



Energy



Transportation



Buildings



Industrial



Agriculture



Sequestration

High-Efficiency Hot Water Systems in Restaurants

Client: California Energy Commission Building Natural Gas Technology program
2014–2018

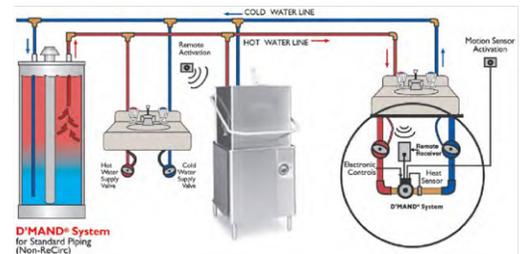
Food service facilities are the largest energy users in the commercial building sector, consuming as much as five times more energy per square foot than any other type of commercial building type, and hot water systems are a major use of energy.

Frontier Energy monitored two hot water systems; one at a restaurant and the other at an elementary school. After establishing the baseline, we changed dish machines, water heaters, and hot water distribution methods and monitored again. Complete replacement demonstrated extraordinary savings: water use cut by 40% and natural gas use decreased by as much as 70%.

We then teamed with researchers at the PG&E Applied Technologies Services Hot Water System Laboratory to quantify savings from individual hot water system components. Savings were substantial.

California has more than 100,000 commercial foodservice facilities that include restaurants, conference centers, schools, hospitals, and office buildings. If all 100,000 upgraded to efficient hot water systems it could yield an annual savings of 11.5 Million HCF of water, 219 million therms of natural gas, an excess use of 52,500 MWh of electricity (potentially mitigated with on-site generation) and operating cost savings of \$360 million.

These findings are applicable to commercial and industrial buildings, and potentially to multifamily properties. Study results could be used to shape building efficiency policies, expand incentives, and move designers toward a new model for efficiency hot water systems. See our Water Heating Design Guide on www.caenergywise.com.



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FRONTIER ENERGY:

- Identified foodservice facilities to participate in the evaluation and monitored water and energy use from existing and replaced systems
- Conducted laboratory testing of more than 70 configurations of hot water systems to identify optimal configurations of water heaters and circulation strategies
- Conducted laboratory testing of dish machines to identify technologies like exhaust-air heat recovery that reduce energy demand of heating water
- Developed a design tool and cost calculator to help plumbing engineers and kitchen designers compare the performance, efficiency, installed cost, and operating cost of conventional systems to modern systems with and without the efficiency upgrades
- Wrote a detailed report that will soon be available at www.fishnick.com/cecwater/