

Revising the Hot Water Energy Calculations in Title 24

**Hot Water Forum
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What is Title 24

- Title 24 of California Code of Regulations, Part 6 - California Energy Code
- Energy conservation standards for all residential and non-residential buildings throughout California
- Since 1978, updated every three years by the California Energy Commission
- Requires building permit applicants submit energy efficiency compliance documentation with permit

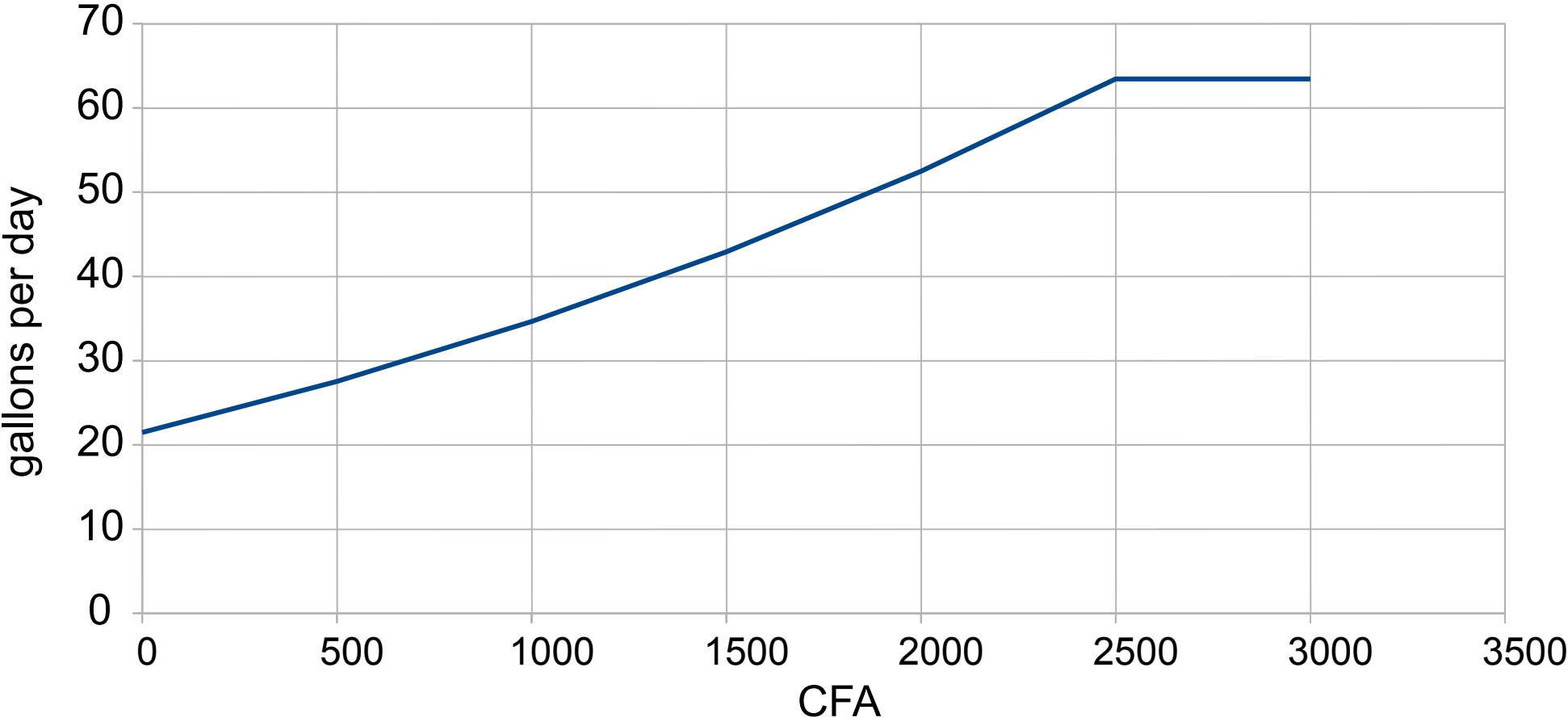
Performance Compliance

- Calculations to show proposed design uses less energy than it would if it met the Prescriptive requirements.
- Uses state-certified, free, open source energy modeling software: CBECC-Res
 - Simulation as a rating tool, not a forecasting tool
 - Time Dependent Valuation (TDV) – different "price" of electricity every hour of year based on PUC cost model
 - Typical Meteorological Year (TMY) – 16 weather files for state

