

**Utilities**

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C-TRAC**Meeting # 5**

Topic: IgCC Chapter 5 and 6

Wednesday June 30, 2010, 3 – 5:30 pm

PARTICIPANTS**Utilities Green Building Team**

Amanda Sutton – Green Building Program Coordinator

Felix Lee – Green Building Code Project Manager

Gary Schroeder – Energy Services Engineer – Commercial GB Code Review

Doug Swartz, Energy Services Engineer, Green Building Program Development Manager

Facilitator

Susanne Durkin-Schindler

C-TRAC Members in Attendance

Company	Representative
Beaudin-Ganze Consulting Engineers	Corey Rhodes
BHA Design	Angela Milewski
Brinkman Partners	Josh Guernsey
Dohn Construction	Doug Dohn
Institute for the Built Environment	Josie Plaut
Nolte & Associates	Jeff Giles
Starwood Construction Mgmt	Sandy Willison
Greg D. Fisher, Architect	Greg Fisher
Trane / IFMA	Matt Horner
Architecture West	Steve Steinbicker
PSD	Pete Hall
Bella Energy	Rick Coen

Building Officials

City of Longmont	Chris Allison
City of Fort Collins	Russell Hovland

Key Points:

Updates:

City Council Work Session - July 13th.

Council Overview - Doug Swartz

The Green Building Program will be an agenda item for the July 13 Council Work Session. Staff will present suggestions on the future direction of the Green Building Program and ask council for their feedback.

Staff will recommend that the green building codes be written and implemented in a similar format. Right now the IgCC is written in code format and the NGBS is a rating system. Staff will also recommend that efforts are focused on key sections that are going to make the most difference, are cost effective, and will help the City reach its overall goals. The TRACs and Staff will go through the code templates and find the "keepers" to include in the code. These provisions would be mandatory and become local amendments to the 2009 I-Codes that will be enforced by the City. The existing City codes and standards are going to be used as anchors for the green code. The green amendments will help raise the bar.

Another recommendation for the voluntary piece of the program to be handled through a third party verification system. Other incentive suggestions from the committees are also going to be presented. These include:

- Fee reductions for stormwater reduction and quality measures
- Flexibility within the code for Green projects
- Subsidies
- Tax increment reimbursement
- Fee-bates

Even if we do not adopt the code template it is still important to go through the IgCC because it is going to be informing the process. Some practices in the IgCC will be adopted into existing codes.

Committee Comments:

- Energy, water, and performance are the key issues that are being addressed. Waste management and reduction are lacking in existing code. Those sections should not be thrown out; they are still important.
- If there is no option for electives to be included in the code then maybe the committee should go back and take a look at some of the resource and materials chapter sections again to make sure nothing important was left out. Materials represent about 15% of the carbon impact of a building. As a

building becomes more efficient, the carbon impact of the resources used to construct the building represent a higher percentage.

- Construction waste management is going to be one of the goals that staff is going to recommend to council as a first step in getting things started. We should also look at construction waste reduction to reduce the total amount of waste and not just looking at recycling. We could look at weight by building type.
- This type of program is only going to work if the incentives are real and valuable. If these do not exist, then there is nothing there to get people to go above and beyond the code.

Chapter 6 Overview - Gary Schroeder

Chapter 6 introduces a concept called Total Annual Net Energy Use (TANEU) which compares the energy use of a building to a baseline building. The ICC is not planning on using the same calculation in the 2012 codes. Staff is recommending that we use a system that is based on an Energy Use Index, such as KBTU per sq ft.

Committee Comments:

- The TANEU calculation is saying that the new building needs to be 10% better than the baseline. Why don't we just say that instead of introducing a new and potentially confusing equation?
- The 2009 IECC has an option that allows the jurisdiction to use site energy use as a measurement tool for efficiency. It may be easier to stick with the calculation used in the 2009 IECC.

604.3 Energy Distribution Design Requirements

This section is requiring that all major systems be on separate meters (HVAC, lighting, etc). This can be helpful when trying to measure the energy use of each system.

604.4 Energy Type Metering

This section requires that each type of fuel used in the building be measured on a separate meter.

Committee Comments

- If these sections became requirements the size of the building would need to be a consideration so that this measure is cost effective. This may not be

efficient or cost effective on smaller buildings. 25-30,000 sq. feet should be the minimum size where this is required.

