

# A Remodeler's Guide



# Conserving Water in Homes



U.S. Department of Housing and Urban Development  
Office of Policy Development and Research





Just as interest in energy conservation during the 1970s and '80s created lots of opportunities for the remodeling industry, water conservation improvements will provide significant opportunities over the coming years and decades.

The purpose of this pamphlet is

## Multiple Benefits from Saving Water

In talking with clients about measures that can reduce their water use, it's important to address the whole range of benefits that result from water savings.

- Reducing water consumption in homes offers the obvious benefits to homeowners of spending less money on water and sewage treatment. While these costs are currently fairly low in most of the U.S., some experts expect significant increases in the cost of water and sewer over the coming decades.
- Using less hot water also significantly reduces energy consumption for heating water—which is usually the second-largest energy cost in homes.
- For homeowners who rely on well water and on-site wastewater treatment, reductions in water use save energy needed for pumping water—quite a bit of energy for very deep wells. Reducing wastewater generation also increases the life of septic systems.
- Some of the water conservation strategies addressed here improve convenience or comfort for homeowners—for example, getting hot water to a bathroom or kitchen sink more quickly or reducing noise from dishwashers.
- Finally, saving water offers societal benefits. In some parts of the country, reducing water use protects underground aquifers from depletion, or reduces pressure on limited river resources. Reducing flows to sewage treatment plants reduces energy and chemical use at those facilities—which consume a significant three percent of the nation's electricity.

- To raise your awareness about water conservation in general;
- To help you convey to clients the importance of water conservation and water efficiency as a priority in kitchen, bathroom and other remodeling projects;
- To describe specific water conservation measures that can be integrated into your work;
- To address how an emphasis on water conservation and efficiency can benefit your business—by differentiating you from the competition and by offering additional value-added products and services to your clients; and
- To direct you to additional resources on water conservation in single-family homes.

## Why Water Conservation is Important

Water is something we take for granted. It's always there—a few steps away at our kitchen sink, cleansing us in the shower, and eliminating waste from our toilets. Throughout most of the U.S., we can draw from the tap a clean, safe glass of water to quench our thirst, and we think little of using sprinklers to keep our lawns a bright, refreshing green even in the most arid climates.

Indeed, most of us think of water as an unlimited resource—after all, it falls from the sky!

But water is not unlimited. In reality, we are using the same molecules of water that our ancestors used hundreds of years ago and that existed on earth millions of years before that. A finite quantity of water is cycled endlessly in the earth's hydrologic cycle—from clouds to sea to sky, and into and out of living organisms.

The demand on water supplies in the U.S. is increasing. Population growth and a shift to drier parts of the country is putting pressure on the aquifers, rivers and lakes we draw from. Global climate change, according to scientists, will significantly increase the incidence of drought in some regions.

Even in many cities where rainfall is plentiful—places like Boston, Atlanta, and Seattle—supplies are becoming increasingly tight, and restrictions on water use are increasingly common.

The bottom line is that water is likely to be in the news in the U.S. and elsewhere in the world as it never has before. Serious

shortages in some areas will force us to use this precious resource far more judiciously.

## Opportunities with Water Conservation

Water conservation strategies that relate most directly to remodeling contractors are briefly covered below. Most of these strategies come into play primarily with kitchen or bathroom remodeling, though there may be opportunities to implement some water conservation improvements with other remodeling work around a home.

### Replace Older Toilets

Whenever a bathroom is being remodeled, replacing older toilets with new, water-efficient models should be a high priority. Toilets are the single largest water use in most homes, and newer models use far less water than older models.

Replacing pre-1980 toilets that use 5.0 gallons per flush (gpf) with a new models using 1.6 gpf will save over 16,000 gallons per year in a typical home. With even older toilets (from the 1950s and '60s) that use up to 7 gpf, the annual savings can be greater.



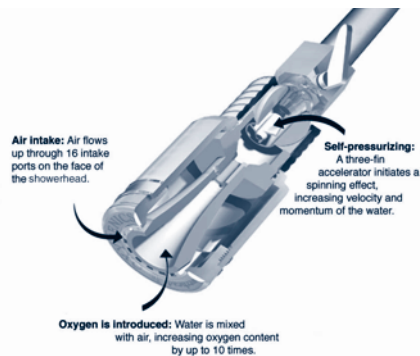
Source: Sloan Valve Company

While most toilets today use 1.6 gpf, there are some excellent toilets on the market that use less than 1.6 gallons. Pressure-assist toilets using just 1.0 gpf are available. Dual-flush models are also becoming increasingly common; these provide a choice of flush volume depending on whether liquid or solid waste needs to be flushed.