Revision Goals

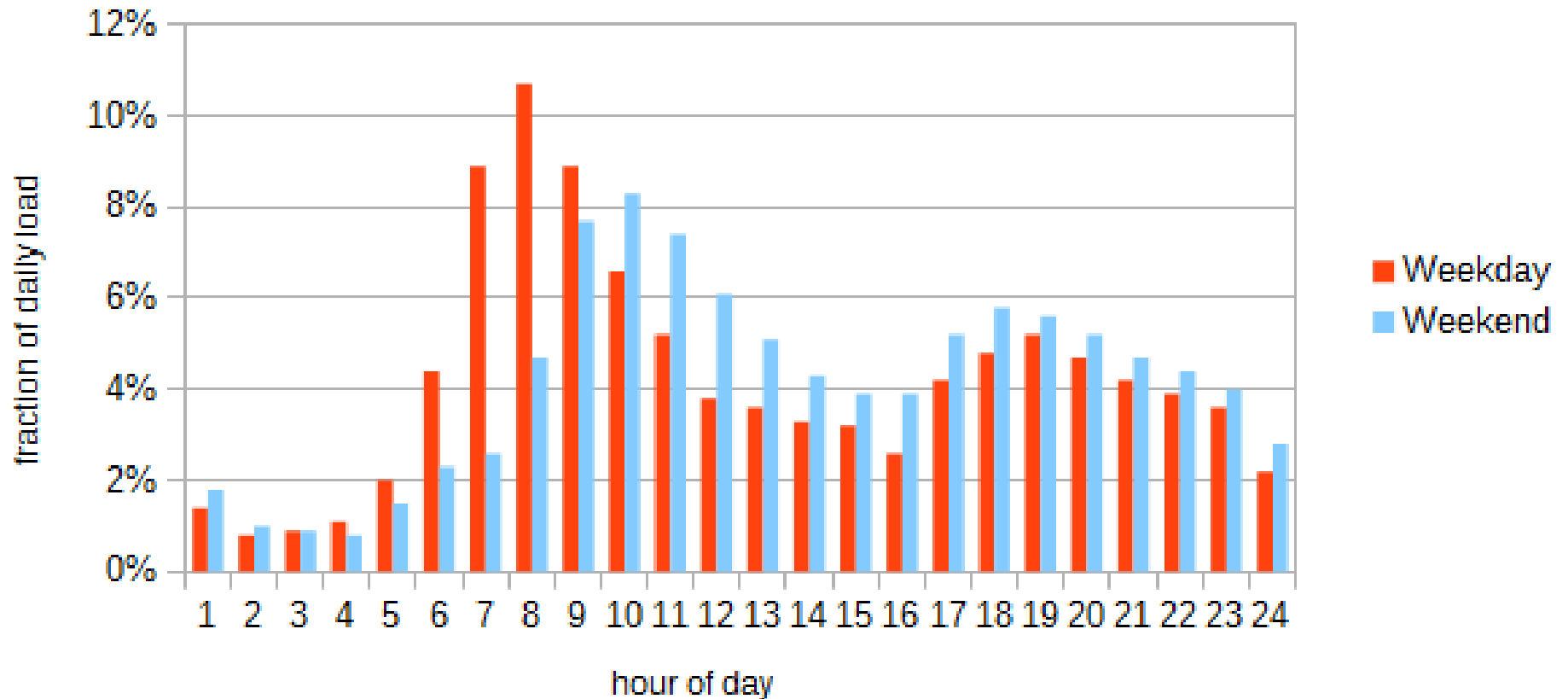
- Improve efficiency calculations particularly for Heat Pump Water Heaters (HPWH)
 - High efficiency electric water heating is of interest for meeting the State Zero Net Energy goal for the 2019 Standards.
 - Current Energy Factor (EF) based model is inadequate for TDV
 - Model the interaction of the HPWH and the building
 - Include new technologies: Drain Water Heat Recovery
- Update the DHW loads model
 - Improve time of DHW electricity use for TDV
 - Diverse rather than average loads,
 - Include peaks that cause HPWH backup

Current Title 24 Hot Water: Average Daily Hot Water Load



Does not depend on number of people or inlet water temperature or water efficiency.
Capped at 2500 square feet floor area.

