

## ▶ FEATURE

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# Graywater: Reduce, reuse, recycle

Help your customers conserve water by installing graywater recycling systems.

▶ As the global supply of freshwater continues to dwindle, people are looking for inventive ways to conserve. One such method is graywater recycling. Graywater (or greywater) recycling involves the reuse of wastewater that is generated from domestic activities such as bathing, dishwashing and laundry.

Experts estimate that graywater makes up around 50 to 80 percent of residential wastewater. Obviously, recycling that graywater can drastically reduce the amount of water a household consumes. Graywater treatment systems have become

quite common in arid regions of the world, most notably Australia, and consumers in North America are slowly picking up on the trend. So how can a water treatment dealer take advantage of this new move towards sustainability and conservation? We spoke with some industry insiders to find out.

### Basic components of a graywater recycling system

"The technologies involved in graywater treatment are not all that much different than the technologies used in potable water treatment or wastewater treatment," says Rick VanSant, president and CEO of UV Pure Technologies Inc. VanSant explains that a basic graywater recycling treatment system involves various types of filtration followed by microbiological disinfection. "The global best practice would be a multiple barrier system that would treat both the chemical properties of the water as well as the microbiological pathogenic properties," he adds.

Phil Krasnostein, technical director of Nubian Water Systems in New South Wales, Australia, describes his company's approach to graywater recycling as "classical." "There's no magic in anything we do," he says. "It's a very classical, engineered approach to water treatment."

Krasnostein explains that in Australia there are two fundamental divisions within the application of graywater: Single-dwellings (residential) and commercial buildings. A single-dwelling refers to a single house on a single block of land with a single family living there. All other buildings, including residential apartments, are considered commercial. This division is important because the regulations that govern each are quite different.

For residential applications, Krasnostein recommends screening the water



A commercial water recycling system in Sydney, Australia.  
Photo courtesy of UV Pure Technologies Inc.

first to remove solids, which in the case of graywater means lint from washing machines, hair from shower drains and so on. The water is then passed through an aerobic biofilter and disinfected with high doses of ultraviolet (UV) light. According to Krasnostein, this three-stage process very comfortably meets the requirements for graywater recycling in Australia. The treated graywater can then be reused to water gardens, flush toilets, wash clothes and for other domestic activities that do not require potable water.

In Australia, commercial graywater recycling is governed by a stricter set of regulations because the risk profile in commercial applications is much higher. "In your home, you have some degree of control over what goes into the graywater system, what it's used for and when it's used. So you have the ability to decide," Krasnostein explains. "If, for example, somebody is very ill with a nasty virus in your house, you might decide that you're going to bypass the graywater

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system until he gets better.”

People who live in multi-dwelling apartment buildings do not have the same luxury. “If the guy living in the [neighboring apartment] is ill with hepatitis, you’ve got no idea and don’t have the ability to make that decision [to bypass the graywater

system],” says Krasnostein. Therefore, the issue of cross-contamination is more serious with commercial systems and to that extent regulators require much higher levels of risk management.

To this end, Krasnostein recommends utilizing a multiple barrier approach in commercial applications.

**Graywater regulations in the U.S.**

While there is no set of federal laws governing the use of graywater in the U.S., several states have established their own graywater regulations. Arizona is often singled out for its effective set of laws governing the use of graywater. Established in 2002, Arizona’s laws allow for graywater recycling as long as the volume of water used is less than 400 gallons per day. California is another state that encourages the reuse of graywater. Lawmakers in California revised graywater laws in 2009 in response to the serious water shortages facing the state. Other states — including Washington, Oregon, New Mexico and Utah — are pushing for more permissive graywater recycling laws as well.

NSF International is currently working to establish a national standard for onsite residential and commercial reuse treatment systems: Draft NSF 350. According to the organization’s website, “The purpose of draft NSF Standard 350 is to establish minimum materials, design and construction, and performance requirements for onsite residential and commercial reuse treatment systems.”

According to Krasnostein, NSF’s approach closely follows Australia’s. NSF 350 uses the same division between residential and commercial applications and the standards are quite similar.

**Benefits of recycling**

Obviously homeowners can vastly reduce the amount of water they consume by installing a graywater treatment system, but what other benefits do these systems offer? According to VanSant, cost savings are not much of a factor in North America as water is still relatively inexpensive. “In our world in North America, water is still largely an unpriced commodity. We don’t pay very much for it,” VanSant says. “So there isn’t the cost benefit to treating graywater and then reusing it that there would be in markets where there is an expensive commodity cost associated with water, such as Australia.”

Krasnostein indicates that the major driver for residential installations of graywater recycling systems in Australia is what he calls “lifestyle maintenance.” He explains that in times of drought govern-

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mental authorities begin placing restrictions on water use. And in most instances, irrigation of lawns and gardens is their first target. "In Queensland, for example, no water whatsoever was allowed to be used externally to the home. And you were fined if an inspector found a garden hose connected to a tap outside the house," Krasnostein recalls.

When restrictions such as these began to take hold in the early 2000s, many Australians began installing graywater systems to protect their lawns and gardens. "That was the primary driver — protection of the investment in gardens and landscaping," Krasnostein says. "My classic illustration is you have friends over on Sunday afternoon for a barbecue, would you rather have it in a landscape or a sandscape? No one likes to be told what they can and cannot do."

### Other reuse technologies

While graywater recycling is an effective water conservation method, there are other technologies available that accomplish the same objective. Dale Squier, laboratory research engineer for A.J. Antunes & Co., describes a heat exchanger system that reuses leftover water from ice machines in restaurants and other light commercial settings.

In commercial ice machines, water that is leftover after the ice-making process is usually flushed down the drain. However, as Squier explains, the heat exchanger system diverts the wastewater into a reservoir that has a coil of tubing inserted into it. Freshwater is pumped through the tubing where it is pre-chilled before entering the ice machine.

"Pre-chilling speeds up the ice making process, meaning it doesn't have to spend a minute or two or three to get that water down to the 32 degree temperature where ice can start forming — it's already pre-chilled," says Squier. "And, in some cases where you got warm tap water coming in — especially Southern states or really anywhere in the summertime — the water in your pipes could be quite warm ... so now you're pre-chilling it and can make ice faster." And, because you're making ice quicker, you can also save electricity as the ice machine is not running as long to make

the next batch of ice, Squier adds.

As climate patterns continue to shift across the globe, there's no doubt that water supply shortages in North America will only become more prevalent. Therefore, Americans would be wise to look to countries like Australia for ways to deal with water crises.

In VanSant's view, graywater recycling could be a major part of the solution. "Without question [water] will one day become the most expensive and scarcest commodity on the face of the globe; and reuse and graywater treatment will become a key factor in the distribution of water," he concludes. **WT**

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