

**DOCKETED**

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<b>Project Title:</b>	Flexible Demand Appliance Standards
<b>TN #:</b>	236102
<b>Document Title:</b>	Presentation - Ashley Armstrong AO Smith SB 49 Lead Commissioner Workshop December 14 2020
<b>Description:</b>	Presentation on attributes for smart water heaters including connectivity and communication protocols for grid integration.
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<b>Organization:</b>	California Energy Commission
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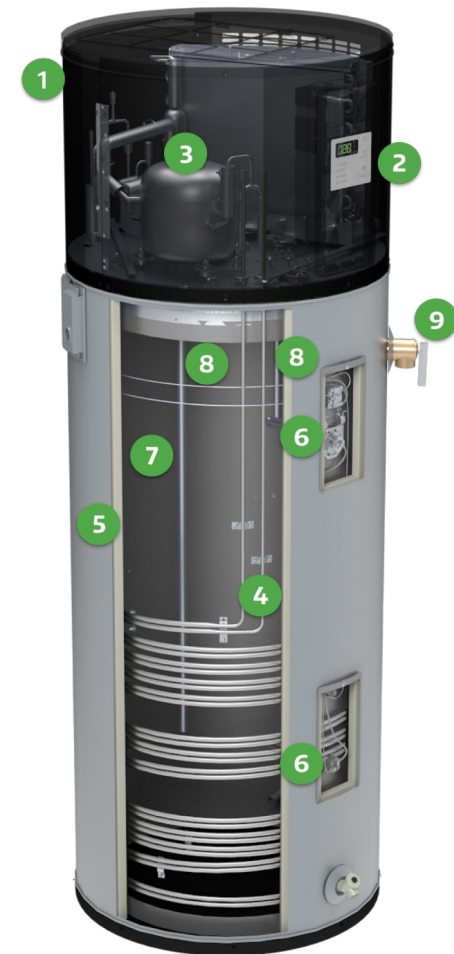