Current Title 24 Hot Water: Hourly Water Heating Schedules

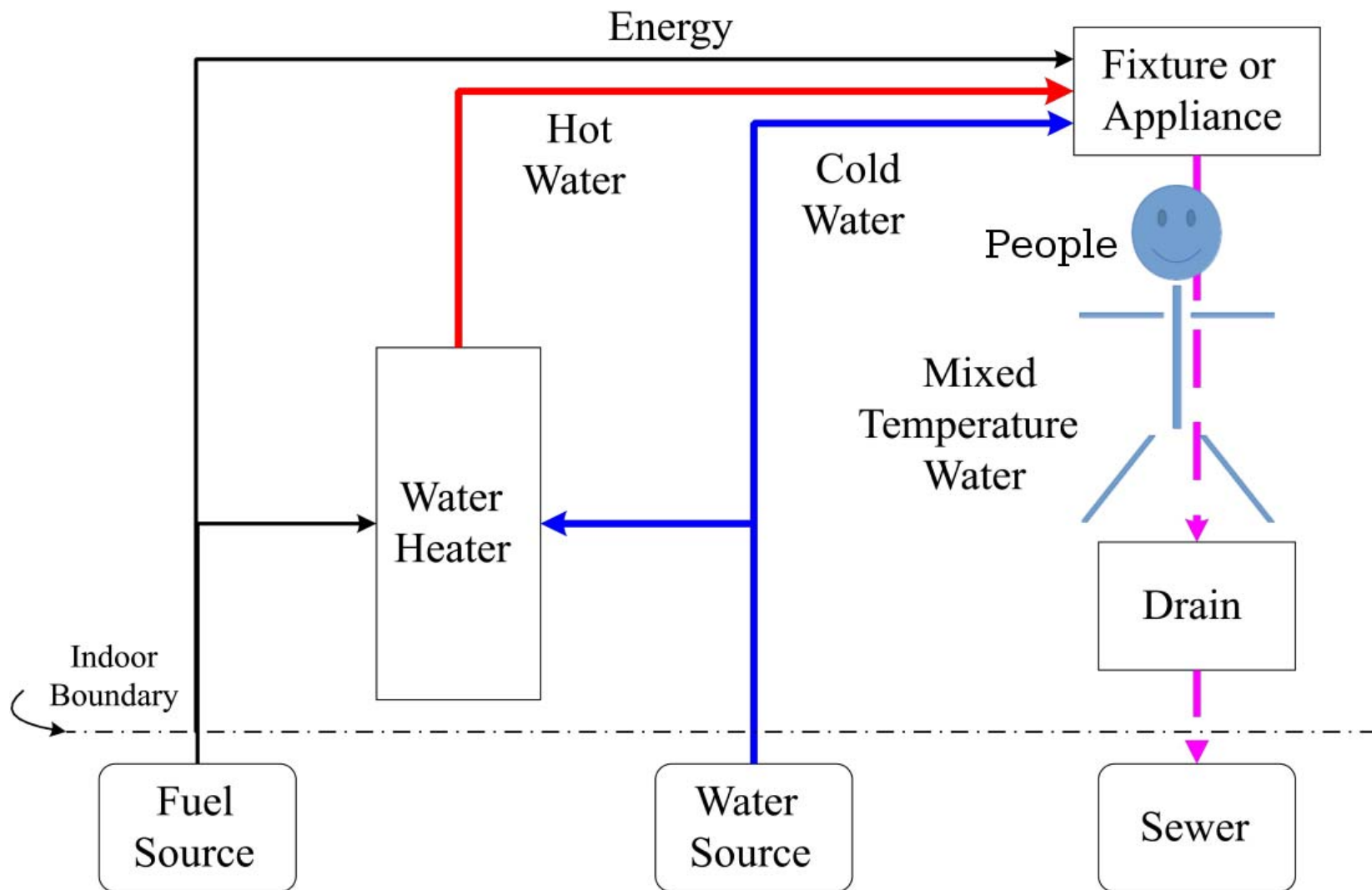


Not how hot water is used in individual buildings.

