Regional Technical Forum

January 23, 2025
Meeting Minutes

Welcome, Agenda Review and Meeting Minutes
Jennifer Light, RTF Chair, began the meeting at 9:00am by calling for introductions. She counted 23 voting members. Mark Jerome, CLEAResult, moved to adopt the minutes from the December meeting. Rick Knori, Lower Valley Electric, seconded. The minutes were adopted unanimously.

Eric Miller, independent, moved to adopt the day's agenda. Christian Douglass, RTF Vice Chair, seconded. The agenda was adopted unanimously.

Management Update
Laura Thomas, RTF Manager Presentation
Staff presented updates and further explained the role of the Research & Evaluation Subcommittee.

David Baylon, independent, asked if the Research & Evaluation Subcommittee is largely there to discuss RTF work products, or if they can tackle larger regional work as well [Slide 5].

- Laura Thomas, RTF Manager: This is not major change. But given that we're going to start doing some research, they would be the group to review this work.

Sunset Date Extension Connected Thermostats
Laura Thomas, RTF Manager Presentation
Staff presented the need to extend the connected thermostats measure and change the status to Under Review. The RTF asked about the ENERGY STAR® process and discussed the importance of controls. The approved the sunset date extension and set the status to Under Review.

Baylon asked if staff think the ENERGY STAR process will deliver anything resembling a response to the problem outlined on [Slide 7].

- Thomas: I'm not sure.
- Baylon: If they remove the heat pump part, we will need to put it back.

Gregory Brown, Tierra Resource Consultants, asked if the Puget Sound Energy study on [Slide 5] shows negative savings in all electrically heated homes, or just ones with a heat pump.

- Thomas: It's all electric homes. It's a small sample, though.

MOTION
I, David Baylon, move that the RTF: Extend the sunset date to September 30, 2025 and change the status to Under Review.
Jes Rivas, Illume Advising, seconded

Brown asked if staff will be looking at DR savings at this time as well as EE.

- Thomas: Yes, we'll consider them together.

Sarah Widder, Resource Innovations, agreed with the motion and Baylon's earlier point about monitoring ENERGY STAR's process, considering what's been observed with heat pumps and connected thermostats. She suggested focusing on controls that achieve better heat pump performance, cautioning that they may look different than controls for eFAF and gFAF systems. Widder asked if this fits under the normal measure update process, or if the RTF needs a new measure proposal for heat pump-specific controls if it's not in the ENERGY STAR spec.

- Thomas: That is to be determined. We'll pull together what we know about homes in the region and in the ENERGY STAR spec.
- Light: We don't need a new measure proposal for a different spec. The RTF already wants to allocate resources to this.
- Widder: Sounds good. I encourage folks to monitor the process and give recommendations to the RTF on what we'd like to see in a heat pump controls spec.

Baylon called this an important measure in the heat pump portfolio and shouldn't be separate from other heat pump measures. He feared that this will be ignored if it's separated out.

- Thomas: It's not the default. We'd need to discuss this with the subcommittee to figure out the approach.

Lisa Gartland, ODOE, asked if anyone is working with the thermostat companies on their controls, or if the RTF is just waiting for ENERGY STAR to do something.

- Baylon: The controls we want are already in the thermostats, but they're three levels down and installers don't want to bother. They also want to avoid call-backs.
- Gartland: Is there a backup plan if ENERGY STAR cannot complete the task?
- Thomas: If ENERGY STAR doesn't finalize this, or it doesn't meet our needs, we don't need to use it. We can do our own thing. But it's worth waiting to see if it's right for the region. NEEA is also working on this topic.
- Brown: When the time comes, we also have data from interviews with manufacturers regarding controls/heat pumps that we can share.

Vote on the motion. The motion carries. (22 yes, 0 no, 0 abstain)

Sunset Date Extension: Commercial & Industrial Fans

Laura Thomas, RTF Manager Presentation
Staff presented sunset date extension request. The RTF approved the extension.

MOTION
I, Ben Mabee, BPA, move that the RTF extend the sunset date to April 30, 2025 for the Commercial & Industrial Fans UES Measure.
Knori seconded.

Vote on the motion. The motion carries. (22 yes, 0 no, 0 abstain)

Update Small Saver UES ENERGY STAR Ice Makers
Denis Livchak, Contract Analyst (CAT) Presentation
Staff presented proposed updates to the ENERGY STAR Ice Makers UES measure. RTF discussion centered on the limitations of using a common practice baseline. The RTF approved the update and Livchak slayed the room with a "cool" pun.

Baylon asked if this technology allows users to plumb to the water main for drainage [Slide 9].