# Smart Water Heaters

Ashley Armstrong  
CEC Load  
Management Rulemaking

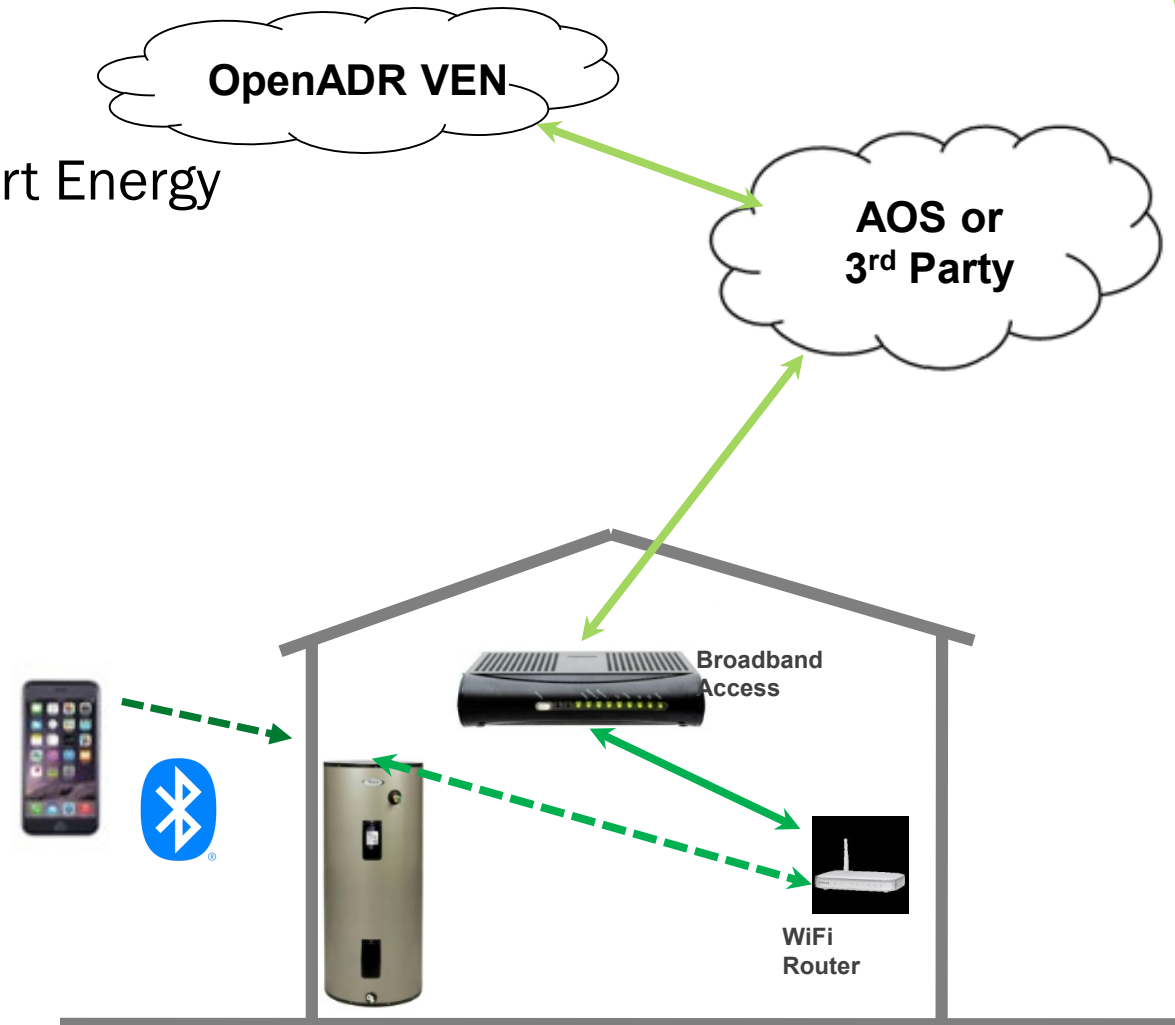
# The Water Heater Advantage

- Low Interruption Annoyance
  - In comparison to most other appliances, lower likelihood that consumer will notice water heater is turned off unless cold water event
- Time Adjustable Power Usage
  - Re-heating of a tank can be done in off peak time
  - Load balancing
  - Reduces the need for spinning reserves
- Energy Storage Device
  - Possibility of loading up the tank (with the addition of a temperature limiting device)
  - Accommodates alternate power generation (renewables)



# Layers for Connectivity

- CTA-2045 Connection to 3<sup>rd</sup> Party
  - Supports OpenADR, Climate Talk, Smart Energy Profile
- OpenADR via A.O. Smith Wi-Fi/BT
  - AO Smith Virtual End Node (VEN)
  - OpenADR to CTA-2045 commands
- Time-of-Use Pricing
  - Local pricing schedule
  - No connectivity required
  - Thermal management based on price



# Basic Demand Response Control

- Shed Load / Critical Peak
  - Turn off until energy in tank too low to satisfy customer
- Load-up
  - Top-off heater to set temperature
- Grid Emergency
  - Heater off



# BPA CTA-2045 Water Heater Demonstration

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- 2 Primary Objectives
  - **Run DR Events:** Recruit and install communications on residential CTA-2045-equipped water heaters, followed by running a set of demand response events from winter through summer season.
  - **Create a market transformation plan and a business case to justify the cost:** The project was initiated because BPA anticipated if market transformation caused every water heater purchased in the next 15 years to be a CTA-2045-equipped water heater, then BPA could create a large cost-effective demand response resource that could be used on a daily basis.

## **CTA-2045 Water Heater Demonstration Report**

**Including**

### **A Business Case for CTA-2045 Market Transformation**

**BPA Technology Innovation Project 336**

**November 9, 2018**

# Smart Water Heater Activities

## Need for Harmonization

- States are Adopting Demand Response Requirements for Water Heaters
  - Washington State (HB 1444) and Oregon
  - California (JA13) Title 24 Alternative Compliance Measure for New Residential Construction
- ENERGY STAR Connected Water Heater Specification and Test Procedure in development
- NEEA (Northwest Energy Efficiency Alliance) Advanced Water Heating Specification
  - Version 7.0 of Tier 3 and above includes CTA-2045 requirement
- AHRI 1430 – Standard for Demand Response Electric and Heat Pump Water Heaters in development

# A. O. Smith's HPWH with iCOMM Smart Connectivity

- Wi-Fi and Bluetooth capable
- Includes Leak Sensor and Reporting
- Free A. O. Smith app
  - Control temperature and mode
  - Monitor water heater status
  - Fault and Maintenance notifications
- California Title 24 – JA13 Compliant
  - Easily load utility Time of Use rates
  - Demand Response: OpenADR 2.0b VEN certified
- Factory Installed
  - Also available as an accessory kit. Backwards compatible on all series 130 heat pumps.



