



## Regional Technical Forum

**July 23, 2024  
Meeting Minutes**

### **Welcome, Agenda Review and Meeting Minutes**

Jennifer Light, RTF Chair, started the meeting at 9:00am by calling for introductions. She counted 18 voting members. Rebecca Blanton, independent, moved to adopt the minutes from the June 18, 2024 meeting. Eric Miller, independent, seconded. The minutes were adopted unanimously.

Miller moved to adopt the day's agenda. Phillip Kelsven, BPA, seconded. The agenda was adopted unanimously.

### **Management Update**

#### **Laura Thomas, RTF Manager [Presentation](#)**

*Staff reviewed upcoming topics and subcommittee meetings. They stated that a new RTF member cohort will begin in 2025, noting special interests of focus will include Demand Response and Industrial work. They added that former Contract Analyst, Adam Hadley, will be returning to the team starting in August.*

There was no discussion.

### **Sunset Date Extension: Small Saver Strip Curtains UES and Residential Gas Furnaces**

#### **Laura Thomas, RTF Manager [Presentation](#)**

*Staff presented information to justify extending the Sunset Dates of two measures. The RTF approved a four month extension.*

Dave Baylon, independent, asked if this work will include the gas companies' fantasies about gas heat pumps [Slide 6].

- Light: That is not this measure.

Baylon asked if this work could be completed later, suggesting next year [Slide 7].

- Light: Thomas doesn't think more time is needed.

### **MOTION**

I, Mark Jerome, move that the RTF approve the sunset date extensions to November 30, 2024 for the following measures: Strip Curtain UES, Residential Gas Furnaces UES.

Miller seconded.

Vote on the motion. The motion carries. (17 yes, 0 no, 1 abstain)

## **2025 Draft RTF Work Plan and Draft 2025-2029 Business Plan**

**Laura Thomas, RTF Manager [Presentation](#)**

*Staff presented the draft 2025 RTF Work Plan ahead of a [30-day public comment period](#). Discussion centered around tool capabilities and the RTF's newly approved ability to do research to support RTF Planning Measures.*

Baylon addressed commercial models asking if staff are trying to align with EUIs from the CBSA [Slide 8]. He noted that the new CBSA promises much better coverage than ever before.

- Thomas: We haven't determined which datasets we'd use for alignment yet.
- Baylon: I ask because for the most part CBSA alignments have been along the lines of characteristics, not EUIs. But in health care, EUI is more dependent on operation than equipment, so I'd encourage you – especially in the next year – to pay attention to the new CBSA because of the way it's been scoped. It's likely to get much better coverage.
- Light: Our current alignment isn't just building characteristics. It looks at energy use. The new CBSA won't be ready for 2024. But we'll look at it when it is.

Baylon called having no new measures at this point discouraging for the region [Slide 11]. He said the region is extremely oppressed by electrification and various state agencies, adding that the problem isn't measures, but what you do with them. Baylon called this embarrassing, adding that it hasn't been on the agenda except for the six minutes he achieved a few years ago.

- Light: Where are you seeing no new measures?
- Baylon: A few slides back.
- Light: That was for the rest of this year (2024).

Thomas reiterated her point that the number of new measures in the workplan for 2024 probably won't be achieved. She added that there is budget in 2025 for new measures.

- Baylon: I stand corrected.

Jackie Goss, Energy Trust of Oregon, wondered if ProCost is capable of doing DR at the same time as EE. She asked if there is budget to modify ProCost for this effort.

- Thomas: The DR budget includes tool development, regardless of what tool(s) that may be.
- Light: I'm not sure we'd model measures as a combined resource, even if we develop the analysis at the same time. We'll need to think about this more.

Kelsven asked if there is budget for planning measure research.

- Thomas: Yes. A little.

Baylon confirmed that [Slide 16] showed the budget, saying that calling it "small" was an understatement.

- Thomas: Yes, that is it.

- Light: There will be more conversation about this.

Baylon confirmed that the RTF is for the most part standing pat on REEDR, except for training [Slide 19]. He said the tool still needs some capabilities, specifically for controls in the residential sector, especially of HVAC (e.g. heat pumps). Baylon urged that the body needs to pay attention to this.

- Light: The RTF has paid attention to controls.
- Christian Douglass, NWPC: Yes, there are improvements you can make, but we can model lockouts as well or better than SEEM and sizing is still good. We could do a pretty good commissioning measure now in REEDR. It's not 100% realistic on dispatching various heating systems, but nothing out there is.
- Light: And we'll be making more improvements.

Baylon confirmed that REEDR will handle this as it comes up.

- Light: We will handle it and maybe we'll do additional work on top of REEDR.
- Baylon: Part of the reason I bring it up is because the tool development part of the budget is minimal. It will probably cover the commercial buildings, but not much more.
- Thomas: I don't expect to spend much on commercial models next year. It's mostly REEDR.
- Baylon: I'd like to see more evidence that we've already done this.
- Thomas: This is a draft. You are encouraged to provide comments.
- Light: Think of the five-year business plan. We can't do all this in one year. Some years we spend more on tool development. Next year we'll spend more time supporting the Power Plan. On a high level, funding levels are set by the funders. But how we spend that money from year to year is flexible.

Sarah Widder, Cadeo Group, asked for an example of "one small study" [Slide 20].

- Thomas: Like a commercial electric vehicle market characterization.

Light added some context to [Slide 23] acknowledging that it looks small. She said that for years, the PAC adamantly opposed the RTF doing research. Light said they've always kept their eye on the number of planning measures and were concerned that a lot of important measures were not getting picked up. She said the thinking is not to hit all of the planning measures but to find things that aren't getting done elsewhere or are hard to coordinate across multiple utilities. Light stressed that the PAC would have final call on what research gets done, calling this a big move on their part.