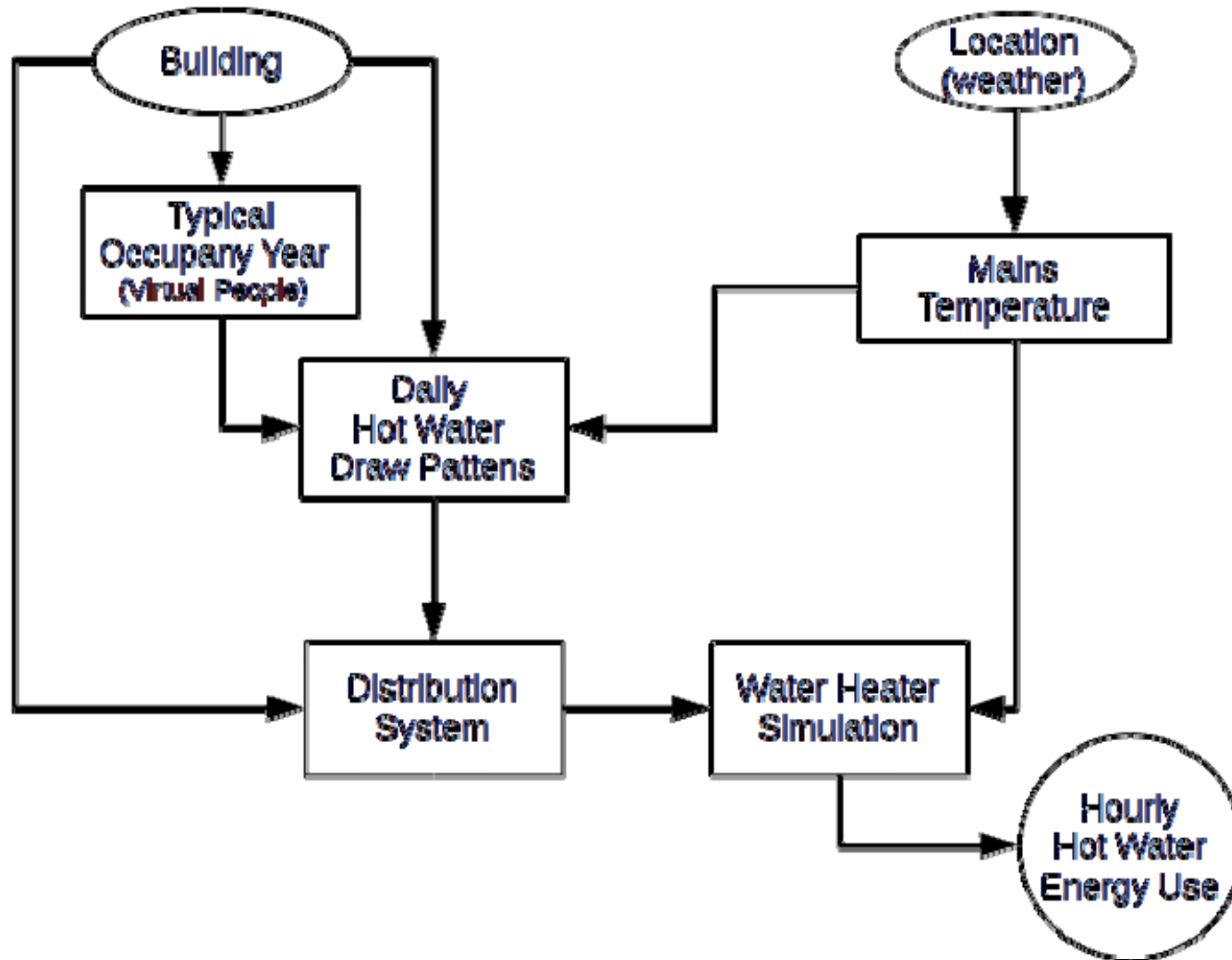
No hours without hot water use.

Will not trigger backup resistance on HPWHs

Schematic of Residential Domestic Hot Water System



Proposed Hot Water Energy Calculations



Data Sources About People and Houses

The image shows three overlapping document covers. The central document is the '2009 CALIFORNIA RESIDENTIAL APPLIANCE SATURATION STUDY Executive Summary', prepared for the California Energy Commission by KEMA, Inc. in October 2010. To its left is the 'Residential Energy Survey (RECS) 2009 Technical Summary' from the U.S. Energy Information Administration, dated January 2013. To its right is the 'Codebook for the American Housing Survey Public Use File: 1997 and later', dated March 2015, published by the U.S. Department of Housing and Urban Development & Research.