



## 2019 Hot Water Forum

Hilton Downtown Nashville • Nashville, Tennessee • March 11-13

PRELIMINARY PROGRAM (*subject to change*)

### Monday, March 11

4:00–7:00 pm REGISTRATION OPEN

5:30–8:00 pm RECEPTION

### Tuesday, March 12

7:30 am–6:00 pm REGISTRATION OPEN

8:00–9:00 am CONTINENTAL BREAKFAST

9:00–10:30 am WELCOME, INTRODUCTIONS, AND PLENARY PANEL

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

Introductions: **Chris Perry**, American Council for an Energy-Efficient Economy

The Forum this year is highlighting its move from the Pacific Northwest to the South. The opening Plenary will kick off the conference with a panel discussion featuring experts in the water heating industry in the southern states. Join us as they discuss the current successful water heating technologies, policies, and programs. In addition, they will discuss the barriers and challenges for implementing energy-efficient water heating technologies in homes and commercial buildings.

10:30–11:00 am NETWORKING BREAK

11:00 am–12:30 pm BREAKOUT SESSIONS

*Track: Technologies*

#### 1A. Commercial Applications of Gas Heat Pump Water Heaters

Moderator: **Paul Glanville**, Gas Technology Institute

Performance of Commercial-Sized Gas HPWHs at a Commercial Laundry Facility

Presenter: **Michael Garrabrant**, Stone Mountain Technology

Demonstration of Pre-Commercial Gas HPWHs for Hot Water and Air Conditioning at Full Service Restaurants

Presenter: **Isaac Mahderekal**, Gas Technology Institute

Results from a Cold-Climate Gas-Fired Absorption Heat Pump Multifamily Pilot

Presenter: **Paoyun Liu**, Enbridge

Application of Commercial GHPWHs to a Fitness Center in the Pacific Northwest

Presenter: **Jeff Rigotti**, Northeast Energy Efficiency Alliance

*Track: System Design***1B. Are Showerhead and Aerator Savings Tapped Out? The Current and Future Market for Low-Flow Fixtures**Moderator: **Sarah Widder**, Cadeo Group

Market Research on Hot Water

Presenters: **Bretnie Eschenbach**, Cadeo Group  
**Jonah Hessels**, Cadeo Group

Flow Rates for Faucets, Showers, and Tub/Shower Values

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

Update on WaterSense and Specification Changes for Showerheads and Faucets

Presenter: **Jonah Stein**, Environmental Protection Agency (*invited*)*Track: Sectors***1C. Multifamily Central Heat Pump Applications and Case Studies**

State of the Shelf: Central Heat Pump Water Heating Technology Review and Three Case Studies

Presenter: **Shawn Oram**, Ecotope

Integrated HPWH in Multifamily

Presenter: **Rob Aldrich**, Steven Winter Associates, Inc.

Field Monitoring of Three Different Heat Pump Water Heating System Types in ZNE Multifamily Housing

Presenters: **Andy Brooks**, Association for Energy Affordability  
**Nehemiah Stone**, Stone Energy Associates*Track: Programs, Policies, and Climate Goals***1D. Water Heaters in Zero Net Energy Applications**

A Near-ZNE Commercial Building with Swimming Pool Heating Using CHP

Presenter: **Joe Shiau**, SoCalGas

Natural Gas Solid Oxide Fuel Cell for Zero Net Energy and Hot Water in Residential Applications

Presenter: **Alejandra Hormaza Mejia**, University of California-Irvine

The Triple Hybrid Water Heater and PV Solution to Solar Hot Water

Presenter: **Hal Slater**, 3X Hybrid Water Heater**12:30–1:30 pm****NETWORKING LUNCH AND DISPLAYS****1:30–3:00 pm****BREAKOUT SESSIONS***Track: Technologies***2A. CTA2045 – How We Got Here and Where We are Going**Moderator: **Geoff Wickes**, Northeast Energy Alliance

High-level Understanding of CTA 2045, Minimum Command Set and Current Status of CTA 2045

Presenter: **Chuck Thomas**, Electric Power Research Institute

Open Standards for Energy Efficiency and Grid-Connectivity (CTA-2045, OADR)