- Widder: This is a great step forward. I'm excited to see how it goes. Was there discussion by the PAC of the RTF acting as a convener for larger regional research? For example, on fans. Other entities may be interested in doing the research, and the RTF could bring the work together.
- Thomas: No, we didn't discuss that. There are other organizations in the region doing that. There was discussion about what tasks are appropriate for the RTF. The PAC wants to be the decider on what RTF does. The PAC would welcome feedback on the

RTF's role. There's a lot of research going on in the region. We want to support that and not get in the way.

- Light: Historically, there was some openness to the convener role. It's a new body now, but there's still some openness.
- Baylon: I think that \$50,000 is definitely the kind of money to help convene interested utilities. The region has dropped the ball waiting for individual utilities to do research. There hasn't been much progress so far in heat pump research. Working as a convener would not be a bad idea. Without leadership from the Council/RTF it's hard to get a coherent research strategy. NEEA sort of has that role, but they don't do everything. This is important because of the disconnect between potential in the Plan and actual savings as well as potential for problems with the electrification movement.
- Thomas: There's a lot to explore with the PAC. We do want to start slow. There's room for discussion about what to do, but we want to bind it for 2025. It will be an evolving process. A small budget in 2025 will help start the exploration.

Light stated that the body needs to move on, adding that Thomas is available for further discussion.

- Jerome: I want to applaud getting this in the work plan. It's needed. I'm thankful that the PAC has approved this.
- Goss: I'm pro-convener. You will need program participation to do this research. For example, installing thermostats in commercial buildings. You can't just look at program data after the fact. You can't separate out what's standard in the market versus what programs did.

## **BREAK**

### **Update Small Saver UES: Steamers**

#### **Denis Livchak, RTF Contract Analyst Team (CAT) [Presentation](#)**

*Staff presented the Small Saver update. Discussion centered around different equipment types and testing methods. The motion passed.*

Baylon asked if you use the difference between take-out and regular cooking as the basis for selecting the type of steamer, or if there is another criterion [Slide 17].

- Denis Livchak, RTF CAT: Restaurants use the steam generator for seafood or maybe vegetables at steakhouses. They're not necessary. Sometimes these units get specified at the build of the restaurant.
- Baylon: So, you use boilerless when you don't want to bother with a water connection?
- Livchak: Sometimes yes. Sometimes a steam generator gets oversold. Restaurants don't need steam generators for rice and potatoes.

Widder moved back to [Slide 12] asking if there are different ENERGY STAR® criteria for boilerless versus steam generator equipment.

- Livchak: No.
- Widder: Does the existing test method differentiate equipment performance realistically.

- Livchak: No, not between boilerless and steam generator. But within each of these types, it does differentiate between efficient and inefficient models. Most of the energy is lost during idle time.
- Widder: So, the test procedure doesn't capture the relative inefficiency of steam generators?
- Livchak: The test results mostly indicate idle energy differences.

C. Douglass asked for further discussion about the choice to not to include a shrimp test, calling a very "shellfish" decision.

- There were loud groans and laughs in the room.
- Livchak: (Helpfully responded anyway) Potatoes are easy to thermocouple, shrimp are not.

Widder further explored separating steam generating equipment versus boilerless, asking if steam generating equipment is more expensive than boilerless [Slide 20].

- Livchak: Yes, but they also have more pan capacity. Most steam generators are dual compartment. Most boilerless are single compartment, but buying two boilerless units is still only 2/3 the cost of one steam generator. Restaurants with dual compartment steamers mostly use one compartment at a time. They do this about 90% of the time.
- Widder: So, there's no motivation to buy steam generators if you don't need it.
- Baylon: You could say there's no incentive for a steam generator.
- Livchak: That's out of scope for our work. We just estimate savings.

Baylon confirmed that boilerless steamers cycle on and off while steam generators don't [Slide 26]. He asked if for boilerless, not cooking at full capacity is less important.

- Livchak: Correct. We're proposing to use the constant steam mode for steam generators and not for boilerless. This is different than the current measure.

Goss noted that this equipment is more common in hospitals and schools, but the data is from restaurants [Slide 21].

- Livchak: I assume hospitals hours of operation are similar to restaurant, and we have different assumptions for schools. Ideally, we'd get more data, but this is all we have for field monitoring.

Baylon stated that a "university" is not a school [Slide 28].

- Livchak: Universities have longer days and more days per year than an k-12 school. University hours are lower than others in this dataset so we're including them in the "other" category.
- Baylon: But the hours per day for universities look like what you're assuming for schools.
- Livchak: Yes but schools would have less days per year.

Baylon wondered why we're providing incentives for things with no incremental cost [Slide 46].

- Light: We don't. We just provide the analysis.

Goss stressed that Energy Trust of Oregon reviewed the market and found that there are plenty of products that are more efficient than ENERGY STAR [Slide 47]. She said their specification is 50% more efficient than ENERGY STAR. Goss said this reveals that there is still potential in OR and WA, but users have to make their own QPL.

- Livchak: Yes. And ENERGY STAR is considering a new specification as well. It may differentiate between boilerless and steam generator steamers.

Widder wanted to further discuss the school /non-school hours of operation [Slide 48]. She understood that, in general, universities have more hours of operation per day/per year than schools but wondered if it would be more accurate and equally too burdensome to have categories based on average operating hours per year. She used the example of a small, rural university that only served lunch and dinner. Widder thought this method would allow users to pick the category that was most appropriate.

- Goss: That doesn't sound practical.
- Widder: OK.
- Thomas: Also, many programs are midstream.

Baylon stated that [Slide 47] with Energy Trust of Oregon results show just boilerless models.

