

2024 HOT AIR & HOT WATER FORUMS

Hot Air Forum | March 12-13
Hot Water Forum | March 13-14

Preliminary Program as of 1-25-24

Tuesday, March 12 – Hot Air Forum

7:00 am–7:00 pm Registration

8:00–9:00 am Breakfast

9:00–10:30 am Welcome and Plenary

Welcome and Introductions

Presenter: **Steve Nadel**, American Council for an Energy Efficiency Economy

Sponsor Welcome

Presenter: **Karen Meyers**, Vice President, Government Affairs, Rheem Manufacturing Company

The Home Energy Rebate Program and Other New Federal Programs Affecting Space Heating and Hot Water

We will discuss the Home Energy Rebate program, which will start in 2024 and ultimately provide about \$9 billion for residential energy efficiency and electrification upgrades. We will also discuss a few other new federal programs, such as for state and local building codes and performance standards targeting zero emissions and expanding heat pump production in the U.S.

Presenters: **Kathleen Hogan**, Principal Deputy Under Secretary for Infrastructure, U.S. Department of Energy

Kristofor Anderson, Director of Energy Resources, Georgia Environmental Finance Authority

10:30–11:00 am Networking Break

11:00 am–12:30 pm Concurrent Sessions

1A: Residential Heating Case Studies

As heat pump market adoption accelerates and heat pump technology continues to evolve, real world data supporting “house as a system” thinking will be vital to ensure we are getting the performance we hope for. The session presenters will explore the intersection of heat pump and whole building performance using real world field data.

Moderator: **Courtney Moriarta**, NYSERDA

What’s Happening? Lessons Learned from Heat Pump Field Research

Presenter: **Samuel Rosenberg**, Pacific Northwest National Laboratory

Field Evaluation of Variable Speed Heat Pumps for AC Replacement

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

Heat Pump Ready Manufactured Homes

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

1B: Market Transformation Programs for Heating

This session considers risks, barriers, and opportunities for heat pump adoption, with an emphasis on high costs for heat pumps and their heating operation relative to gas heat. Presentations examine the issue of cost from multiple angles, including energy burden, program incentive design, utility rate design, dual fuel heating systems, and underlying drivers of high costs. Speakers will present actions individual programs or utilities could take, as well as a collective approach that coordinates actions across a 13-state region.

Moderator: **Lauren Bates**, Northwest Energy Efficiency Alliance

At What Cost? A Study of the Real Costs of Whole Home and Heating, Ventilation, and Air Conditioning (HVAC) Electrification in the Midwest

Presenter: **Pauravi Shah**, Commonwealth Edison

Not at This Rate: Why Enhanced Rate Structures are Both Justified and Necessary for Hybrid Air Source Heat Pumps (ASHPs) in the Midwest

Presenter: **Ranal Tudawe**, Center for Energy and Environment

How to Increase the Demand for Heat Pumps: An Online Trial Examining Household Incentives

Presenter: **Anna Keleher**, Behavioral Insights Team/Nesta

Meeting in the Middle: How the Midwest is Meeting States Where They are to Accelerate Air Source Heat Pump (ASHP) Adoption

Presenter: **Joe Ricchiuto**, Midwest Energy Efficiency Alliance

1C: Systems: Rooftop Units

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

Heat Pump Rooftop Units: Underutilized Decarbonization Strategy for Low-Rise Commercial Buildings

Presenter: **Rachel Lebedinsky**, Guidehouse

Installed Performance of Heat Pump Rooftop Buildings in Cold Climates

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

No Really... Rooftop Unit (RTU) Gas Efficiency Is a Strategy

Presenter: **Chris Wolgamott**, Northwest Energy Efficiency Alliance

1D: Design: Sizing for Heating

Moderator: **Dave Lis**, Northeast Energy Efficiency Partnerships

Heat Pump Quality Installation Tool Pilots and Feedback

Presenter: **Edward Louie**, Pacific Northwest National Laboratory

Manual "J" or Another Way

Presenter: **Brittany Farrell**, Clean Power Research LLC

Integrated Design Approach with Onsite Renewable Energy Source to Achieve Affordable Zero Net Energy Homes

Presenter: **Rohit Jogineedi**, GTI Energy

Advanced Equipment Selection Tools for Cold Climate Air Source Heat Pumps

Presenter: **Greg Thomas**, Performance Systems Development

Better Together: Cold Climate Heat Pump Decision Tool & Heat Pump List

Presenter: **Alek Parsons**, Pacific Northwest National Laboratory

12:30-1:30 pm

Networking Lunch

1:30-3:00 pm

Concurrent Sessions

2A: Multifamily Non-Traditional Heating in New York

Multifamily buildings present a unique set of challenges when making the transition from fossil fuel heating to heat pumps. Attendees will learn about an innovative pilot project to develop and commercialize a new category of heat pump equipment aimed at solving some of New York City's most confounding challenges in decarbonizing affordable multifamily housing.

