



# RETAC Q2 2023 Meeting Notes

June 27, 2023

9:00 a.m. – 3:15 p.m. (Pacific)

Microsoft Teams Webinar

## Meeting Attendees

Kenji Spielman, Energy Trust Oregon

Tim Minezaki, Energy Solutions

Suzanne Frew, Snohomish PUD

Alex Ackerman, Bonneville Power Administration

Ammi Amarnath, Electric Power Research Institute (EPRI)

Robert Bogataj, Seattle City Light

Kerry Cameron, Tacoma Power

Corey Corbett, Puget Sound Energy

Dave Bohac, MN CEE

Todd Greenwell, Idaho Power

Matt Iris, Avista

Jake Wise, Portland General Electric

Keshmira McVey, Bonneville Power Administration

Kevin Smit, NW Power & Conservation Council

Andrew Pultorak, Puget Sound Energy

Tom Osborn, Bonneville Power Administration

James White, Chelan PUD

Kasey Curtis, Puget Sound Energy

Chad Ihrig, Franklin Energy

Jesse Durst, Puget Sound Energy

Megan Lacy, Puget Sound Energy

Andrew Shepard, Energy Trust Oregon

Robert Frost, Benton PUD

Mark Lenssen, Puget Sound Energy

Ekambir Shahi, Intern

NEEA Staff: Becky Walker, Eric Olson, Kathryn Bae, Noe Contreras, Chris Wolgamott, Christopher Dymond, Geoff Wickes, Mark Rehley, Lynne Mosley

## Resources

- Agenda and Packet Materials: [Northwest Energy Efficiency Alliance \(NEEA\) | Q2 2023 RETAC Packet](#)
- Slide Deck: [Northwest Energy Efficiency Alliance \(NEEA\) | Q2 2023 RETAC Slide Deck](#)
- Q2 Emerging Technology Newsletter: [Northwest Energy Efficiency Alliance \(NEEA\) | Q2 2023 Emerging...](#)

## Welcome, Announcements

### 2023 Meeting Dates:

- Q1 – Thursday, March 30
- Q2 – Tuesday, June 27
- Q3 – Thursday, September 21
- Q4 – Thursday, December 14

## Upcoming conferences:

6/24 - 6/27 - Kansas City, Missouri - [Building Owners and Managers Association \(BOMA\) International Conference](#)

6/24 - 6/28 - Tampa, Florida - [2023 ASHRAE Annual Conference](#)

7/11 - 7/13 - Detroit, Michigan - [2023 ACEEE Industry Summer Study](#)

8/3 - 8/5 - Chicago, Illinois - [2023 IES Annual Conference](#)

8/15 - 8/17 - Seattle, Washington (Hybrid) - [2023 Smart Buildings Exchange](#)

9/13 - 9/14 - Indianapolis, Indiana - [EPRI Climate READi Workstream 3 Workshop](#)

## Product Council

Do you have a topic you would like to see NEEA cover in an upcoming Product Council? Visit [Northwest Energy Efficiency Alliance \(NEEA\) | Product Council Submit...](#) to submit your idea, or contact [productcouncil@neea.org](mailto:productcouncil@neea.org).

**Upcoming Sessions:** *(Tuesdays, 10:30 a.m. – 12:00 p.m. PDT, unless otherwise noted)*

- July 18<sup>th</sup> – Micro Heat Pump Field Study Results - [Registration](#)
- August 1<sup>st</sup> – VSHP Advanced Features & Capabilities Update - [Registration](#)
- August 15<sup>th</sup> – Rating Representativeness Preliminary Results - [Registration](#)

## Emerging Technology Update – CalNEXT

- [Slides 14-60](#)
- **Tim Minezaki, Senior Engineer, Energy Solutions**
- CalNEXT is funded by the California IOUs (electric) emerging technology program to provide new research to grow the existing IOU portfolio.
- Focus is on later-state market development and deployment.
- Energy Solutions is primary administrator of the program for the next five years, with bulk of research flowing through VEIC, AESC, The Ortiz Group, TRC, and UC Davis.
- CalNEXT serves as pipeline to other areas of IOU portfolio:
  - Measure Package Development
  - CalMTA
  - Building Codes (Title 24) and Appliance Standards
- There are three main project types:
  - Technology Development Research
    - Early-stage technologies
    - Approximately 8 per year
  - Technology Support Research
    - Market-ready technologies
    - Approximately 32 per year
  - Focused Pilots
    - High-impact technologies
    - Approximately 3 per year
- Non-Utility Research with California Energy Commission