- Goss: We have maximum idle rate and maximum cooking rate. There are also separate values for boilerless and steam generators. I'm not sure why we only have boilerless in our participants.
- Light: If sites need a steam generator, let's encourage them to get the more efficient ones. Hopefully, programs are smart and encourage participants to get the right type of equipment.
- Goss: I encourage keeping steam generators in the measure. The savings are higher. If people need a steam generator, we want to encourage them to get the efficient ones.
- David Bopp, RTF CAT: We discussed this internally. Hopefully, the higher cost of a steam generator prevents customers from buying one when they only need boilerless.

Blanton asked about the mix of gas versus electric

- Livchak: They are 60% electric. This is in line with Energy Trust program data and other market data sources.

## **MOTION**

I, Jackie Goss, move that the RTF approve the steamers UES as presented, and Remove the Oregon application from the measure, Keep the category as Small Saver, Keep the Status as Active, Set the sunset date to May 31, 2028.

Kathy Yi, Idaho Power, seconded.

Vote on the motion. The motion carries. (19 yes, 0 no, 3 abstain)

Light recognized Jim White, Chelan County PUD, as he raised his hand in the middle of the vote.

White said he was undecided as there's no incremental cost for non-steam generators. He wondered why anyone would not buy one. He then asked how the energy saving models save energy and the makeup of the current market (efficient versus not efficient).

- Light: We have a few measures with zero incremental cost. There can be other reasons why people don't make the efficient choice.
- Livchak: [Slide 40] shows the current practice market assumptions which is 50%/50%. For boilerless equipment, steam is generated within the cooking cavity. This is more efficient than a steam generator which generates the steam in a boiler and injects it in the cavity.
- Light: See [Slide 16] for areas for improved efficiency.
- Livchak: Most savings are realized by reducing the idle energy rate.

### **Update Planning UES: Doorway Air Curtains**

#### **Paul Sklar, CAT [Presentation](#)**

*Staff presented proposed updates. The body moves that effectiveness should be moved from a secondary to the primary objective in the research strategy and approved the updates to the measure.*

Baylon asked if staff are using the same EER in all cases, or if it is dependent on application [Slide 4].

- Paul Sklar, RTF CAT: It's the same EER across the board for this measure.
- Baylon: Cold storage would have different EER than a walk-in at a grocery.
- Sklar: That's a good point. Hopefully the SIW update will capture this.

Baylon noted that he's been in several cold storage distribution centers and never experienced one as high as 0°F [Slide 7] saying that they're typically between -5° and -20°F. He emphasized that 5°F is pretty high.

- Sklar: We could improve this if we had a wider dataset, but this is the data observed from the evaluation. Our cold storage temperatures are based on one operator's self-reported temperature.

White stated that in all of his years at Chelan PUD he'd never recommended air curtains. He called it counterproductive to blow air, as half goes in, half goes out. White emphasized that this makes infiltration worse, not better. He asked for any before/after measurements of energy consumption.

- Sklar: No, we haven't measured energy consumption. The effectiveness of the air curtain has been lab tested. These don't block all infiltration, but we do have a sense of the range of effectiveness of air curtains.
- Goss: My team asked me about these numbers. They indicated that the freezer numbers didn't look right. I don't have more detail, though.
- Andi Nix, Energy Trust: I'm the one on Goss's team who brought this up. The freezer temperatures seem low for restaurants, convenient, and grocery. They wouldn't have a suction temperature that low.
- Sklar: We could add that to the research strategy.

Baylon confirmed that the base case is no air curtain or anything else [Slide 9].

- Sklar: Yes. It's just a door.

Baylon noted that grocery doors are open for two hours per day, but the load shape is 24/7 [Slide 12]. He asked how the two-hour per day shape is adapted to the 24-hour shape.

- Sklar: We could create a more specific shape if we had better data.
- Goss: It's important to realize that not every store will have doors open time in the same hour. This shape reflects that it happens at different times at different stores. The flat load profile means there's an equal likelihood of a door being open at all stores at all hours, not that that all doors are open all of the time.

Baylon confirmed that base case results assume 50% effectiveness [Slide 13].

- Sklar: Yes.

Baylon said there is a real problem with this measure [Slide 16], saying it could not be a measure as it could expend more energy. He said the fact that we don't know if that's true or not is the issue as the range includes zero and negative savings. Baylon insisted that the research strategy doesn't do us any good if it doesn't address the effectiveness.

- Light: We updated this measure last year. Putting that aside, the update is only on cost. We don't have new savings data. At that time, the RTF said that the research strategy was appropriate for the size of the potential. You could change that today, but that was what we landed on last year. It's a balance between uncertainty and research cost.
- Sklar: I agree that effectiveness is an important question. But negative savings happen if the door open time is actually longer in the efficient case. The research strategy addresses the door open time.

Light agreed that Baylon makes it a good point and puts it in the parking lot.

### **Parking Lot Items**

Should the research strategy move effectiveness from a secondary to the primary objective?  
What are the cold storage temperatures?

Goss thought that the name of measure should include "refrigeration" in it.

- Light: Refrigerated doorway air curtains sounds fine for now.
- White: I like the addition of the word "refrigerated".

White addressed uncertainty, suggesting running a cooler with an air curtain for one week and one week without. He said that that will should you the effectiveness, and then savings could be per square foot of opening.

- Light: We could add to the proposed motion: Add primary objective for measuring air curtain effectiveness.
- Josh Rushton, RTF CAT: This is a big change to the research strategy. We're concerned about effectiveness, and we have tracer gas study results, which are not trivial. We're



also concerned with door open time – which is behavioral. Redoing lab tests isn't being suggested. I'm not sure if we'd see results in a week-on, week-off energy consumption analysis. Even if it does, would the behavioral aspects settle in during a week-on, week-off study? Is that enough time?

- Light: Our research strategies layout the objectives and candidate approaches, but researchers can choose other paths to meeting the objectives.

Light raised the second parking lot items about temperatures.

- Jerome: I don't think we need to be specific about this. The research would capture this.

