that they will work at industry standards. Only 10% of contractors were willing to sign the contract. All contractors can install systems this way, but it is going to take more time and money. Training is going to be important.

- Another option could be to use a supply only system where the furnace fan is used to pull in fresh air. Old air is pushed out through cracks or through spot ventilation.

- Systems need to be kept simple. When a house changes owners, the new owners will not know how the system works. The systems need to be simple and durable.

- Many people think that you must use active systems for ventilation. Passive systems have been around for hundreds of years. It is not absolutely necessary to have a mechanical system in the home to have effective ventilation.

- Is there a way to meet ASHRAE 62.2 without depressurizing the home and still meet energy use requirements?

- Some low wattage fans exist but they are expensive. If you integrate the systems the concerns about bringing in pollutants from the garage can be reduced.

- How is this going to impact the builders that are not thinking about a home from a systems approach? They just want to do the bare minimum to pass code. More attention needs to be given to how the IRC and green building code can work together (ex. Garage walls)

- Most contractors want to do the right thing but do not know how or why. Training is extremely important for contractors, real estate, homeowners.

Safe Combustion Appliances

Many homes in Fort Collins have atmospheric combustion appliances such as water heaters, furnaces, gas stoves, and fire places. Generally those appliances work well, but occasionally they do not which can be fatal to the homeowner. The green building team is proposing that atmospheric combustion appliances be prohibited in Fort Collins.

Committee Comments:

- Several countries no longer sell atmospheric combustion appliances due to the potential dangers associated with them.

- This is not something that can be easily done in a remodel or retrofit. It will be an added expense to the homeowner.

- This can increase the costs of a home, but it all goes back to occupant safety. How much is that worth?

Efficient Air Handler Blower Motor:

Conventional air handler units can use between 400 and 1000 Watts. These can be one of the largest energy users in a home. In a well designed system, with some of the newer technologies electric costs can be cut in half.

Committee Comments:

- Several 0.5 hp motors exist but they are limited in the amount of air they can move; most houses require larger motors. Options continue to be limited.

- Many manufactures are not including this in packages. In some cases, replacing the motor will make the warranty invalid. However,

technology is improving and many manufactures are working on including energy efficient fans.

Efficient Bath Fans

This option would require that only ENERGY STAR bath fans be installed in homes. Another option would be to require this only if the bath fan is used as part of the whole house ventilation system.

Committee Comments:

- This would not be a difficult thing to require. ENERGY STAR fans are readily available and cost competitive. Many builders install them already.

Duct Work installation

The goal of this requirement is to get the builders doing poor installation to improve their practices. Many homes in Fort Collins are already doing a good job of installing duct work. However, poorly installed duct work can have several negative impacts on HVAC systems and spot ventilation. It is important that it is done correctly.

Committee Comments:

- Could apply requirements for bath fans that are similar to the existing duct work installation requirements for dryers.

- Flex duct is not a bad product if it is installed correctly.

Commissioning:

This is a process that starts with the design of the HVAC system and carries on through the installation. Staff is proposing that the HVAC contractor test their work to make sure it works the way that it should. The contractor would test their own work and fill in documentation to turn into the building department. If the test fails, they would need to fix the problem and then retest the system. The City would have the right to perform spot checks at any time.

Committee Comments:

- The proposed code would make a lot of sense because the contractor can come in and test the system and easily fix problems that arise since they are the ones who installed it in the first place.

- For new construction, HVAC contractors will do initial testing pre-drywall and fix problems. The testing is also done when the project is completed for the AC and furnace commissioning.

- Training would be required to ensure that contractors know how to commission their own work.

- The type of testing required is important. Some commissioning equipment is more sensitive than others.

- Forcing general HVAC contractors to commission their equipment may create a system that is ineffective.

- This would be very difficult for retrofits and remodels.

- The consequences for dishonest contractors and enforcement of the code are important. This needs to be enforced so that the quality is the same across the board.

- There is no way for the City or County to enforce the building codes for contractors that are not licensed. It is also difficult to fine these contractors.

- Third party verification is great but it adds cost to the project.

- The City should consider formalizing a process to determine which contractors can install systems in Fort Collins.

- The City of Parker, Colorado is letting the market drive the commissioning process. If the contractor cannot meet the requirements they cannot work in that jurisdiction. They also have a testing protocol and format sheet.

- The green building team should also consider some requirements for boiler systems in the green building code.

NEXT MEETING

September 22, 2010 – R-TRAC Meeting #10
3-5:30 p.m. City of Fort Collins Streets Facility