- Denis Livchak, RTF CAT: Yes. We're not considering water-cooled equipment. ENERGY STAR also doesn't consider them because we don't know if they are installed in a closed- or open-loop systems.

Baylon asked if the ENERGY STAR line on [Slide 17] is the idealized spec. He then asked if the products below are ENERGY STAR while the products above are not.

- Livchak: Yes. You can even see the imaginary federal spec line defined by the top dots.

Kyle Chase, independent noted that auger machines are much more efficient, asking if Livchak could go over different use cases [Slide 26].

- Livchak: The augers are more efficient for water, but not energy. They are less popular because the ice melts faster and dilutes your drinks. You don't want that, except for sweet tea.
- Thomas: They are also used in grocery stores for open displays.
- Jerome: And hospitals use them to make chipped ice. Restaurants use self-contained and remote condensing equipment.
- Livchak: When designing buffet restaurant, you can either use beds of ice or mechanically cooled tables.

Baylon asked if the segmentation on [Slide 28] is based on sales data or what should happen.

- Livchak: It's based on the model count in the database. We don't have any sales data
- Baylon: So, we get 55% because of the count of products on the market? We don't know this for sure?

Light explained that Baylon is hitting on a challenge with using our current practice when we don't have sales data. She said the RTF often does this–count products in a database–when we lack better data. Light said this is a case of the RTF doing the best with what we have.

- Thomas: Livchak has more on this to come.

Rivas confirmed that [Slide 29] is not weighted by sales.

- Livchak: That's correct, but I'll get deeper into this shortly.

Andrew Grant, Cadmus, asked if the CAT reached out to ENERGY STAR to get the raw data underlying their estimates [Slide 31].

- Livchak: My understanding is that the ENERGY STAR food service group is not currently active.

Grant pointed to the significant secondary market for commercial cooking equipment, asking how the RTF treats the secondary market.

- Light: We've wrestled with this question in the past and the RTF PAC also discussed this. We do not factor the secondary market into sales. Part of this is the way we look at the lifetime savings. There are some open questions on this, but it's not a topic for today.
- Livchak: Most restaurants don't want to buy used equipment because of warrantee and serviceability. We looked into this for rack ovens where there's some used sales, but for most food service equipment, it's pretty small share of sales.

Kevin Geraghty, independent, said he understood why Baylon is sniffing around the market data. He also noted that the size of machines range in an order of magnitude. Geraghty agreed that there's no alternative and we're stuck with it.

- Baylon: We could just use the ENERGY STAR number across the board.

Jerome noted that ice machines for fast food fountain drinks are usually between 200 to 400 pounds with another 1,000-to-2,000 pound machines in the back [Slide 33]. He added that large bars could have five 2000-pound machines to serve their needs.

Baylon asked what extent the assumptions about the fraction of ENERGY STAR equipment plays into the results on [Slide 40].

- Livchak: The savings shown here include the current practice adjustment. The current measure used ENERGY STAR's share of 36% across the board.
- Baylon: So, some of the change in savings is from this shift in current practice?
- Livchak: Yes.

Brown moved back to [Slide 38] to say most ice makers are designed to take advantage of inlet temperature and release ice when it's done. Because of this, he said that inlet temperature shouldn't matter.

- Jerome: Yes, they'll use the thickness of the ice as the trigger.

Baylon asked if this means that the presented savings are too generous.

- Livchak: Ice machines can compensate for water temperature, so yes, they would realize the savings of a lower inlet water temperature.

Rivas confirmed that the proposal is to update to the shape on [Slide 43].

- Livchak: Yes.
- Rivas: What does “professional judgement of metered data” mean?
- Livchak: It’s from an unpublished study of mostly restaurants and a few schools.

Rivas asked what the load shape impacts.

- Light: Capacity savings.
- Livchak: The current shape is flat. We don’t think this is right.

Miller voiced surprise that there’s no seasonal variation in ice production.

- Livchak: We don’t have annual data for this. The metering only ran for two months.
- Baylon: So, monthly savings are just the same savings each day?
- Livchak: Yes.

Noe Contreras, NEEA, asked if this profile is for all applications.

- Livchak: That’s what we’re proposing. We don’t have more granular data for other use cases. As far as seasonality, you might have a longer duty cycle in summer, but not higher loads.
- Contreras: That would matter for time of use rates.
- Light: We’re not looking at DR or TOU rates for this measure at this time. That may change later on. Our measures and shapes don’t reflect these details.
- Livchak: That said, there is DR potential and load-shifting controls in ice machines.
- Light: This is broader than ice machines. DR is a small piece of our work, and we mostly give priority to heating measures. We’re inching into this area.
- Thomas: Based on my experience in food service, there’s potential, but not much interest. Unless our members have a lot of interest, it’s not high on our priority list.

