

DOCKETED	
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Smart Water Heaters

Ashley Armstrong
CEC Load
Management Rulemaking

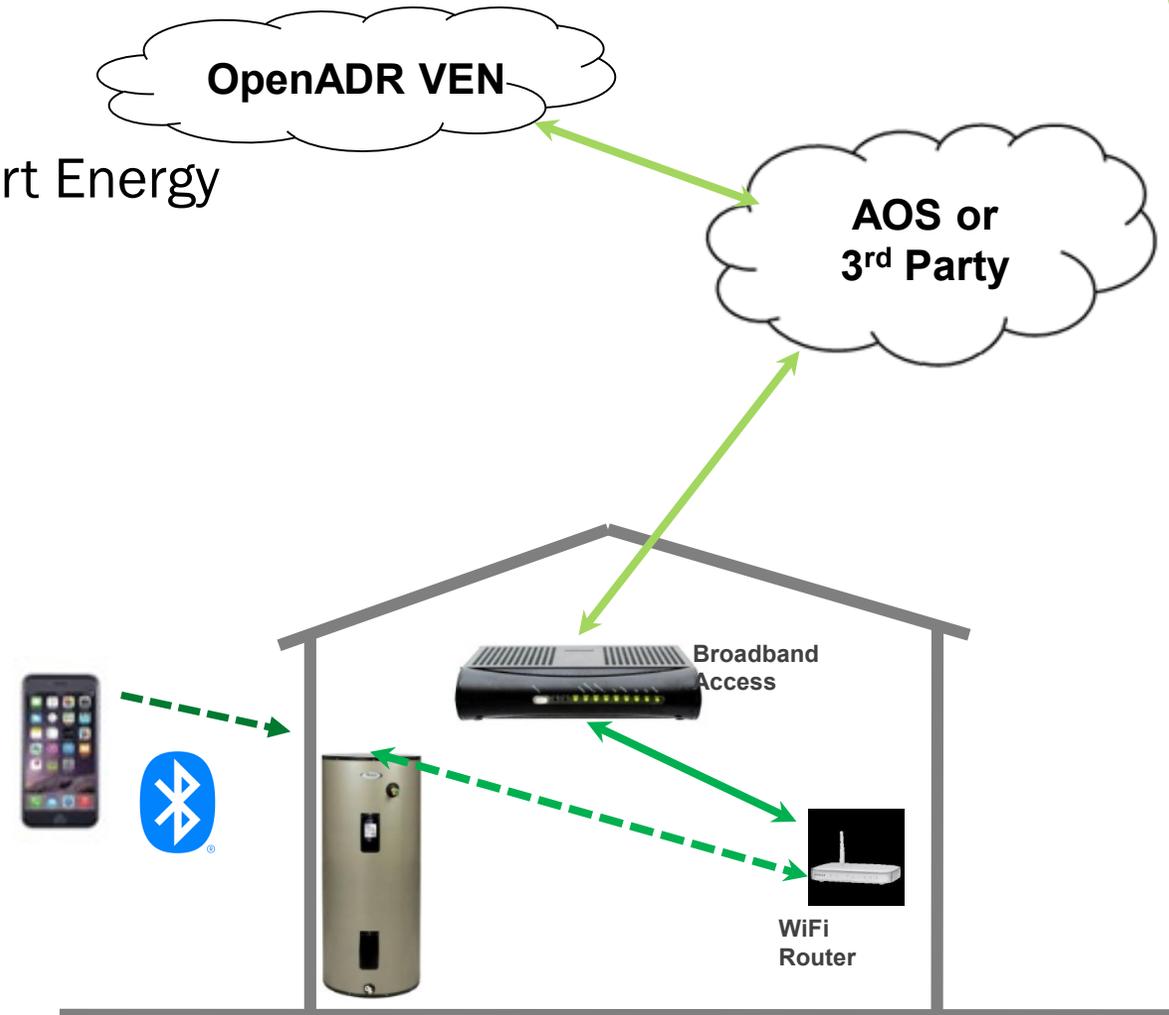
The Water Heater Advantage

- 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 3rd 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

- 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.

