<table>
<thead>
<tr>
<th>Docket Number:</th>
<th>21-IEPR-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>Building Decarbonization and Energy Efficiency</td>
</tr>
<tr>
<td>TN #:</td>
<td>238348</td>
</tr>
<tr>
<td>Document Title:</td>
<td>Presentation - The Advanced Water Heating Initiative IEPR Commissioner Workshop on Building Decarbonization</td>
</tr>
<tr>
<td>Description:</td>
<td>Presentation by Ralph Dinola, CEO, New Buildings Institute</td>
</tr>
<tr>
<td>Filer:</td>
<td>Raquel Kravitz</td>
</tr>
<tr>
<td>Organization:</td>
<td>New Buildings Institute</td>
</tr>
<tr>
<td>Submitter Role:</td>
<td>Public</td>
</tr>
<tr>
<td>Submission Date:</td>
<td>6/21/2021 2:07:33 PM</td>
</tr>
<tr>
<td>Docketed Date:</td>
<td>6/21/2021</td>
</tr>
</tbody>
</table>
The Advanced Water Heating Initiative
IEPR Commissioner Workshop on Building Decarbonization – Equipment, Technology, and Supply Chain: Scale of Building Decarbonization in California, Equipment, and Supply Chain

June 22, 2021
New Buildings Institute

**Vision:** We envision a transformed built environment that is carbon-free, sustainable, and energy-efficient and supports thriving economies that benefit all people and the planet.

**Mission:** We push for better buildings that achieve zero energy, zero carbon, and beyond – through research, policy, guidance, and market transformation – to protect people and the planet.
Building Decarbonization
The Advanced Water Heating Initiative

Why Heat Pump Water Heaters
Water Heating Fuel Mix

National Residential Water Heating Stock

Source: 2015 RECS, 2009 RASS, 2017 RBSA
A National Collaboration

Utilities + Manufacturers + 
State and Local Governments + Building Industry

Strategic Partners and Supporters:
West Coast AWHI

Collaborative effort of over 50 organizations, 100+ active members

COUNT OF ORGANIZATION TYPES

- 31.6% Manufacturers
- 23.7% Utility Participants
- 17.5% Industry Associations
- 9.6% Regulators/Government
- 9.6% Cities/Other
- 5.3% Program Administrators
- 2.6% Organizer/Facilitator

Key Partners

- Bonneville
- Southern California Edison
- NEEA
- SMUD
- NBI New Buildings Institute
May 17, 2021

In partnership with the Advanced Water Heating Initiative, DOE is launching a new initiative to increase market adoption of high-efficiency, grid-connected Heat Pump Water Heaters in residential and commercial buildings – which are two to four times more efficient than conventional water heaters – in homes across the country.

www.advancedwaterheatinginitiative.org

DOE E3 Website: https://www.energy.gov/eere/buildings/energy-emissions-and-equity-e3-initiative


News: Biden administration announces new Energy Star standards, plans for emissions targets for federal buildings

The Washington Post reported that the White House sold that, for the first time, the government will develop “building performance standards” for federal facilities. It will also establish new Energy Star standards for heat pumps and invest in programs meant to boost adoption of the potentially emissions-saving technology.

(May 2021) Related Fact Sheet
Market Sector Goals

RESIDENTIAL HPWHS

100% market share by 2030

COMMERCIAL HPWHS

90% of multifamily new construction by 2026
Strategies for Market Transformation

- HPWHs for every type of building
- Create experts along the supply chain
- Programs and policies working together
- Drive higher consumer demand

Centered on affordability and equity
AWHI Focus as Working Groups

240V
- Playbook
- Rapid deployment

120V
- 4 manufactures
- 7 Products to market in <2 yr.
- Field study underway in CA

Central
- Tools for sizing and performance
  - Ecosizer
  - Ecosim
- Packaged systems – skid mount

Connectivity
- CTA 2045
- NEEA Tier 3 Spec – Title 24 JA13 adoption

Source: Water Drop/ SANCO2
Market Transformation and Building Demand (Residential)

To reach the most cost-effective installations first, the Advanced Water Heating Initiative (AWHI) has identified the following order of priority for transforming the water heater market:

**Pathway 1:**
Install heat pump water heaters (HPWHs) in all newly-constructed single-family and multifamily homes.

**Pathway 2:**
Replace existing electric resistance water heaters with HPWH (240V).

**Pathway 3:**
Replace existing gas and propane water heaters with HPWH (240V or 120V).
California Water Heating Stock by Fuel Type

To Achieve Climate Goals:

