



Hot Water Forum

The Hilton Portland Downtown • Portland, OR • March 20 – 22, 2018

PRELIMINARY PROGRAM

Tuesday, March 20

4:00 – 7:00 pm REGISTRATION OPEN

5:30 – 8:00 pm RECEPTION

Wednesday, March 21

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

10:30–11:00 am NETWORKING BREAK – *sponsored by AO Smith*

11:00 am–12:30 pm BREAKOUT SESSIONS

Track A: Smart, Grid-Connected, and HPWHs

1A: The Connected Future: Policy, Theory, and Infrastructure for Getting to Scale

Moderators: **Sarah Widder**, Cadeo Group
Alexi Miller, New Buildings Institute

Smart Water Heaters: Carbon Impacts, Grid Impacts, and Market Transformation

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

Electrification of Domestic Hot Water: Does It Lead to a More Sustainable Future?

Presenter: **Jennifer McWilliams**, DNV GL

Infrastructure Ready Products for Decarbonization

Presenter: **Ram Narayanamurthy**, Electric Power Research Institute

Track B: Technologies

1B: Verification and Validation of Hot Water System Simulations

Moderator: **Jennifer Amann**, American Council for an Energy-Efficient Economy

How Domestic Hot Water Is Being Left out of ASHRAE 90.1

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

Lab Tests to Model Heat Pump Water Heater Controls

Presenter: **Ben Larson**, Ecotope

Verifying Simulation Models of Water Heaters

Presenter: **Jeff Maguire**, National Renewable Energy Laboratory, US Department of Energy

Track C: Sectors

1C: Large Scale Electric Heat Pump Water Heaters in Multifamily Buildings

Moderator: **Janice Peterson**, Bonneville Power Administration

Heat Pump Water Heaters are not Boilers: Key Differences for Designers

Presenter: **Shawn Oram**, Ecotope

Case Study: Multifamily Affordable Heat Pump Water Heater Installations in Northern California

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

Hydronic Residential Heat Pump Field Results from 61 Daikin Althermas in Zero Net Energy Multifamily Housing

Presenter: **Sean Armstrong**, Redwood Energy

Track D: Policy, Programs and Health

1D: Navigating a Sea of Change: How Utilities are addressing the Evolving Water Heater Market

Moderator: **Jake Marin**, Vermont Energy Investment Corporation

A Comprehensive Strategy to Deploy Efficient Water Heaters at Scale

Presenter: **Howard Merson**, Vermont Energy Investment Corporation

Program Collaboration to Drive Market Transformation: CEE Residential Water Heating Initiative

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

12:30–1:30 pm NETWORKING LUNCH

1:30–3:00 pm BREAKOUT SESSIONS

Track A: Smart, Grid-Connect, and HPWHs

2A: Technology Developments: Grid Connected Heat Pump Water Heaters

Moderator: **Ben Larson**, Ecotope

Thermal Storage and Demand Response with Heat Pump Water Heaters

Presenter: **David Korn**, Cadmus

Can Heat Pump Water Heaters Teach the California Duck Curve to Fly?

Presenter: **Pierre Delforge**, National Renewable Defense Council

Results of the June 2017 Heat Pump Water Heater Transformation Workshop

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

Track B: Technologies**2B: The Latest in CO2 Heat Pump Research**

Moderator: **Charlie Stephens**, Northwest Energy Efficiency Alliance

CO2 Combi System Compared to other Systems in the PNNL Lab Homes

Presenter: **Cheryn Metzger**, Pacific Northwest National Laboratory

Mitigating the Parasitic Effect of Heat Pump Water Heaters on Home Heating Systems in Cold Climates

Presenter: **Steve Groves**, Fortis BC

Optimizing CO2 Refrigerant Heat Pump Performance

Presenter: **Ken Eklund**, Washington State University

Large Capacity CO2 Refrigerant Heat Pumps

Presenter: **Charlie Stephens**, Northwest Energy Efficiency Alliance

Track C: Sectors**2C: Changes in Residential Hot Water Use and Opportunities for Savings**

Moderators: **Sarah Widder**, Cadeo Group

Bonnie Watson, Bonneville Power Administration

Hot Water Market Characterization in the Pacific Northwest

Presenters: **Sarah Widder**, Cadeo Group

Bonnie Watson, Bonneville Power Administration

Are There Savings in Lower GPM Showerheads?

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

How Low Can We Go in Existing Buildings?

