

# Hot Water and Hot Air Forums

Hot Water Forum, March 4–5 | Hot Air Forum, March 5–6



## Monday, March 3

### 12:00 – 5:00 pm UA 290 Tour and Heat Pump Water Heater Equipment Demonstration

Optional event off-site at United Association (UA) Local 290 training facility in Tualatin, OR.

*\*Available to add to your registration for \$25; limited to 56 participants.*

### 3:00 – 5:00 pm Splash Apartments Commercial Water Heater and Building Tour

Come see a former Pepsi bottling plant come back to life as mixed-use (commercial/residential) building conversion. Of particular interest is the Nyle central heat pump water heater. Made in Maine, it is the first one of its kind installed in the US, and an example of a central HPWH system that could be a key to scale through simpler installations. Kick off your ACEEE Hot Water Forum in style with a tour of an important central HPWH!

*\*Optional event off-site. Free to attend. Register [here](#).*

## Tuesday, March 4 – Hot Water Forum

### 7:00 am – 7:00 pm Registration

### 7:30 – 8:20 am Breakfast

### 8:20 – 8:50 am Welcome and Introductions

### 9:00 – 10:30 am Concurrent Sessions

#### 1A. How to Get the Heat for Heat Pump Water Heaters

Many buildings are not designed, modified, and utilized for optimum service with air-source heat pump water heaters (HPWH). This session addresses how to assure optimum performance in the face of installation faults, especially inadequate air supplies for heat exchange, and handling cold discharge air.

Moderator: **Harvey Sachs**, ACEEE

*Air-Source HPWH: Where Does the Warm Intake Air Come From? Where Does the Cold Exhaust Air Go?*

**Gary Klein**, Gary Klein Associates

*Ensuring HPWH Efficiency in Less-than-Ideal Spaces*

**Sam Larson**, Larson Energy Research

*Central Horizontal Drain Water Heat Recovery in 80 Buildings and Growing: Design and Measured Performance*

**Gerald Van Decker**, RenewABILITY Energy Inc.

## 1B. Commercial Food Service

Heat pump water heaters are a proven technology in residential applications but have only been applied in limited cases in commercial food service. This creates a challenge for operators and designers who are unfamiliar with HPWH design principals, specification, and performance as well as Environment Health (EH) professionals who hold the responsibility for approving HPWHs. This session shares the latest lab and field research info HPWH performance as well as practical design advice and current HPWH policy.

Moderator: **Richard Young**, Frontier Energy

*Starting System Design, Sizing, and Policy Research to Decarbonize Water Heating in Commercial Kitchens*  
**Amin Delagah**, TRC Companies

*Foodservice Water Heater Decarbonization: Field Data Research*  
**Maya Gantley**, 2050 Partners

*Evaluating Unitary Heat Pump Water Heaters: Laboratory Insights for Diverse Foodservice Applications*  
**Mehdi Zeyghami**, PG&E

## 1C. Demand Flexibility

Join us for an engaging panel discussion on the importance of demand flexibility in commercial heat pump water heaters, highlighting their benefits for consumers and their role in promoting grid stability. Experts from leading organizations will share insights into the latest advancements in grid-integrated systems, including load-shifting optimization and cost-minimization strategies, highlighting how these technologies can be leveraged to improve energy management and operational efficiency.

Moderator: **Vidhisha Moopnar**, New Buildings Institute

*Pure MAGIC - Made in America Grid Integrated Commercial Heat Pump Water Heaters*  
**Tim O'Neill**, Ecotope, Inc.

*Standardization, Optimization, and Quantification of Load Shift in Commercial HPWH Systems*  
**Scott Spielman**, Ecotope, Inc.

*Central Heat Pump Water Heater Load Shift Testing at Multifamily Buildings*  
**M M Valmiki**, ASK Energy

*Demonstrating Simple Price-Responsive Controls for Central HPWHs to Minimize Cost Under Time-Varying Electricity Prices*  
**Brian Woo-Shem**, LBNL

## 1D. Showers: Cleaning Away the Waste of Water and Energy

A fifth, and in some cases much more, of household and lodging hot water use is for showers. And much of that water, and thus the energy to heat it, is wasted. The presentations in this session look into different ways to reduce the water and energy waste of showers. One looks at how timing of showers and type of water heaters affect both peak and total energy demand for showers. Another presents a new technology to address the wasting of water before it warms up at the shower. The final presentation focuses on best practices for on-demand hot water recirculation systems in single-family and small multifamily homes.

Moderator: **Jim Lutz**, Hot Water Research

*Trade-offs Between Quantity and Timing of Shower Energy Consumption in Households*

**Rebecca Hall**, University of Queensland

*Beyond the Faucet: Impact of Excessive Hot Water Use in Commercial Properties*

**Priya Thomas**, Shower Stream

*On-Demand Hot Water Recirculation Systems and Best Practices*

**Alex Boetzel**, Earth Advantage

**10:30 – 11:00 am**      **Networking Break**

**11:00 – 12:30 pm**      **Concurrent Sessions**

## 2A. Affordable Multifamily I: Solving the Challenges of Heat Pump Water Heaters

The electrification of hot water with heat pumps in multifamily and affordable housing faces challenging economics and technical constraints but is nevertheless essential for low-income and energy-burdened communities. This session will explore potential solutions to current challenges. Panelists will discuss an innovative pilot program in New York City that addressed technical and cost hurdles of commercial HPWHs with displacement strategies, analyze key takeaways from affordable housing organizations that have successfully installed and operated them, and provide updates on NEEA's Hot Water Innovation prize that seeks to develop new equipment options for in-unit HPWH replacements for multifamily buildings.