Baylon asked if the costs on [Slide 46] are in 2022 dollars.

- Livchak: These are in 2016 dollars.

Contreras addressed the cost discrepancy illustrated on [Slide 48] asking if it’s because the DOE focused on the incremental cost of efficiency and not the bells and whistles that come with some models.

- Livchak: Potentially yes, but this is what consumers see.

Brown recalled that when looking at past food service measures, we learned that most people don’t pay full retail price. He asked if this is a factor here.

- Livchak: List price can be two times what people actually pay. But we’re collecting prices from online sources, which is what consumers actually pay. In the past, we used AutoQuotes, which uses the very high list prices. Online retail prices are much closer to what operators pay.

Andi Nix, Energy Trust of Oregon, noted the excessive variability in the cost multipliers. They asked if these are weighted by product availability [Slides 29 & 30].

- Livchak: Yes. The current practice mix is applied to these costs to get the current practice incremental cost.
- Grant: Is the cost multiplier applied to the baseline and the efficient base?
- Livchak: The DOE assumes the markup analysis on the baseline only. We are applying the cost multiplier to the difference between baseline and efficient case. We looked at the scatter plot of efficient and inefficient machines, and in some categories, we didn't see an incremental cost.
- Baylon: But we're ignoring that detail?
- Livchak: We're using the DOE numbers instead and applying the cost multiplier to make the values more realistic.

Grant confirmed that unpublished data was used for load shape development [Slide 51]. He asked if this was used for the energy consumption analysis as well.

- Livchak: A lot of these machines were different vintages and from California. Also, the study was 10 years ago.
- Light: At a high level, 10 aMW is not a small saver. There's some uncertainty, but it's not worth the research cost to pursue.
- Brown: It's more uncertainty than we'd have for a 3 aMW potential, but I like the way that this has been framed. Could we glean HVAC interaction from CBSA data? Maybe in the future?
- Livchak: The previous analysis had some CBSA data on building sector, but the ambient temperature can still vary quite a bit. For instance, in a utility room versus an outdoor area versus a conditioned space. In restaurants, for example, they may or may not be conditioned in the kitchen. There are hoods there, too. Or it could be in the dining area. You'd need to document the machine location, coupled with the HVAC system type, to do this well. For example, an urban hotel could have ice machine indoors. While a rural hotel may put it outside.
- Thomas: We discussed this. We'll be keeping an eye on the CBSA and the commercial end-use metering study.

Jerome praised the work, calling it well done. He said proven is more about savings than cost, and he felt the cost was squishy in this case.

MOTION
I, Mark Jerome, move that the RTF approve the ENERGY STAR Ice makers UES as presented and: Update the Category to Proven, Keep the Status at Active, Set the sunset date to January 31, 2030
Grant seconded.

C. Douglass said he will be voting in favor of the motion. He noted that duty cycle is important, and an ACEEE study corroborates the assumed values and the kWh per 100 pounds of ice.

Geraghty asked what the regional uptake of this measure has been.

- Light: I don't know off top of my head.

- Geraghty: The percentage of ENERGY STAR in some categories is quite low, and in categories where ice makers are the biggest and most efficient. Maybe we don't need those categories? But I don't have a solution in mind.

Vote on the motion. The motion carries (24 yes, 0 no, 0 abstain).

BREAK

Update Standard Protocol: Non-Residential Lighting Retrofits
Paul Skar, RTF CAT Presentation
Staff presented updates. The RTF discussed the current practice wattage ratio and the LED growth rate in ID/MT. The proposed updates were approved by the RTF.

Baylon asked that for this purpose and future equations in this presentation, if "LED" includes LEDs only, or if it's an average wattages of the measure as proposed [Slide 10]. He asked if there is any variation in this.

- Paul Sklar, RTF CAT: We do need to make the distinction between the specific project LED versus the average LED. We need to know both. I'll have more on that later.

Baylon asked what happened to current practice, wondering if the RTF is not doing current practice anymore as it's not in the equation [Slide 11].

- Sklar: The current practice is this summation term.
- Baylon: Ah. There's no real current practice wattage ratio, just a correction term?
- Sklar: No, this is a current practice wattage ratio. This tells you that for a given LED wattage, the average wattage of the current practice mix of technologies, including LEDs. Also, note that the summation term should also include LEDs.
- Baylon: And this is market driven, not pre-condition derived?
- Sklar: Pre-condition gives us pre-condition watts. We go from there to expected LED watts, and from there to expected current practice watts.
- Baylon: So, this has the census of what's going in?
- Sklar: Yes. We've built up a stock model to get to those percentages.

