

Smart practices in water conservation

BY BRIAN KNIGHT

Water and energy use are connected. Saving energy reduces water pollution. Conserving water reduces energy use. Coal-fired power plants consume extreme amounts of water to produce electricity. Mining and burning coal pollute our soil, streams, lakes and oceans. Natural gas extraction pollutes ground and surface water affecting people's drinking water. One excellent path for improving our environment's water quality involves spending less on heating water.



ENERGY STAR offers a 2016 review of the most efficient washing machines available. If buying new, or replacing existing, this investment is solid. Extra effort spent sourcing more efficient models has big paybacks.

Efficient Plumbing Design

- New construction offers enormous opportunity for a compact and efficient plumbing design.
- Small plumbing footprints are an extremely cost-effective strategy for saving energy and water.

Lag time is how long it takes for hot water to arrive at the faucet after turning it on. Not only is it a gigantic waste of water and energy, it is an inconvenience and wastes time. No one wants to wait for hot water. The faster that sinks and showers deliver hot water, the better.

Smarter, smaller plumbing layouts save money on material and labor costs. Less connections and fewer roof boot penetrations reduce maintenance, and increase durability by preventing bulk water damage. No. 2 on our top three ways water destroys homes and buildings.

Drain waste heat recovery

Small plumbing footprints usually offer a better opportunity for waste heat recovery. These are more of an energy-saving feature but are directly tied to water usage. They make sense when the most heavily-used showers have a waste stack in a lower level. These simple



Many water conservation measures can be "do-it-yourself."

Existing homes should consider replacing older plumbing faucets and choosing the most efficient washing machines and dishwashers.

systems dramatically improve the energy efficiency of showers, washing machines and dishwashers. Incoming cold water supply wraps the outgoing, warm waste pipe, capturing energy.

Drain waste heat recovery can have simple paybacks in the 3.5- to eight-year range for most residential systems, depending on consumption and efficiency of the water heater. These systems have no moving parts and should have long lives. This investment usually beats solar PV and easily beats geothermal. Another renewable method,

similar to waste heat recovery, is compost water heating.

Reducing Lag Time In Other Ways

Insulate Hot Water Distribution. This can reduce lag time and energy use.

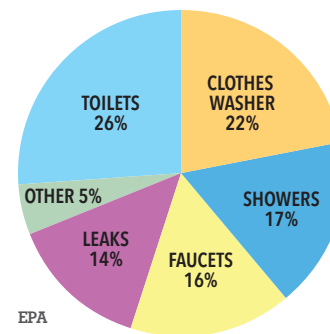
Plumbing Manifolds, Home Runs or More Efficient Distribution

Dedicated pipes of a smaller diameter run to individual fixtures. Typical trunk-and-branch layouts have larger diameters which take longer to flush with hot water from the water heater. Smaller pipes have less water to flush but need dedicated lines for enough pressure. We find it tough to make cost-effective with the extra material and labor charges. A typical trunk-and-branch system can often be designed to be nearly as effective with reduced costs.

Hot Water Recirculation

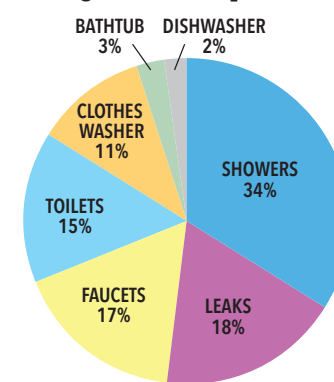
Circulating loops are more of a convenience but do save water. Most systems exist in big homes with lots of space between

Indoor Water Usage: Existing Home



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Indoor Water Usage: High-Efficiency Home



fixtures. Smaller plumbing footprints reduce or eliminate recirculating hot-water systems.

Most recirculation systems are continuously circulating, a crime to the environment and dirty energy costs. Circulating water continuously from the heater to the faucets wastes energy through the pump, water heater and air conditioner. These systems are usually in oversized houses and result in an oversized amount of waste.

More efficient systems activate

the recirculating pump just before hot water is needed. This can be done with a manual switch, timer, or motion detector. These simple controls combined with efficient pumps offer substantial energy improvements. They can also reduce maintenance needs.

This issue is heavily influenced by certain occupant behavior. Those that habitually turn water on and do other things while hot water washes down the drain could benefit more from circulation or an ad-

justment in habits. This comes from a guy who habitually takes 20 minute hot showers. At least I am enjoying the source of my waste and pollution.

Indoor Water Use: Low-Hanging Fruit

The chart on the far left represents an average, existing home. The large toilet consumption being an obvious target for gallons-per-flush restrictions. Clothes washers stand out with the water + energy concerns. It's interesting that dishwashers are nearly immeasurable compared to the biggest-volume users and should be chosen based on energy costs and cleaning performance.

Newer homes built to code begin to change this big picture

The chart on the right depicts averages for newer, more efficient homes; new toilets, high-efficiency washing machines and low-flow fixtures. Interestingly, leaks become the second biggest source of water use indoors. Leak-detection devices may be considered for homes looking to cut water use and reduce problems.

Most leakages are probably from

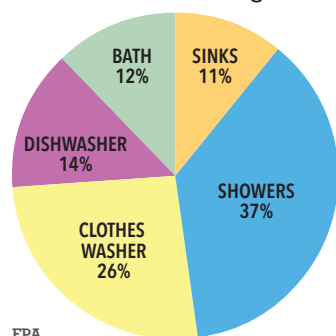
the common issues associated with a toilet's upper tank. Learning to fix these simple problems or hiring a plumber is extremely important for saving water.

These are the most cost-effective approaches to water conservation. Hot water always offers the fastest fiscal and environmental payoffs. Existing homes should consider replacing older plumbing faucets and choosing the most efficient washing machines and dishwashers. Most of a new home's hidden opportunities lie in efficient plumbing footprints and drain waste heat recovery.

For those that garden or irrigate their landscape, outdoor water usually accounts for the biggest overall consumption of water. While it's tougher to make cost-effective, rain-water catchment can be a good choice for many projects.

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Hot Water Usage



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Cost-Effectiveness Starts with Hot Water

It takes enormous amounts of energy to heat water. That energy is typically supplied by nuclear and fossil fuels. The biggest fiscal and environmental benefits start with reducing hot water usage.

Showerheads

Showerheads that use 2.5 gallons per minute still represent one of the fastest paying investments in energy and water conservation, especially when compared to older or higher flow heads.

Washing Machines

The No. 2 hot water user and most important appliance investment for energy and water con-

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