

RISE

UC BERKELEY / UNIVERSITY OF DENVER

University of California, Berkeley / University of Denver
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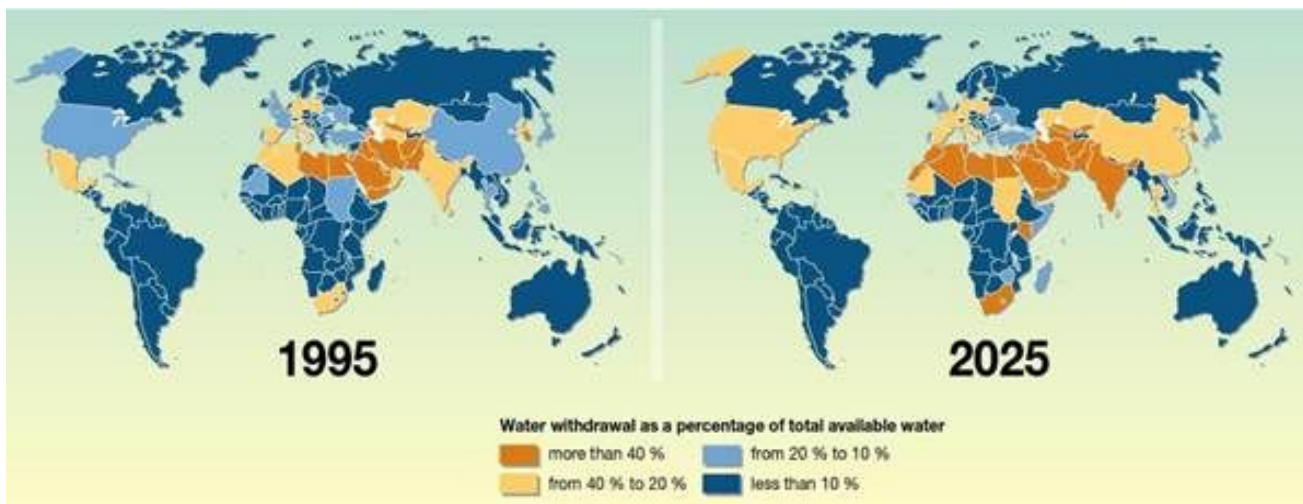


Water Narrative

Design Integration

Our team has been considering water usage since the very early stages of design. We intentionally created a home that minimizes piping and confined our plumbing area to the northern module where we concentrated the piping along a single 'plumbing' wall. The average home losses 10 gallons of water a day due to leaks, which is about 14% of the total amount of water

Going even a step beyond the host of low-flow fixtures and appliances throughout the home, we pursued implementing three specific technologies into our water system with regards to water efficiency; solar-powered water heating systems, greywater reuse systems, and rainwater collection systems. Each offer an innovative solution to water overuse and under-utilization, but we needed to ensure that these systems would



Source - <https://nextcity.org/daily/entry/drought-west-california-water-selling>

used each day¹. By minimizing the amount of piping, we have minimized the area for water loss due to leakage. In addition to preventing leaks, the design decision brings our material costs down and provides fewer opportunities for thermal bridging and heat loss. We further reduce our water-footprint by choosing to integrate only low-flow appliances and fixtures.

be feasible in the market setting of the area that our home would eventually be erected in permanently. Both Richmond, California (the final location), and Denver, Colorado (the competition location) have very dry climates with low amounts of total annual rainfall, making new water-reuse systems very viable for our markets. With climate change only worsening, periods of extreme

¹ "How You Can Conserve Water." Edited by Peter Gudella, *Water Conservation Facts and Tips* | National Geographic, National Geographic, 3 Aug. 2017,

www.nationalgeographic.com/environment/freshwater/water-conservation-tips/.

drought will become exacerbated in times to come. RISE home aims to provide a robust solution to keep inhabitants comfortable in the dry future.

Water Heating II The Sun Bandit

'The first major industry innovation in over 120 years, Sun Bandit® represents a paradigm shift in the way solar energy is captured, stored and used to heat water, empowering solar professionals, policy makers, and consumers to easily achieve their economic and sustainable living objectives.'²

Nearly 30% of total water use is hot water. The Sun Bandit Water Heating System allows us to leverage our solar array. The system is powered solely with electricity that is harvested from our solar panels and will be able to provide all of the water heating we need, saving a projected 30% on energy costs overall³. The system is both Energystar and LEED certified. It also is beneficial to the home's livability due to its non-existent operating sound and zero emissions.