C. Douglass confirmed that we're getting an estimate of current practice wattage.

- Sklar: Yes.
- C. Douglass: So, based on precondition, the calculator says what else could be installed.
- Eva Urbatsch, Puget Sound Energy: You have precondition, and you look stuff up based on that?
- Sklar: Yes. We switch to LED watts first.
- Urbatsch: And this is looked up in the calculator?
- Sklar: Yes.

Nix asked if the watts are based on program data or something else.

- Sklar: Yes, that's the data you provided.
- Nix: And those are multiplied by market shares?

- Sklar: Yes, that comes from a market study.
- Josh Rushton, RTF CAT: I want to clarify that “program” here means data we collected from a program, not what’s in your program

Baylon noted that current practice is being used for the second period. He asked what is used for the initial period.

- Sklar: We use pre-conditions for first period. You just look at what was installed. It’s so simple I didn’t write it down.

Widder was curious about the logic of the wattage ratio and going from pre-condition to LED to current practice.

- Sklar: The example on the next slide should help [Slide12].
- Ryan Firestone, RTF Contract Analyst: [Explains why we need each term in the formula].

Urbatsch stated that the math doesn’t add up in the calculator, suggesting that a division is missing.

- Sklar: Yes. Thank you.

Baylon asked why stock models start at zero for LEDs when they are in the market [Slide 13].

- Sklar: We’re not interested in the whole stock. Just the stock eligible for programs.
- Baylon: So, you’re saying we wouldn’t be doing this if they already had LEDs?
- Sklar: Yes.
- Baylon: So, what happens after 2026? Wouldn’t they be doing it then?
- Sklar: Yes, after the RUL, we’re saying that some lamps get replaced with LEDs. And each year, some integral LED fixtures get installed.
- Baylon: So, in this model about half of lamps are LED in 2038?
- Sklar: In this model 46% are LED every year.
- Light: Keep in mind we’re proposing to change this for the update.

Baylon confirmed that [Slide 17] says that 80% of luminaires are LEDs in the current practice baseline.

- Sklar: Yes, the luminaire or lamp.
- Baylon: Is that reflected in the wattage ratios? That 80% of lights that are already LEDs?
- Sklar: We use the sales data for the lamps, but not the fixtures. I’ll get to that. Note that if you exclude the LED luminaires, 66% are LEDs.

Nix confirmed that staff is not using the LED luminaires data in the current practice baseline.

- Sklar: I’m proposing to use this for lamps but get LED fixture growth from stock data.
- Nix: What do you do when the TLED numbers drop in this table?
- Sklar: The BPA market model shows decrease in TLEDs as LED-luminaires increase. This doesn’t affect our current practice baseline much because we don’t get the LED luminaire growth rate from this table.

Baylon asked why this method was chosen.

- Sklar: The current practice baseline has two objectives: get at the mixture of lamps and determine the increasing fraction of LED luminaires. LED lamps and luminaires compete. The stock model informs this.
- C. Douglass: This table is a starting point. It then gets adjusted by state standards, right? For example, you can't sell fluorescents in OR.
- Sklar: That's true. There are a few more steps to do from this to current practice baseline.
- Gartland: Even if these aren't the final numbers and you have introduced the mercury ban, this seems like an aggressive turnover of LEDs. Fifteen to 47% in five years? Maybe WITH the mercury ban but I remain hesitant.
- Sklar: Let's go through all of the steps of the analysis and then reconsider this.
- Light: Remember that we're spending a lot of time on life-time savings, not the first-year savings. Programs are much more interested in first year savings, which are way more straightforward.

LUNCH

Update Standard Protocol: Non-Residential Lighting Retrofits (Continued)
Paul Skar, RTF CAT Presentation

Baylon confirmed that [Slide 19] shows an index of all tech types to LEDs.

- Sklar: Yes.

Baylon said the denominator on the equation on [Slide 20] have LED to current practice. He asked if current practice includes LED.

- Sklar: Yes.
- Baylon: So why not just say current practice?
- Firestone: That is the program data we have. We want current practice in the wattage.

Grant asked why the LED fixture consumes more watts.

- Sklar: We make assumptions about the inefficiency or delivery losses of lamped fixtures. We assume that in LED fixtures, those losses are minimized by the design of the fixture.
- Grant: But a wattage ratio of 1.07 implies a higher consumption for the fixture.
- Sklar: No, the fixture wattage would be less than a fixture with LED lamps in it.
- Baylon: It's an index value, not watts.

