

Commercial Energy Modeling Working Group

Meeting #3

June 8, 2022

11a.m-12p.m.

Introductions:

1. CPD: Chuck Bartel, Antonio Navarra, Allen Yanong, Robert Pruet
2. CASR: Katrina Managan, Courtney Anderson, Tom Gleason
3. Attendees: Sue Reilly (Group14), Taylor Roberts (Group14) Elizabeth Gillmor (Energetics), Sean Denniston (NBI), Michael Deru (NREL), Mohit Mehta (ME Engineers), Linda Morrison (Ambient Energy)

Meeting Overview (Katrina):

1. 3rd working group meeting out of 4. Finalizing all proposals next meeting and making recommendations to IECC committee who will be hearing and voting on these proposals.
Appendix G proposal split into two – Appendix G and separate site energy proposal for Appendix G

Review and Discuss Proposals:

1. #18 Appendix G
 - a. Proposal Overview (Sean): proposal tells you how to use appendix G and how to calibrate appendix. Want to make sure everything we do is as simple as possible. Focused C407 on straightest path through Appendix G as possible. C407 will just be about standard Appendix G process. Broke site energy approach into a standalone appendix – if you do site energy approach you go straight there, and it doesn't confuse or clutter Appendix G. Enter at the top of the path and go straight through. Replacing building performance factors in Appendix G for the modeling process. To simplify the transition to an Appendix G only approach, all we're doing from the modeling process itself is replacing the building performance factors for all-electric properties. These are the standard building performance factors for Denver's climate zones from Appendix G so we're allowing all-electric buildings to go in at kind of the base code level of efficiency to promote all electric buildings, and then for all other buildings we've applied that Denver target adjustment only to the BPF and brought in a new BPF for practitioners who might be making the transition to using Appendix G more exclusively.
2. Site Energy for Appendix G
 - a. Proposal Overview (Sean): This creates an appendix that we've named Appendix SE. We have a scope statement which includes a phrase about Energize Denver and we'll

wordsmith that to make sure that it is informative and clear. We have one reference and to C407 where mandatory requirements are defined so that we can just define it in one place and keep it up to date in one place, and we're just making a pure reference over to that. In the site energy approach it does require more extensive modifications to the appendix G approach to do site energy than just dropping in some new BPFs. ASHRAE is pretty close to finishing their own addendum for modifying Appendix G to use alternate energy metrics, and it's very similar to what we had here in the previous version. We followed that approach completely except for the mandatory section, which we're really aligning with Denver. All of this comes from ASHRAE about how you modify Appendix G, what words you need to replace, what phrases you need to replace to go from energy cost to site energy throughout. And then we have the site energy BPFs. The version for all electric is just standard 90.1 2019 BPFs all other are BPFs that have been reduced by the Denver target adjustment. It replaces energy cost with site energy replace energy costs with site energy and this word. There's a conversion factor to BTU and therms of natural gas to BTU. Process for users is almost the same, they're just not converting their energy to cost anymore for their calculations. ASHRAE does leave gas baseline systems in place, which actually advantages all-electric even more.

Summary of Topics Discussed

1. Appendix G
2. Definition of all-electric and exceptions
3. Energize Denver Caveats
4. Site Energy

Detailed Notes

1. *Appendix G Alignment with Energize Denver*

- a. Chuck: in C407.1 we added reference to Energize Denver – I want to make sure we've done our homework so that achieving Appendix G will lead to meeting the Energize Denver targets. This doesn't distinguish hi-rise from low rise which have different energy uses and intensities. Also, PNNL had to adjust BPFs because they were too strict and not feasible.
 - Sean: NBI staff has been going through the Appendix G models to get a better understanding of what's driving the kind of EUI results for the prototypes when modeled under 90.1 Buildings with data centers and restaurants, and a couple of healthcare occupancies – Energize Denver sets up custom targets, so it should be adequately set up for that. In almost all building types the 2019 prototypes are ahead of Energize Denver or well ahead of Energize Denver. PNNL did generate a set of Denver specific energy cost BPFs that ended up being more stringent than the standard BPFs for Denver's climate zone and it was based on Denver energy costs - unless you're talking about another recalculation of BPFs, this wasn't a recalculation it was that we got some custom Denver BPF. They were even more stringent, so we decided to just use the standard ones instead

