

IECC/DGC Energy Committee Supplemental Hearing #8 July 21, 2022

1. Attendees:

Name of CCD Committee Member	Organization	In Attendance?
Eric Browning	City and County of Denver (CCD)	X
Christy Collins	CCD	X
Chuck Bartel	CCD	X
Allen Yanong	CCD	X
Carol Pafford	CCD	X
Courtney Anderson	CCD	X
Katrina Managan	CCD	X
Tom Gleason	CCD	X
Robert Pruet	CCD	X
David Carlson	CCD	X
John Arent	Noresco	X
Kirsten Salinas	Noresco	X
Aaron Esselink	Xcel Energy	X
Linda Morrison	Mead Hunt	X
Mark Jelinske	RMH Group	X
Mike Fulton	Western Mechanical Solutions	X
Paul Kriescher	Bowman Consulting	X
Nathan Skrdla	Brookfield Properties	X
Sean Denniston	NBI	X

2. Meeting purpose: Not going to be able to discuss all proposals in hearing agendas – having supplemental discussions to vet proposals for advancement. Want to be transparent, recording meetings and posting minutes so members of the public can know what we’re talking about.

3. Discussion and voting on IECC/DGC Energy
 - a. #100 DGC NZE Path (CASR & NBI)
 - b. #36 Commercial Grid Flexible Lighting (NBI)
 - c. #P12.3 – Space other than Non-Transient Dwelling Unit (Mike Fulton)
 - d. #62 – Air Barrier Compliance (John – Noresco)
 - e. #4b – DGC Battery Storage (John – Noresco)
 - f. #128 – DGC Building and Mechanical Equipment (Kristen)
 - g. #126 – DGC System Commissioning (Kristen)
 - h. #P6 - Lighting for Plant Growth and Maintenance (David Carlson)
 - i. #P7 - Electrical Service Space (David Carlson)

- j. #70B - Residential Grid Flexible Water Heating for DGC (Noresco)
- k. #12.4 – Fans and Fan Control

#100 DGC NZE Path: Courtney (City and County of Denver)

- a. Proposal overview: Current DGC Net zero energy path requires on-site renewables. This proposal would allow property owners to also off-site renewables on land they own or to use a power purchase agreement (PPA) to purchase off-site renewables to meet this path. To be eligible to use off-site renewables, the property would have to meet requirements in a policy document.

Discussion:

- a. Linda: has language in 1.2.2 been vetted by Xcel?
 - i. Katrina: solar language well-vetted and aligned with Energize Denver. Language in this proposal parallels Energize Denver and Green Buildings Ordinance. Allows integration with all of Xcel's long-term renewable subscription program (supports local development of renewables)
- b. Sean: looks like it would make sense to add appendix SE and PT in accordance with C407.
 - i. Courtney made the edit
- c. Linda: in 701.6.2.1 occupancy - showing proof of zero net energy – documentation shall include the percentage of occupancy. Lots of things change in the way buildings are occupied and buildings have variable occupancy by their nature. Are all other circumstances intentionally excluded?
 - i. Christy: at the time we said zero net energy was using 110% or less of the anticipated energy usage – giving teams a little grace. The desire was to give 10% leeway to allow teams to really make it work.
 - ii. Eric: if we want to include additional what-if's, we'd welcome any reference or language you have or know of Linda
 - iii. Linda: not off the top of my head. From the International Living Futures Institute, they said you will demonstrate you have enough renewables to offset your usage, period.
- d. Christy: the ILFI guidelines are what we looked at originally, so a modified version of their submittal standards are what we share with projects teams who pursue this path
 - i. Linda: I appreciate your stance that this approach is moving to as stringent as the living futures certification
- e. Courtney: any objections for moving this proposal forward to City Council
 - i. No objections from the group

Action Items:

- a. Group agrees to move proposal forward

#36 Commercial Grid Flexible Lighting: Sean (NBI)

- a. Proposal overview: if you use luminaire level lighting controls to comply with controls requirements for lighting, demand responsive controls required as well. It's usually a matter of turning the options on, so they can receive the demand response signal – pretty straightforward. This is for the IECC, not a DGC proposal.