For more information, see the HUD Water Conservation fact sheet *Toilet Replacement*. [[link](#)]

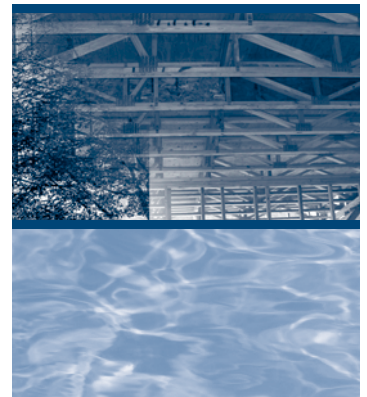
### Replace Showerheads

While a fairly minor component of a bathroom remodeling project, don't ignore the importance of quality showerheads. A high-quality, water-conserving showerhead not only reduces water use in a home, but it can provide a more satisfying shower (see "Not All Showerheads are Created Equal" below).



Source: Energy Technology Laboratories

Showering uses more water in American homes than anything except flushing toilets and washing clothes—about 11,000 gallons per year. While showerheads sold since 1994 can use no more than 2.5 gallons per minute (gpm), older showerheads use up to 8.0 gpm. Even if a new shower is not being installed as part of a bathroom remodeling job, older showerheads should be replaced. Replacing



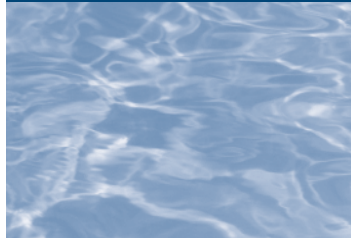
### Watch Out for Poor Performers!

Be aware that there are huge differences in how well new toilets work. Some models—especially the least expensive models—perform poorly and may require multiple flushing. But lots of models perform very well. There are now some good third-party reports on measured toilet performance.

Look for toilets that perform well (see the fact sheet referenced below). Some of the best models rely on a larger-than-average flush valve, or pressure-assist flush mechanisms.

### Not All Showerheads are Created Equal

Be aware that not all 2.5 gpm showerheads provide equal performance. Some new models perform very poorly, giving a bad name to water conservation. Some products that achieve the highest satisfaction rely on high-tech designs to aerate the spray and boost the effective pressure. Some of these products are highly satisfactory even with flow rates of 2.0 or 1.5 gpm. Use only high-quality products.



## How Much Can Better Faucets Save?

Replacing or upgrading older faucets in a home can save 6,500 to more than 18,000 gallons each year. The biggest savings to homeowners, though, usually isn't water—it's energy. With an electric water heater, modifying a pre-1980 faucet to reduce water consumption to 1.5 gpm can save over 1,000 kilowatt-hours per year. That's considerably more energy than a new refrigerator uses!

pre-1980 showerheads throughout an average home will save about 14,000 gallons per year.

Because most of the water used in a shower is hot water, low-flow showerheads also save homeowners energy. In fact, replacing an older showerhead with a new, water-conserving model generally provides homeowners with a payback of just a few months in energy savings. That's a good investment by anybody's standards!

For more information on showerheads and showerhead replacement, read the HUD Water Conservation Fact Sheet *Install Quality Water-Saving Showerheads*. [\[link\]](#)

## Upgrade Kitchen and Bathroom Faucets

With any kitchen or bathroom remodel, replace faucets or make sure water-conserving faucet aerators are in place. In an average American home, faucets are the fourth-largest user of water, representing 16% of all indoor water use.

Faucets sold today use no more than 2.5 gallons per minute (gpm). But many older faucets use a lot more—as much as 7.0 gpm. With replacement faucets and faucet aerators, it generally makes sense to install 2.5 gpm products in kitchens, but lower flow rates—as low as 1.5 or 1.0 gpm—are

often acceptable in bathrooms.



Source: Niagra Conservation Corp.

An amenity that is becoming popular in kitchens is a foot-control or knee-control for the kitchen faucet. This allows homeowners to set the desired temperature mix and flow rate, then turn the water on and off with their foot or knee—leaving their hands free for whatever the task is. While a very nice convenience feature, this can also save a lot of water—because homeowners will be less likely to leave the water running while preparing food or washing dishes.



Source: Niagra Conservation Corp.