- Key Policy Drivers in California
  - CPUC Total System Benefit (D-21-05-031)
    - All programs moving from kW/kWh/Therms to new metric: Total System Benefit (TSB); TSB has three components with implications for what kinds of research to support next generation of programming:
      - Avoided gas infrastructure.
      - Avoided refrigerant emissions
      - Time-valuation of energy
  - Accelerated Heat Pump Deployment (6 million by 2030)
  - Gas Incentives Phase Out (D-23-04-035)
  - Flexible Demand Appliance Standards (SB-49)
  - Embodied Carbon, reducing GHG in building materials (AB-2446)
- **Scanning and Screening Overview**
  - Online submissions; reviewed once per quarter and prioritized; if selected, moved to plan development and contracting
  - Criteria include (weighted highest to lowest): overall idea quality; Technology Priority Map (TPM) alignment & tech transfer; benefits, and cost.
  - Technology Priority Maps are:
    - High-level framework, updated annually, that explain CalNEXT program priorities, sorted into six technology categories.
      - Heating Ventilation and Air Conditioning
      - Plug Loads and Appliances
      - Process Loads (Commercial, Industrial, Agriculture and Water)
      - Lighting
      - Water Heating
      - Whole Buildings
    - Used as a communications tool to define what research projects CalNEXT wants to see; and
    - Used as an internal tool for screening, with 15%+ of ET projects determined based on their alignment with these priority maps.
- There are multiple ways to partner. You can begin by visiting CalNext.com and submit an idea or project.

## Emerging Technology Update – Snohomish PUD

- [Slides 64-73](#)
- **Suzanne Frew, Strategy & Policy Group & New Customer Technologies**
- Snohomish PUD covers 2200 square miles in Snohomish County and Camano Island and serves over 330K residential and over 30,000 commercial and industrial customers.
- 2022 Energy Efficiency equaled enough power for 11,000 EVs.
- Large customers include Boeing, U.S. Navy, Providence Medical, and Hampton Lumber
- American Public Power Smart Energy Provider
  - Two-year designation
  - Good baseline for utility on all activities regarding sustainability and program comprehensiveness
  - Looks at overall portfolio of programs for energy efficiency, electric vehicles, demand response and equity, as well as generation and minimization of greenhouse gas emissions, project activity, external stakeholder interactions and overall customer experience.
- Arlington Microgrid
  - Started in 2015, with full functionality in 2022.
  - Received clean energy grant from Department of Commerce

- Vehicle to grid, community solar, battery storage and a back-up diesel generator; onsite is clean energy center, local office, and data center.
- Benefits include grid resiliency and disaster recovery, community solar, grid support and ancillary services, as well as vehicle-to-grid (V2G.)
- Load Flexibility Projects
  - FleetCarma EV charging
  - Flex Energy Pilot – EV chargers and thermostats
  - BPA/PGE CTA-2045 water heater demand response
  - EPRI cold climate heat pump with CTA-2045 demand response
  - Commercial Time of Use pilot
  - New construction energy design assistance with incentives for EE performance, demand reduction and income qualification
  - Electric transportation portfolio of customer programs, including internal fleet planning and 10-year transition plan.
- Lessons Learned and Next Steps
  - Utility needs vs. implementation costs
  - Creating value streams (EE + load flex + location)
  - Minimized impact to customer in terms of complexity and interaction.
  - Device interoperability needed.
  - Next steps include TOD rollout with AMI deployment and electrification planning with home developers and municipalities.
- Electric Vehicles
  - CEF grant for DCFC at headquarters and transitional housing/job training facility.
  - En-route induction charger for City of Everett in development
  - Everett Transit/Batt Genie recycling King County Metro batteries for off-peak battery charging and peak bus charging.
- Research and Innovation
  - Active participation in emerging technology forums within NEEA and BPA
  - Involvement with EPRI with Grid Edge Customer Technologies, electric transportation, and the Technology Innovation Advisory Council
  - Recipient of clean energy funding from the WA Department of Commerce
  - Active customer partnerships and innovative customers, such as Helion Energy, Eviation, and MagniX