Discussion

- a. Courtney: any objections for moving this proposal forward to City Council?
 - i. No objections from the group

Action Items:

- a. Group agrees to move proposal forward

#P12.3 Space other than Non-Transient Dwelling Unit: Mike Fulton (Western Mechanical Solutions)

- a. Proposal overview: Modification of amendment accepted in 2018. changing from 50% to 60% for enthalpy recovery ratio, and clarifying that's at balanced airflow conditions. Put in factor for unbalanced airflows, that you can adjust the enthalpy ratio. Striking "a bypass" in favor of "bypasses" for products with energy recovery that do not have a control (like a heat wheel) that you can turn the energy recovery off (which can prevent unintentional added loads). Increased pressure drop to 1.1 inches – you can go with higher pressure drop but you would need bypass dampers in economizer mode to get down to that lower pressure. Supply and exhaust fan static efficiency – clarifies it has to meet the table in C403.7.2(1). In tables we lowered the values – we pushed the energy recovery down because it's one of the best ways to get energy efficiency in a building. Modified exception #6 to clarify in our climate zone, heating enthalpy recovery ratio is required. Modified exception #8 to drop threshold from 75% to 60%. #13 – exception for labs (group I) to allow for a lower enthalpy energy recovery ratio

Discussion:

- a. Chuck: if we have an exhaust fan that exceeds one of the table values, the supply air is divided up amongst the multiple RTUs, so there's not as much at a single location, would they still have to provide energy recovery?
 - i. Mike: If the RTU's are below 50%, you would not have to do energy recovery (unless they're 24/7). If you're above 50% and you had, one exhaust that was being served by an area that had greater outside air than 50% than you would.
- b. Chuck: so we're still dependent on supply air to determine if energy recovery applies
 - i. Mike: correct
- c. Mark Jelinske: it's about a system – question should be "what is a system" – if I have a PTAC that has a hole in the wall that brings in 50 CFM, every system has 50 CFM and therefore is not triggered. If I choose to use a DOAS system, now that system essentially has 100% outside air. It's harder to loophole this in Denver than most anywhere else because of exception #8
- d. Chuck: in the lab (I) occupancy exception, recovery methods typically are just sensible recovery. You're just recovering sensible energy.
 - i. Mike: I agree that it should be sensible in our climate, but it's such a big can of worms, but it's almost like you're totally redoing the standard. I'm open to coming up for a plan for that, but since this is what code requires, I wasn't going to wade into that portion.
- e. Mark: I was involved in Mike's process and I've been meeting with some other vendors too, and I passed this by them. They're good with the pressure drop now. I think that might have been the issue before. So, I can say the industry is good with the pressure drops and the values.
- f. Chuck: concerned about the complexity of this proposal, enforcement, how to support the design community to be successful in meeting this. This is a very complex proposal on top of all the other energy proposals that have been adopted this code cycle. Does it seem like we've overcomplicated this compared to what we have today?
 - i. Mark: This can be a problem, especially if you're trying to get away with something. How many hours did you take to figure out the loopholes here? It would be just easier to put in a heat recovery system and be done with it would be my advice to my junior engineers.

- g. Chuck: what about availability of equipment? Based on what Denver passed last time, there's been projects that have had trouble finding energy recovery units. Are off the shelf systems readability available or are these all custom units?
 - i. Mike: let me let me address that - I think that it is supply chain issues. We we've seen it across the board lead times or twice as long as they were. So I absolutely think that that's a part of this. Then the other part is to Mark's point that .6 inches that was in the code previously now is 1.1. Mark, you've run this by other vendors and they said that it was okay right?
 - ii. Mark: Denver is amping it up. This is not this is not the Home Depot energy recovery unit – you could find something to be a greater parasitic loss – this is requiring the good stuff, and I spoke with vendors who can provide the good stuff. This gets interesting at the low end.
- h. Courtney: Chuck do you feel comfortable moving this forward and taking the proposal offline to modify?
- i. Chuck: I feel like we already amped it up last code cycle and this is taking it to a whole other level, and I'm just hesitant right now. I don't feel comfortable adopting this today – there is a lot we need to create to educate and support designers
 - i. Chuck, Mark, and Mike to meet offline to continue to review and discuss proposal
- j. Courtney: Does anyone object to putting this in the hands of the kind of subcommittee here (Mike, Mark, and Chuck) and they can determine what the next right steps are. Understanding we're trying to move it forward, but there's always a possibility that it just does not make it in this code cycle. If the group agrees, the subcommittee can meet with that understanding.
- k. Mike: I would like to suggest that if this doesn't make it forward at the very least what we had in the last cycle makes it forward.
 - i. Chuck: Yeah, I would. I'd support what was in the last cycle moves forward. And possibly even some sort of somewhere in between, but I think it would be worth discussing in a in a subcommittee and maybe reaching out to some of the main committee members like Ken Urbanek and see if he would be willing to sit in and get a fresh set of eyes on this.

