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Nearly every home has a water heater, but people tend not to think about it until the shock of a cold shower signals its failure. To regulators, though, the ubiquitous household appliance is increasingly top of mind for the role it could play in reducing greenhouse gas emissions and weaning the power grid from fossil fuels

High-tech electric water heaters can double as thermal batteries, storing excess production from wind and solar generators. In California, officials aim to install them in place of millions of gas water heaters throughout the state.

That would reduce the need to fire up polluting fossil fuel power plants to supply electricity for water heating after the sun sets.

“Water heaters have significant potential,” says Commissioner Clifford Rechtschaffen of the California Public Utilities Commission. “We know we’ll need a tremendous amount of storage to get to our decarbonization goals. We’re challenged now in evenings when renewable energy production declines and demand peaks.”

The focus is on heat pump water heaters, which transfer warmth from the atmosphere to a tank. They’re up to four times as efficient as conventional gas or electric water heaters. Nationwide, about half of water heaters are powered by natural gas. In California, water heating is one of the biggest consumers of fossil fuels and gas water heaters account for 90% of the market. Swapping them for heat pump versions could reduce greenhouse gas emissions from water heating in the state by as much as 77%, according to a paper published in January by the nonprofit New Buildings Institute.

Here’s how using heat pump water heaters for energy storage works: When renewable energy production peaks in the afternoon, a signal is sent that activates heat pump water heaters. After heating water, the devices shut down and store the hot water for use in the evening when demand spikes. That puts to use excess renewable energy generated during the day that would otherwise be wasted. Grid operators could also charge these thermal batteries as needed to balance supply and demand or before a planned power outage due to wildfire threats or in anticipation of extreme weather that could trigger blackouts. It’s estimated that heat pump water heaters could store hot water for 12 hours or more, depending on the size of the tank.

Water heaters typically have lifespans of 12 to 15 years and about 800,000 of them fail annually in California, according to Pierre Delforge, a senior scientist at environmental group Natural Resources Defense Council in San Francisco. He says replacing them with programmable, WiFi-enabled heat pump devices would create a network of thermal batteries that could be charged with renewable energy as needed. “We’ll have millions of batteries that are useful to the grid and that will make it cleaner,” Delforge says.

A 2018 paper he co-authored for the nonprofit American Council for an Energy-Efficient Economy modeled the potential impact of using heat pump water heaters for energy storage. The study found such a network would lower utility bills, boost renewable energy consumption, and strengthen the reliability of the power grid.