## NEEA 2023 Scanning Projects

- [Slides 76-81](#)
- **Eric Olson, Manager, Emerging Technology & Product Management**
- NEEA has a variety of on-going scanning projects and planning underway across a variety of focus areas:
  - Consumer Products
    - Much of our work continues to focus on laundry equipment, with the continuation of our laundry field study, testing of new heat pump dryer models and testing of laundry centers and “all in one” washer/dryer units with either condensing or heat pump dryers.
    - Also testing commercial displays and monitors to leverage our continued work on televisions, as well as investigating smart home energy management.
  - Building Envelope & Whole Building
    - Continuing work with Partnership for Advanced Window Solutions (PAWS) for high performance windows, completing our commercial secondary window field study.

- Investigating opportunities to test electro-chromatic films, and following development of vacuum -insulated panels (VIP) that can be installed on the exterior of buildings for retrofits.
- Scanning efforts with building AI continue. First site is underway; searching for second site with BrainBox AI deployment.
- We continue to work to understand whole building opportunities and barriers to building improvements.
- Commercial HVAC
  - Continuing very high efficiency DOAS field studies.
  - Efficient RTU study is underway; compares high efficiency RTU to conventional RTU and continues into 2024.
  - Investigating small displacement gas engine heat pumps and searching for testing opportunities.
  - Developing hourly energy modeling analysis to estimate performance of gas heat pumps compared to three conventional furnaces over typical heating seasons for each of the region's states.
  - Testing energy savings opportunities of integrating hydronic systems with very high efficiency DOAS strategy to expand philosophy to larger buildings.
- Lighting & Motor Driven Systems
  - Data collection continues the LLLC field test at NEEA's headquarters.
  - Continue to work on exterior LLLC with integrated storage to understand market opportunity and current landscape.
  - Investing opportunities to test LLLC with integrated HVAC controls sometime in 2023.
  - For Motor Driven Systems, we are working on an ASD market study and exploring fan system energy savings with different technologies.
- Water Heating
  - Scanning for split system heat pump water heaters continues.
  - Work is ongoing for the product assessments on central commercial HPWH.
  - Monitoring continues for multifamily central HPWH installation and large capacity CO2 central HPWHs.
  - EcoSim tool enhancements are underway.
  - We are also scanning and testing gas combined heat pumps for hot water and space heating.
- Residential HVAC
  - Micro heat pump user testing.
  - Conducting field ratings representativeness study, to include both field and lab testing to assess test procedures.
  - Conducting SPE07 repeatability testing, which is assessing heat pumps at multiple ambient air temperatures.
  - Dual-Fuel modeling and gas heat pump testing

## Residential HVAC

- [Slides 83-97](#)
- **Christopher Dymond, Senior Product Manager, NEEA**
- There are three main areas related to residential HVAC products and testing to look at more deeply:
  - Update on Heat Pump Improvements
    - The Variable Speed Heat Pump Program has moved into the Program Advancement phase of the Initiative Life Cycle (ILC).
    - Goal is to continuously improve average installed efficiency and peak savings across all residential heat pump systems.
    - Improvements achieved across several factors with impacts reaching across multiple years.
    - Some issues related to CEE's North/South map and how the IRS has chosen to apply tax credits as a result (i.e., no credit for south heat pumps installed in north and vice-versa).
    - Choosing the best heat pump depends on what you want to achieve: Peak Saver vs. Energy Saver.
  - Explore potential opportunity related to refrigerants and Demand Response
    - Refrigerant changes coming in 2025.
    - GWP limit for unitary HPs goes from ~2300 to 700; OEMs are not retesting current equipment and are updating products for 1/1/2025.
    - New refrigerants are A2L ("mildly flammable"); R-454B has a GWP of 466, but will cost a lot more per pound; R-32 has a GWP of 675, but has slightly better performance.
    - Equipment with high EER values may be constrained, because they need more refrigerant.
    - To consider: what if there was a demand response alternative to the EER requirement? A DR-capable HP would cost less and save more during peak cooling hours. Should region focus ET resources on DR capabilities, rather than EER2?
  - Update on Micro Heat Pump Field Study
    - In partnership with C+C, NEEA conducted a multi-phase field study of various micro heat pump products, ranging from traditional window-style units to portable units, to newer "saddlebag" models.
    - Phase 1 identified 40 potential participants and gathered initial perceptions and candidate information.
    - Phase 2 selected 13 participants to receive units and collect data regarding installation experience and how the units were used.
      - **Note:** Final Report will be presented via Product Council on July 18, 2023, at 10:30 a.m. PDT
    - Early results indicate the product's ability to both heat and cool is well-liked by participants and most impressed by how quickly they heat/cool a room.
    - Some users noted that they only heated/cooled the room they were in.
    - Some units required modifications, such as screwing the unit into the wall, which would be a roadblock for renters.
    - Window units were used less, with saddlebags being used more often.