Moderator: **Courtney Moriarta**, NYSERDA

Packaged Window Heat Pump Product Overview

Presenters: **Rod Mobini**, Gradient
David Leezer, Midea

Monitoring and Verification of Packaged Window Heat Pump Installations

Presenter: **George Aiken/Nate Goodell**, Taitem Engineering

2B: Performance In Heating Systems

Heat pump space conditioning can be the most efficient heating option available – but what makes one heat pump truly perform better than another? This session explores three studies that dive deep into the metrics, operating conditions, and design-parameters that lead to top-tier heat pump efficiency performance.

Moderator: **Matt Christie**, TRC Companies

Heat Pump Field Operations: Research and Case Studies Demonstrating Enhanced Energy Efficiency from Variable Speed Models

Presenter: **Jonathan Moscatello**, Daikin Comfort Technologies

Exploring the Representativeness of Heat Pump Performance Ratings

Presenter: **David Lis**, Northeast Energy Efficiency Partnerships

Low-Load Efficiency: What Makes Some Heat Pumps Excel in Dual Fuel or Mild Climate Applications

Presenter: **Cory Luker**, Cadeo Group

2C: Systems: Thermal Energy Storage in Heating

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

Field Evaluation of Dual Temperature Phase Change Material Ceiling Blankets

Presenter: **Ram Dharmarajan**, GTI Energy

Can Thermal Storage with Heat Pumps be the Lowest-Cost National-Scale Storage Solution?

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

TBD

2D: Innovation Beyond Heat Pumps and Efficiency

The next frontier of HVAC efficiency is ensuring advanced systems are delivering the savings and comfort we have been counting on. Join this panel to learn where to find some of these exclusive but achievable benefits of taking HVAC innovation further.

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

How to Make the Latest Heat Pumps Work with Any Existing Heating, Ventilation, and Air Conditioning (HVAC)

Presenter: **Barend Dronkers**, E Source

Com-mission Impossible? A Rare Opportunity to Transform Heating, Ventilation, and Air Conditioning (HVAC) Practices

Presenter: **Christian Valoria**, Pacific Northwest National Laboratory

Maximizing Heat Recovery in Dedicated Outdoor Air Systems (DOAS): Best Practices for Energy Modeling of High-Efficiency Systems

Presenter: **Neil Bulger**, A2 Efficiency

Unlocking Grid and Customer Benefits of Electrification through Duct Sealing

Presenter: **Bob Swilik**, Aeroseal

3:00-3:30 pm

Networking Break

3:30-5:00 pm

Concurrent Sessions

3A: Smart Grid & Heating

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

Buildings and Beyond: How Modernizing Load Forecasting Practices Can Help Utilities Prepare Their Systems for Electrification

Presenter: **Amara Slaymaker**, Dunsy Energy + Climate Advisors

Understanding the Flexible Use of Heat Pumps in Homes: How “Pre-heating” Homes Works in Practice

Presenter: **Anna Keleher**, Behavioral Insights Team/Nesta

Balancing Act: Addressing the Gap Between Ground Source Heat Pump (GSHP) Costs to Customers and Benefits to Utilities

Presenter: **Stephanie Breton**, Dunsy Energy + Climate Advisors

3B: Policy: Emerging Policies to Drive Building Decarbonization

This panel-style session will explore how state policies can drive the heat pump market while supporting customers and market actors. Panelists will provide an overview of cutting-edge policies like clean heat standards and zero-emission equipment standards, discuss how policies can be designed and coordinated to be equitable and market-friendly, and highlight state efforts to advance these policies.

Moderator: **Matt Casale**, Building Decarbonization Coalition

Overview of Zero-Equipment Emission Standards

Presenter: **Nancy Seidman**, Regulatory Assistance Project

Overview of Clean Heat Standards

Presenter: **Richard Cowart**, Regulatory Assistance Project

Overview of Building Decarbonization Policy Options

Presenter: **Erin Cosgrove**, Northeast Energy Efficiency Partnerships

Session 3B continues next page.