1. New Construction:
   ~ 120,000 240V units/year

2. Electric Resistance Replacement:
   ~ 60,000 240V units/year

3. Gas Replacement:
   ~ 600,000 240V and 120V units/year
   (current national market ~85,000 240V units/year)

Source: 2009 RASS
California Patchwork Quilt Pattern

100% of sale proceeds go to Wildfire Relief Fund

### HPWH Program Framework Summary for Unitary Water Heater Programs

**Scale**
- Program coordinated with other utilities statewide or nationally
- Use common data collection when possible
- Program volume calculated to reach eventual 100% market adoption of HPWHs

**Duration**
- Commit to 10 years+

**Incentive type**
1. Incentives direct to distributors/installers, and/or manufacturers
2. Utility may require the entire incentive to be passed through to customers
3. For customers who use the retail channel, provide instant rebate at point of sale
4. See Appendix D for examples

**Incentive amount**
- ~$500 to ~$1,000 per unit initially
- $ additional for installation as required

**New Construction**
- Pathway 1: New Construction

**Priorities**
- Retrofit Programs (Including both planned replacement and replace-on-burnout)
- Pathway 2: Electric Resistance to HPWH (240V HPWHs)
- Pathway 3: Gas/Propane to HPWH
  - 3.1: Gas to 240V HPWH
  - 3.2: Gas to 120V HPWH
AWHI 120V “Plug-in” HPWH Field Study

• Independent field verification to advance market commercialization and program promotion
• Diversity of demonstration sites
  • Home type, installation location, climate zone
• Four participating manufacturers
• Three funding partners
• Seeking pilot participants!
  • Visit https://www.advancedwaterheatinginitiative.org/join-us to express interest
Supply-Side Market Transformation for Low-GWP Multifamily Central HPWH

- **CEC EPIC funded work**
  - “Large Capacity CO2 Heat Pump Water Heater Project”

- Deep-dive into the multifamily supply chain
  - Mapping market actor influences
  - Market characterization and engagement
  - Expanded understanding of drivers and barriers

- Supply-side engagement and tech transfer activities
HPWH Supply Chain

Color of arrows indicates channel:
- New construction
- Existing building (retrofit)
Market Transformation: Targeted Focus

- Fewer than 15 Developers
- More than 40,000 Building Owners
- Distributors
- Specifiers
- Contractors and Installers
- Manufacturers

Fewer than 15
Market Transformation: Overcoming Key Barriers to Product Adoption

Customers
& Designers

Education,
Tools &
Incentives

CONFIDENCE
COST
CAPACITY

Availability

Manufacturers

Awareness &
Market
Demand

Distributors &
Installers
Confidence: Promote Consumer Campaigns and Provide Contractor and Installer Training

Take action on climate change without leaving your house.
Cost: Support Cost Compression

$600 - $650
Cost: Drive Operating Cost Reduction

HPWH Residential Emissions and Operating Cost Compared to Conventional Efficiency Water Heaters in CA

<table>
<thead>
<tr>
<th></th>
<th>Emissions (mtCO2e/yr)</th>
<th>TOU-D-Prime Off-Peak Operating Cost ($)</th>
<th>TOU-D-Prime Peak Operating Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPWH standard (UEF 3.11)</td>
<td>$206</td>
<td>$110</td>
<td></td>
</tr>
<tr>
<td>ER tank WH (UEF .92)</td>
<td>$711</td>
<td>$379</td>
<td></td>
</tr>
<tr>
<td>Standard gas tank (UEF 0.60) Condensing gas tankless (UEF .90)</td>
<td>4.3x</td>
<td>$177</td>
<td>2.7x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Capacity: Support Production through Demand
Characteristics of an ideal Utility Program according to a subset of HPWH OEMs to AWHI

1. Rebate: Instant at POS (retail) or mid-stream (wholesale); $500 minimum value.
2. Minimal data collection requirement if manual process (i.e., customer zip code).
3. Additional data collection if automated/digitized process (i.e., address, product spec).
4. Targeted audience is homeowner.
5. Increase demand with direct messaging, constant education, and repetition.
6. Willingness to co-brand marketing collateral to drive traffic to retailer or wholesaler.
7. Prominent call-out of robust offers on website and across social media channels. Optimized user experience.
8. Minimum 30% of territory electric service.
9. Market transformation goal >10% of eligible households in region.
10. Additional incentives available for new home builders.
11. Consistent program design and execution across multiple state utilities to leverage scale (i.e., Efficiency Maine influencing program designs in MA/VT/CT).
12. Supportive of ongoing installation contractor training.
13. Bulk purchasing is available.
14. Financing options are offered.
We could save 100 million tons of carbon emissions every year

Create thousands of good-paying jobs in the building industry

Promote equity through investment in under-resourced communities

Enable a cleaner, more resilient electric grid

The solution is a piece of equipment that every home needs...
AWHI is a member-funded initiative, and our work is not possible without the contributions and support of our volunteers, partners, and participating organizations.