Presenter: **Tristan de Frondeville**, SkyCentrics

600 CTA 2045 DR Events in 220 Days – What Were the Results and Where Do We Go from Here?

Presenter: **Conrad Eustis**, Portland General Electric

*Track: System Design***2B. A Veritable Solar Cornucopia: PV Heat Pumps, Integrated Thermal & PV, and Concentrating Collectors**Moderator: **Larry Weingarten**, Consultant

Evacuated Tubes Solar Thermal Field Testing in a Low-Income Multifamily Apartment with Integration to a Commercial Building

Presenter: **Kevin Woo**, SoCalGas

Hybrid PV/T-HP Solar Hot Water System Design and Economics

Presenter: **Albert Nunez**, Capital Sun Group & SunDrum Solar

PreHeat: Direct Injection Solar for Commercial Buildings

Presenter: **Jon Irwin**, Sun Equinox*Track: Sectors***2C. Opportunities in Commercial Kitchens**

Water and Energy Savings with Pumped Rinse Dish Machines

Presenters: **Michael Slater**, Frontier Energy

Design Guide for Hot Water Systems in Commercial Food Service

Presenter: **Michael Slater**, Frontier Energy

A Commercial Kitchen Hot Water System Retrofit Case Study

Presenter: **Stephen Walmsley**, SoCalGas*Track: Programs, Policies, and Climate Goals***2D. Innovative Programs: Where are We Today?**

Efficiency Programs: From Good to Great

Presenter: **Alice Rosenberg**, Consortium for Energy Efficiency

The HPWH Market: What Is Working?

Presenter: **Chris Granda**, Appliance Standards Awareness Project**3:00–3:30 pm****NETWORKING BREAK****3:30–5:00 pm****BREAKOUT SESSIONS***Track: Technologies***3A. It's a Tankless Job**Moderator: **Ben Schoenbauer**, Center for Energy and Environment

New Gas Tankless Technology and How to Support Trade Ally Uptake

Presenter: **Jeff Rigotti**, Northwest Energy Efficiency Alliance

Recent Lab Testing of Tankless Units: Evaluating Performance and Reliability

Presenter: **Alex Fridlyand**, Gas Technology Institute

Utility Program Successes and Lessons Learned

Presenter: **Kent Crouse**, Cascade Natural Gas (*invited*)

*Track: System Design*

**3B. Impact of System Design and Water Use on Premise Plumbing Microbiome**

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

Household Drinking Water is a Source of Clinically Relevant Cystic Fibrosis Opportunistic Bacterial Pathogens

Presenter: **Sarah-Jane Haig**, University of Pittsburgh

Water Stagnation in premise plumbing leads to predictable microbiome responses

Presenter: **Fangqiong Ling**, Washington University in St. Louis

Premise Plumbing Factors Leading to Mycobacterial Growth in Greater Philadelphia Region

Presenter: **Anurag Mantha**, Virginia Tech

*Track: Sectors*

**3C. HPWH in Commercial Applications**

Introduction to Large Scale Heat Pump Water Heaters

Presenter: **Brian Culler**, Colmac WaterHeat

Commercial Gas Water Heaters in the Real World

Presenter: **Jeff Rigotti**, Northwest Energy Efficiency Alliance

Electric Heat Pumps Go Commercial

Presenter: TBA, A.O. Smith

*Track: Programs, Policies, and Climate Goals*

**3D. Innovative Programs for Engagement Strategies**

Moderator: **Jill Reynolds**, Northeast Energy Efficiency Alliance

Contractor Engagement for Training for HPWH Adoption

Presenter: **Alyson Caiola**, United Illuminating (*invited*)

Break me off a Piece of that Kit Program: A Comparison of Two Kit Program Delivery Models

Presenters: **Jordan Folks**, Research Into Action  
**Greg Simmons**, Duke Energy (*invited*)

Midstream Models – A Manufacturer’s Perspective

Presenter: **Francois Lebrasseur**, A.O. Smith

**5:15–6:15 pm LIGHTNING SESSION**

**Shameless Commerce: Introducing New Products and Services**

**Description:** In this session, we will deviate from our usual norms and offer anyone a few minutes to present the advantages, features, and availability of their new products and services. The session will be filled with rapid 2.5-minute presentations. Come hear about market innovations and continue discussing them during the reception.