Presenter: **Troy Sherman**, Evolve Technologies

How Long Can We Go on Hot Water Flow Rates and Use in New Buildings?

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

Track D: Policy, Programs, and Health**2D: Developments in Water Heating Policy and Regulation**

Moderator: **Misty Guard**, Bradley Corporation

Analysis of US Residential Water Heater Stakeholder System and Decision-Making Process

Presenter: **Anurag Mantha**, Virginia Tech

Water Conservation Out in the Cold: From the IECC to the IPC

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

Lessons in Efficiency and Durability from the Past

Presenter: **Larry Weingarten**, New Buildings Institute

3:00–3:30 pm

NETWORKING BREAK – sponsored by AO Smith

3:30–5:00 pm BREAKOUT SESSIONS

Track A: Smart, Grid-Connect, and HPWHs

3A: The Consumer Experience: Findings from the Field of Connected Pilots

Moderator: **Chris Granda**, Appliance Standards Awareness Project

Benefits from Smart Grid Interactive Water Heaters

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

Demand Response 2.0: Not Your Father's Water Heater Demand Response Program

Presenter: **Philip Kelsven**, Bonneville Power Administration

Optimizing Grid and Consumer Benefits to Increase Participation

Presenter: **George Gurlaskie**, Duke Energy

Track B: Technologies

3B: The Future of Solar Water Heaters

Moderator: **Larry Weingarten**, Consultant

New Efficient Water Heating Technologies: What Does This Mean for Solar Thermal?

Presenter: **Shawn Martin**, Solar Rating and Certification Corporation

Thermal Mass Foundation Heated with Solar Thermal Collectors

Presenter: **Pauline Guntlow**, Brookside Construction

PV Powered Heat Pump DHW in a Hot Humid Climate

Presenter: **Bert Taube**, Southern Research

Track C: Sectors

3C: Commercial and Industrial Applications of High Efficiency Gas Water Heating I

Moderator: **Holly Braun**, NW Natural

Gas Heat Pump Water Heating in Commercial Laundries

Presenters: **Michael Garrabrant**, SMTI

Chris Keinath, SMTI

Demonstration of Gas Heat Pump Water Heating/ Cooling in Commercial Food Service

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

High Efficiency, Low Emissions Combustion for Commercial Hot Water Boilers

Presenters: **Sandeep Alavandi**, Gas Technology Institute

David Cygan, Gas Technology Institute

5:15–6:15 pm LIGHTNING SESSION**Shameless Commerce: Introducing New Products and Services**

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. This session will be filled with rapid two and a half minute presentations. Come hear about market innovations and continue discussing them during the reception.

Companies participating include Carina Technology, D'mand Controls, Fusionthermal Limited, Mitsubishi, and Shower Steam.

6:15–7:30 pm RECEPTION**7:30–9:00 pm INFORMAL SESSION****Beneficial Electrification: The Need to Re-focus on Emissions Efficiency**

Session Lead: **Steven Koep**, Vaughn Thermal Corporation

Thursday, March 22**7:30 am–4:00 pm REGISTRATION OPEN****8:00–9:00 am CONTINENTAL BREAKFAST****9:00–10:30 am BREAKOUT SESSIONS***Track A: Smart, Grid-Connect, and HPWHs***4A: Developments in Gas Heat Pump Water Heaters**

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

Development and Assessment of Commercial Gas Heat Pump Water Heaters

Presenter: **Michael Garrabrant**, SMTI
Chris Keinath, SMTI

Experimental Results on Gas Fired Membrane-Based Semi-open Sorption Water Heaters

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

Preliminary Findings from Next Generation SMTI Residential GHPWH Demonstration

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

Track B: Technologies**4B: Designing Hot Water Distribution, Delivery, and Plumbing Systems**

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

Report on Uniform Plumbing Code Pipe Sizing Activities

Presenter: **Dan Cole**, International Association of Plumbers and Mechanical Officials

Hot Water Distribution System Losses in a Net-Zero Home

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

A Model of In-home Water Distribution Systems Energy Losses Using a Civil Engineering Tool for Water Utility Pipelines

Presenter: **Toritseju Omaghomi**, University of Cincinnati

Track C: Sectors**4C: Field Monitoring of End-Use Fixtures and Equipment in Commercial Kitchens**

Moderator: **Don Fisher**, Fisher Consultants

Results from Monitoring 17 Pre-rinse Operations in Large Dishrooms

Presenter: **Amin Delagah**, Frontier Energy, Inc.