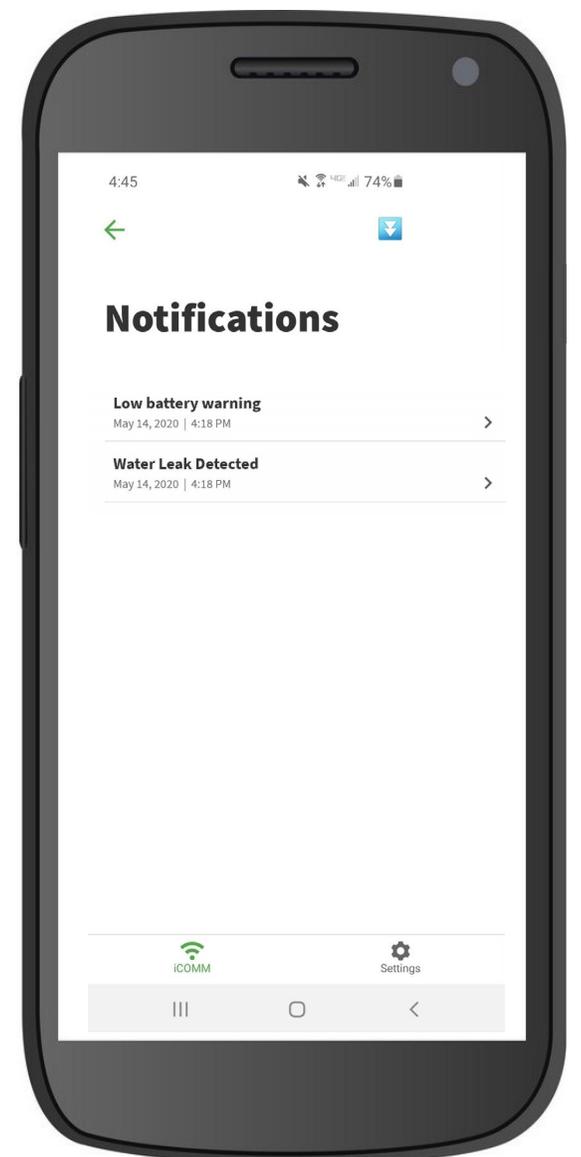
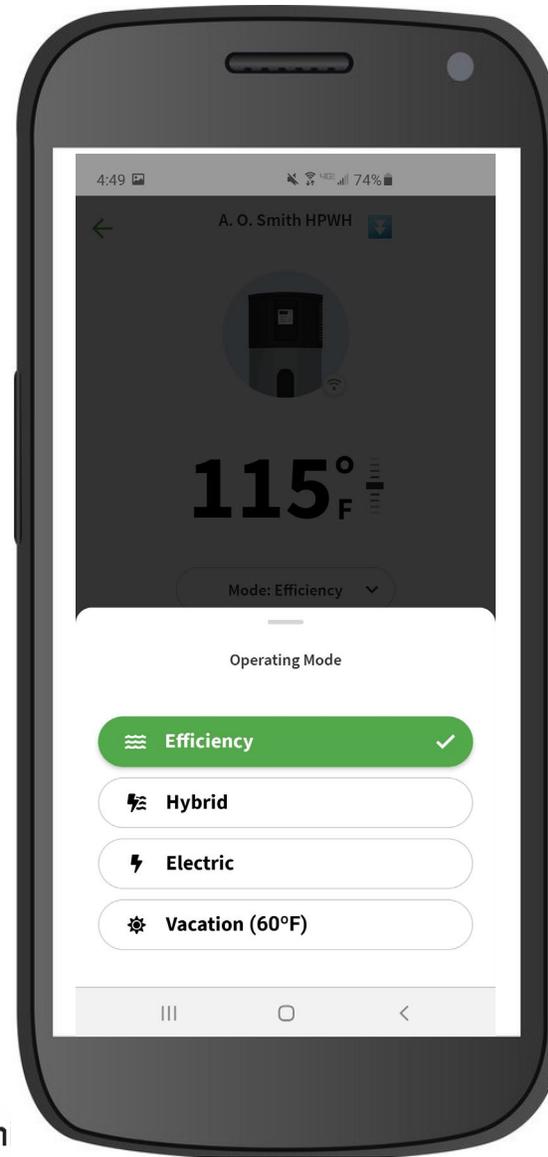
