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Residential Greywater Recycling System

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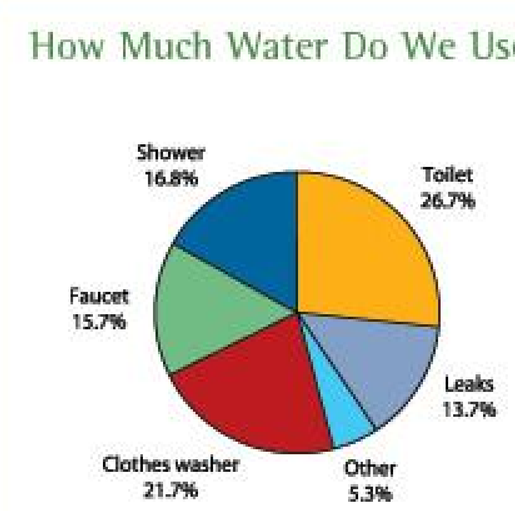
PROBLEM/OPPORTUNITY

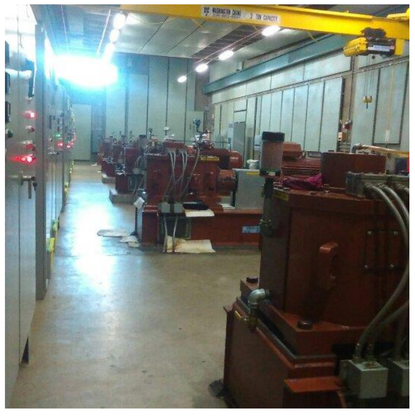
In a typical household, a majority of the fresh water is utilized by the shower, bathroom sinks and laundry. Water exiting from these fixtures is considered greywater. This is wasteful because the greywater is being combined with blackwater making it unusable. If greywater could be separated and captured, it can be reused for other purposes. We came to the conclusion that greywater is able to be recycled and reused for flushing excreta.

Figure 1: Average Household Water Usage



Greywater from the showers, clothes washers, and bathroom sinks is collected, it then goes into our system. The greywater goes through a screen to remove any large debris. Then, it goes into a holding tank where UV light is shown through the water for a period of time to kill bacteria. The water is stored until it is needed. The water in the tank is pumped to the toilets to be reused to flush the toilet.

Figure 2: Sewage Facility



KEY OBSERVATIONS

- When considering what is clean enough to be used in a household, greywater shouldn't have debris, odor and should be clean enough to flush a toilet.
- The screen should get sprayed down by the jets so that debris doesn't accumulate. Otherwise it could potentially cause a clog and more maintenance.
- If the screen becomes clogged, the overflow greywater will go down to the sewer.
- The filtered water, that is sitting in the tank, is pumped to the toilet. It is then monitored by a sensor to determine when the toilet is full and empty.
- We anticipate there will be a surplus of water so there is an overflow pipe in the tank that goes to the sewer. In the event that the toilet is used too much, the standard plumbing system will take over.
- There will be a check valve to prevent the greywater from mixing with the fresh water when entering the toilet.

RESULTS

If a typical household were to invest an estimated amount of $1000 in this system (this amount would include paying for the system itself as well as instilation fees) they would save approximately $15 per month on utility fees (the amount saved will vary depending on the amount of people in the household). Through this, it would take approximately 6 years to pay off this system. After the first 6 years of paying off this system, the household would profit $1000 for every 6 years.

CONCLUSIONS

The purpose of this residential greywater recycling system is to save fresh water as well as help homeowners save money. In times when water is needed the most, this system will help conserve water as well as make water easily available. This system will help homeowners save money by reusing gray water instead of fresh water which would eliminate the cost of fresh water being pumped into the toilet.

Figure 3: Water Flow Chart