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**R-TRAC
 Meeting # 11**

**Topic: Draft Code Proposal Review
 Wednesday October 27, 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
 Kim DeVoe - Energy Services Specialist

Consultant

John Butler - The Brendle Group

Facilitator

Susanne Durkin-Schindler

R-TRAC Members

<u>Company</u>	<u>Representative</u>
Aspen Construction	Gil Paben
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
Fort Collins Board of Realtors	Michelle Jacobs
Crown Jade Design and Engineering, Inc.	Mark Benjamin
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
City of Fort Collins	Mike Gebo

Members of the Public

Alan Cram

Updates

Upcoming Meetings and Events:

- ◆ GBPAC meeting #3 - November 17th from 1-3 pm at Streets
- ◆ Green Building Open House - November 17th from 4-7 pm at Streets
- ◆ City Council Work Session - December 14th

Green Building Code Proposal Review - Doug Swartz

This meeting is focused on looking at the prescriptive code that has been developed over the past six months of meeting with the committee. Staff greatly appreciates the time and effort that each committee member has put into this process. Committee feedback has been extremely valuable in developing this code proposal.

Staff is working on completing all of the necessary research for each green building practice in the code proposal to ensure that we have a handle on the details of each before taking the proposal to City Council in December. All of the research and background materials that are being developed by staff will be available on the website as soon as they are ready. Staff will continue to work on the details and summaries in conjunction with the public outreach that will be taking place in November.

The website will include information on the process that has led to the code proposals, code proposals at a glance, and an overall cost and benefit summary. Both the commercial and residential code proposals will be on the website and each practice will have a link to more detailed information. Committee members as well as the public are welcome to comment on the code proposal through e-mail, phone, or website.

In July, City Council directed staff to include measures in the green building code in more areas than energy efficiency. Staff tried to select a range of green building practices to include in the code proposal. Some stakeholders would like to see more included in the code and some would like to see less. Staff is trying to find a good point of compromise that will result in positive changes in the building community. The code proposal is written in plain English as opposed to code language. Staff will write code language after getting additional direction from Council in December.

Code Proposal Review

Staff would like to go through each green building practice in the proposal and make sure that the committee members understand what each practice means. Also, this is an opportunity for committee members to voice any concerns about the proposal.

Construction Waste Management

This measure would require that builders submit a recycling plan at development review and then implemented on site. Recycling will be required for wood, metal, concrete and cardboard.

Committee Comments

- ◆ The recycling requirement would apply to additions and remodels. Recycling may be more difficult for these projects.
- ◆ The recycling requirements would not include deconstruction.
- ◆ It is important to think about how these codes will apply to additions and remodels.
- ◆ The enforcement and inspection of the requirements will be carried out by the building department. Staff is still working on figuring out the details.
- ◆ Development review works for large projects but may not work for lot infill projects.
- ◆ Could dumpsters be sorted offsite? In some cases, having too many dumpsters on site can create obstacles. Some recycling companies will allow single stream and then sort the materials offsite.
- ◆ If the City sets no minimum threshold there will be zero compliance. 25% diversion rates would be reasonable and motivate all workers on site to recycle. Recycling is not a new concept in Fort Collins.

Certified Wood

Require Forest Stewardship Council (FSC) certified wood for all tropical hardwoods used in a project. Dimensional lumber will need to be certified by a sustainable forestry program approved by the Building Official. This requirement will be an option for City Council separate from the rest of the code proposal.

House Size

This is an idea that is going to be presented to City Council as an option. Staff has not spent a lot of time developing this requirement. The idea is to increase the required efficiency in relation to increasing floor area.

Committee Comments

- ◆ This is going to be difficult to do, but is the best item that should be done! One option is to use HERS rating based on square footage. For example, Homes under 2,000 sq.ft.= no change, 2,501-3,500 sq.ft.= HERS 70, 3,501-4,500 sq.ft.=HERS 60, Over 4,501 sq.ft.=HERS 50.

Air Sealing: Tight Construction and Verification

The 2009 standard adopted by Fort Collins in September list 7.0 air changes per hour at 50 pascals. In Fort Collins, we are building houses that average about 3 air changes per hour. The proposal is to set a maximum at 4.0 air changes per hour. This requirement will be verified by visual inspection. Spot testing can be done if necessary.