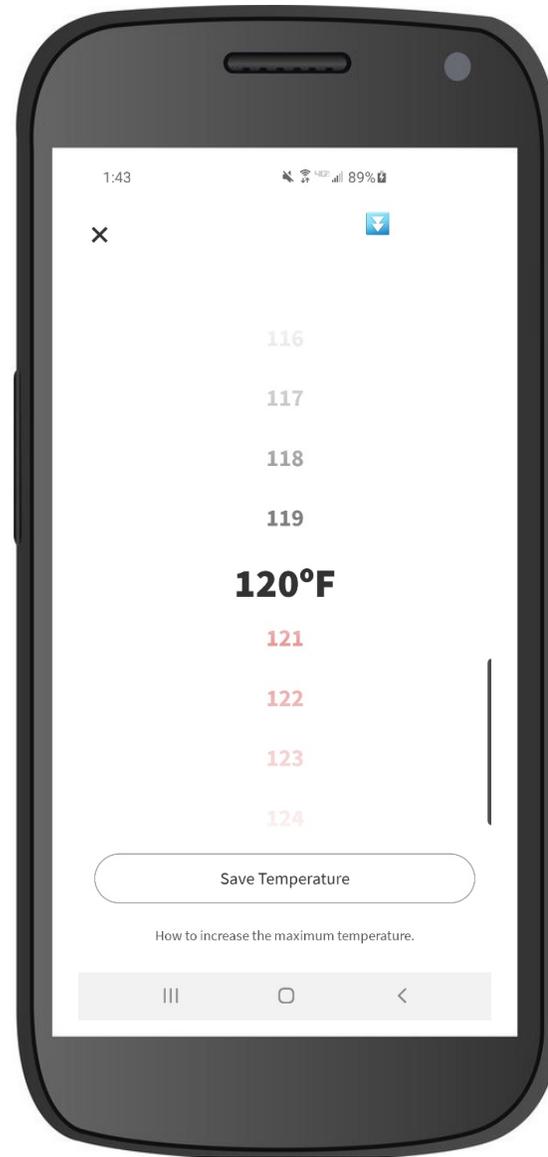
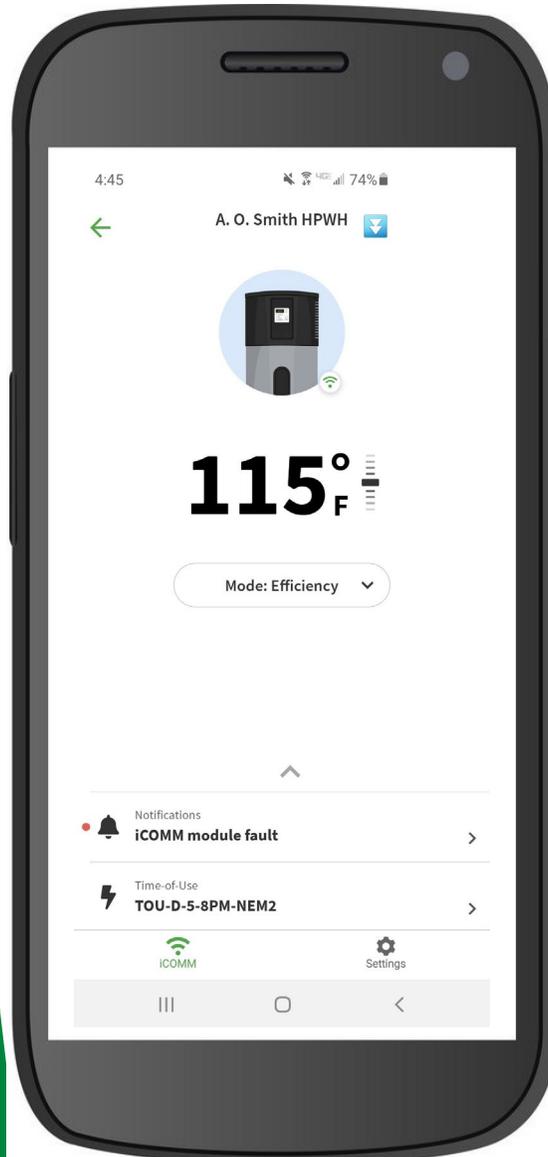