Action Items:

- a. Mike, Mark, and Chuck continue to work on this proposal in an attempt to move it forward and pull in other stakeholder, as needed. The subcommittee may modify proposal and move it forward, or they may decide the proposal does not move forward.

#62 Air Barrier Compliance: John (Noresco)

- a. Proposal overview: the intent of this is to clarify the requirements are to not allow compliance prescriptively for air leakage via only identifying either materials or building assemblies and their air permeance. This proposal doesn't change the leakage requirements per se, but it directs people to towards the testing, which is .6 CFM per square foot at 75 pascals and then retesting if they don't meet that leakage rate. The essential elements of this proposal are to #1 eliminate the exception that allows compliance via materials or assembly component performance, and then #2 removing those sections from the prescriptive code. This is a base code measure.

Discussion

- a. Paul K: I just want to be sure when you're saying the .6 standard at 75 Pascals, was that correct? Because the code has long been .4. and the Army Corps of Engineers is .25. That's my experience

on commercial buildings and we've done a lot of them. It's .4, CFM per square foot of conditioned surface area at 75 Pascals. I don't want to inadvertently taking a step back in the 2018 code, I'm quite positive. In Fort Collins it's been .4 and Boulder it's been .4. but if we take it back to the .6, we're going lower than what the Commercial Code has been for very long time and it's not difficult for commercial buildings to meet .4. .25 The Army Corps of Engineer Standard is more stringent, but we still have buildings meeting that at 75 Pascals in Fort Collins and then on army bases and other places like that. I'm just curious how the .6 may have gotten into there, but we should go back and check the IECC has it being .4 CFM per square foot of conditioned floor at 75 pascals.

- i. Sean: the 2021 IECC is .4 and it allows you to fail basically, and if you feel .6 you have to take remedial steps – you can't fall below .6.
- b. Paul K: We've been enforcing .4 in many other parts of the state. .4 is not a difficult standard to meet so long as there's a good design criteria and air barriers clearly called out on the plans. Subcontractors know what they're bidding to get there – it's not a difficult standard. The .25 Army Corps has been more like the high-water mark
- c. John: IECC 2021 standard has .4 CFM per square foot at 75 pascals as a requirement. Should there be a little bit of latitude for projects that fail and retest to a certain level?
 - i. Paul K: I'd advocate that there could be that flexibility if kind of what Sean was alluding to. If you fail at the .4 that you must remedy it to at least a .6. I thought we had it where you could fail, but you had to work toward getting to a .4 and show improvements made
- d. Sean: There is an exception for buildings between 5k-50k square feet for non-group R occupancies from the testing requirement in 2021. If you wanted to make mandatory testing, the simplest way to do that would be to just strike that exception that it's under C402.5.1.2 under #2 – that would be the simplest way to make it mandatory.
 - i. Eric: Yeah, I agree with Sean's query because our current amendments to this section look quite a bit different from what we have here, so I have to echo Paul's comment and concern. Regarding the numerical values for the leakage rates, but John, I think we need to cross reference and check this with Denver's existing amendments in the in the 2019 document for the section 402.5.1.2 and 402.5.1.3. I think a little bit of reconciliation needs to come to that. And I believe that the .4 is an appropriate number that will replace the .6.
- e. Paul: I could be comfortable for, you know, voting on in our next committee meeting if it was .4 as a minimum, giving a latitude that you could be if you fail, you must at least bring it to a .6.
- f. Sean: this language doesn't align with what's in the Denver Energy Code right now and doesn't align with the 2021 IECC. Whatever goes through needs to align with the 2021 IECC because that's the model code that's being adopted.
- g. Courtney: To resolve this and move forward, again acknowledging that this is the last supplemental hearing that we do have scheduled, it sounds like the group agrees that it should be a .4 and give allowance for buildings to fix and get to .6 for buildings those that don't meet that .4 and then for John to go through and verify the right language aligns with the 2021 IECC and the Denver Code amendments
- h. Courtney: does anyone object to what we just stated here?
 - i. No objection