Panel Discussion with topics including:

- *How Do Equipment Standards and CHS Fit Together? Are Both Policies Needed?*
- *How To Design These policies to be Equitable*
- *How To Design These Policies in Ways that Work for the Market*
- *Which States are Adopting These Policies and What Trends Are We Seeing*

Additional Panelists for Discussion

Panelists: **Leah Louis-Prescott**, RMI

Emily Levin, NESCAUM

3C: Systems: Variable Refrigerant Flow (VRF)

Moderator: **Ram Dharmarajan**, GTI Energy

Variable Refrigerant Flow (VRF) Performance in New Multifamily Homes in New York City

Presenter: **Kevin McDonald**, Steven Winter Associates

Cold-Climate Variable Refrigerant Flow (VRF): Does It Work and Reduce Emissions in the Upper Midwest

Presenter: **Kevin Frost**, Slipstream

Validating Variable Refrigerant Flow (VRF) in Cold Climates

Presenter: **David Korn**, Ridgeline Analytics

3D: Workforce: Best Practices for Heating

Moderator: **Emma Hanson**, Center for Energy and Environment

Don't Stop Believing! The Journey of Developing a Statewide Contractor Network

Presenter: **Rabi Vandergon**, Center for Energy and Environment

Empowering HVAC Distributors and Contractors: Lessons Learned from An Air-Source Heat Pump Training and Education Pilot

Presenter: **Dan Wildenhaus**, Center for Energy and Environment

Listen First! Strategies to Create Partnership Cycles in Growing the Next Generation of Heat Pump Workforce

Presenter: **Zachery Paine**, Slipstream

Getting it Right: New Resources for Air Source Heat Pump (ASHP) Quality Improvement

Presenter: **Emma Hanson**, Center for Energy and Environment

Lessons Learned from Upskilling the Heating, Ventilation and Air Conditioning (HVAC) Workforce

Presenter: **Jamie Kono**, Pacific Northwest National Laboratory

5:30–7:00 pm

Reception

Wednesday, March 13 – Hot Air & Hot Water Forum Combo Day

7:30 am – 6:00 pm **Registration**

8:00–9:00 am **Breakfast**

9:00–10:30 am **Plenary Panel**

Transforming Markets for Space and Water Heating

The widespread use of heat pump technology for space and water heating will be necessary for decarbonization. This panel will provide a variety of perspectives on how, and what, will be necessary to make this transformation happen through a mix of creative marketing, program and policy efforts. The panel will feature perspectives from different segments of the market chain and from different regions.

Welcome, Introductions, and Moderator:

Josh C. Greene, Vice President of Government, Regulatory, and Industry Affairs, A.O. Smith Corporation

The Manufacturers Perspective

Presenter: **Josh C. Greene**, A.O. Smith

The Contractor’s Perspective

Presenter: **Ben Foster**, Barnett Plumbing

The Distributor Perspective

Presenter: **Stephanie Ziegler**, Ferguson

Affordable Multifamily Buildings

Presenter: **Bill Lyons**, Elevate Energy

Focus on Rates and on Programs and Policies in Other States

Presenter: **Steve Nadel**, American Council for an Energy-Efficient Economy

10:30–11:00 am **Networking Break**

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

4A: Programs and Policy: Scaled Solutions and Equity + Incentives and Tools

Presentations in this session will continue in session 5A, from 1:30-3:00 pm.

Moderator: **George Chapman**, Energy Solutions

New Federal and State Water Heater Standards and Their Expected Effects

Presenter: **Chris Granda**, Energy Solutions

Improving Equity through Federal Water Heater Standards

Presenter: **Kanchan Swaroop**, Appliance Standards Awareness Project

Step by Step: Building Code Step Costs and Its Impact on Affordable Housing Supply

Presenter: **William Harvey**, Dunskey Energy + Climate Advisors

Using Customer Experience Data to Optimize Heat Pump Programs

Presenter: **Ellen Steiner**, Opinion Dynamics

Decarbonization Policy in Action: New York State Climate Goals are Driving Major Hot Water Conversions throughout SUNY’s System

Presenter: **Daniel Audette**, Wendel

Session 4A continues next page.