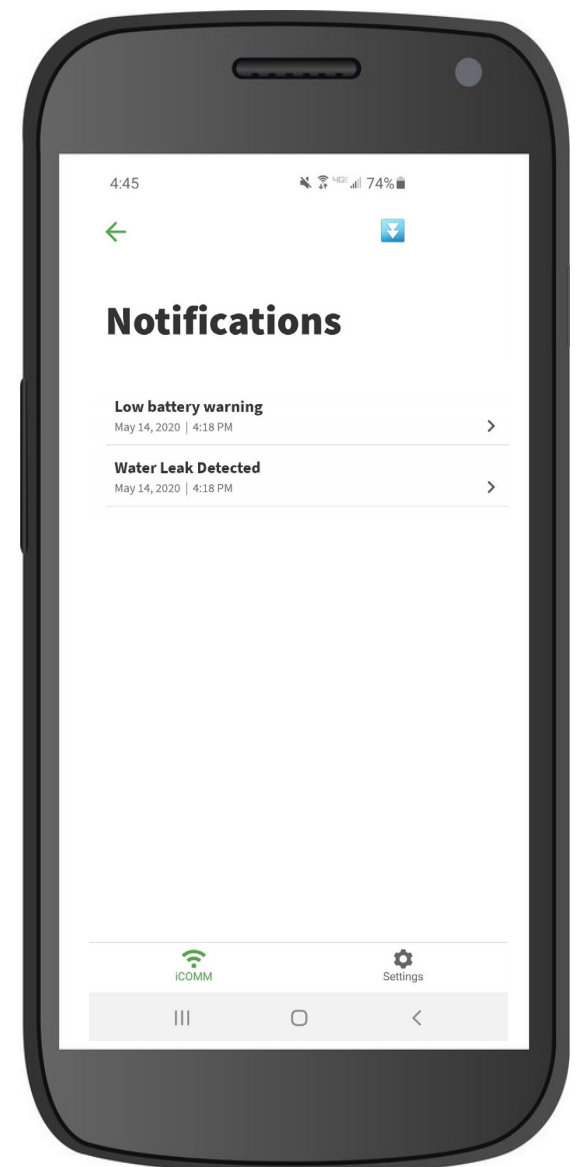
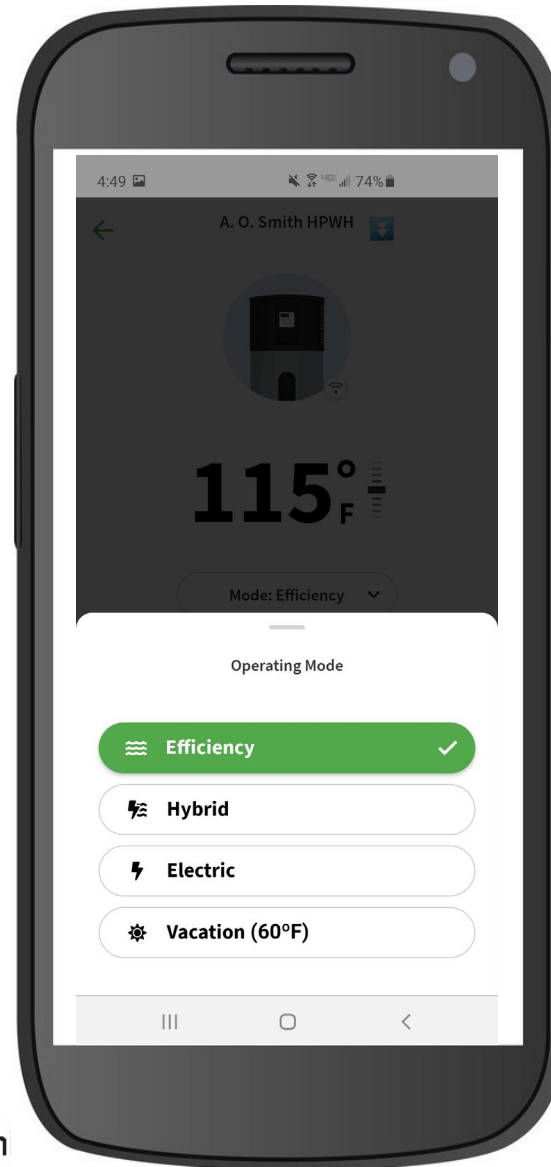
