Commercial Energy Modeling Working Group
Meeting #2
May 25th, 2022
11a.m-12p.m.

Introductions:

1. CPD: Eric Browning, Christy Collins, Chuck Bartel, Antonio Navarra

2. CASR: Katrina Managan, Courtney Anderson, Tom Gleason, Derek Valenti

3. Attendees: Sue Reilly (Group14), Taylor Roberts (Group14), Sean Denniston (NBI), Mohit Mehta (ME Engineers)

Review and Discuss Proposals: P19: IECC C407.4– pEUI Modeled Performance Target – updated proposal

1. Meeting overview (Katrina): focus today is going to be on the pEUI proposal because there was a lot of interest from the energy modelers in our community and having that option for code compliance. In our first meeting, we hope to wrap up the proposal or get very close to wrapping it up today so that we can spend our next meeting developing details on the Appendix G proposal and then we will hopefully have a discussion in our fourth meeting on how things all come together. Do we still need the C 407 modeling path, do we have any final tweaks to pEUI and Appendix G modeling proposals?

2. Proposal Overview (Sean): proposal tells you how to use appendix G and how to calibrate appendix.

   a. Adds additional modeling option to the code. Allows for projects to just model to an EUI, we utilize pEUI that's already in standard appendix g proposal. Targets set in CD103 table – modeled performance target. Target-based approaches are the leading-edge policy approach to modeling. Having this as a separate document allows the modeling procedures to be more nimble and more responsive to user's needs – City can update as needed, or as issues arise. Sets higher bar for modelers, and ensures quality modeling. Identifies the ASHRAE building energy modeling professional certification, and it allows for an approved equivalent certification. Requires modeler supervising the modeling to be identified and certified.

Summary of topics discussed:

1. Modeling software and credentials
2. *Building types and considerations*
3. *Modeling protocols/schedules*

Detailed Notes

4. *Modeling software and credentials*
   a. Mohit: Can we standardize for the modeling software as well?
      - Sean: I believe appendix G has limitations on what is allowed to be used – Sean will double check and get back to Mohit/the group
   b. Sean: The reason that this draft limited this to energy plus and a specific version is that we have heard from Pacific Northwest Natural National Lab that you can get fairly substantial differences by switching simulation programs. You can even get occasionally substantial differences moving from 1 version to another and in response to that comment we went ahead and just specified used this software. This version doesn't have to be that way, but we would need to recognize that you do introduce increased variability for the more versions of the software that you allow to be used.
   c. Courtney: Kristen from Boulder recommended energy plus as well
   d. Mohit: I don't think you can limit the software
   e. Taylor: I agree with just saying that it has to meet the requirements of the standards that the software does and I believe Appendix she does reference that.
      - Mohit: Agree
   f. Eric: We should reference the standard, and not the product
   g. Sean: Right now Appendix G it's the reference is a little bit roundabout, but Appendix G says that the software has to meet the standards in section 11 for simulation software, which tells you that the software has to meet Azure 140
   h. Taylor: Any software is just a tool, right? So there everyone has issues and things that happen, and so I don't think the city should just say use one, but I think it needs to be up to the modeler and then you've got to make sure the modelers are doing their best
   i. Sean: If we delete this section from the modeling guidance, then it just defaults to what's to what's in Appendix G right now
      - Mohit: I think that's fine.
   j. Katrina: does anyone disagree with that?
      - Group was supportive – no one disagreed

5. *Building types and considerations*
   a. Taylor: We wanted to simplify and make it only a couple prominent building types and used Energize Denver as a reference point to establish EUI targets. Made sure this pathway was not easier than a different code pathway, be it prescriptive or performance
   b. Courtney: Summary of conversation with Boulder – Kristen Whitco from Boulder was supportive of us pursuing this pathway, using appendix G scheduled in the protocol document, modeling software, BEMP credentials, and allowing a path for mixed use between these building types, working with our energy modelers to help the pathway for the protocol document, especially around the plug loads and equipment power densities

c. Eric: What about all the other building types? Anything not an apartment, hotel, or office?
   - Sean: this is an optional modeling path. If your building is not one of these 3 types, you'd need to use another approach. Could do another EUI for building types as approved by the building official, but could make compliance more complex for staff
   - Katrina: And that is something that Boulder does, but they have a lot less project volume coming through
   - Eric: don't have a problem with keeping it limited to these three, but want to make sure we have the appropriate reference or pointer to the pathway for other building types
d. Chuck: how does this handle garages attached to offices, or first floor retail – not a lot of office buildings that are 100% office
   - Taylor: You could do weighted average. I don't know what if we would have to add a retail here to be able to do that. Parking garage should always be excluded.
   - Mohit: we don't want buildings to lose amenities and features in fear of missing EUI targets
e. Katrina: Do we let you just exclude the swimming pool from your modeling? Or do we know that we have a standard adjustment for it when you have to actually submit your EUI for performance under Energize Denver
f. Taylor: I think the purpose of this is a first step for Denver down this pathway. It is not supposed to be for every building and it won't be for every building. If you do have that office that has a ton of retail and restaurant it might not work right, and I think that's OK. But just can we get a large portion of buildings that can at least look at this and start you know down that pathway.
g. Sue: I do think it's important that there's some guidance here around those other uses and buildings. So if I have a multifamily and less than 10% of the areas for other uses I may decide to use this approach, but I still have to model those especially higher intensity uses in the building.
h. Katrina: Does anyone disagree with using weighted average? If not, maybe we add that and we need to add language about the weighted average because I've heard everyone say they like that.
   - Group: there was support from the group to include language about weighted average
i. Christy: if these new buildings are making assumptions to get to those targets, then we're setting them up for failure again. A spec office building or residential building will have a restaurant space and it'll be empty for a couple of years, so they don't really know who that tenant is, so they're going to make a bunch of assumptions on behalf of the tenant. If we have pretty aggressive targets for it, that's great, but we want to make sure that the owners of the buildings understand those targets adequately when they go to lease those spaces so that we don't set them up to fail once Energize Denver targets have to be met.
   - Sean: the building envelope is probably going to be driven by the dominant occupancy anyway.
j. Katrina: I think I'm hearing that putting in retail and restaurant sounds OK to everyone else. Does anyone disagree with that after this discussion? Because I do want to look at

the modeling protocols and keep us moving.
- Group was supportive

    k. Katrina: Sean add in EUI targets for retail and restaurants 10% better than Energize Denver