The Roadmap to Scale: Using Metered-based Analysis of 7,000 Heat Pump Installations to Inform the Next 20-Million Projects

Presenter: **Dylan Sarkisian**, Energy Solutions

Policies, Programs, and Technologies for Decarbonizing Existing Buildings in Disadvantaged Communities

Presenter: **Mark Umland**, Guidehouse

A Good Start, but Not Nearly Enough: Evaluating IRA Incentives and Complementary Policies for Heat Pump Adoption

Presenter: **Matt Malinowski**, CLASP

You Can't Incentivize Your Way to 20-Million Heat Pumps: Why a Long-Term, Comprehensive Approach is Needed to Meet U.S. Climate Alliance Goals

Presenter: **Teddy Kisch**, Energy Solutions

A New Home Decarbonization Analytical Engine for Policy Advisors, Contractors, and Consumers

Presenter: **Ryan Shea**, RMI

Tools for Navigating the Building Electrification Landscape: Helping Consumers, Utilities, and Cities Affordably Decarbonize

Presenter: **James Milford**, Lumina Decision Designs

Cooling with Less (Global) Warming: Why Replacing Existing Air Conditioners with Heat Pumps is a Key Climate Strategy

Presenter: **Meg Waltner**, Energy 350

4B: Systems: Gas, Dual, and Hybrid Heat Pumps

Moderator: **Emma Hanson**, Center for Energy and Environment

Accelerating Next Generation Decarbonization Solutions: Gas Heat Pump Case Study

Presenter: **Randy Opdyke**, Nicor Gas

Debunking the Myths of Hybrid Heat Pumps

Presenter: **Jared Landsman**, E3

Hybrid Dual-Fuel System Control Optimization for Annual Operating Cost and Emission

Presenter: **Navin Kumar**, GTI Energy

Energy Modeling and Analysis of Dual-Fuel Heating Systems in Single Family Homes

Presenter: **Surabh Shekhar**, ICF

4C: Residential Water Heating Case Studies

Moderator: **Kim Katz**, C+C

Heat Pump Water Heaters: Taking the Emergency Out of Emergency Water Heater Replacements

Presenter: **Chris Badger**, VEIC

Pre and Post Installation of Heat Pump Water Heaters: Cal Center for Best Practices and Post Installation Consumer Instruction

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

Residential Heater Program Design: Meeting the Needs of Customer, Contractor, and Utilities

Presenters: **Jordan Losiak**, ComEd

Andy Poffinbarger, ClearResult

4D: Central Heat Pump Water Heater Workshop – A Unified Approach to Accelerated Market Adoption

Central Heat Pump Water Heater (HPWH) workshop where we aim to bring together industry experts and manufacturers to create a robust and reliable market for HPWHs. In this workshop, you'll gain insights into market analysis and barriers, learn about the latest technology developments and policies, and explore case studies showcasing the effectiveness of HPWH systems in different climates and conditions. Don't miss this opportunity to dive into the world of central water heating and contribute to a sustainable future.

Moderator: **Keshmira McVey**, BPA

Panelists: **Noah Gabriel**, New Buildings Institute - Advanced Water Heating Initiative

Scott Spielman, Ecotope

Colleen Collins, Cadeo Group

Nick Young, Association for Energy Affordability

12:30-1:30 pm

Lunch & Keynote

Ensuring Equity in Household Weatherization and Electrification

We'll hear from the Honorable Stacey Abrams, senior counsel for Rewiring America, former gubernatorial candidate, and former minority leader of the Georgia House of Representatives.

Weatherization and electrification are key to decarbonizing buildings, and will lower bills and improve health, safety, and comfort. But we must ensure low-income and disadvantaged communities are part of the clean energy transition.

Speaker: **Stacey Abrams**, Senior Counsel, Rewiring America

1:30-3:00 pm

Concurrent Sessions

5A: Programs and Policy: Scaled Solutions and Equity + Incentives and Tools

Moderator: **George Chapman**, Energy Solutions

Continuation of session 4A: Programs and Policy: Scaled Solutions and Equity.

5B: Systems: Refrigerants

Moderator: **Holly Tapani**, Environmental Protection Agency

Design for Decarbonization: Matching Load profiles to Equipment Selection so we can Drive a Whole Life Carbon and Grid Interactive Euphoria

Presenter: **Stet Sanborn**, SmithGroup

Next Generation Refrigerants for Water Heating and Space Heating Applications

Presenter: **Samuel Yana Motta**, Oak Ridge National Laboratory

Deployment of Propane as Refrigerant for Heat Pump Water Heaters

Presenter: **Kashif Nawaz**, Oak Ridge National Laboratory

Missed Opportunities: Reducing Green House Gas Emissions from Heat Pump Retrofits

Presenter: **Rachel Murray**, DNV Energy Insights USA

Cool Refrigerant Developments for a Warming World: Low Global Warming Potential Heat, Ventilation, and Air Conditioning (GWP HVAC) Refrigerant Regulations and Technologies in the U.S. and Global Markets

Presenter: **Jim Young**, Guidehouse

5C: Commercial Water Heating Case Studies

The heating of potable water for showers, cooking and cleaning is the second largest demand for energy in buildings where we eat and bathe. Meanwhile, hot water service remains one of the most difficult amenities to address in both new construction and upgrades. Field studies and research are driving innovation, and the resulting super-efficient systems are now available. Attendees of this session will receive a cross-sectional demonstration of the problem with inefficient systems, and strategies to fractionalize the energy needed to provide the expected service.