I, Eric Miller, move that the RTF approve costs for Refrigerated Doorway Air Curtains, as presented and following update and approval of Standard Information Workbook, update the EER values and any other SIW updates for this measure and report results to RTF at a future meeting, Change the research strategy primary objective to include measurement of air barrier effectiveness, Keep the category of Planning, Keep the Active Status, Set the sunset date to July 31, 2027.

Brian Owens, CLEAResult, seconded.

Vote on the motion. The motion carries. (19 yes, 2 no, 2 abstain)

## LUNCH

### **Update Planning/Proven UES: Air Source Heat Pumps Upgrades and Conversions Single Family and Manufactured Homes**

**David Bopp, RTF CAT, [Presentation](#)**

*Staff presented proposed updates to the two measures. The body discussed baseline assumptions, second period current practice baselines, and remaining useful life changes. They explored moving the efficient case specification to a Cold Climate Centrally Ducted Heat Pump with a COP of  $\geq 1.75$  at 5°F and  $\geq 70\%$  capacity as rated at 47°F, retained at 5°F. Staff proposed keeping this Under Review as the region waits for new data. The RTF also discussed how to account for the federal tax credit. The RTF approved the measure updates.*

Goss asked for an explanation of “merge by 1/variance” [Slide 14].

- Bopp: It's a means of taking a weighted average. Weights are based on the variance of the data, rather than sample size. Rushton can provide more information.

Baylon asked if existing evaluations provide a sense of what auxiliary cooling is going on besides central cooling [Slide 20].

- Bopp: We don't know. Homes without central air conditioning might have window units.
- Baylon: The nice thing about window unit AC is that it has a really low SEER. For your purposes, do you subtract from the observed savings if a home doesn't have Central Air Conditioning?
- Bopp: We'll get to that.

Widder confirmed that the “total evaluated savings” in the first column is heating only [Slide 21].

- Bopp: No, that's the full impact throughout the year.

- Widder: OK, and then SEEM is what we think air conditioning would look like. What's the "AC adjustment?"
- Bopp: This is what we have to add to the savings in the first column to make the numbers work out. We're unweighting.
- Widder: So why are heated savings greater than total evaluated savings?
- Bopp: Without AC, you have an AC penalty. So, your heating has to be greater than the total. With AC, the heating savings are the same as without AC.
- Widder: That's what's not making sense. Heating only is bigger than total savings.
- Bopp: That's how the math works out.
- Light: We don't have it broken out in the evaluation. We don't know the distinction.
- Widder: When you break apart the first row, "heating only" is larger than the total.
- Bopp: That's the weighting.
- Light: And "with AC" is small.
- Baylon: If you take out the weights for AC savings and work out the saturation you get the heating savings column, and the overall consumption change is an addition or subtraction.

White asked why the Heating Zone 2 numbers are so much lower than Heating Zone 1 for single family and the opposite is true for multifamily [Slide 22].

- Bopp: That's what the programs found. Maybe it's supplemental fuel usage? These programs don't have screens, so we get a range of situations. It's a question for the evaluators.
- White: It's counterintuitive.
- Baylon: And counterproductive.
- Light: We see a lot of counterintuitive findings in evaluations because of the lack of screening.

Jerome asked about cooling zones.

- Bopp: We have very limited data and high uncertainty in cooling savings. Maybe we can revisit this when we have better Central Air Conditioning knowledge from HEMS.
- Jerome: That makes sense.

Goss stated that this makes huge assumptions about why people put in a heat pump in the first place [Slide 24]. She agreed that the assumption of people taking out a working air conditioner to put in a heat pump may make sense if utilities are pushing heat pumps really hard but thought it more likely that they're doing it because their air conditioner failed.

- Bopp: Yes, that's a baseline question that we'll be digging into and probably having subcommittee meetings to discuss further. It's likely that homes with central air conditioning are installing a heat pump to replace their failed unit.

Jerome thought it made sense to move to a 50/50 baseline because of the Inflation Reduction Act and other federal activity.

- Light: For this alignment with the load forecast, is this because in 10 years 50% of homes will have cooling?

- Bopp: We assume that all homes will have something.
- Light: Our load forecast talks about central air conditioning, not room air conditioning. We hit that level well before 20 years.
- Bopp: We assume 50% have air conditioning to start with, 50% don't have central air conditioning in the first savings period.
- Light: The 2<sup>nd</sup> period of savings is closer to current practice. We have assumptions about how fast air conditioning is going in. We should go back to see what was assumed for the baseline system in the 2021 Plan. We will have an updated load forecast for the 9<sup>th</sup> Plan by spring 2025 and will align our RTF measures with that forecast when we have it.
- Bopp: For now, air conditioning is a small impact. That could change in the future with a more aggressive central air conditioning forecast.

Baylon confirmed that the implication of this is that in the 2<sup>nd</sup> period a heat pump would be selected because by that time the current practice is a heat pump [Slide 26].

- Bopp: It's 50% heat pump and 50% eFAF (with maybe a central air conditioner). The red bar is not zero because some would not put in a centrally ducted heat pump.
- Baylon: And it's half the size of the blue bar because of the 50/50 assumption?
- Bopp: Yes.
- Baylon: Did you use the FTYM weather files?
- Bopp: No. We're going to be using REEDR soon.

Goss asked where the current practice baseline of 7.5 HSPF2 come from [Slide 28]. She added that tax credits will change this quickly because they require higher efficiency.

- Bopp: The current practice baseline comes from a 2012 analysis.

Baylon pointed to a 2013 metered study of variable speed heat pumps in Eugene and Bend [Slide 30]. He said it gave the same answer of no savings as you're suggesting.

Baylon asked if [Slide 32] means we pull out the electric resistance elements.

- Bopp: No, that's a discussion for next year. That's when we'll discuss a measure with no electric resistance.
- Light: You'll need to apply to be an RTF member for the next session.