Module and
Leak sensor



Available factory
installed

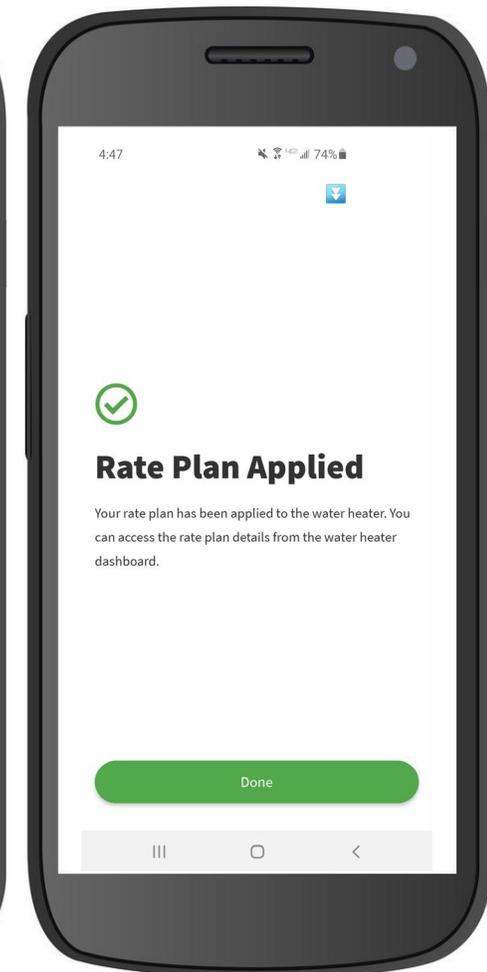
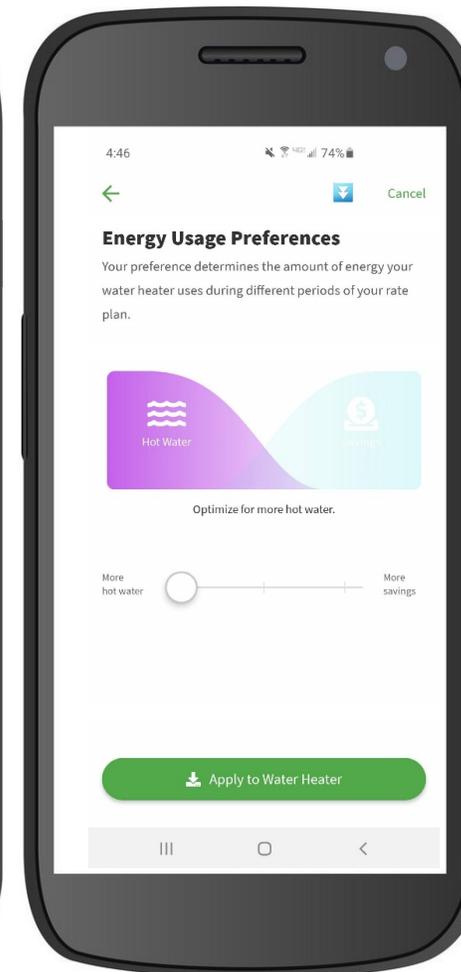