Committee Comments

- ◆ The previous code in Fort Collins required prescriptive list or blower door test. Not requiring a test is another step back.
- ◆ Need to reinstate the requirement for self-closing door between house and garage.
- ◆ If an ACH50=4 is required, will balanced ventilation also be required in order to protect indoor air quality?

Building Envelope: Thermal specification for electric heat homes

This would require that electric heat homes meet higher specifications that are beyond the 2009 code. Another option for City Council would be to push prescriptive specifications for gas-heat homes. The economics at today's energy prices are not strong, but that is not to say that gas prices will not go up in the future.

Basement Windows

This section requires that basement windows meet comparable performance to windows installed on main levels.

Committee Comments

- ◆ The 2009 IRC and IECC require the same U-value and does not differentiate between upstairs and basement.

Insulation: Installation and Verification

The section requires that insulation is installed to RESNET Grade I standard. If insulation is not installed correctly then it may not perform at it stated r-value. If rigid insulation is installed on the exterior of the home then cavity insulation can meet RESNET Grade II.

Windows, Skylights, and Door Installation

This section requires increased detailing regarding integration of fenestration with exterior drainage plane. The window manufacturer's installation instructions will be referenced as a guide to proper installation.

Committee Comments

- ♦ Will framers have to have an American Architectural Manufacturers Association (AMMA) or other certification to install windows?
- ♦ How will that be inspected?
- ♦ The sill drainage seems to be where a lot of problems occur with installation.

Heating and Cooling System Design

This section sets requirements for heating and cooling system design which include heating and cooling design load calculations that include room by room loads, matching of evaporators, condensing units and furnaces, and documentation of key design parameters.

Committee Comments

- ♦ How will this requirement apply to supplemental cooling systems for second floors, etc? Those systems are not intended to heat/cool the whole house.
- ♦ How will this apply to additions and alterations?

Heating and Cooling Systems: Efficient Air Handler Blower Motor

This section would require that only air handlers with efficient (DC) motors be installed. Additional cost/benefit analysis is being done. This is one of the few, clear electric saving measures on the list. Staff is also considering an exemption for small motors. In most cases, an efficient motor will result in about 50% reduction in energy use. These motors are becoming more and more available and common on equipment.

Ductwork Installation

This requirement is designed to ensure that systems are designed, installed, and working properly. Requirement would be to have a visual inspection to avoid ductwork installation details that severely compromise air flow and/or lead to significant heat loss/gain.

HVAC Systems Commissioning

This section would require commissioning of the HVAC systems to make sure that it works the way that it was designed. This requirement references ACCA 5 Quality Installation procedures and is expanded to include ventilation

systems. Testing will be performed and documented by HVAC contractor that have received approved training and certification.

Committee Comments

- ◆ You will need to make sure that there are enough contractors who can perform this job before mandating it.
- ◆ This is going to increase costs for the builder. Some will take it seriously, and some will not. How will the City ensure that this is actually done to the standard? Man hours are the easiest place to cheat out to reduce costs. The requirement needs to have strict enforcement.

Solar Applications

This is an option for City Council. Staff will develop the requirement more based on the feedback received at the December Work Session.

Committee Comments

- ◆ Would this apply to active and passive solar?
- ◆ Will payback information be presented to Council? There is not quick payback with solar.
- ◆ PV systems are only 10% as efficient at providing energy as thermal systems.
- ◆ The investment required for solar could be spent in other areas of the home that would have a bigger impact.

Water Efficient Fixtures

This section requires that toilets, showerheads, and lavatory faucets meet the EPA WaterSense standards. These products are readily available and cost competitive to conventional fixtures.

Committee Comments

- ◆ Some showers fixtures have more than one shower head.
 - The same rules would apply to those situations. Maximum flow means maximum flow. If there are more shower heads then the maximum flow is divided among them.

Safer Combustion Appliances

This section would prohibit the installation of atmospherically vented combustion appliances. Allowed alternatives would include power-vented, sealed-combustion, or direct-vent appliances. Sealed combustion equipment must be installed with hard-piped combustion air and sealed exhaust. For existing homes, combustion safety testing will be required when equipment is

replaced or when major changes are made to the home (insulation, air sealing, etc.) The equipment will need to pass the combustion safety test under natural conditions.