Moderator: **Joseph Wachunas**, New Buildings Institute

*Scalable Affordable Financeable Electrification: Displacement DHW in NYC*

**Nicole Ceci**, Steven Winter Associates

*Enhancing Affordable Housing Through Efficient Hot Water Solutions*

**Vidhisha Moopnar**, New Buildings Institute

*What the 2029 Water Heater Standards Mean and the Next Big Splash for Utility Efficiency Programs*

**Suzanne Foster Porter**, Kannah Consulting

**Dana Bradshaw**, Northwest Energy Efficiency Alliance

## 2B. Simulating Hot Water for Better Programs, Designs and Tests

Water heater lab and field testing yield valuable data but are costly, with field testing posing challenges in managing consistent variables. This session will examine how simulations can evaluate water heater performance across multiple variables.

Moderator: **Debra Brunk**, 2050 Partners

*National Simulation Analysis of 120V Heat Pump Water Heaters*

**Jeff Maguire**, NREL

*Right-Sizing Heat Pump Water Heaters Using Simulation-Based Approach*

**Robbie Svidron**, Intellihot Inc

*How Well Does Laboratory Performance of Heat Pump Water Heaters Represent Field Performance?*

**Jim McMahon**, Better Climate Research and Policy Analysis

## 2C. Designing Distribution Systems

When it comes to hot water systems, we often forget one of the most critical components to making the whole system work: the supply and return of hot water, also known as the hot water recirculation system. The proper design and installation of these systems is vital to making any hot water system efficient, let alone work. In this session, we will explore a number of the strategies to control, update, and optimize hot water recirculation systems to promote sustainability while maintaining safety.

Moderator: **Christoph Lohr**, IAPMO

*Single Zone Hot Water Recirculation Systems: Control Strategies and Water Heater Performance*

**Gary Klein**, Gary Klein and Associates, Inc.

*Remix! - Updating Outdated Hot Water Distribution Systems with Digital Master Mixing Valves*

**Daniel Hacking**, TRC Companies

*Product Ratio Method - Optimizing Flow for Domestic Hot Water Circulation Systems*

**John Lansing**, PAE Consulting Engineers

## 2D. Basics of Commercial Heat Pump Water Heaters

Everything you need to know about central heat pump water systems (CHPWHs), in multifamily settings in one session. Leave with an understanding of all the available tools and support for ensuring reliable and efficient systems.

Moderator: **Neil Grigsby**, Northwest Energy Efficiency Alliance

*CHPWHs Ready for Prime Time: Presenting the Available Body of Tools to Support Market Transformation*

**Jonathan Heller**, Ecotope, Inc.

*Commercial Heat Pump Water Heater Market Research: Programs, Training, and Product Landscape*

**Helen Townsend**, D&R International

**Noah Gabriel**, New Buildings Institute

*Small Commercial HPWHs: State of the Shelf, Known Issues, Current Research, and Path Forward*

**Alexi Miller**, New Buildings Institute

**12:30 – 1:30 pm**      **Networking Lunch**

**3A. Water Heater Cost Drivers and Opportunities**

Heat pump water heaters are a silver bullet technology, but installation costs remain stubbornly high and the economics of transitioning from fossil gas to electricity can be challenging. This panel will discuss regional and national HPWH up-front and operating cost drivers and will present the key barriers along with success stories key solutions to driving down those costs.

Moderator: **Alexi Miller**, New Buildings Institute

*HPWH: Cost Barrier Breakthroughs*

**Nathaniel Jutras**, ENERGY STAR

**Paul Campbell**, ICF International

*Electrifying Fossil Fuel Customers...Strategies to Improve the Economics of Heat Pump Adoption*

**David Lis**, NEEP

*The Cost of Heat Pump Water Heater Installations is Too Damn High*

**Noah Gabriel**, New Buildings Institute

**3B. Market Transformation – Driving the Residential Water Heater Market to DOE's New Energy Efficiency Standard**

DOE projects that its 2024 standards update for residential water heaters will cause 35 million electric resistance water heaters to be replaced with electric heat pump water heaters by the early 2040s. Achieving this transition, and realizing the associated savings, will require market building activities to complement the new regulations. In this session we will review the challenge of transforming residential water heating, look at HPWH promotions that are already in the field, and brainstorm new promotions for the future.

Moderator: **Chris Granda**, Energy Solutions

*Driving the Tide: Realizing the Potential of DOE's Landmark Residential Water Heater Standard*

**Chris Granda**, Energy Solutions

*Using Wholesale Distribution Partnerships as a Catalyst to Accelerate Transformation of the Heat Pump Water Heater Market*

**Emily Rosenbloom**, Northwest Energy Efficiency Alliance

*Making Water Heaters Fun - Costumes, Road Trips and National Holidays*

**Joseph Wachunas**, New Buildings Institute

### 3C. Commercial Recirculation Monitoring Studies

This session will focus on best practices and lab and field research on distribution systems with recirculation loops and discussion on key components such as demand pump controls, mixing and balancing valves. Field testing results from pre and post HP retrofit projects will be shared with focus on troubleshooting to uncover systemic distribution system issues and show the impact of extensive pipe heat losses and methods to mitigate it.