Gartland asked, I'm assuming the percentage on [Slide 17] are for replacement lamps, right? In the question pane.

- Light: These percentages represent sales of lamps.
- Gartland: So that could be either for replacement or new fixtures, thanks.
- Light: Exactly.

Nix said BPA sales data exists for 2023 but noted that it's not reflected in the model [Slide 24].

- Sklar: Yes. I think. But the data I received was only through 2022.

Baylon asked if the presented numbers diverge from the previous slide because they represent total stock and not market sales in a particular year.

- Sklar: Yes.
- Baylon: Sales are generally higher than what you see in the 2021-2022 data. If we have a lot of sales, it should be reflected in the stock.
- Sklar: Doesn't it help to go out to 2025?
- Baylon: Stock is consistently lower than sales.
- Sklar: That's why I'm looking out to 2025 in part. It would be a judgement call to look out further.
- Baylon: We'd do this to increase the rate of fixture increase?
- Sklar: Yes.
- Baylon: It surprises me that we're talking about non-LED fixtures as late as 2027. Maybe this is just the slow group in the region?
- Light: This is stock. We shouldn't be projecting in our measures beyond the start of program period.
- Nix: This data is for all four states. Only OR and WA have fluorescent bans, though.

Baylon speculated that the participants on [Slide 25] are the slow learners.

- Sklar: Yes! This is the portion of the population that hasn't switched to LEDs yet.

Baylon said that it stretches credibility that the slow groups in ID/MT are still going to be using linear fluorescents for that long [Slide 30]. He didn't think that people would prefer fluorescent to LED for the next 12 years.

- Light: Do you have an alternative proposal?
- Baylon: The growth rate is too slow. ID/MT won't look that different than OR/WA. I recommend a higher change-out rate (smaller gray bars) so 2034 looks like what this graph shows in 2038/39. Having fluorescents all the way out to 2044 just isn't realistic.

Rob Marks, Snohomish County PUD, thought that two lamp change outs was too much and suggested using perhaps just one cycle. He noted that manufacturers are switching from linear fluorescents to LED, meaning that the price is going down to a point where people eventually won't choose linear fluorescents.

- Sklar: We only need the current practice baseline at the RUL, which is a few years out.
- Light: So, the data beyond that is moot?
- C. Douglass: The NEMA shipments data for linear lighting is showing much slower growth of LEDs. We're at the top of the S curve. I think Sklar's forecast seems reasonable.

Sklar asked Baylon if he's suggesting moving the 2038 status up to the RUL period.

- Baylon: Maybe just move it five years faster, like to 2033.
- Jerome: If we do this in one cycle, we change everything over in three years. I think that's too fast. Baylon is saying 15 years, but that's the result of how fast the market

changes. Will it slow? I don't see anything that tells me this is right one way or another. What's been proposed makes sense and we'll revisit in a few years.

Nix noted that [Slide 32] says "Market share" but it looks like "stock."

- Sklar: You're right. I'll correct that.

Baylon asked if there is a separate standard for fluorescents [Slide 34].

- Sklar: Yes.
- Baylon: So even in Idaho, you'll need to bring in fluorescents at this efficacy [Slide 35]?
- Sklar: No, this only covers LED lamps.
- Baylon: 124.6 lumens per watt applies to LEDs and Fluorescents?
- Sklar: No, just the LEDs. Fluorescents are covered by a separate standard.
- Baylon: That's a bad idea.

Baylon stated that pin-based numbers on [Slide 37] are higher than any available equipment.

- Sklar: The standard says that LEDs will need to be significantly more efficient (higher efficacy) than current products.
- Baylon: To me, this says that in 2028, you come to the same conclusion (all LED).

Baylon suggested saying that all non-LEDs are gone in 2038 [Slide 42].

- Nix: Should WA be replaced with LEDs before their fluorescent ban starts?
- Sklar: Just at the natural turn-over rate through 2028.

Grant thanked Sklar for incorporating new federal standard. He called this confusing, asking if the region is confident that manufacturers can meet the standard. He wondered if it would force manufacturers back to fluorescents, admitting that he didn't know.

Brown said he was not a fan of picking a year to get to 100%. Instead, he leaned towards picking a number of replacement cycles, saying it's all just a guess adding that it doesn't impact first year savings. He asked the RTF to be mindful of this. Brown stated that the body needed to land this as our forecast uncertainty is greater than anything we might pick.