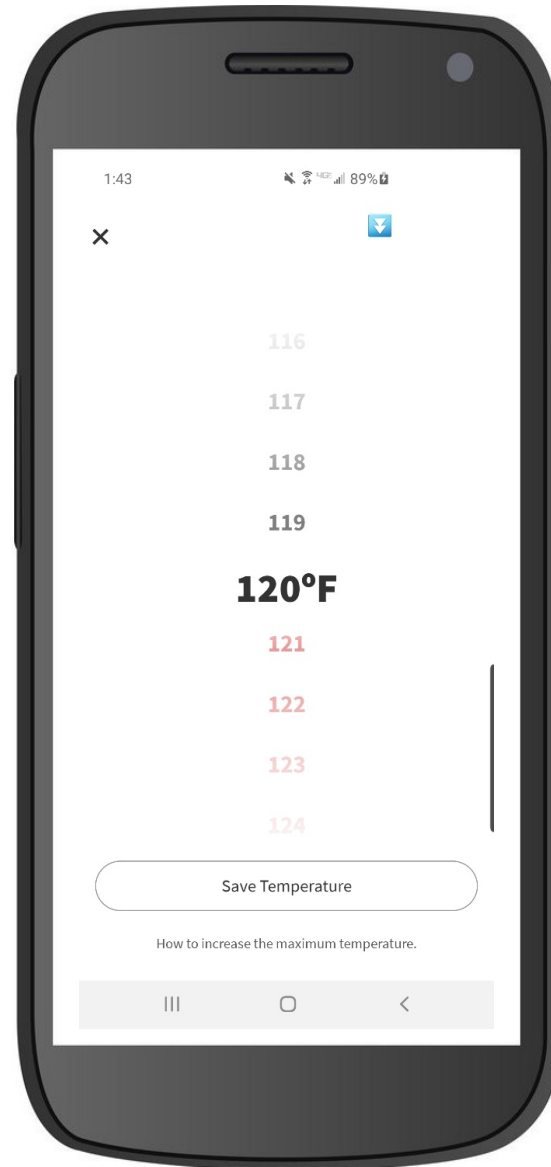
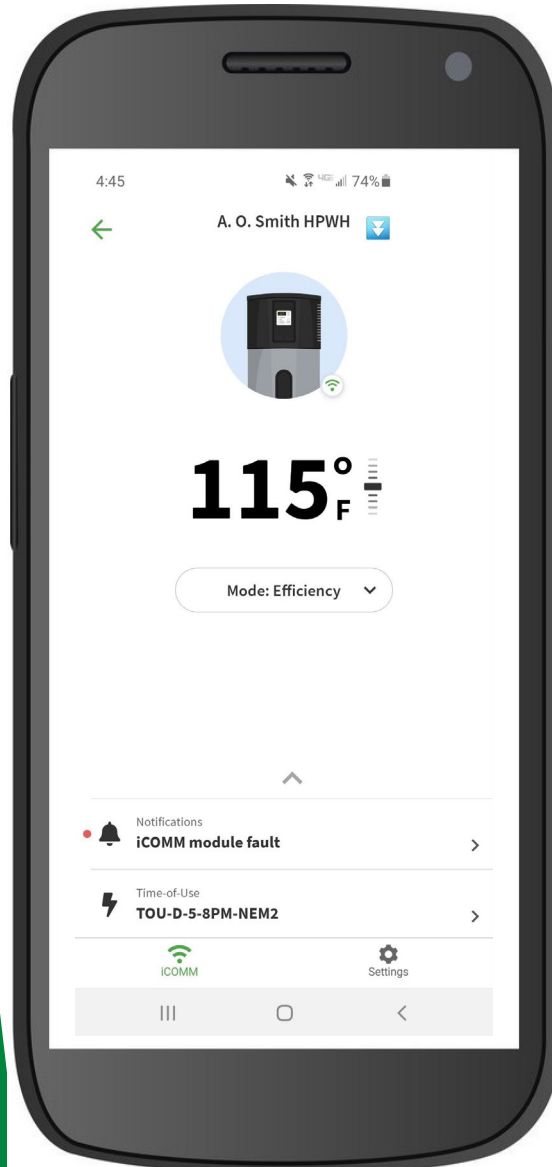
Module and  
Leak sensor