Moderator: **Amin Delagah**, TRC Companies

*Optimizing Central Heat Pump Water Heating Performance: The Essential Role of Pre- and Post-Retrofit Monitoring in Multifamily Buildings*

**Ashley Davis**, Association for Energy Affordability, Inc.

*Are Automatic Balancing Valves Effective in Improving Recirculation System Balancing and Reducing Recirculation Heat Loss?*

**David Chapman**, ZYD Energy

*Laboratory Assessment of Master Mixing Valve Performance and the Impact of Recirculation Controls*

**Michael Slater**, PG&E

### 3D. Commercial Design

Size Matters: Explore sizing HPWH in multifamily buildings for optimal comfort and efficiency.

Moderator: **Michael Corbett**, Bradford White

*Water Heater Right-Sizing: Comparing Retrospective Demand Sizing Using Building Hot Water Data and ASHRAE Sizing Methods*

**Debra Brunk**, 2050 Partners

*Introduction to the New ASHRAE Guideline: Central Heat Pump Service Water Heating Systems in Multifamily Buildings*

**Cristalle Mauleon**, Lincus, Inc.

*Reducing Cost and Carbon Emissions at Dairies with Heat Pump Water Heaters*

**Scott Spielman**, Ecotope, Inc.

**3:00 – 3:30 pm**      **Networking Break**

**3:30 – 5:00 pm**      **PAE Living Building Tour**

As part of ACEEE's Hot Water Forum, Tour Portland's first Living Building to learn about sustainable engineering. The five-story, mixed-use building demonstrates replicable and cost-effective solutions for sustainable design removing barriers to entry for highly sustainable projects while revitalizing the community. The tour will cover all petals of the International Living Future Institute's Living Building Challenge, which includes placement of the building health and happiness of the tenants; beauty; equitability of the company; water, energy, and building material efficiency. This tour of the PAE Living Building will focus heavily on the mechanical systems and innovative water systems.

*\*Optional event off-site. Free to attend. Register [here](#).*

**4A. 120 V Heat Pump Water Heaters**

This session will address issues important to 120 V HPWHs, including experiences in the field with 120 V products, and leveraging heat pumps and energy storage to unleash the delivery capacity of next-generation systems. Field data gathered on commercially available products in the field will be presented, with the Midwest, South, and West all represented. Since delivery capacity is an important question relevant to customer satisfaction, draw profiles that can be useful for development and laboratory evaluation of prototype systems are presented. In addition, the theoretical and practical limits of water delivery capacity are presented, to inform future research and development.

Moderator: **Noah Gabriel**, New Buildings Institute

*Plugging In for Hot Water in Cold Climates: 120V Heat Pump Water Heaters in the Midwest*  
**Maass**, Illume Advising

*Field Data Driven Draw Profiles to Support HPWH Development*  
**Melanie Moses-DeBusk**, Oak Ridge National Lab

*How Much Water Can a Water Heater Heat, If a Water Heater Fully Utilizes 12 Amps at 120 Volts?*  
**Kyle Gluesenkamp**, Oak Ridge National Lab

**4B. Residential Program Design: Bridging the Gap from Supply Chain to End Use**

This session will explore innovative programs, strategies, and partnerships that have uncovered lessons learned from real-world implementation. Gain actionable insights to overcome challenges and build on proven success for energy-efficient water heating solutions.

Moderator: **Emily Rosenbloom**, Northwest Energy Efficiency Alliance

*Lessons Learned from Research with Distributors*  
**Josh Butzbaugh**, Pacific Northwest National Laboratory

*Empowering Access and Affordability with Homeowner DIY HPWH Installations*  
**Meghan Harwood**, VEIC

*Time to Level Up: Bringing Water Heater Installers Onboard with HPWHs*  
**Troy Zdzieblowski**, Evergreen Energy Partners

#### 4C. Commercial Field Demonstrations: Data Dispatch from California

This session will focus on design, operation, and optimization of high-performance HPWHs, recirculation systems, and controls. Emerging code-readiness research projects will address 1) real-world operation of light commercial hybrid HP/ER heaters, issues encountered and retrofit optimization strategies to deal with poor ventilation, low system COP, and water runouts, 2) CO2 HP operation in return to primary configuration at various recirculation return temperatures, and 3) energy savings and operation of advanced pumps with integrated and standalone pump controls. Lastly, results will be shared from a HPWH field demonstration with a full DHW system control solution for small centralized HPWH applications.

Moderator: **Amin Delagah**, TRC Companies

*Code Readiness Project Overview and Results from Integrated hybrid HPWH and Recirculation Pump Controls Retrofit Projects in Non-Residential Buildings*

**Jeff Staller**, 2050 Partners

*Results from CO2 Split HPWH in Return to Primary Configuration and Recirculation Pump Controls Retrofit Projects in Multifamily Buildings*

**Scott Adler**, Association for Energy Affordability

*Field Demonstration of High-Performance Design and Control Solutions for Small Central Heat Pump Water Heater Systems*

**Yanda Zhang**, ZYD Energy

#### 4D. Commercial Measurement & Verification

Come learn from specific field deployed multifamily HPWH installations. The speakers will cover 1) operational data visualization, 2) proper commissioning, and 3) new construction applications.