Greywater Reuse II The Concept

Greywater systems allow for the re-use of greywater, water that has been already been used in a non-contaminated setting. For uses of greywater in which the greywater

² Fact Sheet, Sunbandit, 2017.

Dimensions



Source - Recover Manual

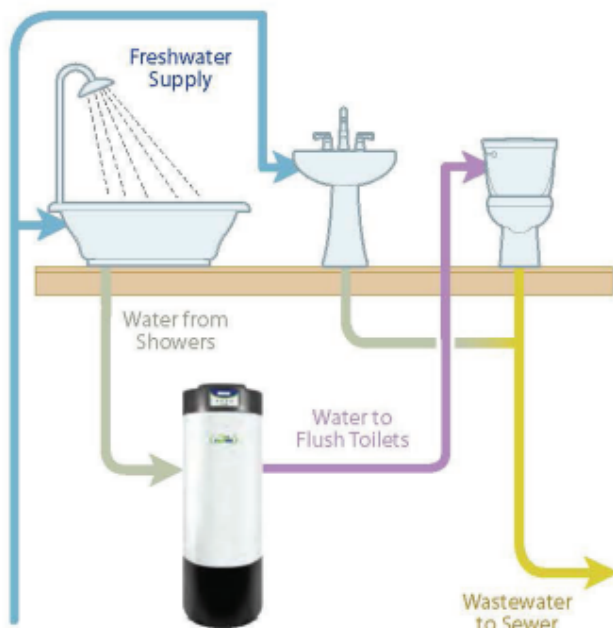
needs to be treated, such as the case with laundry and the removal of chemicals and detergent, a full greywater treatment system is required which puts the system at a much higher price point. In exploring the full range of systems for our home we discovered that other than price, one of the major issues with a full greywater treatment system is the size. Such systems need, at minimum, a collection tank, a filtration tank, and a storage tank. For a single-family residence like ours, this would take up a significant amount of area and would be an eyesore, if it could even fit. These systems seemed more geared towards a commercial and industrial market, working with different scale and water distribution demands. Another factor which we considered throughout the procurement process was the inhabitant's health and comfort. We did find some new technologies that we were comfortable implementing that would allow for full direct non-potable reuse within our price range. This led us to the more simple and

³ "Water & Energy Conservation." *Water & Energy Conservation | Home Water Works*, www.home-water-works.org/energy-water.

affordable end of the spectrum, a greywater reuse system: the Recover System.

Greywater Systems II Recover

Recover, from Bio-Microbics, is a uniquely compact greywater reuse system which is able to re-utilize shower water for usage in toilets.



Source - Recover Manual

On average, a typical home uses 19% of indoor water on showers⁴. Because we do not intend to have a large water footprint, we felt that spending extra money on a treatment system that could recycle a just a little larger portion of water was unnecessary and would not fit our target market's budget. Minimal maintenance is

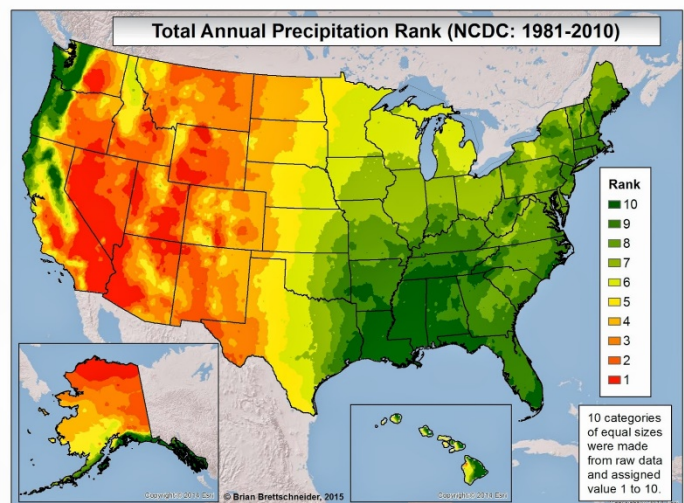
⁴ "Water & Energy Conservation." *Water & Energy Conservation | Home Water Works*, www.home-water-works.org/energy-water.

required, as it is equipped with a self-cleaning filter and only requires disinfectant top off about twice a year.

The system has a compact footprint, taking up a similar amount of space as an electric water heater, an important consideration, and will take strain off of the septic system and reduce sewer discharge. Overall, it is a simple, user-friendly design that will connect well with inhabitants who may lack the technical skills and/or interest in reusing greywater.