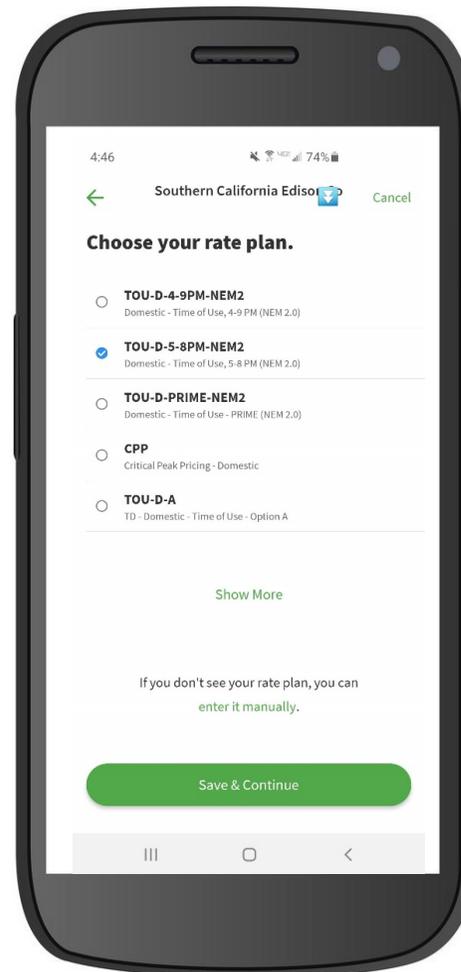
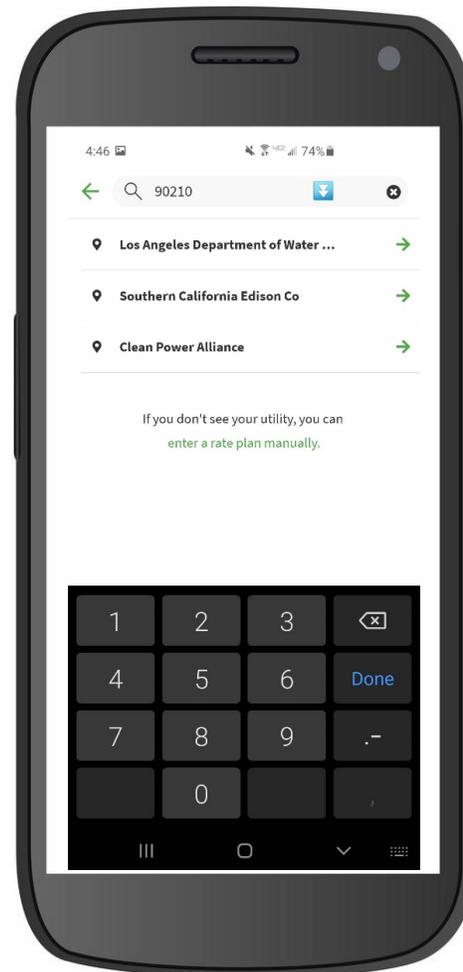
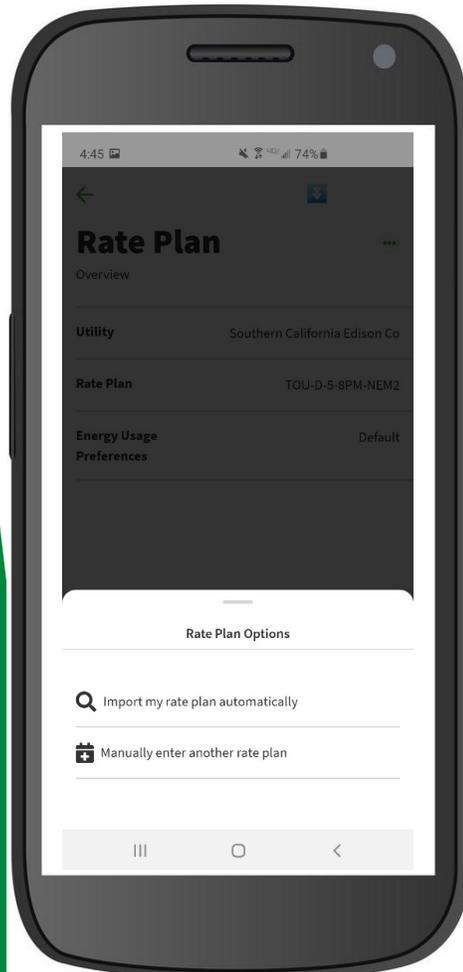
IoT Controls



