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Savings and Showers: It's all in the Head

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Savings and Showers: It's All in the Head

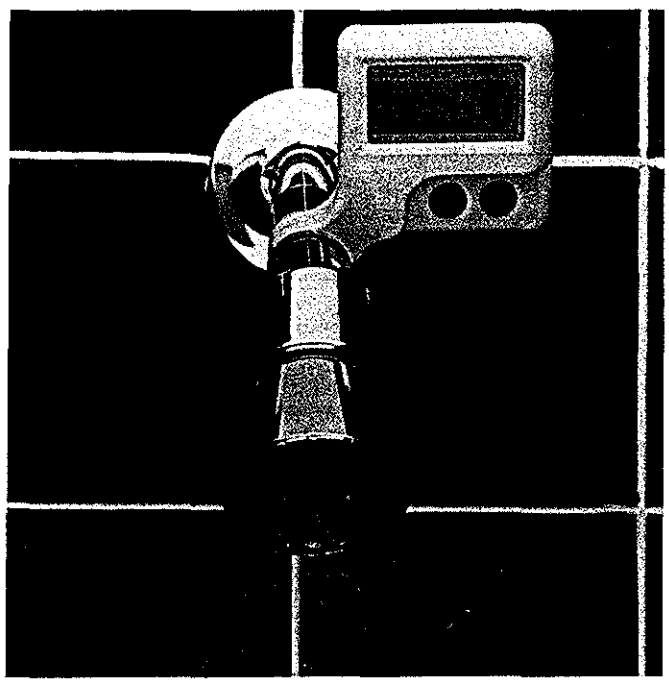
How much energy do low-flow showerheads actually save? To answer this question, Proctor Engineering Group (PEG) and Pacific Gas and Electric Company (PG&E) metered 243 showerheads as part of a larger evaluation of PG&E's low-flow showerhead rebate program. The study involved a customer survey, at least eight single-point measurements, and long-term metering of each showerhead.

We used two types of devices to measure the amount of water flowing through the showerheads. The first (a Muir Products Water Tracker™) recorded the total gallons used. The second meter (a Pacific Science and Technology Flow Logger) registered the amount of time water flowed out of the showerhead. In order to determine the shower flow in gallons per minute, we used a Micro-Weir flow measurement device (see "Soggy Notes [or Birth of The Micro Weir]" *HE* July/Aug '91, p.27) on both full flow and throttled flow, which was adjusted by the customers from outside their showers.

We studied two types of showerheads: 156 low-flow units bought with the PG&E rebate, and 87 traditional "high-flow" showerheads that flowed in excess of 2.5 gallons per minute at full flow. In addition, new low-flow showerheads were installed in the "high-flow" residences after the first metering period and the results were metered.

As we expected, there was a substantial usage difference between the traditional showerheads and the low-flow showerheads. Based on the Water Tracker, the daily use per low-flow showerhead was 6.6 gallons less than for the high-flow showerheads (20.3 gallons for non-rebated to 13.6 for rebated). The original program estimate for "high-flow" daily use had been 31 gallons.

Based on an annual average supply-water temperature (63°F), the average temperature of water used in the shower (104°F), water density (8.3), average water heater recovery efficiency (.77 gas and .98 electric), and average home occupancy (351 days per year), it was possible to calculate the therms (gas) and kWh (electricity) saved by the installation of the energy-efficient showerheads. PG&E and PEG found that when it replaced a high-flow showerhead, each low-flow showerhead saved an average of 10.3 therms or 237 kWh of energy per year.



Courtesy of Muir Products

This WaterTracker™ water meter, which measures the number of gallons of water used per shower, and another device which registered the duration of water flow helped researchers to determine the relative efficiency of several showerheads.

People Don't Shower as Long as They Think They Do

While the above-mentioned savings make for a cost-effective investment, they don't live up to original estimates. Energy savings for both gas and electricity were about half of what had been expected (10.3 therms actual gas savings compared to 22.8 therms predicted, and 237 kWh electric savings, compared to 524 kWh predicted).

This discrepancy comes largely from the difference between occupants' self-recorded water habits (the basis for many predictions of water and energy savings) and their actual habits as measured by the meters. In essence, people don't spend as much time in the shower as they think they do, and when they are in the shower, the shower is adjusted to a lower flow than they created for PEG's technicians.

Initial utility predictions for water and energy savings were based on algorithms developed in the 1980s, when studies projected extensive savings on the basis of participating households self-reported shower use. More recent studies have used Micro-Weirs and advanced measuring devices to calculate savings (see "Everything I Know about Energy-Efficient Showerheads I Learned in the Field," *HE* Jan/Feb '94, p.39).

The discrepancy between self-reported use and metered use was illustrated in our study. Rebate participants reported the shower to be in use for an average of 16.9 minutes per showerhead per day, but the elapsed-time meters we used showed those showers to be in use for 10.1 minutes per day. That's a discrepancy of about 40%. Non-participants reported an average of 19.5 showerhead minutes per day. Measurements showed them to actually use their showers for 10.9 minutes per day. That's a discrepancy of about 44%.

Summing it up, low-flow showerheads save less water and energy than is sometimes assumed, but they are still one of the most lucrative conservation measure available, as long as they are used to replace high-flow showerheads.

—John Proctor, Bill Gavelis, and Bill Miller

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