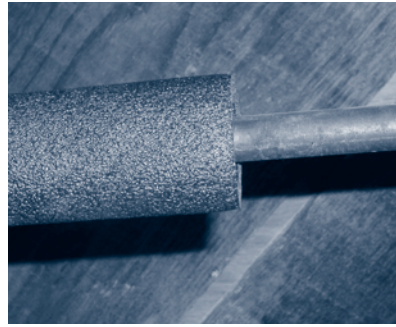
For more information on upgrading faucets, read the HUD Water Conservation fact sheet *Upgrade Faucets for Water Savings*. [\[link\]](#)

## Insulate Water Pipes

Insulating water pipes might not seem like a water conservation strategy, but it can be. The best time to insulate pipes is during major kitchen or bathroom remodeling—when walls are likely to be opened up and pipes exposed.

Insulating hot water pipes will both save water and improve convenience for homeowners. Here's how: When hot-water pipes are insulated, the water in those pipes will cool more slowly after hot water is drawn from the tap. If the homeowners next need hot water within an hour or so, they are less likely to have to wait for hot water to reach the tap. Waiting for hot water in our homes wastes a huge amount of water—as much as 9,000 gallons per year in an average home. The further the distance from the water heater to a kitchen or bathroom, the more important pipe insulation is.

Insulating pipes can also have other benefits. Any time you use less hot water, you save energy. And because insulated hot-water pipes lose less heat, hotter water reaches the tap—so homeowners can maintain their water heaters a few degrees cooler (thus saving energy).



Source: D&R International

Even insulating cold-water pipes can be beneficial—at least in humid climates. During the summer, condensation commonly forms on cold-water pipes (sweating). Water dripping off pipes can damage materials in the home or cause mold and mildew, which can cause serious health problems. By insulating the pipes, condensation is prevented—and cooler water will be delivered to the tap.

More information on when and how to insulate water pipes is provided in the HUD Water Conservation fact sheet *Insulate Water Pipes*. [link]

### Install an On-Demand Hot Water Recirculation System

There is another strategy for eliminating waste and reducing the wait time for hot water at locations distant from the water heater: installing an on-demand hot water recirculation system. Few homeowners will be familiar with this system, but it can be a very nice addition to a kitchen or bathroom remodeling project.

Don't confuse this with a continuous-circulation system. With the latter, a pump circulates hot water in a loop throughout the house all the time—as is commonly done in hotels and office buildings. These continuous-recirculation systems, which are becoming more common in homes, save water because homeowners don't have to wait for hot water, but they waste tremendous amounts of energy by radiating heat to their surroundings all the time.



Source: Taco, Inc.

With an on-demand hot water recirculation system, the user pushes a button in the bathroom or kitchen and a small pump, usually installed under the sink, delivers hot water to that location very quickly—usually within 15 to 30 seconds. Water that had been sitting in the hot-water pipe is circulated back to the water heater instead of being dumped down the drain. As soon as hot water reaches the point of use, a temperature sensor automatically turns the pump off.

Two manufacturers currently produce code-listed, on-demand hot water recirculation systems. For more information, get a copy of the HUD Water Conservation fact sheet *Install On-Demand Hot Water Recirculation System*. [link]

### Replace Dishwasher with a Water-Efficient Model

If a kitchen remodeling project will include replacement of the dishwasher, select a water-efficient model. Dishwashers use a relatively small amount of water, but this



### Why the Problem is Getting Worse

The wait time for hot water in new homes has increased significantly in recent decades due to three trends:

- Houses are getting bigger and more spread-out, so the distance between the water heater and end-uses has increased;
- The flow rate of most faucets and showerheads has dropped as water conservation standards have kicked in; and
- Building codes are requiring the installation of larger-diameter piping.



is a fairly easy way to make a moderate difference in a home's water budget.

Most older dishwashers consume about 14 gallons of water per load, while today's models typically use about half as much. A "fuzzy logic" control on some dishwashers senses the degree of soiling on dishes and regulates the cycle time and water use accordingly—thus saving water and energy.

In selecting a dishwasher for a homeowner, also consider how quiet the operation is and various convenience features. Refer to the yellow ENERGYGUIDE labels to compare the energy performance of different models, and look for ENERGY STAR-listed models. Standard dishwashers start at \$200 to \$300, with top-rated, quiet, ENERGY STAR models usually starting around \$500.

For more on selecting a new dishwasher, see the HUD Water Conservation fact sheet *Replace Dishwasher*. [link]

### Replace Clothes Washer and Dryer with Efficient Models

If remodeling work involves modifications to a laundry room, suggest to the homeowners that this might be a good opportunity to upgrade the washer/dryer—and offer to help them select suitable replacements.