**6:15–7:30 pm RECEPTION**

**Wednesday, March 13****7:30 am–4:00 pm****REGISTRATION OPEN****8:00–9:00 am****CONTINENTAL BREAKFAST – VISIT DISPLAYS****9:00–10:30 am****BREAKOUT SESSIONS***Track: Technologies***4A. Refrigerant-free Heat Pump Water Heaters**

Refrigerant-Free Heat Pump Water Heaters

Presenter: **Uttam Ghoshal**, Sheetak Inc.

HFO-Based Low GWP System

Presenter: **Kashif Nawaz**, Oak Ridge National LaboratoryCO<sub>2</sub> vs. Fluorocarbons: Thermodynamic Comparison of Subcritical and Transcritical HPWH EfficiencyPresenter: **Kyle Gluesenkamp**, Oak Ridge National Laboratory*Track: System Design***4B. Designing Hot Water Recirculation Systems**Moderator: **Sara Widder**, Cadeo Group

Background and Recent Findings on DHW Recirc Controls in Commercial, Multifamily, and Commercial Buildings

Presenters: **Nate Baker**, Cadeo Group**Jonah Hessels**, Cadeo Group

The Taxonomy of Hot Water Circulation Systems

Presenter: **Gary Klein**, Gary Klein Associates

Demand Circulation Technology for Central Distribution Systems – Findings from the Field

Presenter: **Karla Butterfield**, Steven Winter Associates (*invited*)*Track: Sectors***4C. Residential Combined Space/Water Heating Systems**Moderator: **Ben Schoenbauer**, Center for Energy Efficiency

Laboratory Results for Advanced Combi Research

Presenter: **Tim Kingston**, Gas Technology Institute

Modeling and Calibrating Combined Space and Water Heating in Residential Applications

Presenter: **Alex Fridlyand**, Gas Technology Institute

Design and Development of Low-Cost GHPs for Residential “Combi” Systems

Presenter: **Michael Garrabrant**, Stone Mountain Technologies

Results from the Demonstration of GHP “Combi” Systems in the Upper Midwest

Presenter: **Paul Glanville**, Gas Technology Institute

*Track: Programs, Policies, and Climate Goals*

#### **4D. Carbon Reduction Strategies in the Water Heater Market**

Presentation

Presenter: **Holly Braun**, NW Natural

Decarbonizing Building Heat Loads at Mass Scale with Gas Absorption Heat Pumps

Presenter: **Scott Reed**, Stone Mountain Technologies

**10:30–11:00 am**

**NETWORKING BREAK**

**11:00 am–12:30 pm**

**BREAKOUT SESSIONS**

*Track: Technologies*

#### **5A. Retrofit-ready Heat Pump Water Heaters**

The Greenhouse Gas Emission Reduction Goals in California: Implications for Water Heaters in Existing Buildings

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

Programmatic Framework Development

Presenter: **Panama Bartholomy**, California State Assembly

Retrofit-Ready HPWH Specification

Presenter: **Ben Larson**, Ecotope, Inc.

*Track: System Design*

#### **5B. How Do Plumbing Codes and Guidelines Need to Change to Conserve Water and Improve Quality?**

(Due to the government furlough, information for this session is incomplete.)

Water Use Efficiency and Water Quality in Premise Plumbing Systems

Presenter: **Tania Ullah**, National Institute of Standards and Technology

Presentation TBA

Presenter: **Maureen Hodgins**, Water Research Foundation

Presentation TBA

Presenter: **Veronica Blette**, US Environmental Protection Agency

*Track: Sectors*

#### **5C. Heat Recovery for Hot Water Systems**

Laboratory Experimentation and Modeling of Installation Slope Impacts on Drain Water Heat Recovery Effectiveness

Presenter: **Peter Grant**, Frontier Energy

Utilizing Whole System Model to Optimize Water and Energy Nexus

Presenter: **Ricardo Amon**, University of California-Davis

PIRANHA – Zero Carbon Energy Efficient Hot Water for Buildings

Presenter: **Dani Mueller**, SHARC Energy Systems Inc.

