

## Roof Rainwater-Harvesting Questions Answered

By Anne K. Goedken

Best Practices  
in  
Sustainability

Previous generations collected water in barrels and used the contents for watering gardens and plants. Today, water is being harvested and reused on a much larger scale to save money, earn LEED points, and tell a story about sustainability in action.

### How does it work?

Just as it does in any building, the roof serves as the collection point for rainwater. A roof washer is installed to remove dirt, leaves, and debris from the roof periodically, ensuring clean water. Gutters or downspouts still carry the water away, but instead of depositing water to the ground, the gutters carry the rainwater to a storage tank. "All we're really doing is taking [the roof] system (which is in place and designed into every building), intercepting the run-off, and diverting it to a storage tank," explains Jerry Yudelson, sustainability director at Interface Engineering Inc. in Portland, OR. Yudelson is the author of *Developing Green: Strategies for Success*, a primer on green marketing for developers.

The storage tanks are typically located underground in parking garages or basements and made of epoxy steel, fiber glass, precast concrete, polyethylene, or poured-in-place concrete. Tank size is based on a mathematical equation, keeping this guideline in mind: For every inch of annual rainfall, it's possible to collect 600 gallons of water per 1,000 square feet of roof area. The delivery and treatment system requires installation of a dual-plumbing system, typically making roof rainwater harvest-

ing a project best suited for new construction. Filtering and ultraviolet treatment of the rainwater are also needed to produce the safest water possible.

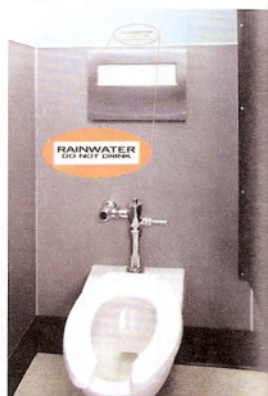
### What is it used for?

The primary application for rainwater is usually toilet flushing, but according to Yudelson, it varies depending on the location and type of building. Because of the ratio of roof area to restrooms, low- to mid-rise commercial buildings are the best candidates for a roof rainwater system. Irrigation would be a more suitable use for rainwater collected on a warehouse-type of building, which would have a large surface area and few toilets to flush. In high-rise buildings, rainwater can also be used for required fire-suppression storage by simply upsizing the tank, incurring minimal extra costs.

Although it's difficult to say how much water can be saved by reusing rainwater, up to 80 percent of rainfall can be collected and used in a building. "You're just not going to get it all," Yudelson emphasizes. Total collection is impossible due to negligible rainfall when the water pools and evaporates on the roof or when overflow occurs during heavy rain.

### Where does it work?

"The very first thing you try to do as you integrate a building design is [ask], 'What's nature going to give me for free?'" Yudelson explains. "The Northwest is an ideal climate for rainwater collection because it comes in fairly regularly and fairly gently." However, many other areas of the country also receive enough rainwater to make harvesting it an option. According to ([www.weather.com](http://www.weather.com)), Orlando, FL, receives an average of 48 inches of rain per year; 37 inches of precipitation falls yearly in Dallas. Northerly cities like Chicago (38 inches per year) and New York City (46 inches per year) receive enough rainfall to make a harvesting system possible, but frozen precipitation needs to be taken into account. In extremely dry climates, such as Phoenix, where rainfall is less than 10 inches per year, rainwater harvesting is not as practical.

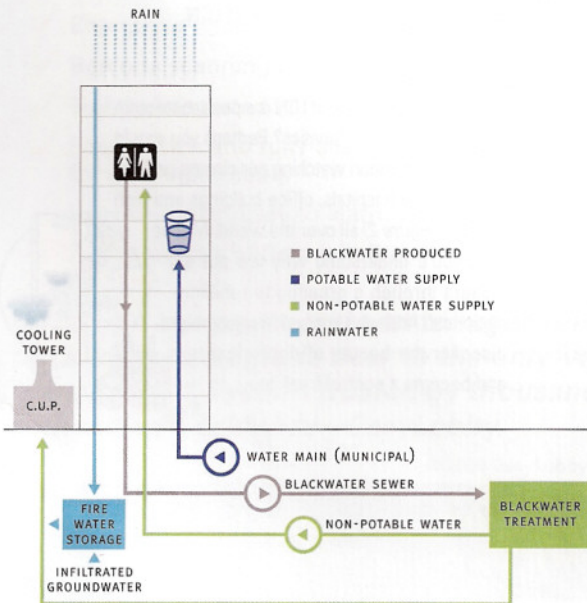


Some municipalities require buildings to label any source of rainwater.

### How much does it cost?

One dollar per gallon of the tank's storage capacity is a simple cost estimate for incorporating a roof rainwater-harvesting system into a new-construction project. The bulk of the expense comes from the storage tank and the dual-plumbing system needed to handle the water.

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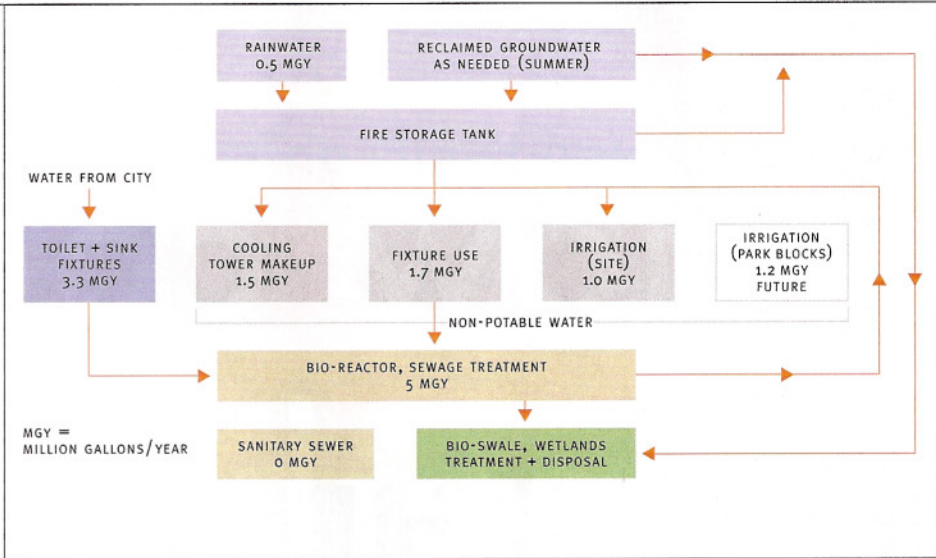


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Although rainwater systems are considered more of a LEED “point-getter” than an economic building measure at this point, there are some cases when they make financial sense. Yudelson points to Portland as an example of one city where stormwater hook-up fees are climbing dramatically. “If you can avoid the hook-up fee, that can often pay for the entire system,” he states. When looking at sustainable measures, Yudelson recommends that building owners ask themselves, “What’s for free here that I can harvest, that’s going to be there forever, and that I’m not going to have to pay for over and over again?”

## What are the benefits?

The most obvious benefit of a rainwater system is LEED certification; up to 7 points can be garnered by installing a system in a new building. The process itself is inherently green – reusing rainwater reduces the stress on groundwater supply and helps curb run-off and erosion. Yudelson says that one of the most important benefits is using the process as a



teaching opportunity for building occupants and stakeholders. “You can talk about a rainwater system, you can diagram it, [and] you can show it to people; you can even have cut-outs where people see the rain. It’s one of the [most] easily grasped systems that you can put in a building [and have] the average person understand.” **B**

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