Development and Demonstration of a Compressed Air Boosted PRSV Unit

Presenter: **Jesse Castaneda Lutz**, California Polytechnic State University and H. Parker Hospitality

Results from Replacing Ten Cold and Hot Water Dipper Wells in Commercial Kitchens that Show 95% in Energy and Water Savings

Presenter: **Michael Slater**, Frontier Energy, Inc.

Track D: Policy, Programs and Health**4D: Promoting Water Heating through Midstream Programs**

Moderator: **Alice Rosenberg**, Consortium on Energy Efficiency

Jump Starting Heat Pump Water Heater Sales: ENERGY STAR'S® Latest Efforts to Grow the Heat Pump Water Heater Market

Presenter: **Stacy Glatting**, US Environmental Protection Agency

Promoting Heat Pump Water Heaters

Presenter: **Lisa Boba**, The United Illuminating Company

Selling Heat Pump Water Heaters – The Final Frontier

Presenter: **Jill Reynolds**, Northwest Energy Efficiency Alliance

10:30–11:00 am

NETWORKING BREAK – *sponsored by the International Code Council*

11:00 am–12:30 pm BREAKOUT SESSIONS*Track A: Smart, Grid-Connect, and HPWHs***5A: Technology Developments: Grid-Connected Controls, Monitoring and Retrofits**

Moderator: **Steven Koep**, Vaughn Thermal Corporation

Panelists: **Paul Steffes**, Steffes Corporation
Matt Carlson, Aquanta, Inc.
Laurie Vaudreuil, Mosaic Power
Clint Caudie, Carina Technologies
Eric Rehberg, Armada Power

*Track B: Technologies***5B: Heat Pump Water Heaters and The Last Mile: Installation, Implementation, and Answers to Lingering Questions**

Moderator: **Sarah Widder**, Cadeo Group

Perceptions and Realities of HPWH Market Barriers and Related Best Practices

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

Characterization of HPWH Interaction with Space Conditioning Systems in the PNNL Lab Homes

Presenters: **Sarah Widder**, Cadeo Group
Cheryn Metzger, Pacific Northwest National Laboratory

Understanding HPWH Interaction with Space Conditioning Systems in the Field

Presenter: **Ben Larson**, Ecotope

Taking It to the Street: HPWHs and Installer Acceptance

Presenter: **Bruce Manclark**, CLEAResult

*Track C: Sectors***5C: Advanced Gas Water Heating for Multifamily Buildings: Cutting Edge Boilers and Heat Pumps**

Moderator: **Holly Braun**, Northwest Natural

New Burner Design Using Additive Manufacturing

Presenter: **Dave Kalensky**, Gas Technology Institute

Breaking through the 100% Efficiency Barrier Using Gas Absorption on Gas Absorption Heat Pumps: A Multi-residential Case Study

Presenter: **Ekaterina Tzekova**, The Atmospheric Fund

Updating our Favorite Conservation Measure: From Condensing Water Heaters to Heat Pumps

Presenter: **Nicole Ceci**, Steven Winter Associates

Track D: Policy, Programs and Health

5D: Legionella and Other Microorganisms

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

Report on ASHRAE Standard 188 and other Recent Regulations Regarding Legionellosis

Presenter: **Tim Keane**, Legionella Risk Management, Inc.

Working Toward Safer Drinking Water at Home, Work, and School

Presenter: **Tiong Gim Aw**, Tulane University

Flint River Water Switch Increased Propensity of *Legionella Pneumophila* Growth in Premise Plumbing

Presenter: **Rebekah Martin**, Virginia Tech University

12:30–1:30 pm NETWORKING LUNCH

1:30–3:00 pm BREAKOUT SESSIONS

Track A: Smart, Grid-Connect, and HPWHs

6A: Smart Controls for Efficient Hot Water Generation and Distribution

Moderator: **Ben Schoenbauer**, Consortium for Energy and Environment

Smart Water Heater Controller – Research Results

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

Demand Activated DHW Controls

Presenter: **Larry Acker**, ACT D'MAND KONTROLS® Systems

New DHW System Design and Its Real-World Performance Data

Presenters: **Neil Donnelly**, New Ecology, Inc.

Maciej Konieczny, New Ecology, Inc.

Jonah Decola, New Ecology, Inc.

