

## **Commercial Prescriptive Path and Renewables Working Group**

### **Meeting #2**

May 31, 2022

3 p.m. – 4 p.m.

#### **Introductions:**

1. CASR: Katrina Managan, Jonny Rogers, Sharon Jaye
2. CPD: Eric Browning, Chuck B, Robert Pruett, Antonio Navarra, Allen Yanong, Carol Pafford
3. Attendees: Sean Denniston (NBI), Elizabeth Gillmor (Energetics), Mark Jelinske (RMH Group)

#### **Review Updated Proposal:**

4. In first meeting, working group asked that we combine the two proposals into one (commercial prescriptive path and renewables proposals)
5. Renewable proposal incorporated into the Prescriptive Path (C406) proposal
6. Modifications to all-electric options to ensure all-electric buildings have a positive impact on operating costs, provides range of credits available for renewable energy, capped credits for renewable energy, targets for mixed-fuel buildings brought down to ensure mixed-fuel building could comply with code without electrification and without renewable energy (but they would have to do all efficiency measures). Introduced Northeast Energy Efficiency Partnership (NEEP) cold climate heat pump specification. Also allows electrification via 1.35 watts per square foot threshold – aligns with Passive House

#### **Summary of Topics Discussed:**

1. Requiring or incentivizing NEEP standard for heat pumps
2. PTACs, PTHPs and available technologies
3. Affordable housing
4. Encouraging greater building efficiency and energy recovery
5. Heat pumps vs electric resistance – encouraging electrification
6. Water heating electrification

#### **Discussion/Detailed Notes:**

1. Requiring or incentivizing NEEP standard for heat pumps
  - a. Mark: NEEP spec only goes to 6 tons – intended for residential and small commercial.

Not available to serve entire commercial market

- Sean: larger buildings and buildings with central systems are more likely to model since this is the prescriptive approach
- b. Mark: I also recognize and I'm completely in favor of all these options within C406, this is not the only way to do it 100% on board with that. I've never designed a building that would be able to accept this credit. I've never designed a building that was designed with all six ton and less individual pieces of equipment
- c. Chuck: question about NEEP standard – are we just requiring equipment to meet the NEEP standard, or actually be listed by NEEP?
- Sean: It's structured right now to meet the specifications in NEEP's standard and what you brought up is that relying on this external organization that might have varying levels of speed of actually adding and certifying, I think that it's a little bit problematic. It's not terrible NEEP's water heater spec is used all the time and there's the same issue with that one. The spec is pretty simple so it seems easier just to include the specifications in the code and that will just be easier for users. We did ask the question, does it make sense to just refer to the spec? Would that be better? It kind of sounds like you think it wouldn't be?
- d. Mark: there's not really a third party verification of this – you'd just be going with the manufacturer's rating, which is not an objection. The equipment doesn't exist much beyond the NEEP listing. You're going in the right direction trying to put all this together in one place (combing proposals). In R in particular what we should be doing is further reducing air infiltration, so you're even encouraging the right path here by not making BTUs enter or leave the building in the first place

**2. PTACs, PTHPs, and available technologies**

- a. Elizabeth: only one PTAC manufacturer. Cannot meet performance path with PTACs. Every single time we use PTACs, we have to go prescriptive. I cannot meet the performance path with PTACs.
- b. Katrina: I'd like to get input on the overall structure and then refine what exactly would get partial electrification credit. What does group think about concept of having on set of requirements for all-electric buildings, another set of requirements for all other buildings.
- c. Elizabeth: Need to define all-electric. PTAC project never going to get 52 points. PTACs

can't get heating, can't get cooling, can't get electrification (credits) so I think that definition is really important.

- d. Sean: is heating generally being provided in Denver projects that utilize PTACs? Is it the electric resistance option or is it the central?
- Elizabeth: No, it's still a heat pump. A packaged terminal heat pump – there's just one manufacturer on the NEEP list in the packaged terminal heat pump products. There's lots of packaged terminal heat pumps out there, but the heat pump element stops at 40 degrees. We're talking about affordable housing that primarily use PTACs – it would be really rough to eliminate or reduce that system as a potential
- e. Katrina: Elizabeth and Chuck what are you most commonly putting in and what are you most commonly seeing come through?
- f. Elizabeth: It's the plug and play packaged terminal heat pumps where you stick it in the hole, you take it out of the hole. They're really easy to maintain. It has a heat pump element. It's a packaged thing. There's only a couple of manufacturers of heat pumps where the heat pump element will function below 40 degrees. I know of 1 that'll go down to 30, but that's it. This ice air manufacturer one is not a plug and play, it's a thing you have to drive all around it, it's very high end, it's very expensive, and it's not an option for affordable housing they just wouldn't go with that.
- g. Chuck: No, I would agree that majority is plug and play electric resistance. I mean some of the older buildings with retro that we've seen come through retrofit do have hydronic. Associated with it, but for the most part it's just packaged plug and play
- h. Sean: I want to make sure we're absolutely clear, PTACs that just use electric resistance aren't really being installed in Denver. It is PTHPs that have electric resistance back-ups in Denver right?
- Elizabeth: Right – people use those terms interchangeably
- i. Sean: The systems that you're looking at that are larger than the 6 tons, but are not fossil fuel central boiler-based systems, can you give me examples of what those designs look like?
- Mark: Packaged roof top units 10-40 tons is the big middle group. That's one of the biggest categories and in other forums we've talked about the difficulty of providing heat pump based terminal heating when your base core system is a

variable volume packaged system. There's a valid response to the statement that is it's difficult to do these things and the valid response is good. If you want to specifically talk about package rooftop units, they are not generally designed to provide all the heating and they're not really capable of doing even 20 degrees full heating without adversely oversizing them so.