Utility Time of Use Rates



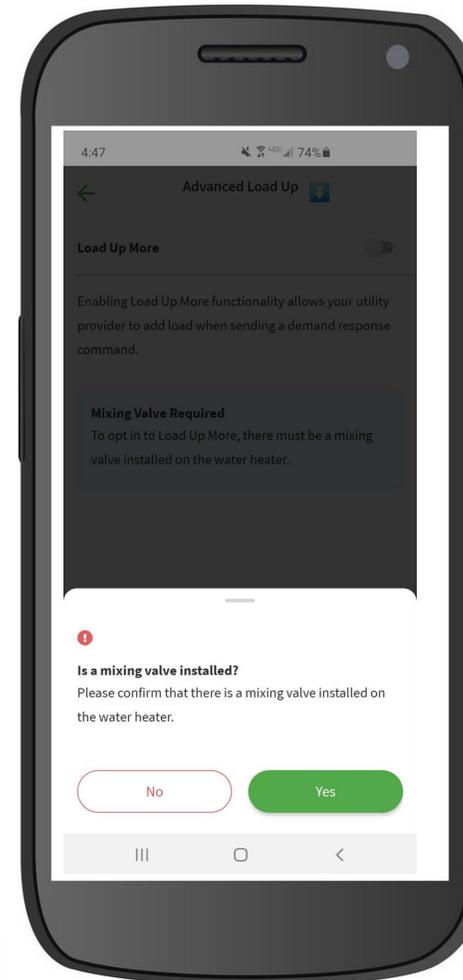
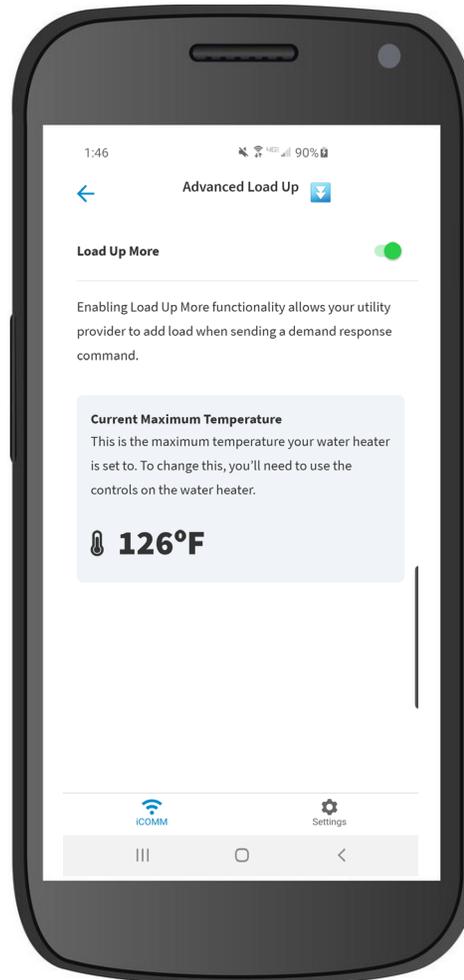
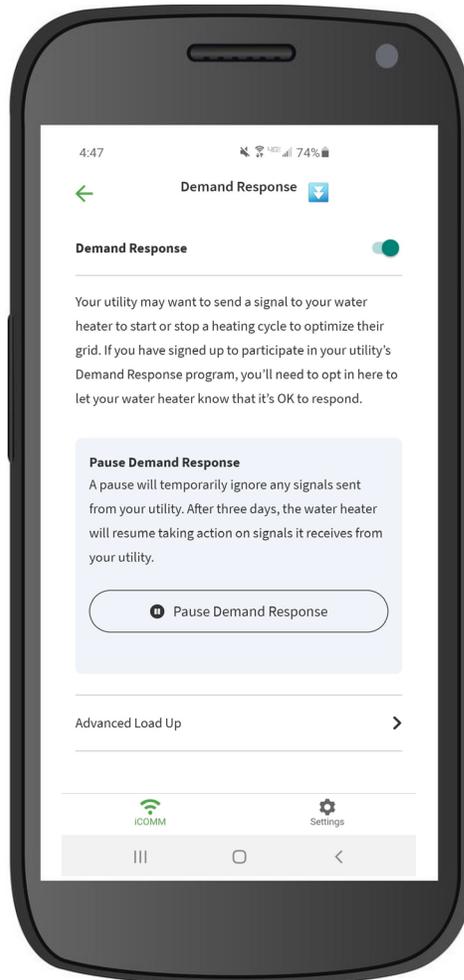
- Easily load ToU rates by utility name or zip code



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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