Low VOC Materials

This section requires that major interior materials meet VOC emissions limits compliant with California Department of Public Health CDPH 01350 or other approved emission standard. Materials that would need to meet these requirements include sealants, adhesives, resilient flooring, paints stains, varnishes, and other site-applied finishes. In addition, all structural wood panels, hardwood, veneer plywood, particle board, and fiber board building products will need to meet the U.S. Department Of Commerce PS-1 and PS-2 standards.

Committee Comments

- ◆ Staff needs to be clear about how this requirement will be verified and enforced.
- ◆ Are all of these products clearly marked with the emission levels?
- ◆ How is staff going to know what products are installed before or at time of permit submittal?
- ◆ Will certified and low VOC dimensional lumber and sheathing need to be specified on structural plans?

Whole House Ventilation

This section would require whole-house, controlled, mechanical ventilation systems that are designed to meet ASHRAE 62.2 requirements. The key design parameters would need to be documented and bath fans used as part of the system must be ENERGY STAR qualified.

Committee Comments

- ◆ Education and training is going to be required to ensure that this is done correctly.
- ◆ This requirement should be tied to #16 and require a combustion safety test on ALL whole house systems.
- ◆ This is a catch 22. If we have to meet 62.2 the rater software gives a watt allotment for ventilation. This number of watts is very low. The only form of compliance is an expensive, high efficiency fan. Also, this will negatively pressurize the house and the air being brought in may not be the best quality.

Exterior Lighting: Fixture Design

This section requires that dark-sky friendly exterior lighting fixtures be installed for outdoor lighting. The City will define the parameters that fixtures must meet to comply with this requirement.

Building Owner's O&M Manual

This section would require that the building owner receive a manual for all 1 and 2 family dwellings. Staff is still trying to determine the best format for this manual to help ensure that it will stay with the home if ownership changes.

Committee Comments on Code Proposal Overall:

- ◆ No items in particular seem like they would be a problem. It would be great to see some order of what has the best payback.
- ◆ Concerned about a prescriptive code. Certified wood, DC blower, commissioning, and safe combustion are adding cost to the house.
- ◆ Cost is a big deal - especially in this economy. Number 18 (whole house ventilation) is a big concern because you are requiring a high efficiency, expensive fan because that is the only way to meet energy requirements. Also, this negatively pressures the house and essentially gets rid of heat recovery ventilation systems in Fort Collins.
- ◆ Electrical efficiency seems like it was left out of the code proposal. Energy efficient lighting package not addressed. Could include requirements around auto controls and phantom load controls. These options could be easy and low cost.
- ◆ Electric heat vs. gas heat requirements may push people to use a non-renewable energy (gas) as opposed to an electric system that could be powered by renewable energy.
- ◆ The code is not too heavy handed. Makes improvements but won't create a big push back. Convince the council that this is a good place to start and then monitor it to make sure it is working and how it could be improved.
- ◆ From the enforcement side this is all very doable. This is going to increase cost on the industry's part. Would like to have the building department verify as opposed to third party verification.
- ◆ Builders may have a hard time verifying or proving that materials are low VOC or certified wood. When do additions or remodels come in? Whole

house ventilation should be considered when looking at HVAC system design. It is not a simple, stand alone thing.

- ◆ Concerns about the cost to the customer and impacts on affordable housing. For someone who is just getting into the market, a big upfront cost may be too much and drive them out of the community. Remodels need to be addressed. Cost and length of inspections is a concern. This will be a lot of information for the inspectors.
- ◆ Recycling plan needs to have a template to provide consistency. Insulation installation is a judgment call on behalf of the inspector. Commissioning should be verified by the City. Low VOC material list is going to be difficult to verify and enforce.
- ◆ Implementation - will it work out in the field? This may limit the client in their selection. The builder has little control when it comes to interior lighting/material selections.
- ◆ If City Council wants a prescriptive code then this is a good start. The points based system would force people to look at green building from a broader perspective. We have spent a lot of time on new construction - how is this code going to affect remodels and infill?
- ◆ Some sections may be more appropriate to incentivize instead of mandate. Points based system fosters creativity.
- ◆ Did not see any mention of tankless water heaters. Regular water heaters have a 10 year lifespan whereas tankless water heaters have a 20 year lifespan.
- ◆ The code is well balanced and hits a lot of different topics. Remodel aspect of the code is huge. Training and education are important and should be considered for the implementation plan. Will the VOC requirements really have that much of an effect? Perhaps the code should focus on the material that off gas for the longest period of time.
- ◆ The code proposal should also include future items that staff would like to include in the next version. This will allow the market to plan ahead and possibly change faster than the next round of code adoptions.

