

Lab Testing of Heat Pumps to Mimic Restaurant Use

Update on California Research & Policy Activities

BayREN

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INTEGRATED

[RESILIENT]

SUSTAINABLE

Code Readiness Activities to Prepare for Tomorrow



Research and advocacy to overcome barriers for adoption of new technology

- **PG&E Code Readiness Program** conducts planning to set the stage for effective code development by gathering robust data on technologies and systems in advance of multi-year rulemakings at the state/federal level, and helps bring various agencies to the table
- Code Readiness can help **overcome various code barriers with new building requirements**
 - Can help building systems researchers prepare for the development of Codes and Standards Enhancement (CASE) Initiative Reports
 - CASE reports summarize the need and viability of proposed energy code measures and provide sample code language to support rulemaking process to make changes to the Title 24 Part 6 Building Energy Efficiency Standards

Project Funders



Project Partners



2050 PARTNERS



- Conduct commercial kitchen hot water system performance testing at PG&E ATS Group’s Performance Testing & Analysis Unit environmental test chambers on behalf of PG&E Code Readiness Team.
 - Testing will primarily focus on various HPWH equipment including unitary and split HPs storage tank and distribution system configurations.
 - The automated 24-h application testing will mimic hot water system operation in café, fast food and sit-down foodservice facilities.
 - The test configurations will include standard and recirculation loop-based distribution systems and use draw stations to mimic end-use fixtures.
- This project supports the development of HP water heater sizing guidelines for commercial kitchens that may be used by health departments.
- This research supports energy code proposals.

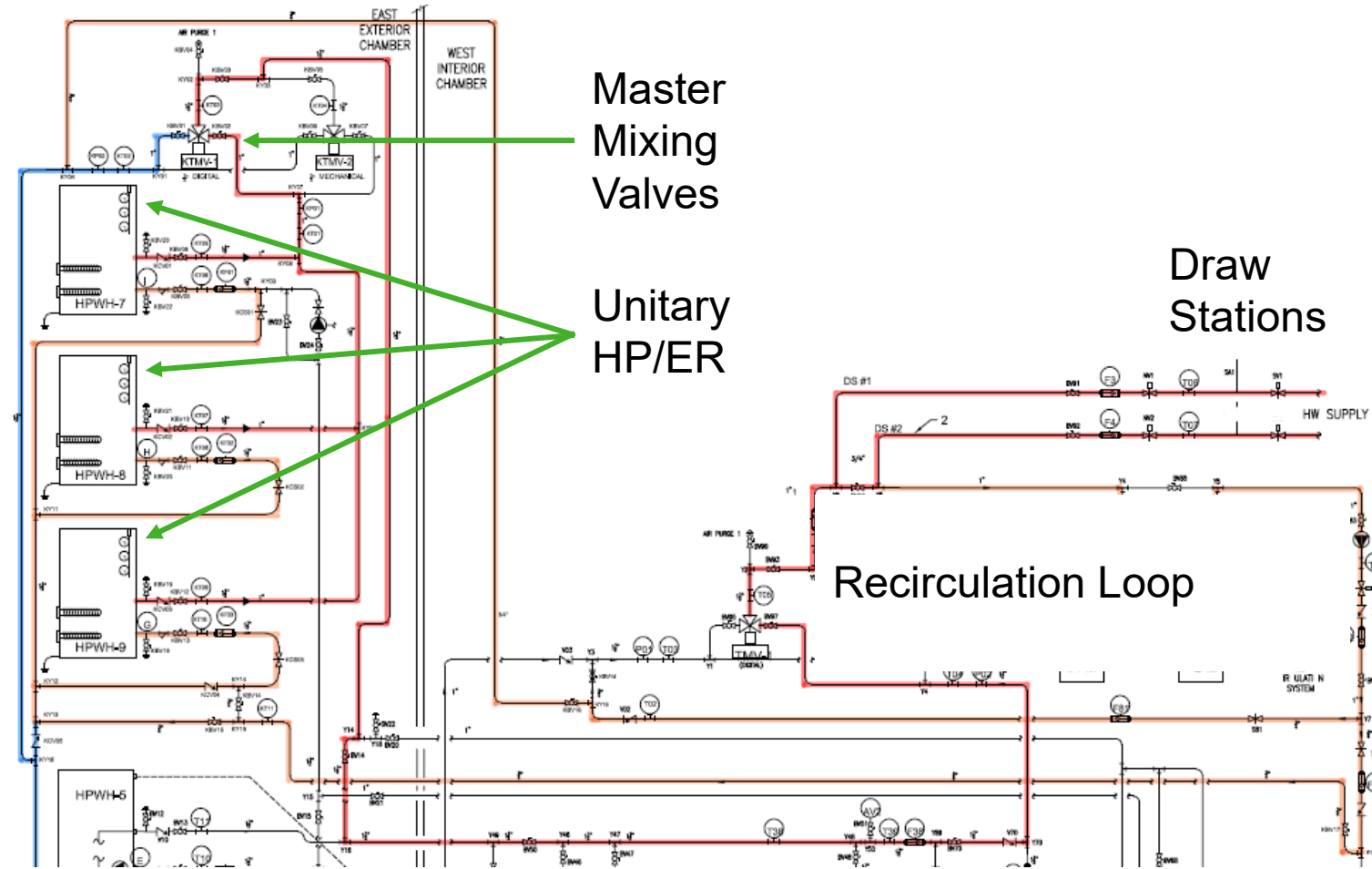


Photo Credit: ATS

- Can HPs meet the hot water load, if so which HPs and system designs?
- How much energy do they consume, what is the system efficiency?
- There are so many types, how are they sized?
- How much space do they take up?
- Why is Lab Testing Important?
 - It offers a location where steady-state repeatable testing can be conducted where environmental conditions can be kept constant
 - Ambient air temperature and relative humidity
 - Inlet cold supply water temperature
 - And test conditions can be kept constant
 - Hot water use
 - Hot water outlet temperature and return temperature
 - Pipe heat loss rate
 - Recirc pump flow rate



- Ability to vary distribution system designs
 - No recirculation
 - With recirc loop heat loss rate controlled to mimic distribution system sizes ranging from cafes to full-service restaurants
- Ability to vary HP and storage tank setups
 - Series and parallel storage tank setup
 - Unitary and split HP test configuration with single pass or multi-pass heating
 - Single or multiple units
 - With temperature maintenance tank or return to primary configurations
- Various conditions can be tested, data gathered, and results compared



Phase I Testing : Unitary HPs

In facilities with small hot water loads, there is a regulatory path to use light-commercial integrated HP/electric resistance heaters (10.3kW at 208V) that meet health dept. electrical input power requirements of nominally 8 kW.



Unitary HPs are best suited for systems without continuous recirculation.

Review of new construction plumbing drawings shows more systems with recirculation and pump controls



Photo Credit: A.O. Smith

Thank You

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