Goss asked where the proposed numbers come from [Slide 33].

- Bopp: They're from the current analysis (modeling out of SEEM).
- Goss: But that's not based on cold climate requirements?
- Bopp: No, it's based on variable speed, not cold climate, with better control of electric resistance.
- Goss: We're setting a new specification to require a cold climate unit, but we don't have anything to base savings on.
- Bopp: Correct. I've heard enough interest in a new specification that I thought it was worth putting it out there.

Nathan Kelly, BPA, asked why the Energy Trust report is not representative of the proposed measure, wondering if it's the heat pump specifications in the program or something else. He said it seems like a good evaluation.

- Bopp: See [Slide 94] for the explanation.
- Jerome: Also, the definition of the system in the evaluation is different than the cold climate specification.

Widder said she understood the discontinuity but agreed that these numbers seem in the ballpark. She said that philosophically, yes, these are different systems, but modelling this measure in SEEM, changing the system to meet the specification, and then layer on wild installation practices, would probably end up in this neighborhood or maybe a little bit higher. Because of this, she understood why staff chose to stick with what they have.

- Christopher Dymond, NEEA: These numbers seem reasonable. The results are based on a model that would probably qualify for this new specification. The Tennessee Valley Authority did a study of no electric resistance installs which probably corroborates these estimates.

Jerome said when recently working on this for California he saw a 21% increase in HVAC costs since 2021 [Slide 37]. He said the spike in cost is due to required changes in refrigerants and a switch to new HSPF2 metric.

Goss admitted that she was not familiar with the Energy Trust data but said this looks less expensive than what we've seen for prices recently [Slide 39]. She also noted a fixed price program

- Bopp: I removed all the data from the fixed price program.

Widder asked if these numbers are equipment only, or full installation.

- Bopp: Full installation.
- Widder: OK, so what does it mean to add the conversion and upgrade? Are you adding labor twice?
- Bopp: No, the upgrade is just the incremental cost of the cold climate equipment.

Eric Mullendore, BPA, asked if including variable speed equipment in the conversion measure exceeds the specification.

- Bopp: Yes, but we're looking for the average of what gets installed for a given specification.
- Mullendore: Don't we usually use the bare minimum cost, not the bells and whistles?
- Bopp: That's only true if there's no additional savings from the bells and whistles. If savings and costs vary, we try to take an average. As programs promote cold climate rather than variable speed, variable speed might drop out of the market and costs might go down on average.

Nathan Kelly, BPA, asked if these are 2016 dollars.

- Bopp: Yes.

- Light: Our current Council Power Plan is in 2016 dollars, which is why we use that reference year in our work.
- Kelley: And the cold climate cost is...?
- Bopp: It's the full cost of going from an eFAF to a Cold Climate-Centrally Ducted Heat Pump (CC-CDHP).

Goss noted that the data shown already shows that we are now almost double the number of CC over standard HP. She thought that will be the market baseline in the future.

- Dymond: Virtually all HPs that hit 70% capacity at 5°F will be variable speed. And there is a lot of price variability on cold climate. Are there other attributes to these units that don't affect EE but do jack up the price? There are some very affordable cold climate/variable speed units. Maybe it's cloud services, humidity control, that kind of thing?
- Bopp: If we had that kind of data, we'd try to determine the cost of the simpler products that meet the spec.

Widder didn't know if that cost difference on [Slide 41] is significant.

- Baylon: I'm sure it's not.
- Bopp: We thought that someone in the RTF would ask for a difference, but the proposal could be to not split the costs by heating zone.
- Baylon: A good rule of thumb is that when the numbers are this close and the data is scattered, we call them the same.

Jerome mused on [Slide 43] saying it illustrated air conditioning as a benefit we're getting, by adding a heat pump that has cooling anyway...

- Bopp: Some of these people would have installed air conditioning anyway, and they avoid that cost. But I think we should revisit this as the Plan gets developed.
- Jerome: Yes, this does feel icky. As we move towards updates to the measure that are more substantial, I hope we revisit this.

Goss was thrown off by the word "benefit." She asked where it's used.

- Bopp: If they didn't have AC in the pre-condition, we reduce the cost of the heat pump system by ½ the cost of the central air conditioning system. It's a negative cost.
- Widder: Yes, we could take it away, but we've got a savings penalty, and this mirrors the savings penalty.

Goss thought the information on [Slide 44] seemed backwards, noting that the tax credit requirement is same as the cold climate requirement. She said it will apply to almost all upgrades and none of the conversions. Because of this, Goss asked why staff did not just put the credit on the upgrade.

- Light: This would still work if we put the credit on just the upgrade, not the conversion, right [Slide 45]?
- Bopp: Yes.

Baylon confirmed that with central air conditioning and tax credit, it's more expensive than without central air conditioning.

- Bopp: Yes, because of the cooling benefit
- Baylon: But they actually wrote a check for \$10,000, though?
- Bopp: Yes, we're just not counting the full \$10,000.

Dymond asked if the blue columns on [Slide 46] are from version eight.

- Bopp: Yes, red columns are the previous version.

Widder addressed the blue line with no spikes on [Side 51] asking if staff doesn't think those spikes are real.

- Bopp: There are spikes, but we don't think the savings are that spiky.
- Widder: Got it. We could bring the spikes back, but that's not this measure, right?
- Light: Right, if we improved the controls.

Goss agreed that it would be great to bring the spikes back to the savings shape, noting that this shows a model of one average house.

- Bopp: This is an average of 36 HEMS homes (blue), orange is a SEEM model.
- Baylon: The SEEM results might be more than one model, but not more than one operating schedule, so you'd get the same spike in all models.

Widder asked how staff feels about costs on [Slide 56]. She didn't see it on the uncertainty slide but thought it should be considered.