Track B: Technologies

6B: HERS and WERI Capturing Energy and Water Use in Hot Water Systems

Moderator: **Chris Perry**, American Council for an Energy Efficiency Economy

Rating Whole House Water Efficiency through HERSH2O

Presenter: **Jonah Schein**, US Environmental Protection Agency

A Builder's Perspective on Rating Whole House Water and Energy Efficiency

Presenter: **Jacob Atalia**, KB Home

Track C: Sectors**6C: Commercial and Industrial Applications of High Efficiency Gas Water Heating – Part II**

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

Cool Approaches to Upgrading Central Heating Plant Infrastructure

Presenter: **Brandon Conheim**, DC Sustainable Energy Utility

Design of a Novel Burner for Commercial Water Heating Use Additive Manufacturing

Presenters: **Sandeep Alavandi**, Gas Technology Institute

David Kalensky, Gas Technology Institute

Case Study of Commercial Near-ZNE Project–Micro-CHP for Pool Heating with Solar PV

Presenter: **Joe Shiau**, Southern California Gas

Track D: Policy, Programs and Health**6D: Do We Need Hot Water for Handwashing?**

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

The Room-Temperature Lavatory, Getting (completely) out of Hot Water

Presenter: **Duane Jonlin**, City of Seattle

ICC, IAPMO, EPA, CDC, NSF, ANSI, TJC, APIC, ASHE, CMS, CPSC, VA, ACHD, ASHRAE, and of course ASSE: Alphabet Soup and Hot Water for Handwashing

Presenter: **Tim Keane**, Legionella Risk Management, Inc.

3:00–3:30 pm

NETWORKING BREAK – *sponsored by the International Code Council*

3:30 – 5:00 pm

BREAKOUT SESSIONS

Track A: Smart, Grid-Connect, and HPWHs**7A: Technology Developments: Grid-Connected Electric Resistance Water Heaters**

Moderator: **Keith Dennis**, National Rural Electric Cooperative Association

Capturing All System Benefits of Grid-Connected Water Heating

Presenter: **Jim Lazar**, Regulatory Assistance Project

The Grid-Enabled Product Category – How We Got Here!

Presenter: **Keith Dennis**, National Rural Electric Cooperative Association

Bringing Grid-Connected Water Heaters to Market

Presenter: **Paul Steffes**, Steffes Corporation

Lessons Learned from a CTA2045 Pilot Project

Presenter: **Amy Houston**, Jackson EMC

The Path from Grid-Enabled to Grid Interactive

Presenter: **Steven Koep**, Vaughn Thermal Corporation

Track B: Technologies

7B: What are the Best Approaches for the Combi Systems?

Moderator: **Peter Grant**, Frontier Energy

Optimal Approaches for Water Heating with Combi Systems

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

Optimal Approaches for Space Heating with Combi Systems

Presenter: **Dave Kalensky**, Gas Technology Institute

Optimal Approaches for Tankless Coil Boilers

Presenter: **Thomas Butcher**, Brookhaven National Laboratory

Track C: Sectors

7C: Final Results from Demonstration of Hot Water Systems in Commercial Kitchens for California Energy Commission

Moderator: **Amin Delagah**, Frontier Energy, Inc.

Comparative Analysis from Monitoring the Existing and New Hot Water System at an Elementary School

Presenter: **Michael Slater**, Frontier Energy, Inc.

Comparative Analysis from Monitoring the Existing and New Hot Water System in a Full-service Restaurant

Presenter: **Don Fisher**, Fisher Consultants

Final Results and Next Steps from 2nd Generation Hot Water System Testing Laboratory at Pacific Gas and Electric Company

Presenter: **Eddie Huestis**, Pacific Gas and Electric Applied Technology Services

Track D: Policy, Programs and Health

7D: Solar Hot Water for a Cooler Climate: Massachusetts Campaigns for the Municipal and Residential Sectors

Moderator: **Alice Rosenberg**, Consortium for Energy and Environment

Overview and Context for the MassCEC Solar Thermal Challenge

Presenter: **Cammy Peterson**, Metropolitan Area Planning Council

Educating and Engaging Multifamily Building Owners and Operators

Presenter: **Marcus Gilmore**, Center for Sustainable Energy

Ways to Increase Uptake of Solar Hot Water Heaters through Targeted Analysis

Presenter: **Jeremey Koo**, Meister Consultants Group

Thank You Funders and Allies!

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