MOTION

I, Jes Rivas, move that the RTF approve the Non-Residential Lighting Retrofits Standard Protocol as presented and: Keep the Status as Active, Set the sunset date to January 31, 2027
Brown seconded.

Baylon proposed to amend motion.

AMENDEMENT

"in all cases, the fluorescent component of the stock will be reduced to less than 1% of the stock by 2038."
There was no second

Vote on the original motion. The motion carries. (23 yes, 0 no, 0 abstain)

Data Centers Market Characterization
Mitchell Rosenberg, DNV, C.D. Nayak, DNV, Presentation
Staff from DNV presented the Data Center Market Characterization work done throughout the past year. RTF members asked many questions about backup fuels, cooling (or non-cooling) options, and the low chance of data centers taking advantage of efficiency measures.

Baylon asked about the average connected load for each application [Slide 6].

- Mitchell Rosenberg, DNV: Mid-tier is 1 to 3MW, enterprise 5 to 100 MW. For smaller ones, like a server closet, it's about 10,000 MWh per year. I can share some information on this.
- Baylon: What's the energy implication if we're moving towards enterprise scale equipment?
- Rosenberg: We'll get to that.
- C.D. Nayak, DNV: We'll talk about that transition. Small data centers are currently 65% of count of units currently and are projected to shrink to 10% over time.

Gartland wrote, we should mention that the supporting data centers are being moved to the cloud/dedicated digital services in the question pane.

Geraghty noted that power use is being measured in kW, asking if we can assume operation at full capacity [Slide 7].

- Rosenberg: No, it depends on the time and the application. Needless to say, it's not 8760 at full capacity.
- Nayak: We use two terms: MW (capacity) and aMW (average capacity). We got 8760 data for one data center and found two peaks throughout the day. I can explain the two peaks later.

Baylon stated that the cost of the electricity is an issue in one of two ways: find cheap electricity to buy or invest in efficiency [Slide 11]. He asked which is typical.

- Rosenberg: Both. Data centers are concentrated where electricity is cheap, so the NW, SE, and now the Midwest. Big data center operators are trying to maintain efficient operations. Also, for power procurement, companies have ESG and greenhouse gas reduction goals. They do remote power purchase agreements and crazy things like acquiring/building their own power plants.
- Nayak: Crypto mining datacenters are about 30% of total data center use. They go to places where power is cheap and not well regulated. The cost of land is also a factor.

Baylon pointed to ongoing pressure to move out of small server rooms and onto the cloud [Slide 12]. He acknowledged that that's only about 15% of load but stated that it's a lot of servers. He asked if this is this observable, or just a hope of the server operators.

- Rosenberg: Yes, there's been a migration of activity to the cloud since the 2010's. We'll get into that data, at the national level.

- Shelly Carlton, Energy Trust of Oregon: Server closets are more common in rural areas, from our experience at Energy Trust (from the question pane).

Grant noted that [Slide 14] projects a lot of load growth from AI. He wondered if AI would get more efficient over time.

- Rosenberg: I'm not sure.
- Nayak: The forecast is that the efficiency components have already been captured. AI chips are 900W and increasing. Data processing requirements and power consumption are increasing. We shouldn't see increased chip efficiency.
- Grant: But what about the processing of the Large Language Models, i.e. the algorithms? Won't that improve?
- C. Douglass: We've heard from large data centers. When they become more efficient, they just use more power.
- Nayak: Systems do run in learning and inference mode. Learning mode takes time. Inference mode takes less time. I don't have an exact answer, though.

Douglass asked if there are any location maps of large data centers in the northwest [Slide 15].

- Rosenberg: Yes, there are maps out there. Baxtel, for example.
- Nayak: There are other databases with location, size, type, and application.

Poppy Storm, 2050 Institute, asked if we have some of these numbers at northwest state level, rather than regionally.

- Thomas: We just wanted regional perspective. I'm not sure about what the Council wants for the Power Plan, but we can check and let you know.

Geraghty asked what fraction of the big players are located in the three mid-Columbia utilities. He said if it's all of them we have to remember that the earth is finite so any forecast of geometric growth needs to be viewed with skepticism. Geraghty stated that the mid-Cs have about two dams each, saying that that is all of the cheap electricity.

- Rosenberg: That's a good point. Relative growth in the NW has slowed. The northwest is attractive because of power cost, proximity to big companies, and the number of nodes to connect to. But those will get saturated.
- Thomas: Also, the Council will be doing their own forecasting exercise. This is out of scope of the RTF work.
- Jerome: I think that this is going to be the amount of power distribution and development is going to increase like we haven't seen in a long time. Kind of like the 1930's through 60's in this region. It's a big deal.
- Thomas: Noted. But that's not what we asked DNV to do for this study.