604.6 Minimum Energy Measurement and Verification

This section requires that meters and sub meters be connected to a data management system. One of the challenges with this requirement is finding people who are going to be able to analyze and manage the data. A concern about the usefulness of this data has also been expressed. Staff recommends that this be excluded from the code at this time.

Committee Comments:

- These data management systems are not yet fully developed. They can be difficult to run and there are not a lot of people who can work on them. The systems also need to be able to talk to each other but not all systems speak the same language in today's buildings.
- Data access is also an issue. That information is confidential.
- This may be something that could be valuable in the future.
- This could also be incorporated at some level into the existing utility programs that offer design assistance.
- Committee recommends deleting 604.6 since 604.3 covers the spirit of it.

606.1 Building Envelope Systems: Prescriptive Compliance

ASHRAE is starting to require that building envelopes have a continuous air barrier. This is a high value item that can be very expensive to correct if not done properly during the construction of the building. There may be some additional training and costs associated with requiring this section, but there are a lot of benefits.

The suggestion from staff is to build upon the IECC and use the ASHRAE 189.1 Language (Appendix B) to amend the code. It may be a good idea to include testing as part of the code requirement.

Committee Comments

- Need to be careful about not creating stagnant buildings. This could increase the amount of air that is being pulled into the building through the economizers which needs to be heated.

- The problem that is occurring with some buildings is that the indoor air is moving through the walls - which it is not supposed to do - and creating condensation which can lead to mold and other problems.
- Right now, engineers do not account for the air that is moving through the walls. They assume that the building is sealed because that is what they have to do. Implementing this requirement would not affect the way that systems are designed for buildings.
- There is definitely going to be education required to bring the building community up to speed on how air barrier systems work and are installed. Once builders know how to install this type of barrier the costs will be less of an issue.
- It may be important to test buildings to make sure that they are reaching a certain level of compliance. If we adopt the ASHRAE standard, testing would be required.
- The size of the building would not impact the costs of this measure. It is important for both small and large buildings. The cost of installing the barrier would be linear to the size of the building.
- It may be too expensive to require testing of all buildings. Testing during the construction phase can be expensive because you have to shut down construction during the testing period.
- This is something that is important. The testing would provide a good stop gap measure during construction that would help ensure that things are done correctly. There are smaller level tests that can be done so that the whole building does not need to be tested.
- It is not the sole responsibility of the builder to make sure that the building performs the way that it is supposed to. The builder builds to the design. If the building does not pass the test - who should be responsible for the costs associated with fixing it?
- There is going to be a learning curve that will decrease as contractors learn how to build in a way that passes the tests. After figuring out what causes leaks and what doesn't work this process will become easier for builders. Testing may not even be required after a certain point.
- Residential builders may have more control over the design of the building than the commercial sector. Also, tests tend to extend the length of the construction period. However, the only way to see if the

building is performing the way it should is by testing it. Models do not always represent what is actually happening in the real world.

- ASHRAE references an ASTM test and has specifics about how to create a tight air barrier. IgCC references building tightness but is not well defined. The IECC is not as restrictive as the IgCC in regard to air barriers and sealing.
- Another option would be to take the air sealing requirements in chapter 4 (multifamily - 402.4) of IECC and move it to chapter 5 (commercial) instead of bringing in an outside exception or code. The chapter 4 requirement is in-depth and prescriptive. The chapter 5 description is very general.
- Could also take a piece out of ASHRAE and amend the code instead of referring to ASHRAE.
- Don't know how you can have a green building code that doesn't include this section.
- The cost of the recent envelope investigation for 215 N. Mason was about \$10,000. That cost should be less during the construction phase. The costs and benefits study will help answer some of that.
- The IECC offers compliance paths for blower door testing or visual inspection. That helps reduce the cost impacts for projects.
- Could have a prescriptive method that lays out specific methods for meeting the requirement. There could be a performance path that requires testing. This would apply to builders who are using different/innovative technologies.
- The IgCC chapter that talks about building envelope also has regulations on several other aspects of the building. Some of that is good, but some of it is over the top and is more restrictive than a lot of other codes.
- Staff is not planning on making all of the additional requirements of the IgCC mandatory. The IECC will serve as the base code and the selected requirements from the IgCC will raise the bar.
- It may be important to promote better U-Factor and other limitations on glazing with the option for the builder to "buy out" in other ways if they don't meet those requirements. For example, if the glazing is not as efficient, then the other systems would need to be more efficient to compensate.