Moderator: **Geoff Wickes**, Bonneville Power Administration

*Empowering Meaningful Measurement & Verification with EcoDash: A Standardized Tool for Commercial HPWH M&V*

**Madison Johnson**, Ecotope

*Measuring the Bumpy Road to a Properly Commissioned Multi-SanCO2 Array in New Markets*

**Charlie Simek**, New Ecology

*Utility Funding for Large Heat Pump Water Heater Systems in Multifamily New Construction – Lessons Learned*

**Phoebe Warren**, Seattle City Light

**5:30 – 7:00 pm**

**Reception**



## Wednesday, March 5 – Hot Water and Hot Air Forum

7:30 am – 7:00 pm      Registration

8:00 – 9:00 am      Breakfast

9:00 – 10:30 am      Welcome, Introductions, and Plenary Panel

### 2025: Uncertainty on Federal Policy but State and Air Quality Management District Efforts Will Shine

Panelists will discuss potential changes in federal policy under the Trump administration and new Congress and growing efforts in California, the Northeast, and several other leading states. Topics covered will include equipment emissions standards, utility programs and regulations addressing the energy transition, federal grants and tax credits, clean heat standards, electric rate reforms and the New England Heat Pump Accelerator.

Moderator: **Karen Myers**, Vice President, Government Affairs; Rheem

Panelists:

- **Panama Bartholomy**, Executive Director; Building Decarbonization Coalition
- **Erin Cosgrove**, Director, Policy and Programs; Northeast Energy Efficiency Partnership
- **Steven Nadel**, Executive Director; American Council for an Energy-Efficient Economy

10:30 – 11:00 am      Networking Break

11:00 – 12:30 pm      Concurrent Sessions

### 5A. Financing

Increasing energy efficiency performance and electrifying/decarbonizing buildings always involves one thing: financial support. This panel will discuss a variety of funding sources, innovative financing strategies, and customer preferences for electrifying hot air and hot water systems in buildings across commercial and residential (multifamily and single-family) buildings.

Moderator: **Daniel Farrell**, American Council for an Energy-Efficient Economy

*Financing Preferences Among Residents in Low-Income and Disadvantaged Communities*

**JahAsia Jacobs**, Rewiring America

*Tackling the Electrification Cost Gap Through Municipal Funding & Financing*

**Paul Picciano**, E3

*Assessing a Utility Model for Widespread Ground Source Heat Pump Adoption*

**William Harvey**, Dunsky Energy Consulting

## 5B. Energy from Wastewater and the Sun

Paths less commonly taken include photovoltaics for water heating in cold climates or green CHP for both hot water and power; improving any water heating system's efficiency with solar thermal; solar pool heating technologies today; and central horizontal drain water heat recovery in larger buildings.

Moderator: **Harvey Sachs**, American Council for an Energy-Efficient Economy

*Get Over the Hump: Utilizing Solar Thermal Technology to Dramatically Improve the Efficiency of Any Water Heating System*

**Adam Chrisman**, SunEarth Inc.

*Green CHP - Hot Water AND Power from the Sun*

**Terry Bickham**, Green CHP

*Solar Pool Heating Technologies*

**Jill Murphy**, Magen Eco-Energy US

## 5C. Appliance NOx Emission Rules – A Bay Area (California) Perspective

The first of two sessions dedicated to updates and perspectives on the development of zero-emissions equipment standards for residential HVAC and water heating. These standards, establishing zero NOx and/or zero GHG emissions for equipment, represent one of the largest greenhouse gas reduction policies that states or regions can pursue. However, these standards also have considerable consumer, market and system impacts that must be well understood and addressed to ensure successful implementation. This session will examine this potential, and impacts, through the Bay Area Air District rulemaking process. Presenters will provide updates on this process and considerations, while representatives from environmental justice communities and community choice aggregators will share the perspective of consumers and utility systems as they participate in this process and navigate the promise, and challenge, of this policy.

Moderator: **Jim Lutz**, Hot Water Research

*Bay Area Air District Zero NOx Building Appliance Rules: Overview of Rules 9-4 and 9-6 and the Implementation Working Group*

**Richard Chien**, Bay Area Air District

*Wait - Who Installs water heaters? State of the California Water Heater Market*

**Jayden Wilson**, Opinion Dynamics

*Understanding Community Perspectives and Driving Meaningful Equity: Lessons Learned from the San Francisco Bay Area's Zero-Emission Appliance Standards*

**Megan Leary**, Emerald Cities Collaborative Northern California

*Silicon Valley Electrifies Residential Water Heating*

**Zoe Elizabeth**, Silicon Valley Clean Energy

## 5D. Hot Water and Hydronic Heat Combination Units

This session includes presentations on multifunctional heat pumps (combi heat pumps) capable of delivering space cooling, space heating, domestic water heating, and energy storage. It will also examine dual-fuel heat pumps that integrate electricity and natural gas. The session will delve into new technologies, market trends, and findings from initial field investigations.