Baylon wondered if the 15% reduction on [Slide 19] is because they are getting "sloppy."

- Rosenberg: Data centers monitor energy consumption and operating efficiency more than just about anyone else.

Brown asked if we have panel data on PUEs at one facility over time. He wondered if facilities have gotten less efficient over time or if they were designed with less efficiency.

- Rosenberg: We can look at efficiency versus vintage and yes, you're right. But it's not changing as much now.
- Nayak: For a PUE of 2, one MW goes to IT and one to support systems. Most of the improvement is from the cooling system. In the Pacific Northwest, lots of data centers don't require cooling. Operators have to replace servers after five years, anyway. Google has achieved 1.06 PUE. That's very good. They're targeting 1.02.
- Baylon: That's based on their operating strategy?
- Nayak: Yes. The northwest has a favorable climate. In 2008, ASHRAE recommended a temperature and humidity range for data centers. The Green Grid (industry body for data centers) created a free-cooling map of the world. The Pacific Northwest gives 8,000 hours of free cooling per year. Cooling system can mostly be on standby and use 100% outside air.
- Gartland: For most other businesses, utility costs are an afterthought and not a consideration. In data centers, it's their major expense. It doesn't surprise me at all that they spend so much time thinking about this.

BREAK

Data Centers Market Characterization (Continued)
Mitchell Rosenberg, DNV, C.D. Nayak, DNV, Presentation

Grant asked what backup systems would look like at large data centers. He wondered if they would be diesel, or some other technology [Slide 27].

- Nayak: This is interesting and disturbing. The backup power is typically diesel generators. Big data centers can't store that much diesel on site because of permitting issues. They can't even procure that much fuel. And if they could, the EPA/local emissions regulations would kick in. So, they're motivated to move to fuel cells. Gas lines are in place and are more reliable than electric system.
- Baylon: Are these gas plants on site?
- Nayak: Yes.
- Rosenberg: Some data centers are looking at storage and microgrid arrangements.

Baylon asked if the facilities on [Slide 30] have 80°F air provided by a cooling tower.

- Nayak: The allowable range is higher than the recommend range. Some operators use the allowable range. Servers are replaced relatively rapidly, like every five year, regardless. But data center operators work in the aisles, which can be noisy and more than 100°F.
- Baylon: In our climate, a cooling tower would be sufficient.
- Nayak: Yes, but for the Pacific Northwest, we don't even need a cooling tower. Water use is a big quantity. Evaporative cooling is used when outside air is too hot.
- Baylon: On average, it's not many hours, but you'd still see chillers running sometimes if they use mechanical cooling.
- Nayak: Yes, the mechanical cooling systems are there but remain on standby.

Baylon stopped at [Slide 33] to say that the Puget Sound Energy service territory has a big player.

Grant asked about using the waste heat, like industrial heat pumps for example.

- Nayak: There are very few industrial heat pumps in the US. There are some data centers that have absorption chillers to use the heat from data centers. There are opportunities for heat recovery, but they're typically located in rural areas. So, there's not a lot of opportunity to use the heat. Plus, the heat isn't that high. It's like 100°F.
- Grant: Did you look beyond the NW?
- Rosenberg: We looked everywhere. All of the regulatory body archives for all of the states.

Baylon so this doesn't sound like a good customer for conservation programs.

- Rosenberg: Not so far. But the market is changing and there are cost-effective savings out there.
- Nayak: Most of the improvement is based on in-house motivation, not efficiency programs.
- Micheal Daukoru, CAL TF: Was liquid cooling (immersion or direct-to-chip) efficiency potential assessed?

Gartland asked about humidity controls in a small datacenter [Slide 36]. She said that large data centers add waste heat utilization. She wrote, maybe add humidity control to the list of possible measures? Adjusting those settings used to be a thing in small data centers with CRAC units.

Terry Judge, Hotstart, wrote: RTF has a measure for backup generator block heaters and is now studying block heaters using heat pump technology that is being retrofitted on big generators in data centers. Should this be listed as Possible Measure for Large Data Centers?

O'Neil stated that Oregon and Washington need to follow ASHRAE 90.4 which covers a lot of these measures. He said that 90.4 should be considered the baseline for new construction in those states.

- Nayak: 90.4 has two terms: mechanical load component and ELC (electrical loss component). All new data centers need to adhere to this.

Light stated that there is a lot of reluctance in data centers to shift load. She said there may be shifting backup generation usage depending on price incentives.