6. **Modeling protocols/schedules**

    a. Sean: These rules and procedures modify the way that something is modeled under Appendix G so that it can use a performance target instead of a reference model. This requires changes to almost every section of Appendix G, so we do have a couple of modifications to documentation, and I'll go through this. The proposal references specific simulation software, it modifies the tables and for the most part it's modifications to the proposed building performance. Most of these changes are about things in Appendix G that you hold constant between your proposed and reference case it can be whatever you want it to be but has to be the same in the two. And since there's no reference case, we have to be more specific about what those modeling inputs need to be (that's what most of the modifications to the tables include). We have more specific guidance around ventilation because of the same issue. And then we get into the schedules. These schedules come out of Comnet. We can't just reference comnet because it has not been updated for 2019, but we can pull the things out of commnet that we want to use. It also includes equipment power densities, occupancy density, sensible heat gained, latent heat gain, ventilation rate and it lines up schedules to whole building categories.

    b. Sean: I think with a targeted approach there's always this tension between what the actual schedules and occupancy densities and plug load densities are going to be versus what they might be in the future. We need to make sure that you're designing it so that it's efficient under different uses. And I think finding the best way to deal with that in these schedules and in these density numbers is an important piece of this document. I think this is language used, and it's definitely the Boulder approach that says use these unless the code official says you can use something else.

    c. Taylor: The idea of having to ask a building official is really difficult just timing wise – this gets a little crazy. My recommendation would be use these schedules, if you don't, document – include in submittal to the City – this is what we changed and why.
- Sean: I think there's a couple of ways that we could approach that. One would be provide documentation substantiating the reason acceptable to the code official, which doesn't make it approval, but does involve the code official somewhat. Use where there is a drastic input difference something like 30% or 40% higher or lower

    d. Christy: I would like to see the worse of either actual anticipated use values or what's in the schedule. Would want to require flexibility be built into a certain extent. I don't want schedules to define predictive modeling – I want teams looking at what they actually expect and comparing against this schedule and picking the worse of the two.
- Taylor: looking at offices, if we use these schedules an office could pass easily but that's not how they actually operate
- Mohit: I can vouch for that. If you scroll to the next page over, you'll see office plug load is 1.67. We're using easily double that for our ventilation calcs and our cooling calcs and those high-rise offices are still coming around 35-40 EUI

    e. Christy: Where does the building's anticipated performance fall relative to the schedule?

If I get a model I can't judge - the model has all of the schedule of values in it, that raises a flag, but how do we know?

f. Mohit: When we turn in a report, whether it's for USGBC or for energy code compliance, any jurisdiction anywhere other than comcheck, we have a simple table there. If you get to that table or plug loads or equipment power density, you could probably see what's being assumed and then you could say oh look that's so much lower than the table or so much higher. Maybe you can ask the question and get some clarification.

g. Christy: I want to make sure we don't wind up in a boat where we don't give enough information to the energy modelers from the design team or owners side and the modeler is left making assumption and the model becomes less and less predictive. In my experience it was very difficult to get information from owners on how they were actually going to use the building.

h. Mohit: Energize Denver is going be based on the utility data that you're going to get – that's going to determine the EUI, and not on the model. We are a lot more alert or sensitive that we need to extract that information because I don't want to look bad by every model that comes out of ME or Group 14 is complying, but three years down the road and they are all using two to three times energy. That looks horrible for us. We are very mindful that we are trying to thread a needle to try and make that model as accurate possible because whether you like it or not, it's going to be compared to what data is uploaded on that energize Denver map.

i. Katrina: I wonder if we can add some language to prompt some narrative language, or Christy do you have another suggestion about how we can help make this more reviewable?
   • Christy: how we communicate with development teams about Energize Denver is going to be a critical factor. Maybe through the plan review process we can communicate to teams that choose pathway about Energize Denver and the consequences if their assumptions are not well informed.
   • Katrina: can we add some introductory guidance at the beginning of this?

j. Katrina: I think I heard Christy saying like that you have to that you can pick these schedules or you can pick something that is more likely to perform better than these schedules.

k. Taylor: I think this could be the backstop.

l. Mohit: Energize Denver is going to be where the rubber meets the road.

m. Katrina: My sense is that we don't want to defer things to the building official's discretion
   • Antonio: Agree

n. Eric: It needs to be complete so that the committee has reference to it during the formal code hearing discussion. That isn't to say that there aren't modifications that couldn't be made thereafter, but it needs to essentially be complete draft of the document.

o. Taylor: Separate kind of item to that needs to be in here is something on elevation derating for gas equipment. We have a pretty good framework we can share
   • Taylor share derating framework with Sean
   • Taylor and Mohit happy to help

7. Next steps/upcoming meeting topics:
   • 6/8 #18 Appendix G and #20 Site Energy
   • 6/22 Consideration of paths and how it fits into existing Denver policies

Meeting Adjourned