## Dual-Fuel Technology

- [Slides 99-142](#)
- **Noe Contreras, Senior Product Manager, NEEA**
- **Andrew Shepard, Residential Sector Program Manager, Energy Trust Oregon**
- **Jesse Durst, Senior Market Analyst, Energy Efficiency Services, Puget Sound Energy**
- **Megan Lacy, CEM Program Manager, Puget Sound Energy**
- Dual-fuel systems are comprised of a furnace, heat pump and controller.
  - The furnace is usually fueled by natural gas and operators during colder heating seasons, and is sized for heating load of entire home.
  - The heat pump is electric and operates during warmer heating seasons. Capacity is based on overall cooling load.
  - The controller selects between the furnace and heat pump and is wired to the furnace, heat pump and outdoor temperature sensors.
    - Outdoor temperatures drive fuel source decisions.
    - Installer will program controller for switchover temperature.
      - Two switchover temperature types are:
        - Thermal Balance Point
        - Economic Balance Point
      - Controller opens and closes 24-volt analog circuits to achieve control.
      - Two essential elements of installation are: 1) correct wiring; and 2) proper programming.
    - Benefits include:
      - Single heating and cooling system that reduces operating costs.
      - Increased energy efficiency
      - Reduction of carbon footprint
      - No need for electric back-up heating installation
  - Northwest Code HVAC Updates:
    - Regional trend of state code updates resulting in increased HVAC efficiency in new buildings and major retrofits
    - Significant impact in Washington
      - Electric HPs required in most cases.
      - <5% capacity or CFA; ≤25% of load if supplemental to an air-to-water heat pump.
  - Regional Differences in Heating Load
    - Portland and Seattle have negligible heating load below 30 °F.
    - Boise has 20% of the heating load below 30 °F, but mostly above 20 °F.
    - Missoula has 39% of the heating load below 30 °F, but mostly above 10 °F.
    - ASHP performance above 30 °F is critical.
    - Cold climate units designed for performance below 5 °F have limited benefits in all areas, with the greatest benefit potentially in Montana.
    - Variable speed units designed for performance between 5 and 17 °F have benefits in some areas like Idaho and Montana.
    - Single speed units designed for performance above 30 °F have benefits across the region, particularly in context of dual-fuel systems, where cold temp loads or extreme weather events can be handled using the gas furnace.
  - Backup Usage Assumptions
    - Backup natural gas is used below the switchover temperature.
    - Maximizing heat pump usage can produce the largest reduction in site heating energy, but it may not be the most economic way to operate the system.
  - **Hybrid (Dual-Fuel) Heat Pump Pilot – Energy Trust Oregon (ETO)**