Moderator: **Ryan Hamilton**, CEE

Optimizing Hot Water Systems in Commercial Facilities: Behavioral Insights from Shower Hot Water Consumption

Presenter: **Priya Thomas**, Shower Stream

Simple Solutions for Complex Problems: Commercial Unitary Heat Pump Water Heaters

Presenter: **Bretnie Eschenbach**, Cadeo Group

Reducing Water and Energy Consumption of Domestic Hot Water Systems by Addressing End-Users

Presenter: **Rebecca Hall**, University of Queensland, Australia

5D: Systems: Field Evaluation of Air-to-Water Combination Heat Pumps in Single and Multifamily Buildings

Moderator: **Amin Delagah**, TRC

Field Evaluation of Air to Water Heat Pumps in Minnesota

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

Combi Heat Pumps: Findings from the Space Cooling & Domestic Hot Water (DHW) Season

Presenter: **Edward Louie**, Pacific Northwest National Laboratory

Compact, Cheap, and Clean: Air-to-Water Heat Pumps with Phase Change Material Thermal Energy Storage for Multifamily Residential Space and Water Heating

Presenter: **Kopchon Sittihammach**, Harvey Mudd College

Data from Hydronic Heat Pump System Field Sites: A Dive into System Design and Performance

Presenter: **Hillary Weitze**, Red Car Analytics

3:00-3:30 pm

Networking Break

3:30-5:00 pm

Concurrent Sessions

6A: Workforce for Water & Air

Moderator/Session Lead: **Daniel Lawlor**, EPA

Using AI to Solve the Clean Heating Labor Shortage

Presenter: **Herbert Dwyer**, EMPEQ

U.S. DOE's Energy Efficient Buildings Workforce Training Recognition Program

Presenter: **Charles Degan**, Pacific Northwest National Laboratory

Heat Pump Retrofits: Don't Forget the Envelope

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

Powering Progress: Best Practices and Strategic Approaches in Energy Workforce Development

Presenter: **Kendra Lee**, The JPI Group

Leveraging Industry Input to Create Sustainable Solutions

Presenter: **Peter Florin**, Energy Solutions

6B: Systems: Cold Climate Heat Pumps (CCHP)

Cold climate heat pumps have the potential to effectively heat homes in colder climates while lowering greenhouse gas emissions – but only if deployed widely. This panel will provide insight into the performance of new models of cold climate heat pumps being developed under the Residential Cold Climate Heat Pump Challenge (CCHP Challenge). This session brings together a group of experts to discuss the lessons learned and findings to date from the CCHP Challenge as the initiative enters the second year of the field validation effort, sharing observations from the field, challenges uncovered along the way, and the potential impact of the CCHP Challenge on transforming one of the most challenging market segments.

Moderator: **Julia Rotondo**, Pacific Northwest National Laboratory

Panelists: **Payam Delgoshaei**, U.S. Department of Energy

Jeremy Sager, Natural Resource Canada

Vrushali Mendon, Pacific Northwest National Laboratory

Ali Kazmi, Guidehouse

6C: Multifamily: Extending the Work of the “Amazing Shrinking Room” Study into Solutions for Water Heating in Confined Spaces and Multifamily

Small heat pump water heater (HPWH) systems, which are compact and easy to install, play an important role in electrifying small multifamily buildings, which constitute nearly 40% of all existing multifamily buildings. This study, funded by Southern California Edison, addresses a research gap in this subject by conducting laboratory testing of a small HPWH system based on a residential HPWH. A new testing procedure was developed to assess the impact of design options on system hot water supply capacity and efficiency. In particular, the study delves into the question of how to effectively integrate a storage tank with a HPWH to enhance overall system performance. The study provides insight on small HPWH system performance to support design guideline development. Furthermore, this novel laboratory testing method provides a new approach to characterize the performance of HPWH systems.