Clothes washers have improved dramatically in recent years, with newer models offering better washing performance even while using significantly less water and energy.

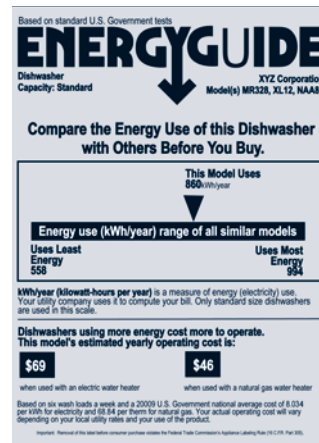
Clothes washing is the second-largest use of water in the typical American home—after toilet flushing—with a typical household use of 14,000 gallons per year. Many older top-loading clothes washers use 50 gallons or more per load, while a state-of-the-art ENERGY STAR model uses about 27 gallons. While water consumption of clothes washers isn't regulated, energy consumption is, and the two are closely tied (because 80-90% of the energy use is associated with heating water).



Vertical-Axis Clothes Washer

Horizontal-Axis Clothes Washer

Source: Vertical-axis, D&R International, Ltd., Horizontal-axis, Sears



Source: Federal Trade Commission

## Saving Water with a Dishwasher Also Saves Energy

Approximately 80 percent of the energy consumption of dishwashers is expended heating water (both by the water heater and through a booster heater in the dishwasher), so any dishwasher that uses less water also uses less energy. Features such as "no heat dry" can also reduce energy by avoiding use of the electric-resistance heating elements.

as the drum rotates. Vertical-axis (top-loading) machines generally require a lot more water, because the drum is upright and has to be nearly full of water to ensure that the clothes stay wet. Most horizontal-axis washers also spin much faster, which removes more moisture so the dryer doesn't have to work as hard.

All horizontal-axis and some advanced vertical-axis washing machines achieve ENERGY STAR performance—the threshold for which also rose on January 1, 2004.



Source: Whirlpool Corporation

New resource-efficient clothes washers are expensive—a minimum of about \$500 with some more than \$1,500, but the water and energy savings are so significant that replacement of an older machine is generally a good investment with payback in several years or less.

For more on clothes washers, see the HUD Water Conservation fact sheet *Replace Clothes Washer/Dryer*. [[link](#)]

### Saving Water With a Spa

If the installation of a spa (hot tub) is part of remodeling work, there are some key priorities for ensuring that water consumption will not be too great.

While only about 5 percent of homes have spas, the water consumption associated with these amenities is very significant. That water consumption results from evaporation, leaks, splashing, unnecessary refilling, and automatic filter cleaning.

The most significant water loss from spas is due to evaporation. The higher the temperature of a spa, the greater the rate of evaporation. The best strategy for reducing evaporation is to install a tight-fitting, insulated cover. Most manufactured spas come with insulated covers; if you are designing and building a custom spa, be sure to factor in the cost of making a quality cover.



Source: US Dept. of Energy

How a spa is maintained also has a large effect on its water consumption. If inadequate filtration means that the spa has to be regularly emptied and refilled, water use can be dramatic. With proper cleaning and maintenance, a spa should not have to be emptied more frequently than every three months. Make sure any spa you install includes the proper filtration equipment and be sure that the homeowners fully understand its operation.

Other tips and strategies for saving water with spas (or swimming pools) are covered in the HUD Water Conservation fact sheet *Conserve Water with Pools & Spas*. [[link](#)]



## About HUD and Path

The U.S. Department of Housing and Urban Development's (HUD) Partnership for Advancing Technology in Housing (PATH) is a public-private initiative that seeks to speed the creation and use of advanced technologies to radically improve the quality, durability, energy efficiency, environmental performance, and affordability of America's housing. PATH is a voluntary partnership in which leaders of the homebuilding, product manufacturing, insurance, and financial industries join forces with representatives of federal agencies concerned with housing. By working together, PATH partners improve the quality and affordability of today's new and existing homes, strengthen the technology infrastructure of the United States, and help create the next generation of American housing.

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U.S. Department of Housing and Urban Development  
Partnership for Advancing Technology in Housing  
451 7th Street, SW, Room 8134  
Washington, DC 20410-0001

Web: [www.pathnet.org](http://www.pathnet.org)  
Email: [pathnet@pathnet.org](mailto:pathnet@pathnet.org)  
Phone: (800) 245-2691

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