Moderator: **Bo Shen**, Oak Ridge National Laboratory

*Combi Systems for North America*

**Amir Refaat, P.Eng., MBA**, Systemair

*Development and Assessment of a Multi-Functional Heat Pump with Wall-Embedded Thermal Storage*

**Yifeng Hu, PhD., P.E.**, Oak Ridge National Laboratory

*Triple Threat: Characterization of a Residential Tri-Mode Heat Pump for Multiple Climates*

**Pradeep Vitta**, GTI Energy

*Early Findings from a Dual-Fuel Combi-System Demonstration*

**Meg Waltner**, PE, Energy 350

**12:30 – 1:30 pm**      **Networking Lunch**

**1:30 – 3:00 pm**      **Concurrent Sessions**

## 6A. Correctly Installing Technologies to Keep Operation Costs Low

This session focuses on research related to contractor installation of high-performance HVAC equipment, and improving quality installations through technical assistance.

Moderator: **Neil Grigsby**, Northwest Energy Efficiency Alliance

*Results from Field Research with Contractors*

**Kieren McCord**, Pacific Northwest National Laboratory

*Literature and Resource Review Results*

**Fredericka Brown**, Pacific Northwest National Laboratory

*Preparing Contractors for High-Quality Installations*

**Eduardo Rodriguez-Feo Bermudez**, Pacific Northwest National Laboratory

## 6B. Driving Adoption with Rates, Incentives, and Regulations

The affordability of heat pump retrofits can be impacted by electric rates, building codes, and installation incentives. This session will highlight the current state of heat pump bill impacts and prevalence of heat pump rates, and examine alternative rate designs, incentives, and other policy levers to reduce costs.

Moderator: **Jon Koller**, Slipstream Inc.

*Speeding Up Clean Heating: Global Insights on Policies and Pathways to Electrification*

**Cory Luker**, Resource Innovations

*Electric Rate Reform: The Prevalence and Bill Impacts of Heat Pump Rates Across the US*

**Ryan Shea**, RMI

*Rate Roadmap for Electrification and Energy Affordability in Massachusetts*

**Vivan Malkani**, E3

## 6C. Appliance Emission Standards – Northeast Perspective

The second of two sessions dedicated to updates and perspectives on the development of zero-emissions equipment standards for residential HVAC and water heating. These standards, establishing zero NOx and/or zero GHG emissions for equipment, represent one of the largest greenhouse gas reduction policies that states or regions can pursue. However, these standards also have considerable consumer, market and system impacts that must be well understood and addressed to ensure successful implementation. This session will examine emissions-based standards activities in the Northeast, with an emphasis on the climate, building stock, utility infrastructure and costs and policy factors that reflect considerable differences with ongoing California rulemakings. Presenters will provide an update on Model Rule development for potential adoption by various states, as well as a market analysis indicating consumer impacts and opportunities for policy interventions. How best to implement a successful standard will be discussed, including the support structures necessary. Maryland's rulemaking process and the unique considerations of the state will be reviewed as a case study, more information on Maryland's program is available [here](#).

Moderator: **Helen Davis**, Energy Solutions

Presenters:

**Riena Harker**, NESCAUM

**George M. Chapman**, Energy Solutions

## 6D. Thermal Energy Storage

Integration of thermal energy storage systems with building heating and cooling systems can reduce peak thermal loads and improve energy efficiency. This session showcases different integration strategies and solutions.

Moderator: **Kaushik Biswas**, GTI Energy

*Strategies for Combining Air Source Heat Pumps and Thermal Energy Storage in Cold Climates*

**Samantha Hill**, Center for Energy and Environment

*Thermal Energy Storage: Market Barriers and Opportunities for Adoption in Buildings*

**Liz Traynor**, American Council for an Energy-Efficient Economy

*Novel Modular Residential Cold-Climate Heat Pump for Space Conditioning and Water Heating*

**Juan Catano**, NREL

3:00 – 3:30 pm

Networking Break

**7A. Affordable Multifamily II**

Income-qualified multifamily buildings represent a largely untapped market for energy savings and present a particularly challenging landscape of split incentives that make capital expenses complicated to justify without a more holistic understanding of the potential for savings and improved comfort. In this session, we will hear about current efforts aimed at this market segment and discuss unique challenges faced when engaging them, with a focus on comprehensive strategies that address these market realities.

Moderator: **Ryan Hamilton**, Consortium for Energy Efficiency

*Electrifying Evanston – Lessons from the Green Homes Pilot Program*

**Bill Lyons**, Elevate

*Decarbonizing Public Housing: Sustainable Futures for Low-Income Multifamily Communities*

**Joel Wool**, Boston Housing Authority

*Affordable Multifamily Electrification Retrofits in the Midwest: Monitoring and Verification Results*

**Justin Sharer**, Slipstream

**7B. Designing the Future: Innovative Utility Programs for Decarbonization**

This session plans to explore the steps that utility programs are taking as their focus shifts to decarbonization and what these innovative programs look like today.

Moderator: **Kim Rose**, C+C

*Updating TRMs to Align with Decarbonization Goals*

**Deepti Dutt**, Northeast Energy Efficiency Partnerships

*Innovative Residential Electrification Programs*

**Nupur Hiremath**, Silicon Valley Clean Energy

*An Industry Consortium for Power Efficiency*

**Brendan McEwen**, Dunskey Energy + Climate Advisors

*Adding it All Up: Innovative Residential Program Approaches in an Evolving Landscape*

**Evelyn Lane**, Consortium for Energy Efficiency

## 7C. Performance Metrics

How can utilities continue to pay incentives on heat pumps when the savings are so difficult to measure accurately? Presenters will share some of the latest research on new metrics for measuring and differentiating heat pump performance and efficiency.