- Chuck to forward PNNL calculation email chain to Sean, Courtney, and Katrina
- b. Sue: how do new BPFs compare to the old BPFs times the adjustment factor? Are some building types them are going to be easier to hit (multifamily, restaurant, retail, etc.) – seems like targets went down for hotel, motel, office, school, and warehouse. New BPFs seem lower than the old adjusted PECIs with the Denver target adjustment.
 - Sean: In that previous approach where the DTA was being applied to all building energy, we were just using the BPFs from Appendix G for Denver's climate zone, and then the DTA is applied in the equation. If you look at it now, those same BPFs that were in the previous process are now only being applied to all electric. We've gotten rid of the DTA entirely. This “all other buildings” column is just the BPF times, the DTA. We didn't try to reduce the BPF enough to get the unregulated load savings. We just basically said, let's take a step back, it'll be a little bit less stringent, but it'll be more straightforward and simpler, and that seems what's appropriate for this code cycle. Favors all-electric. Capturing savings from the national code as part of the advancement.
- c. Chuck: we're only going to apply the DTA to the BPF which then only gets applied to the regulated loads. Unregulated loads are going to maintain Appendix G where that it doesn't get applied. Does this create an opportunity for non-successful performance with Energize Denver once the building becomes an existing building?
 - Katrina: we're planning on adding language/caveats related to Energize Denver.
 - We're talking about buildings that will be built to an efficiency standard well beyond Energize Denver. They will still need to operate them well, but buildings will at least be capable of being operated in a way that is ahead of Energize Denver
- d. Chuck: C407.1 language is challenging – says “ensure buildings are capable of complying with Energize Denver”
 - Katrina: I agree Chuck, we will change this language and make sure it's clear unregulated loads and operations aren't part of this
- e. Elizabeth: If I used if I had to use these numbers for a Boulder project (MF project that's mostly electric with a pool), I would have completely lost the argument to go all electric. I'm interested to see the site EUJ option, but I will also tell you that my compliant gas building would have an EUJ of 50 which does not meet Energize Denver.
 - Katrina: but that includes the pool – Energize Denver will adjust for that
 - Sean: this is still an energy cost method, which is still going to discourage all-electric even with giving all-electric a different set of BPFs, so we're trying to encourage the all-electric even in the energy costs approach. That doesn't completely eliminate the advantage that gas has when you're using all electric, which is why the site appendix exists.

2. Definition of All-electric and Exceptions

- a. Taylor: question about all-electric building definition – what about an all-electric MF building with a gas-heated pool – would that meet the requirement?
- b. Chuck: does all-electric definition include emergency standby power like a diesel generator?
 - Sean: I think this has come up in a couple of places. Is this something we define in the definition or in the application of all-electric buildings? We could use the

definition or go to the BPF for all-electric properties and add a footnote saying back-up generation is allowed.

- Katrina: so we could have a standard definition, or standard set of exceptions to all proposals?
- c. Mohit: all of our all-electric buildings use diesel back-up generators with the exception of one building in New York that uses battery back-up, but that was a fight.
- d. Sean: are projects using natural gas or propane for true emergency generation or is it always diesel? Want to be mindful of buildings using back-up generators to bring down peak demand rather than for true emergency generation
- e. Mike D: seems like all-electric definition or putting those things in up front would make it more clear to users. Also, how often would BPFs be updated?
 - Sean: BPF approach been in Appendix G since 2016, so every time 90.1 is updated the BPFs will be updated as well – following the 90.1 cycle.

3. Site Energy

- a. Sue: when we were looking at the EUI target we suggested derating gas for the reference model approaches, which gives gas an advantage. I'd rather include the derating to hit the EUI targets in real life because once it's an existing building, I don't want my clients yelling at us. If you derate the gas condensing equipment vs standard 80% equipment looks a lot better
- b. Katrina: these three modeling pathways may not all align perfectly like we're going to try to get them close, but to your point you need the EUI. I want to work in a way that works for how buildings actually going to operate, and so it just needs to be done in that way. These will be close, but maybe not perfectly calibrated in all cases. I think this group is helping get each pathway to be in general at the right level of ambition to reach Denver's goals.
- c. Taylor: I agree – I don't think it has to be the same across all of them
- d. Sue: I think your statement at the beginning about meeting benchmarking targets then makes these reference EUIs more wrong because they don't have the derating in it
 - Katrina: I think we should add some specific caveats to that statement – about keeping in mind meeting Energize Denver, not including derating of gas, not including operations, the caveats will vary
- e. Sean: do we think any building would choose this for mixed fuel?
 - Elizabeth: yeah it will be the ones with the small gas loads that don't qualify as all-electric
- f. Sean: we do have a requirement to in the documentation to include the PEUI of the design instead of this phrase about Energize Denver up in the scope, would it make more sense to require the documentation to include the relevant Energize Denver target? And then you have the two of them right next to each other and your documentation?
 - Katrina: maybe we do both? Let's make it as easy as possible for someone who is not familiar with Energize Denver to navigate this.

4. Other Topics Discussed

- a. Katrina: We will come back with final proposals with all these changes made. Feel free to send additional feedback offline, so we can bring back final drafts on all 3 proposals (the two proposals discussed today and EUI proposal) and the Denver modeling

guidelines sent out. Our team is available this week and early next week to discuss in greater detail.

b. Next Steps/Upcoming Meeting Topics

- 6/22 Finalizing proposals and consideration of paths and how it fits into existing Denver policies.

Meeting adjourned