- o The IgCC is very vague on these requirements yet the requirements are set higher. The IECC gives a lot of information about how to meet the requirements and is raising the bar from current codes.
- Insulation is also an important consideration for this section. Insulation is integral to the air barrier topic and ties into the systems integration piece of the discussion.

The committee agrees that building envelope systems are important to implement as a requirement, but there needs to be a big educational component involved. Green building staff will have to figure out the details. The committee would like to keep this in the code at some level.

607.4 Duct and plenum insulation, sealing and testing

This section requires that supply and return air handling systems components are insulated and sealed. This section also states that the "joints, longitudinal and transverse seams and connections in ductwork and plenums shall be leak-tested."

It is the suggestion of staff that this section be made code.

Committee Comments:

- This is not something that is currently tested unless there is a problem. It would take time and money to implement this as a requirement.
- This is not currently required as part of the commissioning process for LEED.
- This may be a lost opportunity once the building has been completed. It is very expensive to go back to test and make corrections.
- The main, high pressure ducts coming off of the air handlers are commonly tested on larger projects.
- The City already requires testing and commissioning of the HVAC system for new buildings and tenant finishes in new core and shell spaces. This is not required in remodels. A third party test and calculation is submitted at the time that the contractor is applying for a C.O. The proposed design CFM and the final calculation rate of the air flow are reviewed. This was the amendment to the 2003 code adoption. That testing looks at the air that is being delivered but not necessarily the amount of air that is being lost. Duct testing would give a more realistic

view of how the ducts are operating. The tests are not being applied to any existing buildings. Most testing being done is done by a third party verifier.

- o The City definition of commissioning is actually a third party test and balance of the system. It is really more of an air balancing report. It does not necessarily test the ducts.
- There could be a prescriptive method for sealing the duct work. If that is not done then it needs to be tested.
- The current code is only dealing with high pressure systems. Most of the systems being installed are low/medium pressure buildings which are not covered in the IECC. This requirement should apply to medium/Low pressure systems as well.
- Testing could be per the SMACNA HVAC Air Duct Leakage Test Manual.

607.7 Variable air volume (VAV) fan control.

This section is requiring that individual fans that are 1.0 horsepower or greater meet certain requirements such as variable speed drives, variable pitch blades or control devices. The IECC requires this for fans that are 10.0 horsepower or greater. There is a big difference between the two codes.

Committee Comments:

- The energy that you consume is the cube of the air that you are moving. If you reduce the air flow by half you reduce the energy to $1/8^{\text{th}}$. This can make VAV fan controls a high value item. That being said, requiring this on a 1.0 hp motor would be difficult because a lot of manufacturers do not make them for smaller air handling units. This is not something that is widely used.
- It may make more sense to do this on a unit tonnage basis as opposed to a horsepower basis, since there is a tonnage breakpoint above which manufacturers offer VFD drives.
- The efficiency of a VAV unit depends on the application. It may not result in energy savings if the system is not applied or controlled correctly. It may not make sense to require this for all buildings. However, it may make sense to require VFDs on pumps in place of balance valves for energy savings on constant speed applications.
- LEED references the 2007 ASHRAE 90.1 which uses a VAV unit as a baseline on buildings over 25,000 sq. ft.

- o The only problem is that if you choose to use a section of ASHRAE you have to comply with ASHRAE in its entirety. You cannot pick and choose. Note: We may be able to amend existing code to include ASHRAE language.
- A square footage requirement may be more reasonable. Again it would depend on the application. That may not be appropriate for labs or hospitals that need to have constant air changes.

Homework:

Review Chapter 6 in the IgCC.

NEXT MEETING

July 21st – C-TRAC Meeting #6:

3-5:30 p.m. City of Fort Collins Streets Facility

Comment for next meeting:

Efficiency of space: Revisit the vestibule issue. What are current requirements for vestibules? How do the different codes compare?

Appendix A

Staff Presentation