Available factory  
installed



# IoT Controls

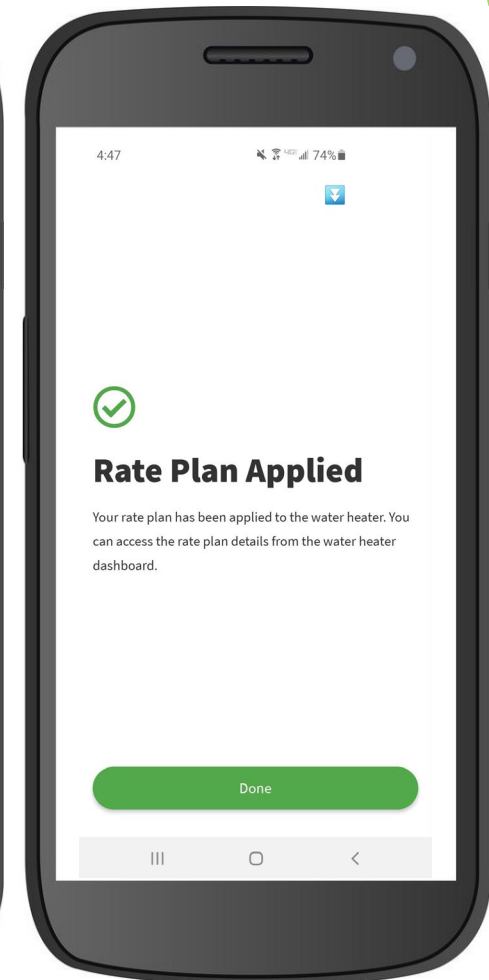
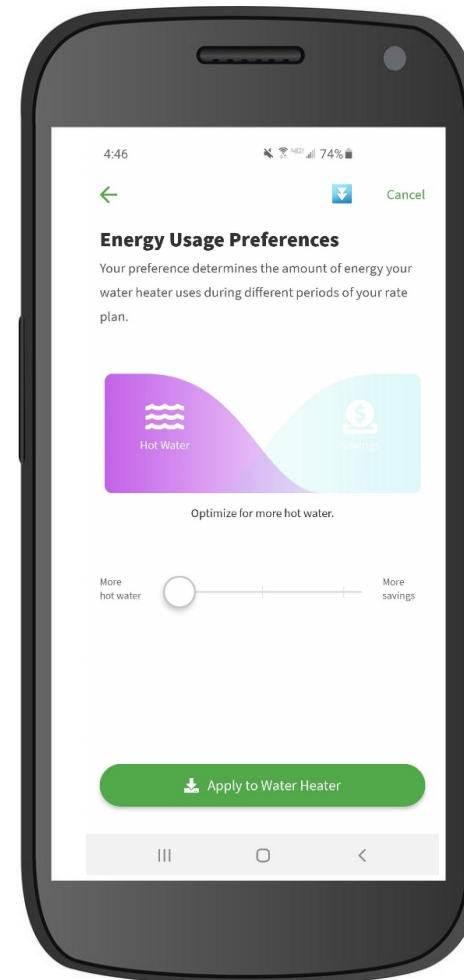