Join the Effort!

https://www.advancedwaterheatinginitiative.org/
Thank you!

Ralph DiNola
ralph@newbuildings.org
Appendix
The Advanced Water Heating Initiative
Space and water heating = 2/3 of home energy

Source: 2015 RECS
The future of water heating

Water heating uses up to 1/3 of building energy

Heat pump water heaters are 2-4 times more efficient than standard water heaters

New technologies are available for all residential, multifamily, and commercial buildings
HPWH compared to DG solar

- **Annual energy cost savings** would be roughly **3 times** the value of all US small-scale distributed solar generation in 2020.
- **The annual energy savings** would be about **10 times** more than all US distributed solar PV generation in 2020.
- **It would save about 3 times** more carbon annually than was saved by all US distributed solar PV in 2020.
## Magnitude of the Opportunity

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Buildings</td>
<td>118.2 mil</td>
<td>Annual New Home Construction</td>
</tr>
<tr>
<td></td>
<td>1+ mil</td>
<td>Water heaters replaced annually</td>
</tr>
<tr>
<td></td>
<td>7.5 mil</td>
<td>Households w/WH &gt;10 yr old</td>
</tr>
<tr>
<td>Commercial Buildings</td>
<td>5.9 mil</td>
<td>Annual Carbon emissions per year</td>
</tr>
</tbody>
</table>
|                           | 100 mil tons | Coal fired power pla

**Sources:** Building stock from 2015 RECS and 2018 CBECS, annual construction from US. Census Bureau, market potential from ENERGY STAR Water Heater Market Profile (2010), and savings calculated by New Buildings Institute
AWHI Five Priorities

1. **TRANSFORM THE MARKET.**
   Advance from an increase in market penetration to market transformation. This includes simplifying and targeting policy and program levers.

2. **FOCUS FIRST ON NEW CONSTRUCTION.**
   Help establish universal program adoption and policy performance requirements that support HPWHs.

3. **BUILD DEMAND.**
   Build awareness through a coordinated marketing campaign customized for various audiences to provide inspiration, awareness, confidence, and education.

4. **CREATE UNIFORM PROGRAMS AND INCENTIVES.**
   Create a consistent statewide approach that results in uniform program design and incentive amounts that include direct-to-consumer rebates and incentives for distributors and retailers.

5. **ESTABLISH TRAINING AND TOOLS.**
   Provide training and tools to distributors, contractors, and installers.
Our Vision and Mission

VISION
Efficient heat pumps are universal in all water heating applications by 2030

MISSION
1. Improve building energy efficiency and cut emissions by bringing HPWH to mainstream
2. Engage with state/regional partners and community-based organizations, and support their success with national coordination, resources and expertise
3. Promote equity through workforce development and investment in under-resourced communities
Technology Innovation Model

Coordinated management of multiple swim lanes – single voice to manufactures and regulators
Typical Single-Family Supply Chain

- Strong interconnectivity between all market actors
- Installers play a critical role

Source: NEEA
## AWHI Success Metrics

<table>
<thead>
<tr>
<th>Success Metrics</th>
<th>Value To</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Program incentive dollars</strong>: increased amounts and availability of incentives for HPWHs as compared to standard water heaters</td>
<td>Manufacturers, Contractors and Customers, Utilities</td>
</tr>
<tr>
<td><strong>2. Number of utilities/Program Administrators (PAs) providing HPWH incentive programs that offer statewide aligned program and incentives (percent of incentive-offering utilities that include HPWHs)</strong></td>
<td>Manufacturers, Utilities, Contractors and Customers</td>
</tr>
<tr>
<td><strong>3. HPWHs sold vs. total water heaters sold (percent HPWH as compared to standard water heaters sold should increase) by region</strong></td>
<td>Manufacturers, Utilities</td>
</tr>
</tbody>
</table>
| **4. Technology development and advancements. Central systems**: Manufacturers develop plug-and-play, fully packaged products sold by local suppliers  
**Unitary**: 120Vs products on the market | Program Administrators, Utilities, Building owners and occupants, and Manufacturers |
| **5. Affordability. Reduced first cost and installation costs as well as clear and validated energy cost reduction** | Customers, building occupants and building owners, Disadvantaged Communities |
Join AWHI as a member!
Membership levels available to range of organizations. Benefits include:

- Curated educational resources for building energy professionals
- A shared repository of real-time, nationwide M&V data
- Co-branded marketing and communication materials for utility and local government water heating programs
- Personalized strategic sessions with industry experts
- Working Groups to shape technology and policy development
Thank You!