- Bopp: Uncertainty has typically been focused on savings. For costs, we'd need more granularity in program data. For example, is a product variable speed or not. Were other things (like duct work) included in the project? We don't include cost research in our research strategy.
- Light: One think that came out of 2021 Plan was a deeper focus on costs. Talking about uncertainty in costs is good, but it wouldn't go into research strategies because it doesn't impact savings uncertainty. That is what we need to address to move from planning to proven.
- Widder: That makes sense. But providing some information on how to improve the estimates would be helpful. Cost is a critical input for programs.
- Light: I think we can do that without putting it in the research strategy. It could go in a slide in these presentations.
- Bopp: I think we'll be spending time on costs in the next year because we'll have measures that are different than historical programs.

Goss stressed that the region needs to do this research. She said Energy Trust would like combine forces with others, explaining that a sample size of 100 is not sufficient. Goss added that Energy Trust's other heat pump research showed that even sample sizes in the thousands give high uncertainty bounds because of the range of behaviors.

- Bopp: That sounds good.

Baylon pointed to the quality of the duct work as the relevant variable for both savings and costs, especially with variable speed units. He said if the duct work is leaky and the variable speed goes to low air flow, you have continuous duct loss and could wipe out the COP completely, or at least the benefit of the variable speed. Baylon insisted that there needs to be some detail on projects, is it variable speed or not, is the ductwork leaky or not. He said this information is all buried, resulting in a non-cost-effective measure.

- Bopp: We do have a measure for sealing and insulating duct work. That could be claimed at same time as a heat pump project.
- Light: We had more granular measures, but for a variety of reasons, these changed to “any” measures, and then we ended up with low savings and measures that aren’t cost effective. There will be upcoming work to come to address this. Let’s pause on talk of future measure types for today.

White noted that how the thermostats are programmed are a key detail, pointing to lockout temperatures and defaults for backup heat.

Widder confirmed that we’re not proposing to look specifically at the cold climate measure.

- Bopp: No, because we can’t find that baseline in program data.

Kelsven said he understood using variable speed for cold climate [Slide 60] as there will be real data available in a year. Still, he thought these optics were not good. Kelsven believed there should be a measure for BPA, saying in the spirit of a planning measure, we should have higher savings to encourage usage.

- Light: I agree that we want to put planning measures out there, but we can’t just throw savings numbers out.
- Baylon: I’d like to reiterate what Kelsven is saying. The DHP project had considerably less data than this. We had some SEEM runs. We didn’t have the nuances of real installations like thermostat settings or other behaviors. These are unfortunate, but not necessarily the measure we want.
- Light: We’re working on measures that try to capture that. But that’s not what the RTF has had on the books for years, because that’s what programs have wanted. When those more granular measures come, we’ll have to do more than just the old SEEM or REEDR runs. But that’s not this measure. You’ll have to come back for that. And it would help if you’re a voting member, so please reapply!

Thomas expanded that staff are trying to get through these measures now so that we can put them down and then move on to the newer measures that we think will be more impactful.

- Bopp: As a region, we haven’t researched this. So, it’s not realistic to have them developed right away.
- Jerome: In December 2019 we created “ANY” measure. And look, we now have a non-cost-effective measure. But because of it, we’re going to end up with better, cost-effective measures. We’ve done this to ourselves.
- Light: It’s a wakeup call to what you need to do for cost-effective.

## Parking Lot Discussion

Light suggested not differentiating between heating zone 1 and 2 costs in the proposed motion.

Kelsven asked if the tax credit is subtracted from cost.

- Light: Yes, the question is should it be applied to upgrade, rather than conversion?
- Baylon: When you talk to your tax preparer, you'll get the credit.
- Bopp: In that case, we don't need the measure identifier unless our spec doesn't align perfectly with CEE requirements. So, we should keep the measure identifier.

Goss addressed the name change, saying she appreciates it but so many of the cold climate heat pumps are ducted with additional ductless heads as options.

- Bopp: We'll talk about those after the break. This is just fully centrally ducted systems.
- Widder: And can there be horizontal discharge?
- Bopp: It doesn't matter. As long as it's a centrally ducted system. I think it still qualifies if it's centrally ducted but also has a head to some far-off room.

## MOTION

I, Mark Jerome, move that the RTF approve the Air Source Heat Pump Upgrades and Conversions for Single-family and Manufactured Homes UES as presented, and: Apply tax credit to the upgrade application with an identifier, not the Conversion application; Not cost differential between HZ1 and HZ2/3; Change the name to "centrally ducted air source heat pump upgrades and conversions; Keep the category at Proven for SF and MH for heating zone 1 and Planning for MH heating zone 2/3 for conversions; Change the category to Proven for SF Heating zone 2/3 conversions; Keep the category at Planning for all Upgrade options; Keep the status at Under Review for upgrades and conversions; set the sunset date to December 31, 2025.

Blanton seconded.

Vote on the motion. The motion carries. (16 yes, 0 no, 4 abstain)

## BREAK

### Update on Proposed Plan for Ductless Heat Pump Measures

David Bopp, RTF CAT, [Presentation](#)

*Staff presented an update on the proposed plan for the residential ductless heat pump measure updates. Discussion focused on methods to get to higher savings/higher program complexity, the reasons for eroding savings, and a list of proposed updates for the September/October meeting.*

Widder asked about the bullet on [Slide 9] about sizing not being integrally tied to savings.

- Bopp: It's tied to savings, but not as much as with centrally ducted units.
- Widder: I think sizing is important. More size means more savings.

Widder then mentioned that manufacturers are considering integrating DHPs with backup system.

- Bopp: Yes, and that's not necessarily a good thing. It depends on the controls.



Baylon cheekily opined that in the 14<sup>th</sup> century the region put money into DHP systems that were based on the model of displace, not replace. He said this is still mostly true, adding that it works better than you think, even though it is mercilessly undersized. Because of this, Baylon did not agree with Widder. He said the first ton of a system might do 70% of the heating as a much larger, much more expensive multi-head system.