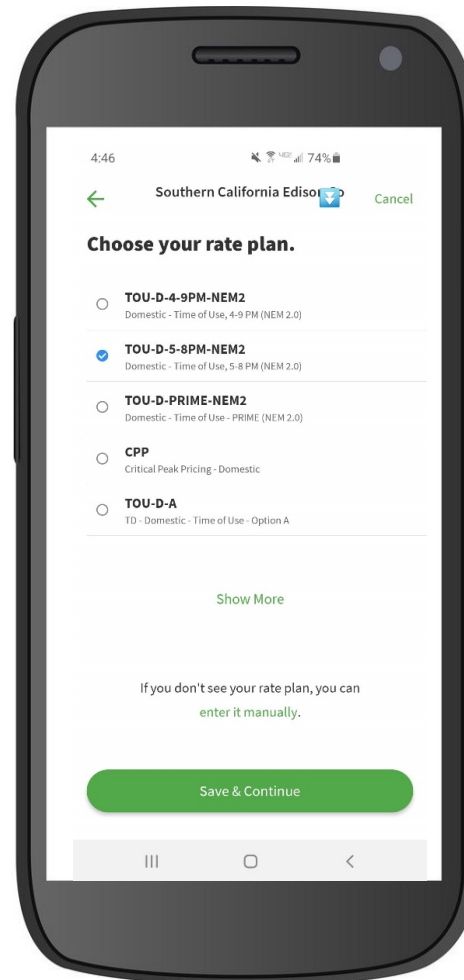
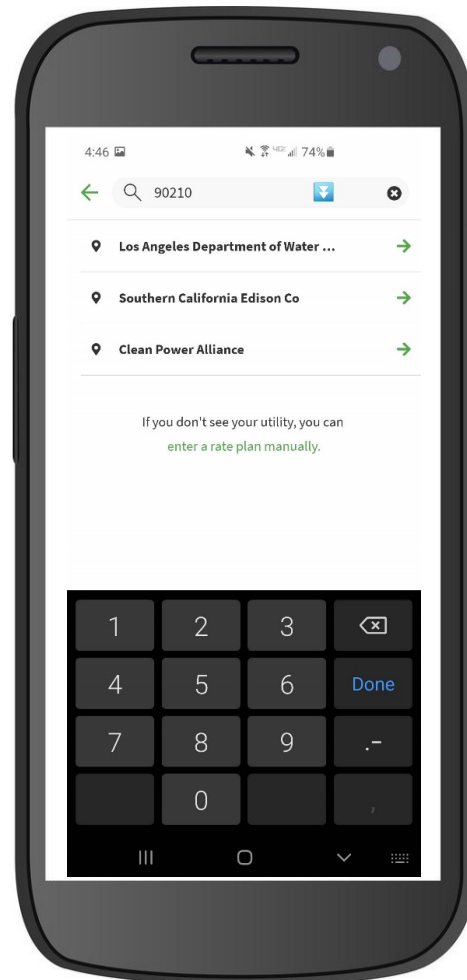
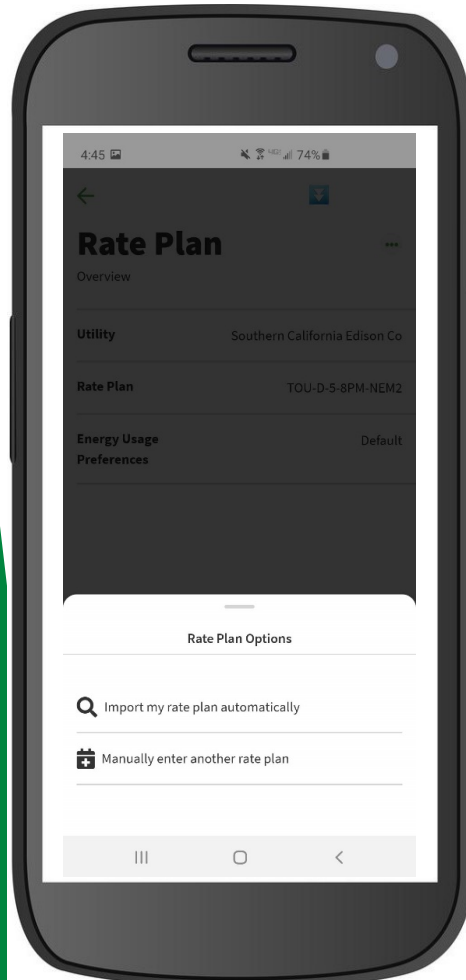