Moderator: **Geoff Wickes**, NEEA

Small Heat Pump Water Heater Systems: Design and Performance

Presenter: **Yanda Zhang**, ZYD Energy

Heat Pump Water Heater Form Factors for Multifamily Dwelling Installations

Presenter: **Ben Larson**, City of Seattle

A Systematic Modeling Study of Heat Pump Water Heater System for a Multifamily Building

Presenter: **Yanfel Li**, Oak Ridge National Laboratory

6D: Systems: Air & Water Decarbonization

Moderator: **Harvey Sachs**, ACEEE

Revolutionizing Decarbonization: The Monoblock Heat Pump Solution for Existing Homes

Presenter: **Neil Bulger**, A2 Efficiency

High Lift Air-to-Water Heat Pumps for Large Building: Technology and Market Assessment

Presenter: **Keirstan Field**, EPRI

High Temperature Heat Pumps for Buildings Decarbonization

Presenter: **Kashif Nawaz**, Oak Ridge National Laboratory

Hydronic Heat Pumps: Adding to Our Electrification Toolkit

Presenter: **Jonathan Heller**, Ecotope

5:00–6:00 pm

Shameless Commerce

6:15–7:30 pm

Reception

Thursday, March 14 – Hot Water Forum

7:00 am–4:00 pm **Registration**

8:00–8:50 am **Breakfast**

9:00-10:30 am **Concurrent Sessions**

7A: Water Quality: Building Water System Goals to Promote Safe Water and Sustainability

Moderator: **Tania Ullah**, NIST

Panelists: **Tim Bartrand**, ESPRI

Jim Lutz, Hot Water Research

Eric Yeggy, Water Quality Association

7B: Equity & Affordability: Heat Pump Water Heaters in Low Income Areas

Moderator: **Maggie Kelley Riggins**, Southeast Energy Efficiency Alliance

Increasing Equitable Access to Heat Pump Water Heaters: A Paper on Strategies and Best Practices

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

The Return of the Amazing Shrinking Room

Presenters: **Maya Gantley**, 2050 Partners

Decker Ringo, 2050 Partners

7C: Models, Sizing and Reality, Oh My!

Hot water system sizing methods date from at least 30 years ago. The energy models date from the late 1970s, with periodic updates in the intervening years. Neither the sizing methods or the energy models match what actually happens in buildings. This makes it difficult to properly account for improvements to system efficiency. This session will discuss the sizing for different scales of multifamily buildings. It will also present the work PNNL is doing to revise the hot water system modeling for IECC-Residential and for ASHRAE 90.1.

Moderator: **Gary Klein**, Gary Klein & Associates

Giving Credit for Good Plumbing Design

Presenter: **Cary Faulkner**, Pacific Northwest National Laboratory

Incorporating Realistic Designs into Energy Models for Improved Energy Savings Analysis

Presenter: **Carmen Cejudo**, Pacific Northwest National Laboratory

Investigating Domestic Hot Water Heater Sizing Issues

Presenter: **Alyza Khan**, Lincus Inc.

State of the Art Multifamily Hot Water Plumbing and Production

Presenter: **Peter Skinner**, E2G Solar LLC

7D: Smart Grid: Grid Interactivity

Buckle up for a deep dive into the hot (water) topic of grid-interactive water heaters! This session uncovers the secrets to unlocking their flexibility, from optimizing control systems to navigating rate structures. Get ready to shift your perspective on water heating as we explore how these unsung heroes can become smart grid superstars, boosting efficiency, saving costs, and supporting a resilient energy future.

Moderator: **Scott Spielman**, Ecotope

Distributed Energy Resource Conformance

Presenter: **Dana Paresa**, Portland State University

Designing Better Model Predictive Controllers to Maximize the Flexibility of Grid-Interactive Water Heaters

Presenter: **Elizabeth Buechler**, Stanford University

Grid-interactive Load Flexibility Control of Multifamily Heat Pump Water Heater Systems

Presenter: **Greg Pfothenauer**, Artemisia Energy

Navigating Connection Options, Thermostatic Mixing Values (TMV), Time-of-Use (TOU) Rates and their Impacts on Water Heating Daily Load Shifting

Presenter: **Amélie Besson**, Association for Energy Affordability

Heat Pump Water Heater Load Shifting Meta Analysis

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

Central CO2 Heat Pump Water Heater Performance and Load Shifting in Multifamily Buildings

Presenter: **M.M. Valmiki**, ASK Energy

10:30–11:00 am

Networking Break

11:00 am-12:30 pm

Concurrent Sessions

8A: Codes/Standards: System Water Heating Design

Moderator: **George Chapman**, Energy Solutions

The Research and Codes Nexus: The Hot Water System Revolution

Presenter: **Christoph Lohr**, IAPMO

Findings from Four CalNEXT Projects Relating to Heat Pump Water Heaters in Commercial Kitchens