Moderator: **Suzi Asmus**, Northwest Energy Efficiency Alliance

*Exploring Representativeness of Heat Pump Performance Ratings*

**Dave Lis**, Northeast Energy Efficiency Partnerships

*The Case for COPpeak*

**Jeff Stewart**, Trane Technologies

*Low-Load Efficient Heat Pumps – Lab and Field Data Analysis*

**JJ Sawicki**, TRC Companies

## 7D. Gas Heat Pumps

Heat pumps aren't all electric—some are powered by fuels such as natural gas and hydrogen. This session covers these systems that can be more efficient than condensing combustion technology, including field studies of commercially available gas heat pump products, laboratory evaluation of pre-commercial systems, hydrogen-readiness of fuel-fired heat pumps, and sizing approaches tailored toward the unique characteristics of gas-fired heat pumps.

Moderator: **Kyle Gluesenkamp**, Oak Ridge National Laboratory

*GAHP Field Results in DHW Systems*

**Cristalle Mauleon**, Lincus Inc.

*Heat Pump Performance in California: Hydrogen-Natural Gas Blend Fired Water Heating Applications*

**Madeline Talebi**, ICF

*Comparing Current DHW Sizing Methods with Reality*

**Alyza Khan**, Lincus Inc.

*Laboratory Evaluation of Thermally-Driven Adsorption Heat Pump for Domestic Hot Water*

**Magnus Ekblad**, HeatAmp

5:30 – 7:00 pm

Reception

## Thursday, March 6 – Hot Air Forum

7:00 am – 4:00 pm      Registration

8:00 – 8:50 am      Breakfast

9:00 – 10:30 am      Concurrent Sessions

### 8A. Affordability: Lessons from TECH Clean California

The TECH Clean California program has incentivized over 40,000 residential heat pump systems for space and water heating. This session will share perspectives on the customer and contractor experience, energy and cost impacts, and how this data can inform future electrification programs throughout the country.

Moderator: **Peter Grant**, Lawrence Berkeley National Laboratory

*What can data from heat pump installs tell you about customer satisfaction, customer bills, and grid impacts?: Insights from participant surveys, meter-based energy impacts, and machine learning analysis of TECH Clean California heat pump data.*

Presenters:

**Teddy Kisch**, Energy Solutions

**Jen Loomis**, Opinion Dynamics

**Adam Scheer**, Recurve

**Dylan Sarkisian**, Energy Solutions

### 8B. Heat Pumps and HVAC Business Structure

Residential contractors are at the frontlines of home upgrades, but in today's market, most offer fragmented services and are unequipped to guide residents in their home electrification journey. This session will highlight on-the-ground insights from state and utility sponsored programs that reach energy auditors, weatherization, solar, HVAC and plumbing contractors on how they have expanded their business to bring electrification solutions to market rate and income eligible programs. We'll also discuss the unfortunate trends of anti-competitive behaviors and model examples to watch out for, while providing recommendations to track and mitigate these outcomes for your customers and programs. Lastly, this session will highlight a prime example of government collaboration with small, local businesses that help them achieve their sustainability goals and offer funding to work with energy efficiency vendors to achieve them. Other governments and non-profits looking to learn about the benefits of a green business program, or vendors looking to connect with local green business programs in their area, will find value in this story.

Moderator: **Paul Campbell**, ICF

*Leveraging Federal and Local Green Business Programs to Recommend Pollution Prevention Technologies*

**Max Ciarlone**, Cook County (IL) Department of Environment and Sustainability

*Collateral Damage: Trends that Heat Pump Policies and Programs May Be Driving Up Heat Pump Costs Due to Attracting Anti-Competitive and Monopolistic Behavior*

**Matthew Horwitz**, Southern California Edison

*Optimizing Hybrid Heat Pump Swapover Temperature for Cost and Carbon Savings*

**Ethan Goldman**, Resilient Edge

## 8C. Installation Tools

The success of high-performance HVAC technologies will depend on contractors being empowered to install them effectively. Come learn about the latest tools available for installers to find and manage jobs, select equipment, and validate performance.

Moderator: **Sam Larson**, Larson Energy Research

*Responsibly Scaling ASHPs in Cold Climates: Upskilling HVAC Contractors to Guess Less and Measure More*  
**Zak Paine**, Slipstream

*Digitizing Contractor Workflows: What Works, Why It Matters, and How to Build the Future Software Stack*  
**Jason Trager**, Plentiful.ai

*Tools for Your Quality Installation Toolbox*  
**Christian Valoria**, Pacific Northwest National Laboratory

## 8D. Decarbonization Using Dual-Fuel Technologies

This session will examine the potential of dual-fuel space conditioning and water heating systems in building decarbonization. Presenters will discuss findings from modeling studies and field demonstrations that investigated energy and emission savings of various configurations of dual-fuel equipment. Presenters will also share insights and best practices from demonstrating residential ground source heat pump systems in the field.