- Hybrid HVAC (HHVAC) is a dual-fuel system where a ducted, single-speed heat pump and programmable thermostat are added to an existing gas furnace.
- Pilot conducted in single-family homes without air conditioning and with gas furnaces that are, on average, five years old. Homes have been previously weatherized, did not have deferred maintenance, did not need major duct repair, and did not need major electrical upgrades.
- Several research objectives framed the pilot:
  - Determine utility system costs and benefits of HHVAC system installations.
  - Determine customer costs and benefits of HHVAC system installations.
  - Determine costs and process considerations associated with installing HHVAC systems in low-income households.
- ETO paid full costs of installations in income-qualified households previously served by low-income weatherization services.
- Triage and customer service education and support provided by ETO staff, with post-install Q&A provided in every home.
- Heat pump size determined through Manual J and cooling needs of home, in alignment with ACCA2 Standard.
- Cost range between \$10-12K, not to exceed \$13K per home.
- Full customer screening, site audits, and ongoing support post-installation.
- Pilot began in May 2023 and will run through December 2025.
- **Hybrid Heat Pump Pilot – Puget Sound Energy (PSE)**
  - Pilot Objectives:
    - Explore value of this technology to state decarbonization goals.
    - Compare impacts of hybrid heat pumps to full targeted electrification strategies like cold climate heat pumps.
    - Identify level of financial incentive and technical assistance needed to encourage adoption.
    - Identify software, equipment, and controls to facilitate hybrid systems.
    - Learn about impacts of hybrid systems on annual energy consumption and peak loads.
    - Learn about customer and contractor preferences and impressions, as well as risks and barriers to adoption.
  - Eligible equipment:
    - Split dual-fuel systems; single, double, or multi-stage HPs combined with a new or existing gas furnace.
    - Packaged dual-fuel equipment; may be more in common with MH applications; low volume expected due to low number of MH with gas furnaces.
    - Inverter-based HP compatible with new or existing furnaces; limited models available and specialized controls are required.
  - Participation requirements
    - Active gas and electric accounts
    - Existing residential customers with natural gas forced air furnaces as primary heat source.
    - Contractors must be approved and provide customer incentives.
    - Limited budget for up to 275 hybrid HP systems; installation must be completed by December 31, 2023.
  - Performance and Installation Specifications
    - BPA PTCS Air Source Heat Pump installation specifications are considered best practice.
    - AHRI Certified® with 9.0 HSPF or 7.7 HSPF2 or higher.
    - Balance point must be 30 °F or lower.
    - Auxiliary heat lockout must be 35 °F or lower.
    - Consistent with WAC 51-11R-40310



- System performance is critical; PSE seeking to displace as much gas usage as technically feasible to evaluate Hybrid HPs as a decarbonization measure.
    - Incentives include a \$1,700 rebate on Air Source Heat Pumps for single family and manufactured housing and a \$700 rebate on add-on Natural Gas Furnaces for single family and manufactured housing.
  - Pilot will be evaluated via participant and contractor surveys, as well as HVAC equipment sub-metering.
  - Bid process began in May, with final applications submitted by January 31, 2024.
- **Targeted Electrification Pilot – Puget Sound Energy (PSE)**
  - Pilot Objectives:
    - 40% efforts conducted in Named Communities
    - Educational theme
    - 10K assessments among PSE gas and dual-fuel customers, with \$50 gift card + referral incentives
    - \$2-4K in Heat Pump rebates; tax credit eligible; existing dual fuel customers; gas furnace must be removed.
    - Special projects include 50 LIW + HP installs, multifamily project, and three small business makeovers.

## Poll Questions

- What is one thing you appreciated about this meeting?
  - Variety of topics
  - Information exchange
  - Technical presentations
  - Q&A time
  - CalNEXT presentation and projects
- What would you like to see at a future meeting?
  - Industrial Heat Pumps
  - Update on dual-fuel pilot project progress
  - Flexible efficiency
  - Performance results
  - Aligning NEEA’s programmatic approach with how utility programs reach customers.
- What’s got you curious right now in the realm of energy efficiency?
  - Gas Heat Pumps
  - Decarbonization and electrification “waltz”
  - AI integration
  - Micro Heat Pumps
  - Low GWP refrigerants
  - EE/DR/Electrification working together.
  - NW policy evolution
  - Large-scale HPWHs
  - How to structure a program to get the best efficiency heat pumps installed.
  - Working with manufacturers regarding CTA modules/direct connectivity/standardizing.
  - Value of DR or load shifting
  - Industrial Heat Pumps