- Jerome: Added heads doesn't necessarily mean added efficiency. Within the last couple of years, there was a study showing a COP drop at each added head. With enough heads to cover the whole home, you might as well have an electric furnace.
- Bopp: We've seen that too.
- Baylon: We saw that in 2010. The multi-head systems always performed noticeably worse than single head and cost a lot more.

Baylon stated that the BPA study was an eFAF study done in about 2010-13 [Slide 13]. He said this is a good study to know because it provides a lot of nuances relative to the deemed savings numbers. He said it contains both MH and SF homes, maybe 20 of each. Baylon reported that results were similar in some cases and that savings depended on controls.

Light recalled that when we did analysis for the screened option, it wasn't based on supplemental fuel, it was based on heating consumption [Slide 15]. She reported that there were a lot of savings, the same as with centrally ducted HP.

- Kelly: When you talk about duct leakage do you mean with a short run DHP?
- Bopp: Yes. Ducts can leak, as can the hole you made to the envelope to add the duct.
- Kelley: Short run DHP probably aren't a majority of DHPs, right?
- Bopp: Yes, that's right.

Jerome stated that the 2029-30 federal standard update and new test procedure includes provisions for low static air handlers.

Baylon recalled talking to a Mitsubishi rep a few years ago who said the company couldn't keep up with the orders for the short duct run systems.

Kelley asked how many DHPs have auxiliary heat, admitting that he didn't think that was an issue.

- Bopp: None have auxiliary heating, but homes have other electric resistance heat sources. But by "supplemental fuel" we mean non-electric heating.
- Light: So, a home has electric cadets but also has a gas or wood fireplace. The homeowner could rely on that fireplace a lot and just use the cadets in the back rooms.

C. Douglass said he was looking at the pre-energy consumption screen for the Plan now. He said examining the top quartile of pre-usage finds a good heating signature and 4,000 kWh savings. He also said the lowest quartile savings are about negative 1,500 kWh savings. He said averaging overall produces a range of -1,500 to 4,000 kWh. C. Douglass said the measures would look very different with screening.

- Light: And each of those units costs that same to install!

Baylon asked if anyone is using the screen on [Slide 21].

- Light: I don't think anyone in the region is.
- Baylon: Utilities have the bills.
- Goss: But they don't sell the HPs.
- Bopp: You'd need a pre-approval process, and be able to say "no."

Light mused on what the RTF can do to get to higher savings/higher program complexity. She said some things, like a midstream measure, won't help. But Light stressed that it's worth thinking several question through like: What can we do if no one is using the current screens, but wants higher savings?

- Bopp: You can have a screen and target high users, still not deny anyone and still have higher savings.
- Goss: Moving up the savings/complexity curve might be serving fewer customers overall. Those other customers might install DHP anyways. I don't want to pretend that everyone can save energy with these if they can't.
- Light: That's right. We want to focus on the homes with good savings, but that can be challenging for implementers.

Widder emphasized that we don't know what the homeowner wants and what the contractor wants to sell. But she stressed that only having a 1:1 measure limits how many people this applies to. Widder thought there may be ideas beyond 1:1 that are good and save energy. She urged the body to think about that as we develop our measure suite.

- Bopp: You could have 1:1 in the living room and another 1:1 in the master bedroom. I don't think the 1:1 measure eliminates other options in the rest of the house.
- Widder: Realistically, the homeowner is going to install everything at once.
- Light: We can put together any measure we want. But if it's not cost-effective, it's not a good use of utility dollars.

Widder stated that program adoption also impacts potential.

- Light: Right, we consider number of applicable homes and ramp rates. For cost-effective measures, you can pay for the full incremental cost of the measure. Not everything people want to do is EE as a resource.
- Jerome: We need a 1:1 measure that shows where you get maximum savings. Trying to meet the market where it sits is where we slide into getting a lot of installs, but also lots of variability and more risk. But maybe there's somewhere in the middle that's closer to what the market is at but not as far as 1:1.

Samuel Rosenberg, PNNL, asked are we going to discuss DR capabilities for DHPs? Especially when looking for areas to find cost-effectiveness, in the chat.

- Bopp: Most likely, yes.
- Jerome: If there's a benefit we can claim there, that would be worth it.
- Baylon: The screen sets the level of savings you can get. It doesn't set what kind of DHP you install. You need a screen to get savings. You need a heating signature. If you're

going to make an incentive for a cost-effective measure, and someone does that, plus a bunch of other measures that aren't cost effective, that's not your problem.

Goss said Energy Trust has a DHP report coming out next week that looks at savings with and without supplemental heat. She reported that all homes used 12,000 to 15,000 kWh of electric heat.

- Baylon: We were seeing homes in MT with 10,000 kWh for the whole home. There's no way you can heat a home in MT with that.
- Light: We can think about more screens because using supplemental fuel doesn't mean there's no heating signature.

Dymond stated that he's on the CEE/Res HVAC committee for the tax credits and all DHPs will get tax credit. He asked if the tax credit should require DR, saying he needs to hear from the body about this.

Widder addressed "the main living area" recalling that we discussed removing this at a meeting or subcommittee based on the challenges in identifying the main living area [Slide 22].

- Bopp: I was implementing at the time and found the concept completely absurd.
- Light: We removed this because no one was doing this. So, our evaluations reflected installations all over the house.

Goss asked if the O&M costs on [Slide 23] are a credit and not a non-energy benefit.

- Light: It doesn't matter in ProCost where we put it, as long as we're accounting for the benefit.