Moderator: **Ramanathan Dharmarajan**, GTI Energy

*Navigating the Dual-Fuel Landscape: Insights and Strategies for Market Adoption*  
**Aaron Winer**, Northwest Energy Efficiency Alliance

*Dual Fuel and All-Electric Heat Pumps: Ratings are only Half the Story; Installation Matters*  
**Matt Haffner**, Illume Advising

*The New Dual Fuel: Exploring Ground Source Heat Pumps with Gas Backup to Decarbonize Residential Heating*  
**Kristen Dong**, Illume Advising

**10:30 – 11:00 am**      **Networking Break**

**11:00 – 12:30 pm**      **Concurrent Sessions**

## 9A. Lowering Energy Bills for Multifamily and Manufactured Homes

This session explores case studies in energy-efficient manufactured and multifamily housing, pilot projects for grid-interactive multifamily retrofits, and research on retrofit barriers in manufactured housing.

Moderator: **Dr. Tyler Pilet**, Pacific Northwest National Laboratory

*Leave No Home Behind: Enhancing Access to Decarbonized Heating in Manufactured Homes*  
**Hannah MacDonald**, Dunsy Energy + Climate Advisors

*Grid-Connected Multifamily Building Retrofit Program*  
**Jason LaFleur**, GTI Energy

*Advancing Cost Effective Energy Efficient Manufactured Homes in Georgia*  
**Don Shirey**, EPRI



## 9B. Refrigerants

This session presents the latest research on next generation refrigerants. It covers performance evaluations and technology updates for A2L and A3 refrigerants in both new installations and retrofit HVAC&R designs, and in various applications.

Moderator: **Kaushik Biswas**, GTI Energy

*Central Space Heating: Performance of VRF and AWHF Systems and Alignment with A2L Requirements*  
**John Arent**, NORESKO

*Experimental Evaluation of Ultra-Low GWP R290 Residential Heat Pump Across Multiple Operating Conditions*  
**Sarath Kannan**, GTI Energy

*Technology Update on Next Generation Refrigerants for Air Conditioning and Heat Pumping Applications*  
**Samuel F. Yana Motta**, Oak Ridge National Laboratory

## 9C. Impact of Controls on Dual Fuel Heat Pump Performance

Maximizing the potential of dual-fuel heat pumps in an evolving electric grid depends on the optimization of their control strategies. Presenters will highlight the impact of different control schemes for dual-fuel heat pumps on performance and utility cost to the homeowner. The session will also explore the cost-effectiveness of adopting dual-fuel systems in gas-connected homes in cold climates.

Moderator: **Ramanathan Dharmarajan**, GTI Energy

*Hybrid Heat Pumps: Optimizing Backup Fuels for Decarbonization*  
**Micah Sweeney**, EPRI

*Affordability Benefits of Grid-Responsive Dual Fuel Heat Pump in 2025, 2035 and 2050 Scenarios*  
**Zhenning Li**, Oak Ridge National Laboratory

*Hybrid Heat Pumps Avoid Extreme Marginal Abatement Costs of Electrifying Peak Heating Loads in Cold Regions*  
**Sean Smillie**, E3

## 9D. Advancing Heat Pump RTUs: Potential and Real Impacts

Rooftop units (RTUs) are the most common commercial HVAC equipment, yet heat pump RTUs are uncommon. Hear about efforts to deploy heat pump RTUs more broadly through a national campaign, a cold-climate heat pump RTU specification, state market transformation, and pairing RTUs with energy recovery.

Moderator: **Courtney Moriarta**, NYSERDA

*Heat Pump RTUs – Accelerating Awareness, Availability, and Adoption (Part 1 Campaign)*  
**Jim Young**, Guidehouse  
**Michael Blunsch**, U.S. Department of Energy

*Heat Pump RTUs – Accelerating Awareness, Availability, and Adoption (Part 2 Challenge)*  
**Michael Deru**, National Renewable Energy Laboratory

*Next Gen Rooftop Units: Modeling Performance and Influencing the Market*  
**Leah Guenter**, Center for Energy and Environment

**12:30 – 1:30 pm**      **Networking Lunch**

**10A. Assessing Workforce Needs**

Growing a workforce with the skills to perform building decarbonization jobs is necessary for improving the energy efficiency and resiliency of our building stock. This session will provide insights into what actions and market approaches have been successful in supporting the development of a clean energy workforce.

Moderator: **Rohini Srivastava**, American Council for an Energy-Efficient Economy

*Taking the Guesswork Out of Workforce Investment*

**Erin Kempster**, Opinion Dynamics

*Achieving Electrification and Decarbonization Goals Through the Contractor Network*

**Steven Jaslowich**, National Grid

*Ensuring Excellence in Ground Source Heat Pump Installations: Quality Assurance is a Pillar of Success*

**Carina Paton**, VoltaMetrics

**10B. Utility Programs: incentives, TRMs, and Automation**

How do we optimize utility programs to focus on cost reduction for homeowners and building owners. Please join our panel for an in-depth discussion of opportunities, challenges, emerging trends, and lessons learned in this space.

Moderator: **Daniel Farrell**, American Council for an Energy-Efficient Economy

*Energy Efficiency Opportunities*

**Andrew Wiegand**, Michaels Energy

*Evolving Business Models: The Opportunity to Equitably Support Development of Residential Electrification Service Provider Businesses that Specify and Install Heat Pumps*

**Zak Paine**, Slipstream

*Partnering with Utilities for Energy Efficiency and Building Optimization*

**David Burchfield**, Burch Energy Services

**10C. Rooftops, PTACs, Window Units and More**

Developing efficient and high-performing heat pumps in a variety of form factors will be key to decarbonizing commercial buildings. Presenters will summarize efforts to bring more efficient rooftop units to the market and how better cold-climate or dual-fuel models can provide the needed warmth in the harshest climates.