- Sean: there are large packaged rooftop heat pumps, the 6-20 ton range that are electric heat, so they could be eligible for all electric space heating, but they can't meet these cold climate specifications?
- Mark: Yes, that is exactly true. You can buy an all-electric heat pump packaged unit, but similar to the PTACs, they'll end up doing the majority of their heating with resistance because there's not a lot of heating that has to occur above 40 degrees and they just plain old shut off at 30-40 degrees.

### **3. Affordable housing**

- a. Sean: So Elizabeth, on the affordable housing projects, I know their ventilation systems are often unbalanced which makes ERV a challenge, but would an option where ERV instead of cold climate, is that something that would be doable?
  - Elizabeth: It's already required by 2021 codes. It's a prescriptive requirement. So conceivably you could model around it, but assume we're talking C406 right here, that PTAC project already has to do energy recovery. ERV + PTHP would meet Denver code today and then some.
- b. Katrina: we want to make sure we're not saddling affordable housing residents with high energy bills by running electric resistance back-up below 40 degrees
  - Elizabeth: it's a non-issue. Rents charged are fixed based on your income and the rent includes utilities. The utility costs basically drive what the rents are. If you're 80% AMI, your monthly rent plus utilities total might be like \$600/month. So if the utility costs are \$100 a month, that means the owner can only charge \$500 a month rent, so there's zero impact to residents for any of this. This goes all to the developer and the builders and the feasibility of affordable housing in general is driven by the delta of the rent. It's already a huge concern making sure that utility costs are low, because if they're are too high the projects don't pencil out financially like you can't get a loan because you can't charge enough rent.

4. Encouraging greater building efficiency and energy recovery

- a. Sean: Based on the way that a lot of these projects are built there is a certain amount of energy recovery ventilation requirements in the code currently, but there are some holes. Would something like energy recovery ventilation as an alternate to cold climate heat pumps provide a good balance to reducing costs and carbon impacts?
- Mark: Yes, by adding heat recovery to my packaged heat pump unit I can further reduce the load and therefore get it a lot more possible that the unit will be able to produce the amount of heating required at least down to 20 degrees. That's all possible, but we're pulling out a lot of stops to do it, which again I hear is a feature, not a bug.

5. Heat pumps vs electric resistance – encouraging electrification

- a. Katrina: What would you propose Elizabeth in terms of points here? Or maybe Sean, you have something in mind where there's efficient, all-electric that's worth more points and less efficient but still heat pump all-electric that's worth less points or something that what are you thinking about Sean?
- Sean: the space heating, partial electrification credit would basically have three paths in it, energy recovery, cold climate heat pump or you know very low heating energy buildings with electric resistance – the passive house type building with electric resistance. There would be 3 paths and you would never have to do a super heat pump. You could do a regular heat pump, any old heat pump that's on the market that meets code, as long as you have the energy recovery and that fills the energy recovery holes that are in the Denver code right now. That seems to be a doable path based on what people have said, what do our stakeholders think about that?
- b. Elizabeth: technology is going to keep advancing, so it's a great idea to incentivize these higher efficiency heat pumps. You get awareness and market interest. If nothing else, there's positive benefits
- c. Mark: I like the direction we're going here. I suggest 3 components be independent credits. Ex. heat recovery in addition to the heat recovery that wasn't otherwise required. All-electric space heating is fine, it's just limited in the amount and type of equipment available. If we can add heat recovery to that otherwise standard packaged rooftop unit as a separate line item, that'd be a wonderful thing.

- d. Mark: does this do us any good? If the heat pump gets heat from the building and you've got a gas fired building, you've got a gas fired heat pump because it's just sucking the heat out of the building to put it into the water. If you've got an electric resistance heated building, you've got an electric resistance heated water heater, because it's just sucking heat out of the building.
- e. Jonny: want to second what Elizabeth is saying. It's important to put in electrification measures even if it's electric resistance. It's going to be very hard to electrify buildings down the line if gas infrastructure is already in place. given the trajectory we're seeing of the grid, I think that carbon benefit is going to quickly turn in the favor of electrification even with electric resistance.