Jerome said he's done equipment cleaning [Slide 25] reporting that it takes between one to two hours and requires lots of precautions. He stressed that the work is yucky with liquid that looks like chocolate milk coming out of the unit for a while. Because of this Jerome insisted that unit cleaning is definitely not a DIY thing, adding that every three years sounds about right for a cleaning schedule.

- Baylon: The indoor units have changed. They are bulkier. They can have higher MERV filters. I wouldn't be surprised if newer DHPs are easier to clean or need less cleaning.
- Rosenberg: Some new models come with more easily removable blower wheels that you could wash in your tub. But it's correct that they're currently difficult to clean.

Goss said Energy Trust has a recent evaluation and would like to do more research and partner with more programs [Slide 30]. She said their sample was over 4,000 and they still have a lot of uncertainty in savings. She stressed the need for a really big sample size and asked to please let their program team know if you're interested in partnering.

Jim White addressed DR for a ductless HP, saying they assume peak is reduced by about half with DHP.

Light ended the meeting at 4:00pm.

**Voting Record: July 23, 2024**

Motion Language	Yea	Nea	Abs	Motion Passes?	Percent of Yea Votes		Number of Voting Members Present
					RTF Voting Members (40% min)	Members Voting (60% min)	
<b>Motion:</b> Approve the agenda for the July 23 meeting (Miller/Kelsven)	18	0	0	Yes	60%	100%	18
<b>Motion:</b> Approve the minutes from the June 18 meeting as posted (Blanton/Miller)	18	0	0	Yes	60%	100%	18
<b>Motion:</b> Approve the sunset date extensions to November 30, 2024 for Strip Curtains UES and Residential Gas Furnaces UES (Jerome/Miller)	17	0	1	Yes	57%	100%	18
<b>Motion:</b> Approve the Steamers UES as presented and: Remove Oregon from the measure application, keep the status at active, keep the category as small saver, and set the sunset date to May 31, 2028. (Goss/Yi)	19	0	3	Yes	63%	100%	22
<b>Motion:</b> Approve Doorway Air Curtains, as presented: Following update and approval of Standard Information Workbook, update the EER values and any other SIW updates for this measure and report results to RTF at future meeting Update name of measure to Refrigerated Doorway Air Curtains Change the research strategy primary objective to include measurement of air barrier effectiveness Keep the Category of Planning Keep the Active Status Set the sunset date to July 31, 2027 (Miller/Owens)	19	0	2	Yes	63%	100%	21

<p><b>Motion:</b> Approve the Air Source Heat Pump Upgrades and Conversions for Single-family and Manufactured Homes UES as presented, and:  No cost differential between HZ1 and HZ2/3  Change to apply a tax credit to the upgrades but keep the identifiers  Change the name to “Centrally Ducted Air Source Heat Pump Upgrades and Conversions”  Keep the Category at Proven for SF and MH for HZ1 and Planning for MH HZ2/3 for Conversions  Change the Category to Proven for SF HZ2/3 Conversions  Keep the Category at Planning for all Upgrade options  Keep the Status at Under Review for Upgrades and Conversions  Set the sunset date to December 31, 2025 (Jerome/Blanton)</p>	16	0	4	Yes	53%	100%	20
--	----	---	---	-----	-----	------	----

July 23, 2024, Meeting Attendance

\* Designates Voting Member

Name	Affiliation
Nicholas Ackerman	Idaho Power
Suzi Asmus	NEEA
Sofya Atitsogbe	WA UTC
Clifford Babson	Energy Solutions
Landon Barber	Idaho Power
David Baylon*	Independent
Johnathon Belmont	BPA
Rebecca Blanton*	Independent
David Bopp	RTF Contract Analyst
Frank Brown	BPA
John Davey	Puget Sound Energy
Emily Donohue	Evergreen Energy
Jesse Durst	Puget Sound Energy
Christian Douglass	NWPCC
Logan Douglass	RTF Contract Analyst
Christopher Dymond	NEEA

Ryan Firestone	RTF Contract Analyst
Wesley Franks	WA UTC
Trevor Frick	Clark PUD
Todd Greenwell	Idaho Power
Kevin Geraghty*	independent
Pace Goodman*	Illume Advising
Jackie Goss*	Energy Trust of Oregon
Daniel Groshans	CLEAResult
Adam Hadley	Hadley Energy Engineering
Brandon Hines	TRC Companies
Scott Honegger	Energy Solutions
Aaron Ingle	NEEA
Mattias Jarvegren	Clallam PUD
Mark Jerome*	CLEAResult
Mitt Jones*	Cadmus Group
Nathan Kelly	BPA
Phillip Kelsven*	BPA
Rick Knori*	Lower Valley Electric
Paul Kuck	Energy Solution
Scott Leonard	Energy Trust of Oregon
Jennifer Light*	RTF Chair
Denis Livchak	RTF CAT
Ben Mabee	BPA
Eric Miller*	Independent
Eric Mullendore*	BPA
Andi Nix	Energy Trust of Oregon
Nick O'Neil*	Energy 350
Sorochukwu Okam	RTF CAT
Brian Owens*	CLEAResult
Andrew Paul	Avista Corp
Joe Prijyanonda	Applied Energy Group
Laney Ralph*	NW Natural
Mark Rehley*	NEEA
Samuel Rosenberg*	PNNL
Josh Rushton	RTF Contract Analyst
Aditya Saxena	TRC
Peter Schaffer*	PacifiCorp
Blake Shelide*	ODOE
Brien Sipe	PGE
Paul Sklar	RTF Contract Analyst

Kevin Smit	NWPCC
Jennifer Snyder	WA UTC
Kenji Spielman	Energy Trust of Oregon
John Stalnaker	BPA
Jason Talford	Idaho PUC
Samantha Taylor	CLEAResult
Laura Thomas	RTF Manager
Joe Walderman	NWPCC
Jim White*	Chelan County PUD
Sarah Widder*	Cadeo Group
Kathy Yi*	Idaho Power