Moderator: **Jason Jones**, Northwest Energy Efficiency Alliance

*Building Demand for Heat Pump Rooftop Units*

**Bjorn Jensen**, Consortium for Energy Efficiency

*Dual Fuel RTUs for Drop-In Decarbonization*

**Jason LaFleur**, GTI Energy

*Assessment and Evaluation of Heat Pumps Designed for Use in Cold Climate Multifamily and Hospitality Buildings*

**Ben Schoenbauer**, Center for Energy and Environment

## 10D. Heat Pump Commissioning and Controls for Cold Climates

This session explores innovative strategies to enhance the performance, efficiency, and grid integration of heat pumps for building decarbonization. Topics include optimizing dual fuel heating systems with predictive controls, addressing cold-weather performance limitations to reduce grid strain, and advancing connected commissioning solutions for streamlined installation and operation.

Moderator: **Subhrajit Chakraborty**, UC Davis

*Connected Commissioning Heat Pumps – 4 Birds, 1 Stone*

**Christopher Dymond**, Northwest Energy Efficiency Alliance

*Decarbonization of Heat Pump Dual Fuel Systems Using Advanced Control: Field Demonstration in a Small Commercial Building*

**Jingjuan Dove Feng**, TRC Companies

*Bad Heat Pump System Setback Recovery – An Electrification Barrier*

**Ben Larson**, Larson Energy Research

**3:00 – 3:30 pm**      **Networking Break**

**3:30 – 5:00 pm**      **Concurrent Sessions**

## 11A. Space Heating Up-front and Operational Costs

This session focuses on the costs associated with heat pumps and electrification. Presenters will share data behind heat pump upgrade costs, solutions to address cost barriers, and program designs to address affordability.

Moderator: **Justin Margolies**, Slipstream Inc.

*The Answer is Finally Here: How Much Does a Heat Pump Upgrade Versus a Gas Like-for-Like Replacement Actually Cost?*

**Malena Hernandez**, Opinion Dynamics

*AC Replacements as a Decarbonization Strategy: Updates on Potential, Strategies, and Progress*

**Meg Waltner**, Energy 350

*U.S. Heat Pump Affordability: Top Strategies to Address Upfront and Operating Costs*

**Russell Unger**, RMI

## 11B. Bringing Advanced, Efficient Space Conditioning to New Markets

Window heat pumps are an emerging packaged air source heat pump implementation promising portability, simplicity, and rapid deployment to market segments that can be difficult to serve, such as multifamily buildings and rented single family homes. These products can perform as efficiently as a conventional mini-split system, yet be installed without any tools or training, and new cold climate models are expanding the potential reach of the market rapidly. Leading window heat pump manufacturer Gradient's Sam Lamos will present to discuss their market strategy, major partnerships, and other research currently being conducted on window heat pumps. Hear VEIC's Jake Marin experiences bringing renters through the "DIY" process of installing a window heat pump in Vermont. Tom Bougher, from 2050 Partners, will present an analysis on the opportunity for window heat pumps in more moderate climates and CalMTA's Elaine Miller will discuss strategies for in delivering these products to the California market as part of a new California-wide market transformation initiative.

Moderator: **Matt Booth**, Washington State University

*Heat Pumps Without the Hassle: How Window Units Are Changing the Game*

**Samantha Lamos**, Gradient

*Window Heat Pumps for Renters - A DIY Electrification Solution for an Underserved Population?*

**Jake Marin**, VEIC

Window heat pumps in California and More Moderate Climates – Large Opportunity, but new Barriers

**Tom Bougher**, CalMTA/2050 Partners

*Transforming the Market for Room Heat Pumps: How Strategic Partnerships Can Accelerate Technology Adoption and Accessibility*

**Elaine Miller**, CalMTA/Resource Innovations

## 11C. Cold Climate Heat Pumps and Peak Impact

The session presents field and modeled data from investigation of both VRF and residential split system cold climate heat pumps. The results provide insight into challenges and potential solutions for addressing peak power consumption during periods of very cold weather.

Moderator: **Christopher Dymond**, Northwest Energy Efficiency Alliance

*The Challenge of Decarbonizing Peak Heat*

**Sean Smillie**, E3

*Annual Energy Savings and Peak Power Reduction Simulated for Cold Climate Heat Pumps*

**Bo Shen**, Oak Ridge National Laboratory

*Cold-Climate VRF: Is VRF an Electrification Option in the Future?*

**Kevin Frost**, Slipstream

## 11D. Field Study Data

Fact vs. Fiction: What is really happening with ASHP performance in cold climate conditions? Join us in this session to hear results from several field studies on real-world heat pump performance in cold climates.

Moderator: **Suzi Asmus**, Northwest Energy Efficiency Alliance

*Characterizing Real-World Performance of Air Source Heat Pumps: Insights from Several Midwest Studies*  
**Dani Ball**, Slipstream

*Advancing RTU Performance with Heat Pumps and Energy Recovery*  
**Daniel Raherimanjato**, Center for Energy and Environment

*Thank you for attending!*