*Track: Programs, Policies, and Climate Goals*

**5D. Innovative Programs for Midstream Approaches**

Moderator: **Kyle Booth**, Energy Solutions

Midstream Distributor-Focused Heat Pump Water Heater Programs: A Discussion of the Key Elements of Success

Presenter: **Nathan Jutras**, US Environmental Protection Agency (*invited*)

Therm Savings with Midstream Programs

Presenter: **Kyle Coumas**, Energy Solutions

**12:30–1:30 pm**

**NETWORKING LUNCH**

**1:30–3:00 pm**

**BREAKOUT SESSIONS**

*Track: Technologies*

**6A. Residential Gas Heat Pump Water Heaters – Moving to the Market**

Priming the Gas HPWH Market

Presenter: **Aaron Winer**, Northwest Energy Efficiency Alliance

Gas HPWHs in California – Field and Laboratory Results

Presenter: **Paul Glanville**, Gas Technology Institute

Gas HPWHs as a Means to Reduce GHG Emissions

Presenter: **Holly Braun**, Northwest Natural

*Track: System Design*

**6B. How Low Can We Go; How Close Can We Get?**

Discussion Panelists: **Jim Lutz**, Hot Water Research

**Gary Klein**, Gary Klein and Associates

**Yanda Zhang**, ZYD Energy

*Track: Sectors*

**6C. Emerging Hot Water Use Applications and Technologies for Commercial Buildings**

Dipper Well Replacement Research Update

Presenters: **Michael Slater**, Frontier Energy

Hot Water Use for Marijuana Grow Operations

Presenter: **Chris Neil**, Colorado Office of Consumer Counsel

*Track: Programs, Policies, and Climate Goals*

**6D. Innovative Programs for Demand Response**

Moderator: **Conrad Eustis**, Portland Gas and Electric

Residential Natural Gas Demand Response Program Planning Using Connected Water Heaters

Presenter: **Andrew Nih**, SoCalGas

HPWH Low Income Demand Response Pilot

Presenter: **Alyson Caiola**, United Illuminating

Controlling Load through Water Heaters

Presenter: **Kit Hagen**, Armada Power

Demand Response for the Retrofit Market

Presenter: **James Jackson**, Emerson Climate Technologies (*invited*)

**3:00–3:30 pm**

**NETWORKING BREAK**

**3:30 – 5:00 pm**

**BREAKOUT SESSIONS**

*Track: Technologies*

**7A. New Concepts for Heat Pump Water Heaters: Split Units and Alternative Refrigerants**

Moderator: **Tania Ullah**, National Institute of Standards in Technology

Field and Lab Performance of CO2 Heat Pump Water Heaters

Presenter: **William Healy**, National Institute of Standards in Technology

Presentation TBA

Presenter: **Ben Larson**, Ecotope

Presentation TBA

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

*Track: Technologies*

**7B. National Laboratory Water Heating Research in Tennessee**

Virtual Storage: Laboratory and Field Evaluations of Grid-Interactive Water Heaters

Presenter: **Jeff Munk**, Oak Ridge National Laboratory

Future Refrigerant Outlook for Heat Pump Water Heaters

Presenter: **Van Baxter**, Oak Ridge National Laboratory

Semi-open Sorption Water Heater: Experimental Results and Theory of Operation

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

Optimization of Water Heater Control Strategy to Maximize UEF and FHR

Presenter: **Ahmad Abu-Heiba**, Oak Ridge National Laboratory

*Track: Programs, Policies, and Climate Goals*

**7D. Implications and Considerations from Carbon Reduction Strategies for Water Heaters**

Canada's Energy Efficiency Regulations – An Update

Presenter: **David Villarroel**, Natural Resources Canada

Carbon Footprint and Levelized Cost Comparison of Gas and Electric Water Heaters

Presenter: **Ferit Ucar**, Environmental Defense Fund

Implications of Policy-Driven Residential Electrification for Water Heaters

Presenter: **Rick Murphy**, AGA