
# Water Narrative

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## Introduction

SILO, an acronym for a smart innovative living oasis, represents how sustainable and green ways of living can exist in balance with a farmhouse style home. The house relies heavily on creative conservation methods to intertwine tradition and sustainability. The design of SILO's water systems reflect the growing importance of water conservation in the modern world. The methods taking place within the home to reduce water consumption and reuse greywater are some of SILO's key aspects.

## Flowing Water

The plumbing system used in SILO is sustainable in several different ways. The system was designed in such a way to allow the water heater to be within a short distance of the bathroom, the primary location for hot water use. This small distance allows for minimal heat loss when the water moves from one location to the next. To simplify the construction and deconstruction of the home, the team designed all of the plumbing in one wet module. The home also uses efficient appliances designed specifically to save energy and water, key components to conservation in SILO. The dishwasher used in the house uses two thirds the amount of water as the average dishwasher.

Radiant flooring throughout the house utilizes pipes of water running underneath the kitchen, bathroom, and bedrooms heat the house from the floor up. This is a more efficient and effective method than forced air. The team chose water for this system because it acts as an environmentally-friendly alternative to glycol. Water is safer for the plants and animals that may be affected by an unforeseen leak during transit.

If the homeowner is using more water than the greywater reclamation system can store, a rainwater collection system can easily be implemented. Gutters will be installed on the north and south sides of the home once SILO returns to the Missouri S&T campus as part of the Eco Village. The gutters send water to two locations for it be stored. For the purposes of competition, gutters are not feasible for SILO due to shipping limitations.

## Greenery

Placed around the main rooms in SILO, terrariums bring color and natural decoration indoors while minimizing water needs. The terrariums contain succulents, plants which require very little water to thrive in their environments. In the breakfast nook of the house, a table inlaid with preserved moss and topped with a large piece of glass provides additional greenery without needing water.

Two movable green walls hold a multitude of plants. By growing these plants in soil instead of in water, the team is able to reduce water consumption and simplify shipping methods. The walls, shown in Figure 1, are designed to be movable and can be placed inside during periods of poor weather, allowing for plant life to thrive longer and contribute to the home's indoor beauty. Water is added to the basin of the green walls, pumped to the top of the panels, allowed to flow back down to the basin, and circulated through the system again. Once the water has reached the basin, it can be pumped back through and then finally removed when the water is no longer fit for reuse.

A common method of growing vertical gardens is by implementing a full-scale hydroponics system. The green walls used in SILO are unique in this aspect because the variety of plants grow in soil instead of in a water-based system. Planting in soil is advantageous to SILO because it allows for less water use by the green walls in the overall lifecycle of the walls.

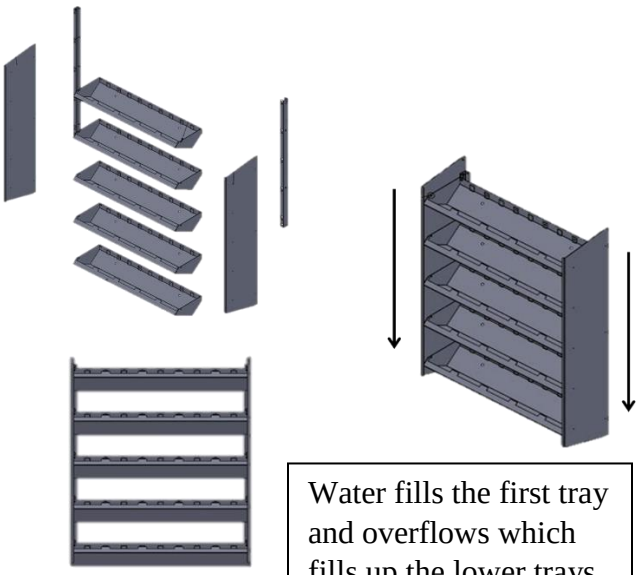


*Figure 1: Green Wall Panels*

## Greywater Reclamation

One of the most ecological student-designed systems in SILO combines various off-the-shelf products to filter greywater for reuse. Shown in Figure 2, the system is comprised of a spin, activated charcoal, and ultraviolet filters that take water from the bathroom sink, shower, and washer. Sediment filters remove particulates that may escape through the waste stream. Carbon block filters are used to remove chlorine and other unhealthy chemicals. UV filters then destroy harmful pathogens that may cause disease in plants. This system works to provide water for the movable green walls and other non-edible plants the homeowner may have.

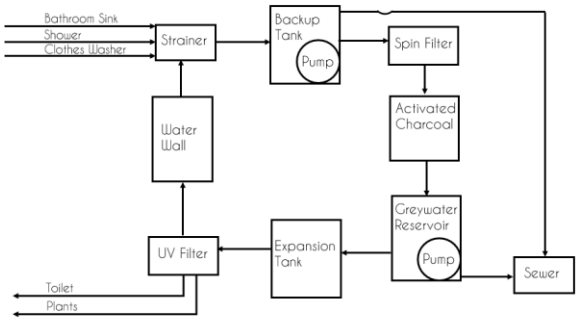


*Figure 2: Greywater Oneline*

## Water Wall

Typically, greywater can only be stored for twenty-four hours because the stagnant water would start to grow bacteria. To overcome this issue, S&T students designed a water wall which aerates, prevents stagnation, and limits anaerobic bacteria growth. This system extends the time the water is usable, which has been a hindrance in many greywater systems. The wall itself stands five feet tall and is composed of a large pane of glass surrounded by a wood casing with an enclosed pump and reservoir. The greywater system pumps water into the wall and through a piece of tubing running above the glass. Holes are cut in the tube, creating a constant flow of greywater down the glass. Furthermore, this running water allows the homeowner to fully experience the peaceful sounds emitted by the water wall while aerating the greywater for future use.

## Conclusion

The water systems throughout SILO emphasizes water conservation and reclamation. The appliances and green walls use less water than the average comparable systems. The greywater system reclaims water that the water wall aerates for future use. The gutters direct rainwater to be stored as the homeowner sees fit. The moss table and terrariums add natural greenery throughout the home while using as little water as possible. All of the techniques the team applies throughout SILO work together to greatly reduce water consumption while highlighting the great benefits of reclaiming and reusing water in any home.