Presenter: **Amin Delagah**, TRC

8B: Programs & Lessons Learned: Water Heating

Moderator: **Emily Rosenbloom**, Northwest Energy Efficiency Alliance (NEEA)

TECH Clean California Heat Pump Water Heater Incentives: Accelerating Load Management through Flexible Water Heating

Presenter: **Emily Kehmeier**, Energy Solutions

Guidance on Domestic Hot Water Heat Pump Design in Multifamily Residential Buildings

Presenter: **Stuart Hood**, Introba

Harriet Lilley, Introba

Saving the Grid with Water Heaters – The South African Way

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

Jessie Yen, Hot Water Research

Heat Pumping in the Great Lakes Peninsulas: Lessons Learned from Heat Pump Contractor Education and Collaboration in Michigan

Presenter: **Justin Margolies**, Slipstream

8C: Bringing Hot Water System Sizing into the 21st Century

Current practice in sizing hot water systems is based on data from the early 1990s: before the 1992 EPACT, which put limits on flow rates for faucets and shower heads and before water efficient dishwashers, washing machines, and commercial equipment came on the market. ASHRAE guidelines for peak daily hot water demand for apartments varies by a factor of 4.5 from 90 Gal/person per day to 20 Gal/person/day. In addition to outdated estimates of hot water usage, the sizing methods do not properly include the energy needed for temperature maintenance systems or other losses in the distribution system. These losses typically account for about 30% of the energy use of a water heating system in an apartment building but there is almost no data or guidance related to how to size or optimize this component of the energy demand. This session will focus on how to improve sizing methodologies to include the energy for the uses and for the delivery losses based on modern information about hot water use in multifamily and other commercial buildings.

Moderator: **Keshmira McVey**, BPA

Panelists: **Nicole Ceci**, Steven Winter and Associates

Jon Heller, Ecotope

Jack Aitchison, AEA

8D: Smart Grid: Load Shifting in Multifamily

As we shift to more heat pump technologies in multifamily water heating what is the potential, challenges and solutions.

Moderator: **Geoff Wickes**, Northwest Energy Efficiency Alliance

Multifamily Grid Interactive Central System Heat Pump Water Heater (GIWH) demonstration projects

Presenter: **Tristan de Frondeville**, SkyCentrics

Minimizing HPWH operating costs by leveraging storage against utility TOU tariffs and demand charges

Presenter: **TBD**

Electrification Options for Multi-Family Water Heating in Cold Climates

Presenter: **Zhenning Li**, Oak Ridge National Laboratory

12:30-1:30 pm

Networking Lunch

1:30-3:00 pm

Concurrent Sessions

9A: Codes/Standards: Multifamily Buildings and Water Heating – 2025 California Building Energy Code Title 24

Moderator: **George Chapman**, Energy Solutions

Central Heat Pump Water Heater Requirements

Presenter: **Jingjuan Dove Feng**, TRC Companies

Electric Ready Measures

Presenter: **Jose Garcia**, TRC Companies

Distribution System Measures

Presenters: **Amin Delagah**, TRC Companies

James Haile, Frontier Energy

9B: Workforce: Heat Pump Water Heaters

Hot Water Design: Water Quality, Design, and Innovations

Moderator: **Sarina Sawyer**, Southeast Energy Efficiency Alliance

Heat Pump Water Heater Industry Resources Coming of Age

Presenter: **Paul Campbell**, ICF

Adapting to Change: Ethnographic Insights on Installing Heat Pump Water Heaters in Cold-Climate Zones

Presenter: **A. Maass**, Illume

The Pursuit of Updating State Technical Resource Manuals (TRM): Ensuring Robust Heat Pump Water Heater Rebates!

Presenter: **Nathaniel Jutras**, U.S. Environmental Protection Agency – ENERGY STAR

9C: Optimizing Hot Water Distribution Systems

An ideal hot water distribution system is one in which the water is heated in the plumbing fixtures and appliances. No distribution system losses, but lots of water heaters. The other extreme is where one water heater serves a garden apartment complex. One water heater and very long distribution system piping, with correspondingly large losses. This session will discuss the impact of distribution losses on central electric HPWHs, methods of balancing parallel-path risers, and the performance of a semi-centralized hot water system, and the performance of several HPWH systems serving a men's halfway house.