Action Items:

- a. John (Noresco) review proposals for alignment with IECC and update language
- b. Group agrees to move proposal forward with modifications, as discussed
- c. Tom (CASR) follow-up with Paul K. about education and incentives of assisting buildings getting

to the Army Corps standard of .25

#4b Commercial DGC Battery Storage: John (Noresco)

- b. Proposal Overview: would require projects that are required to have a PV system would also be required to have some level of battery storage system onsite. For every watt of PV that's DC installed on the roof, you would have 1.68 watt hours of battery storage available onsite. Batteries should be used for demand response, shift the energy loads, and limiting exports such that exported generation is no more than approx. 20% of the entire production of the system

Discussion:

- a. Carol: trying to understand the exceptions – appearance of conflict between square footage and size of the PV system (exception #3 vs exception #1)
 - i. John: the intent of exception #1 is that if you're installing a low-capacity PV system, the energy storage system wouldn't be required. There could be some language clean-up to clarify if any of the exceptions are met, that the project wouldn't be required to have an energy storage system
- b. Carol: is it possible that the number in exception #1 should be 0.025 kw DC instead of .25 because that would make a lot more sense. With the current figure, I could have a very large system exempt from the requirement
 - i. Eric: I was thinking the same thing – we could be an order of magnitude off here. I think to clarify that meeting any of the exceptions would except the project from this requirement
- c. Chuck: the 2021 fire code includes more requirements with installing these systems, so that's something to keep in mind when requiring these systems.
- d. Courtney added language to clarify this is for on-site PV systems
- e. Carol: we need to update reference where renewable systems are required to comply (C406, high input water heating, etc.) and update 704.1.2
- f. Courtney: Does anyone object to moving this forward with the intent to clarify and confirm items discussed (clarifications to exceptions, looking at capacity figure for exception #1, fire concerns/considerations, 704.1.2 update, etc.) by John?
 - i. No objections

Action Items:

- a. John (Noresco) make edits discussed
- b. Group agrees to move proposal forward with modifications, as discussed

#128 DGC Building and Mechanical Equipment: Kristen (Noresco)

- c. Proposal Overview: about systems commissioning and functional testing for residential projects. Requirements for mechanical systems as well as lighting systems. Functional performance testing and a final commissioning report would be due at the end of the project. Requirement that there is a registered design professional or commissioning agent that is doing this work. Would also apply to all single-family residences – there is no minimum property size

Discussion:

- a. Eric: how would this affect additions or alternations? Would the entire building be commissioned under these regulations?
 - i. Kristen: Correct – I don't know the likelihood of a project like that going through this process, but potentially yes.

- b. Carol: if you have an older home, where they plan to have an addition, the homeowner would have to go back to the original home and replace all lighting controls where required by 4.2.2 – is that correct?
 - i. Kristen: I wouldn't think so, I would advocate for some clarifying language around some of these things in terms of scope.
 - ii. Sean: it could be as simple as new systems installed in buildings and that covers new buildings and new systems and additions and new systems and alterations.
 - iii. Courtney added language, as proposed
- c. Chuck: one other point of clean-up, if you look at 402.2.3, it references section 402.2.3.1 through C408, so that C408 is the commercial commissioning section of the base code. I think the intent was to list the sections that are here – whatever the final section of this would be.
 - i. Courtney made the edit
- d. Courtney: does anyone object to moving this forward?
 - a. No objection to moving proposal forward