6. Water Heating Electrification

- a. Sean: in order to get the water electrification credit, you would need to do heat pump water heaters. A few key exceptions brought over from electrification proposal. Low-boy or instantaneous water heaters, high-temperature, and other strategic exceptions not required to use HPWH.
- b. Elizabeth: would Denver rather have electric resistance water heaters than gas water heaters?
  - Katrina: Gas is about the same for the climate, based on current grid mix, and much lower operating cost than electric persistence water heaters. That's my understanding.
- c. Elizabeth: If we really want all-electric buildings, I think you've got to consider the electric resistance water heaters as an option
- d. Mark: Need to define all-electric building
  - Sean: clarifying comment- if you look at the table to be able to use the 10 credit column, you have to have an all-electric building, which is defined and then the all-electric building has to have what is essentially this better electric space and water heating. And that's one of the things that is one of our discussion topics today, whether we should have it that way. This would apply both to all electric buildings and to partial electric buildings that want this credit.
- e. Chuck: agree with Elizabeth and Jonny. Maybe have some guidelines like the proposal where the space that the water heater is located in is suitable for heat pump water

heater in the future to help prevent another hurdle down the road from converting to heat pump. My question is how do these exceptions apply to this cause it's kind of going for credit. The 20-gallon water heater like a retail strip mall which is single restrooms in each tenant, or double restrooms in each tenant can easily have just these small electric resistance water heaters. Would they qualify for this? Because I don't understand how the exceptions apply. A high rise could also have a 20-gallon water heater on each floor, so would they qualify for this exception?

f. Sean: most of the value of the credit comes from the electrification. In those cases where you have such small service water heating loads that you can do it with small electric resistance tanks, it is envisioned that you would be able to get the credit for doing that, it's only when the water heating loads get larger and therefore the costs become more of an issue that it would require the higher efficiency water heating. I think the big question comes do we have ameliorating condition for electric resistance or at least larger electric resistance loads like we did in space heating? If it's electric resistance does that make energy recovery mandatory or something like that? I know that energy recovery can be challenging on in in hot water system. Do we need something like that or is the value of electrification so high that really we just go straight electrification of water heating?

- Mark: I would promote that heat recovery is just another point. The base code has credit for heat pump heat recovery and it requires unit not to draw conditioned air from within the building – that's what makes a HPWH more efficient than any other system – if you take the heat out of something that was otherwise going to be exhausted

g. Sean: Just so that we are painfully clear, it doesn't sound like the working group really favors anything to be added to water heating electrification other than electrification and maybe some heat pump, water heater space requirements so that you can get a heat pump water heater into that space in the future, but nothing like heat recovery or anything else? Am I hearing that right?

- Elizabeth: It sounds like maybe there was interest in giving a tiny bit of incentive to electric resistance water heating and then extra incentive to the heat pump. Water heating with the considerations that Mark brought up.
- Sean: So maybe the all-electric water heating measures stays as electric

resistance, but the points just go down a little bit so that electric resistance doesn't get you quite as far – you would need to go to a higher performance to get some real points.

- h. Elizabeth: Yeah, but I still like the idea of having some incentive to nudge people in that direction, getting the building off of gas. That's a benefit.

## 7. Other Topics Discussed

- a. Katrina: are we going towards the right direction by having one proposal that has renewables and electrification and efficiency all in it in one prescriptive proposal
  - Elizabeth: Yeah, I think I think conceptually we're on the right track. I think the idea of NEEP stuff is great. But as Mark pointed out, there's very few buildings that would fit into that. Maybe that's something you add as a credit – a project that pursues that one really expensive PTAC qualifies for points or give points for all electric space heating that meets the NEEP spec. The NEEP qualification is not a standard that we can ask buildings to design too, but can we incentivize it? Yeah, I think that'd be great. How about giving some extra points for all electric space heating that meets the NEEP thing to start to introduce that concept, but I don't think we're ready to mandate that. There're just not enough equipment options.
- b. Katrina: We think we heard from the group that you'd like buildings still to get there without having to electrify or do renewables this time for points, but that it's hard and they'd have to do all the almost all the efficiency measures possible with the way the points are structured is that conceptually right?
  - Elizabeth: I'd probably want to play around with it and see how different projects fit to make sure we're not causing something unintentional there.
  - Chuck: Core and shell, remodel, change of use, and other simpler options prescriptive path often. New buildings typically don't use the prescriptive path, so if in an affordable housing space there was a maintenance area being converted into a dwelling unit, they would use the prescriptive path for compliance
- c. Katrina: Okay, any final comments on where we're going with electric space heat before we turn to water heat? Do folks like where we're going with renewables with a cap around at 5%, so that enough other work like electrification and efficiency needs to be

done in the building?

- Chuck: This sounds like we combined our 406 and the renewable energy proposal on site renewable together. How does this affect the performance paths? Does that mean renewable on site renewable needs to be added to the performance paths or what happened to the performance paths and the on site renewable?
  - Sean: (to Chuck) right now all that has happened really is that on site renewable got absorbed into C406, the credits weren't increased. We would want parity on both the value of electrification and the value of renewables and what we're asking in terms of efficiency between prescriptive and modeling.

8. Next steps/upcoming meeting topics:

- a. 6/14: Continue refining and finalizing proposals
- b. 6/28: Final meeting, if needed

**\*Meeting adjourned\***