Staff will consider the committee's comments as the code proposal continues to develop. Additional information will be sent to the committee as it is completed. The committee can provide feedback and comments to staff at any time.

National Green Building Standard as an Alternative Compliance Path - John Butler

See Presentation in Appendix A

An alternative compliance path exists in the current residential code. It is called the simulated performance alternative (SPA). You use a performance model to demonstrate that the way you propose to build a building is equivalent to the prescriptive code. This path only applies to energy performance. Staff is working to determine which prescriptive green building elements would apply for the alternative compliance path.

The Committee expressed interest in using the National Green Building Standard (NGBS) as an alternative compliance path. A subgroup was convened to discuss the likely options that builders would take to meet the different levels of the NGBS and assign costs to each (lot design was not included in the exercise).

The baseline was established using the 2009 International Residential Code and current building practices. The baseline home did not reach the point levels required for the Bronze level in the Resource Efficiency, Water Efficiency and Operations and Maintenance categories. The point requirements for Bronze were reached in the Indoor Environmental Quality and Energy categories.

The upgrade paths were based on the most practical and most likely measures. The group found that a significant amount of extra work and effort were needed to reach the Gold and Emerald Level of the NGBS. It is important to remember that it is the responsibility of the builder to document and keep track of each measure that is implemented. Once the scenarios were defined the costs associated with each path were estimated. The cost ranges used were no cost (0-\$50), low (\$50-500), medium (\$500-1,000), high (\$1,000-3,000), and very high (\$3,000 and up). The ranges were then broken up to low, medium, and high to help the group narrow in on costs.

A fixed cost was assigned to the project overall because there would be additional costs associated with the NGBS for administration and third party verification. This cost was estimated to be between \$1,500 and \$2,500. Some of the cost ranges for each level overlapped which is representative of what the differences in cost would be for builders in Fort Collins. Additional costs associated with each level are as follows: Bronze: 1-3%, Silver: 4-9%, Gold: 8-19%, Emerald: 17-42%. These are overall total costs which would result in a higher mortgage payment but would result in lower operations and maintenance costs and lower utility bills which is not currently reflected in this study.

The next steps for this project include comparing the draft prescriptive path with the NGBS to see how the NGBS could be used as an alternative compliance path and determining the payback associated with each level.

Committee Comments

- ♦ Silver Level looks like it would be the best value.
- ♦ Value of energy efficiency product is not being seen as a value to appraisers and is not reflected.
- ♦ This can be difficult because when you are a leader, no one knows what you have because there is nothing to compare it to. May not get the true value initially.
- ♦ Energy savings values under each of the levels. How would the energy savings add up over the life of the mortgage?
- ♦ This model includes all green aspects and not just energy savings.
- ♦ It would be nice to see a third option for alternative compliance based on ENERGY STAR or a lower HERS rating.

NEXT MEETING

December 1, 2010 – R-TRAC Meeting #12

3-5 p.m. Fort Collins Utilities Service Center - 700 Wood St.

Appendix A

Presentations

NGBS Benchmarking Progress Report

RTRAC Meeting
October 27th, 2010



Engineering Sustainable Change

NGBS Benchmark Subgroup

- Objectives
 - Establish baseline – 2009 IRC + standard practice
 - Scenarios for NGBS levels (Bronze, Silver, Gold, Emerald)
 - Cost range by level
- Subgroup participants
 - Gordon Winner - Highcraft Builders
 - Terence Hoaglund - Vignette Studios
 - Rob Sabin - Aspen Homes
 - Chris Allison – City of Longmont
 - (Dennis Sovick – Sovick Design Builders)
- Met three times in Sept/Oct
- Spreadsheet results available