Action Items:

- a. Kristen (Noresco) move proposal forward

#126 DGC System Commissioning: Kristen (Noresco)

- d. Proposal Overview: This is for commercial projects and we are expanding the language for functional performance testing as well as commissioning. There is a threshold that projects not greater than 10,000 square feet will comply with the functional performance testing requirements and then larger buildings will also do functional performance testing as well as commissioning requirements. This language is directly from the 2021 IECC with some adoptions for Denver and includes all of HVAC and refrigeration, lighting, domestic hot water and then any type of water pumping and irrigation as well. For the larger systems, it also includes the commissioning of any renewables and energy storage systems, building management systems etcetera. This language has come directly from IECC and so you'll have all of the functional performance tests requirements, all the activities there are some. Intent is to have O&M documentation, you'll have a commissioning plan, you'll have a design review report, a preliminary commissioning report and a final commissioning report. This includes for a larger buildings looking at the OPR and the BYOD as part of the design review and then lesser requirements just for functional performance testing of all the systems for smaller buildings.

Discussion:

- a. Chuck: on a new building that's being constructed, complying with the Denver Green Code these commissioning requirements are slightly different than the commissioning requirements in based IECC. Is the intent that they would follow just the Green Code commissioning requirements. Have the two different commissioning requirements between the IECC and Denver Green Code been reconciled? What are we asking for at the end of the project? Challenge I see is we probably should identify which way we want the design team to Commission their project. Having one commissioning path would be best.
 - i. Kristen: Yeah, that's a fundamental difference. I would assume that we should probably stick with IECC since that's in the base code, so this language would need to mirror that. I see yes, there are several references to ASHRAE a standards and those would need to be revised. I assume that's the direction that Denver would want to go.
- a. Carol: question in section 1001.3.1.1.1 – b. is the intent to include the internal and external lighting?

- i. Kristen: I think the intent is only internal lighting – I’ll double check IECC.
- ii. Courtney edited to say “interior lighting systems” for clarity
- b. Courtney: does anyone disagree with moving this forward with the understanding that Kristen will update the ASHRAE language to reflect IECC instead?
 - i. Group supportive of moving proposal forward

Action Items:

- a. Kristen (Noresco) update the ASHRAE language to reflect IECC and move proposal forward

#P6 Lighting for Plant Growth and Maintenance (David Carlson)

- a. Proposal Overview: house-keeping – in the lighting for plant growth, there’s a reference to require UL listing or national recognized testing laboratory listing for luminaires for plant growth, in IECC, you shouldn’t really reference a safety item, those are covered in the respective building codes. NEC requires listing of equipment, so it should be deleted from here.

Discussion:

- a. Carol: I agree with David
 - i. Eric: I do too
- b. Group supportive of moving proposal forward

Action Items:

- a. Group agrees to move proposal forward

#P7 Electrical Service Space (David Carlson)

- b. Proposal Overview: provisions for interconnection to PV systems and to energy storage systems. Language in the proposal is written so that interconnection can only happen in the main panel opposite the main device in the panel. The National electrical code addresses the issue of interconnection of PV systems and energy storage systems that allows for other provisions besides that one and I think we should follow what the NEC, allows for how systems are interconnected.

Discussion:

- c. Carol: question for Sean. Where David is referencing 705.11 or 705.12 - can we do that or should we not reference another code section where reference numbers could potentially change? Is it adequate to reference the NEC specific code sections or do we reference article related to supply side and load side source connections? What's most appropriate?
 - i. Sean: it's usually best to not reference specific sections from another code, especially ones that are being updated in the same process and we're numbering change. I think you would just say the reserved spaces shall be located in accordance with the National Electric Code. Section 705 is also a safe reference.
 - ii. Courtney made the edit
- d. Courtney: does anyone disagree with moving this proposal?
 - i. Group supportive of moving proposal forward

Action Items:

- a. Group agrees to move proposal forward

Next Steps:

Courtney (CASR) will reach out to proponents of remaining proposals that were not discussed in today’s meeting

Meeting Adjourned