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# Utility Time of Use Rates



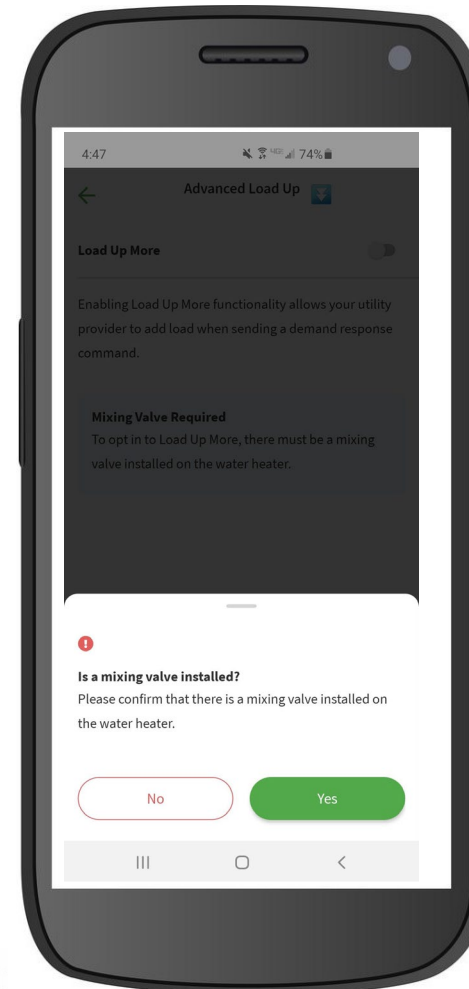
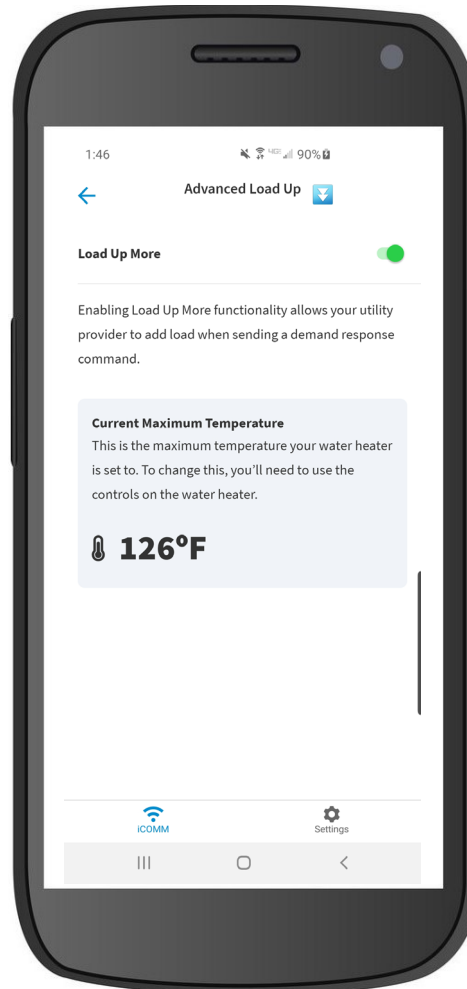
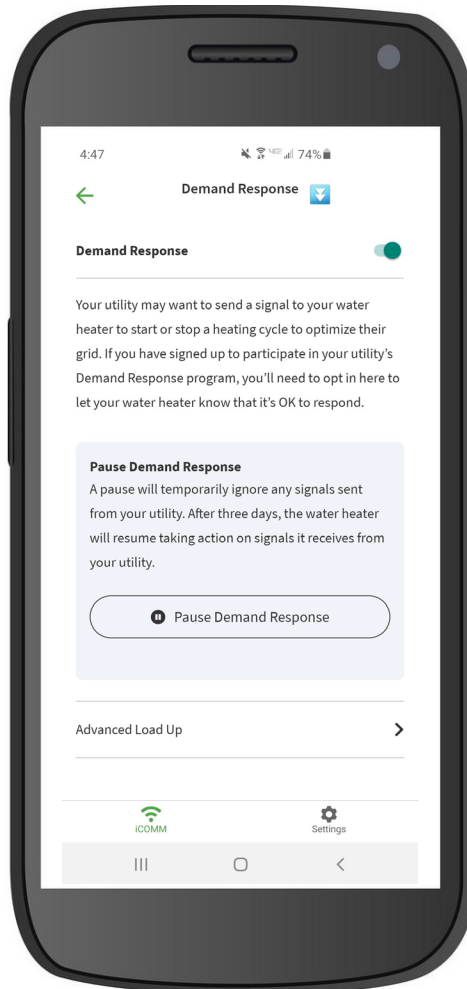
- Easily load ToU rates by utility name or zip code



# Utility Demand Response



- OpenADR 2.0b VEN certified



# Smart Water Heaters – What's Needed?

- Move to Sustained Large Scale Deployments
- Stick to Uniform National Standard(s) – CTA 2045 preferred
- Avoid Custom One-off DR Integrations
- Make it Worth Consumers' Effort to Participate in the Program
  - Properly Structured Incentives and Rate Tiers
- Ratepayer Satisfaction with the Program is Critical
  - Minimal no Hot Water Events and Show the Savings Realized

# Thank You!



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