Foregoing Rainwater Harvesting

There are some very impressive systems available in the water re-catchment and rainwater harvesting system industry but this decision was based around our target market and financial feasibility. As we described, our Recover Greywater system will allow for indoor greywater re-use, so the only real benefit that these systems could provide us is extra irrigation water. Our concept is designed for urban infill settings

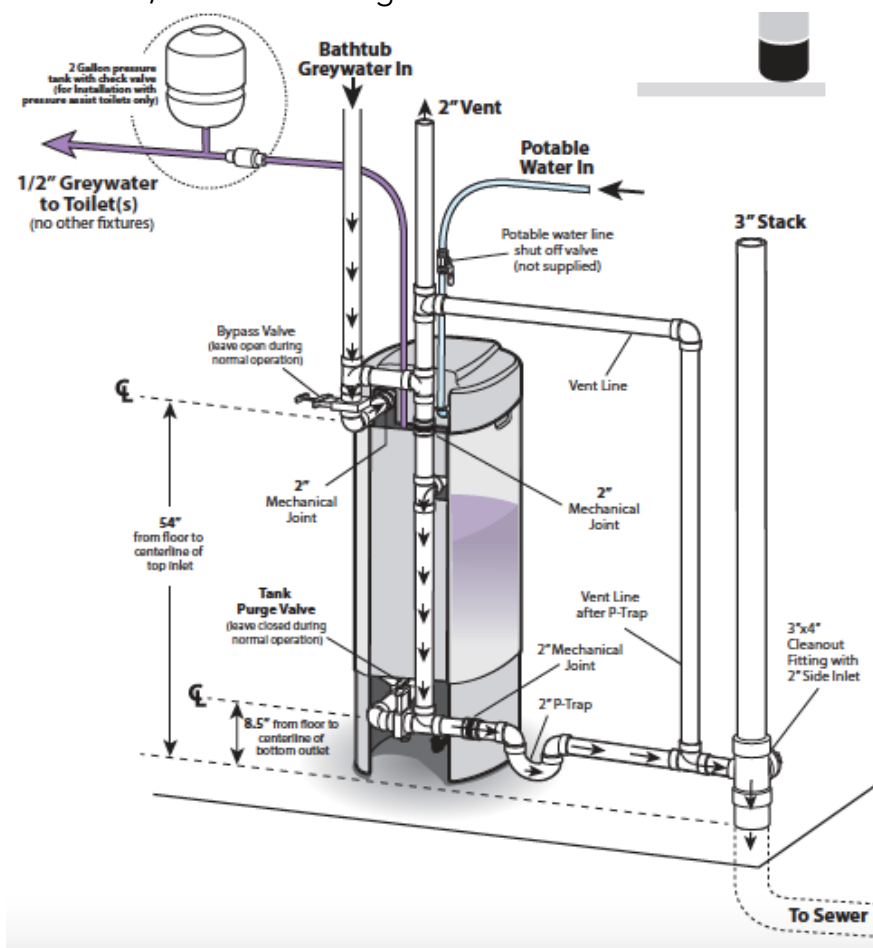


so there will not be an overwhelming amount of area available for greenspace. Our home is specifically designed for rainwater drainage off of our roof onto our moss wall, so we actually will be utilizing rainwater just via design rather than through technology. California, unlike many other states throughout the United States including Colorado, does allow rainwater collection, but the main goal of our water

system is not to harvest extra water from a dry region, but to use water we have as efficiently as we can. In the end, we actually saw implementing a true rainwater harvesting system beyond our strategic roof runoff plan as detrimental to our home and our story.

RISE Water Savings

Factoring in both the savings and innovations of our design, the RISE home will use at least 40% less than your average single-family home. On a per-person basis, we conservatively estimate an average usage of 60 gallons a day versus a commonly cited traditional average of 100 gallons a day. This equates to a projected saving of 14,600 gallons a year. An individual need approximately 365 gallons of drinking water a year to survive⁵. The yearly water savings from the RISE home could sustain 40 impoverished individuals!



Source - Recover Manual

⁵ Perlman, USGS Howard. "Water Questions & Answers How Much Water Does the Average Person Use at Home per Day?" *Per Capita Water Use. Water Questions and Answers*;

USGS Water Science School, USGS, 6 Dec. 2016, water.usgs.gov/edu/qa-home-percapita.html