- Grant: Crypto mining seems like a key opportunity for DR events.
- Gartland: And for large data centers I'd add using waste heat wherever possible.

Light ended the meeting at 4:00.

Voting Record: January 23, 2025

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)	
Motion: Approve the minutes from the December 17, 2024 RTF meeting. (Jerome/Knori)	22	0	0	Yes	76%	100%	22
Motion: Approve the agenda for the January 23, 2025 RTF meeting. (Miller/Douglass)	22	0	0	Yes	76%	100%	22
Motion: Move that the RTF: -Extend the sunset date to September 30, 2025 -Change the Status to Under Review (Baylon/Rivas)	22	0	0	Yes	76%	100%	22
Motion: Move that the RTF extend the sunset date to April 30, 2025 for the Commercial & Industrial Fans UES measure. (Mabee/Knori)	22	0	0	Yes	76%	100%	22
Motion: Move that the RTF approve the ENERGY STAR Ice Makers UES as presented, and: • Update the Category to Proven • Keep the Status at Active • Set the sunset date to January 31, 2030 (Jerome/Grant)	24	0	0	Yes	83%	100%	24
Motion: Move that the RTF approve the Non-Residential Lighting Retrofits Standard Protocol as presented, and: • Keep the Active Status • Set the sunset date to January 31, 2027 (Rivas/Brown)	23	0	0	Yes	79%	100%	23

January 23, 2025, Meeting Attendance
* Designates Voting Member

Name	Affiliation
Jamie Anthony*	BPA
Kathryn Bae	NEEA
Landon Barber*	Idaho Power
David Baylon*	Independent
Talullah Blanco	DNV

David Bopp	RTF Contract Analyst
Frank Brown	BPA
Gregory Brown*	Tierra Resource Consultants
Nathan Brunner	DNV
Shelly Carlton	Energy Trust of Oregon
Kyle Chase*	Independent
Noe Contreras*	NEEA
Shouka Darvishi	DNV
Michael Daukoru	CALTF
Christian Douglass*	RTF Vice Chair
Logan Douglass	RTF Contract Analyst
Christopher Dymond	NEEA
Patrick Fegan	Tierrarc
Ryan Firestone	RTF Contract Analyst
Wesley Franks	WA UTC
Lisa Gartland*	ODOE
Kevin Geraghty*	independent
Emily Gilroy	WA UTC
Andrew Grant*	Cadmus
Jackie Goss	Energy Trust of Oregon
Adam Hadley	RTF Contract Analyst
Josh Haver	Idaho PUC
Rocio Herrera	DNV
Michael Hoch*	Energy Trust of Oregon
Scott Honegger	Energy Solutions
Zachary Horvath	Cadmus
Mattias Jarvegren*	Clallum PUD
Mark Jerome*	CLEAResult
Terry Judge	HotStart
Nolan Kelly	BPA
Bryan Kilgore	DNV
Cody Kleinsmith	Energy Trust of Oregon
Rick Knori*	Lower Valley Electric
Jennifer Light*	RTF Chair
Denis Livchak	RTF Contract Analyst
Ben Mabee*	BPA
Tyler Mahone	DNV
Bruce Manclark*	Earth Advantage
Rob Marks*	Snohomish County PUD
Jarred Metoyer	DNV

Eric Miller*	Independent
Andi Nix*	Energy Trust of Oregon
Nick O'Neil*	Energy 350
Brian Owens	CLEAResult
Megan Ovaska	DNV
Craig Patterson	independent
Andrew Paul*	Avista Corp
Larry Pratt	independent
Joe Prijyanonda	ICF International
Laney Ralph*	NW Natural
Ronald Ramey	Energy Solutions
Akanksha Rawal	Energy Trust of Oregon
Jes Rivas*	Illume Advising
Samuel Rosenberg*	Pacific Northwest National Lab
Josh Rushton	RTF Contract Analyst
Blake Shelide	ODOE
Paul Sklar	RTF Contract Analyst
Kevin Smit	NWPCC
Jennifer Snyder	WA UTC
Kenji Spielman	Energy Trust of Oregon
John Stalnaker	BPA
Poppy Storm	2050 Institute
Mariah Sullivan	BPA
Jason Talford	Idaho PUC
Laura Thomas	RTF Manager
Taylor Thomas	Idaho PUC
Eva Urbatsch*	Puget Sound Energy
Michelle Wildie	PSE
Joan Wang	BPA
Shannon White	Tierrarc
Sarah Widder	Resource Innovations
Mark Wilhelm	Tierrarc
Michael Yim	Tierrarc
Yao Yin	Idaho PUC