Engineering Sustainable Change

NGBS Review

- NGBS Required Points – Table 302
 - Chapter 5 – Lot Design not included

Ch.	Topic	BRONZE	SILVER	GOLD	EMERALD
6	Resource Efficiency	45	79	113	146
7	Energy Efficiency	30	60	100	120
8	Water Efficiency	14	26	41	60
9	Indoor Environmental Quality	36	65	100	140
10	Operation, Maintenance & Education	8	10	11	12
	Extra Points from any category	50	100	100	100
	TOTAL (w/o Ch 5)*	183	340	465	578



Engineering Sustainable Change

Baseline

- 3,200 sf ranch
 - 1,600 sf main level over 1,600 sf basement, 3 bedroom, 2 bath
- 2009 IRC + Current Practice
 - NGBS score – 131, need 52 points to reach Bronze

Chapter	Topic	Baseline	Bronze
6	Resource Efficiency	42	45
7	Energy Efficiency	42	30
8	Water Efficiency	3	14
9	Indoor Quality	42	36
10	O&M & Education	1	8
	Additional Points	n/a	50
	TOTAL POINTS	131	183
	Point Status	-52	



Engineering Sustainable Change

“Most-likely” Upgrade Path

- Most practical
- Most likely

# of Practices	BRONZE	SILVER	GOLD	EMERALD
Incremental	15	31	29	19
Total compared to baseline	15	46	75	94



Engineering Sustainable Change

Example GB Practices

BRONZE	SILVER	GOLD	EMERALD
<ul style="list-style-type: none"> • Recycling facility • ES dishwasher • 1.5 gpm lav aerators • 1.28 gpf toilets • Bath fan timer • MERV 8 filter • Plumbing in cond space • Owner training and owners manual 	<ul style="list-style-type: none"> • Compost facility • Recycled content • Recycle materials • +10% insulation • ES windows • 92% furnace • Power-vented water heater • ES clothes washer • 3 ACH50 • Garage fan 	<ul style="list-style-type: none"> • Optimized material use and layouts • +20% insulation • 94% furnace • Whole house fan • Tankless WH • Sun-tempered design • Passive cooling • 2 ACH50 • Low vol irrigation • Low VOC paint 	<ul style="list-style-type: none"> • Prefab components • Recycled content • Construction waste on-site recycling • Certified wood • Solar PV • 1 ACH50 • Energy monitor • Gray water system • Low formaldehyde cabinets • HRV



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NGBS Scenarios

Ch.	Topic	Baseline	BRONZE	SILVER	GOLD	EMERALD
6	Resource Efficiency	42	59	80	114	146
7	Energy Efficiency	42	46	119	183	221
8	Water Efficiency	4	28	40	48	61
9	Indoor Quality	42	61	97	125	139
10	O&M & Education	1	9	11	12	13
TOTAL POINTS		131	203	347	482	580
Point Status		-52	20	7	17	2



Engineering Sustainable Change

Costing Approach

- Categorize costs
 - Ranges: no, low, med, high, very high
 - Assign cost range to each category
 - Assign a low, median, and high end cost within each range
- Assign a cost to each practice

Level	Cost Range	Example
No Cost	\$0 - \$50	Indigenous concrete
Low	\$50 - \$500	ENERGY STAR ceiling fans
Med	\$500 - \$1,000	92% AFUE furnace
High	\$1,000 - \$3,000	HRV
Very High	> \$3,000	Solar PV



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Cost Results

- Additional cost to reach each level compared to baseline
- NGBS Fixed Costs – \$1,500 - \$2,500

	BRONZE	SILVER	GOLD	EMERALD
Median	\$4,000	\$14,500	\$31,000	\$65,000
Range	\$2,500 – \$7,000	\$9,000 – \$23,000	\$20,000 – \$48,000	\$42,000 – \$104,000
% Total Cost	1% - 3%	4% - 9%	8% - 19%	17% - 42%



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Cost Results

- Monthly cash flow perspective
 - Higher mortgage payment
 - Lower O+M costs – not yet reflected
- Mortgage assumptions
 - \$250,000 home price
 - 6% annual interest rate, 30-year mortgage
 - \$1,500 monthly mortgage payment

	BRONZE	SILVER	GOLD	EMERALD
Median	\$24	\$87	\$186	\$390
Range	\$15 - \$40	\$55 - \$140	\$120 - \$290	\$250 - \$625



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