Moderator: **Tania Ullah**, NIST

Demand Hot Water (DHW) Distribution Issues in Existing Multifamily Buildings and Their Impact on Central Heat Pump Water Heater (HPWH) Performance

Presenter: **Nick Dirr**, Association for Energy Affordability

How to Enhance Comfort and Efficiency by Effective Balancing of Hot Water Distribution Systems in a Multifamily Building: Lab Evaluation of Different Balancing Methods

Presenter: **Mehdi Zeyghami**, Pacific Gas & Electric Company

One for Some: Performance of a Semi-Distributed Hot Water System

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

Bringing Plumbing into the Energy Reference Models

Presenter: **Stephen Zimmerman**, NIST

9D: Systems: 120v

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

Lessons Learned from the Field: Challenges and Opportunities from 120V Heat Pump Water Heater Deployment in New Orleans

Presenter: **Tyler Pilet**, Pacific Northwest National Laboratory

Max Tech FHR for 120v Heat Pump Water Heaters

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

Field Monitoring Advanced Load Shifting Controls for 120V Heat Pump Water Heaters

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

Plugging in for Hot Water in Cold Climates: 120V Heat Pump Water Heaters in the Midwest

Presenter: **Kevin Gries**, Slipstream

3:00-3:30 pm

Networking Break

3:30-5:00 pm

Concurrent Sessions

10A: Residential Water Heating installation

Moderator: **Kim Katz**, C+C

North Carolina Demand Response Heat Pump Water Heaters for Low-Income Homes

Presenter: **Helen Davis**, Energy Solutions

The Path of Least Resistance: A Performance Evaluation of Residential Hybrid Electric Heat Pump Water Heaters

Presenter: **Saroj Karki**, DNV

Overcoming Challenges: Heat Pump Water Heater Installation Tool

Speaker: **Josh Butzbaugh**, Pacific Northwest National Laboratory

10B: Commercial Gas Heat Pump Water Heaters (GHPWH) and Market Transformation

Despite notable performance improvements in electric water heaters over the past two decades, enhancements in commercial gas water heater efficiency have been limited due to challenges in design complexity, high first costs, and a limited understanding of the value proposition to building owners, developers and designers for efficient gas water heating solutions. Market Transformation actions have the potential to reduce these barriers to commercial gas heat pump water heater adoption and increase gas savings and decarbonization opportunities with this technology. Join our panel of experts to learn more about developments in commercial gas heat pump water heating from around the country.

Moderator: **Jack Davidson**, NEEA

Hybrid Boiler Plant with GHP for Combination Heating Applications

Presenter: **TBD**, GTI Energy

Studying Application of GAHPs in DHW Systems

Presenter: **Cristalle Mauleon**, Lincus Inc.

Heat Pump Performance in California: Fuel-Fired Water Heating Applications

Presenter: **Madeline Talebi**, ICF

Codes and Standards Review for State-of-the-Art Gas Absorption Heat Pump Water Heaters

Presenter: **Arjun Thirumaran**, GTI Energy

10C: Multifamily Water Heating Case Studies + Tips and Tools to Accelerate Market Adoption

Accelerate the market adoption of electric multifamily domestic water heating – Experts will share their experience, learnings and offer tips and tools such as a Qualified Products List to deploy scalable, efficient and reliable central hot water systems.

Moderator: **Keshmira McVey**, Bonneville Power Administration

Technoeconomic Analysis of Novel Heat Pump Water Heaters for Families with High Energy Burden in Cold Climates

Presenter: **Joseph Rendall**, Oak Ridge National Laboratory

Multifamily Decarbonization: Making an Equitable Transition

Presenter: **Joy Ward**, Stewards of Affordable Housing for the Future

Advanced Water Heater Specification 8.1, QPL and Scalable, Affordable, Effective, Electrification in the West

Presenter: **Jonathan Heller**, Ecotope

10D: Innovative Solutions and Emerging Technology

Exploring the many configurations to leverage heat pumping technology continues with all fuel types. This session will explore phase change materials into heat pump water heaters, thermally driven heat pump water heaters, and photovoltaics with thermal energy storage. Join us to learn about expected performance and functionality of these emerging technologies.

Moderator: **Noe Contreras**, NEEA

Unlocking the Potential of Embedded Phase Change Materials Thermal Energy Storage Heat Pump Water Heaters

Presenter: **Stephen Kowalski**, Oak Ridge National Laboratory

Service Hot Water Heating with Photovoltaics and Thermal Energy Storage

Presenter: **Alejandro Baez Guada**, GTI Energy

Laboratory Evaluation of Thermally Driven Absorption Heat Pump for Domestic Hot Water

Presenter: **Abbas Ahsan**, GTI Energy

Thermally Driven Ejector Heat Pump Water Heater Progress

Presenter: **Stephen Kowalski**, Oak Ridge National Laboratory