

Grey: A New Shade of Green

Laith Elayyan (CVE)

Hassan Hamdan (ELE)

Wesam Saba (CVE)

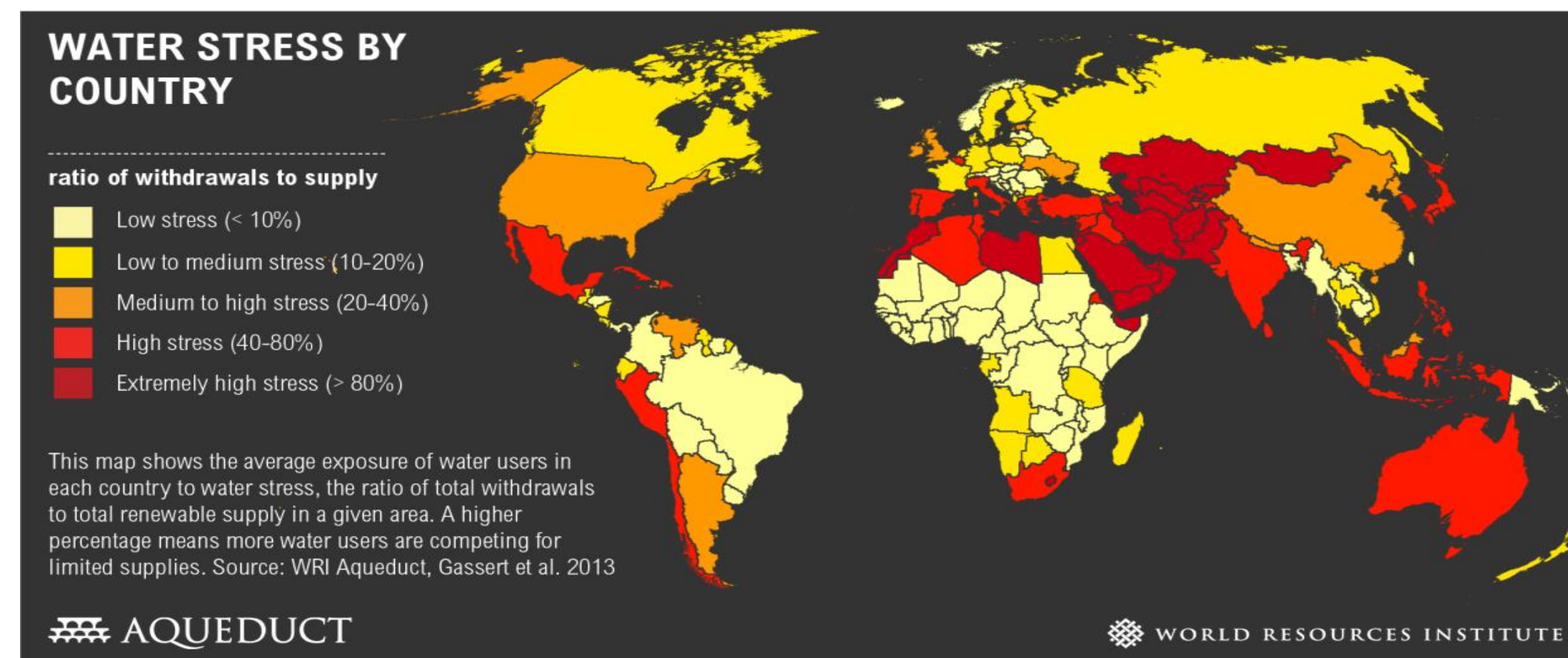
Firas Gefe (ELE)

Yousef AlSheikh (CVE)

Abstract

In this project, we have designed and created a system that can re-use grey water that is being wasted in buildings, which will be effective in countries such as United Arab Emirates due to their high water consumption. This design is approached from civil and electrical engineering perspectives. This collaboration leads to a better way of living economically and socially. The system consists of various kinds of sensors, filters, pumps, pipes, tanks and solar panels. The process relies on collecting the water, detecting impurities, cleansing the water and finally supplying it to individual households for use. This process proved to be most safe, economical and efficient at reducing the high water stress that the UAE suffers from.

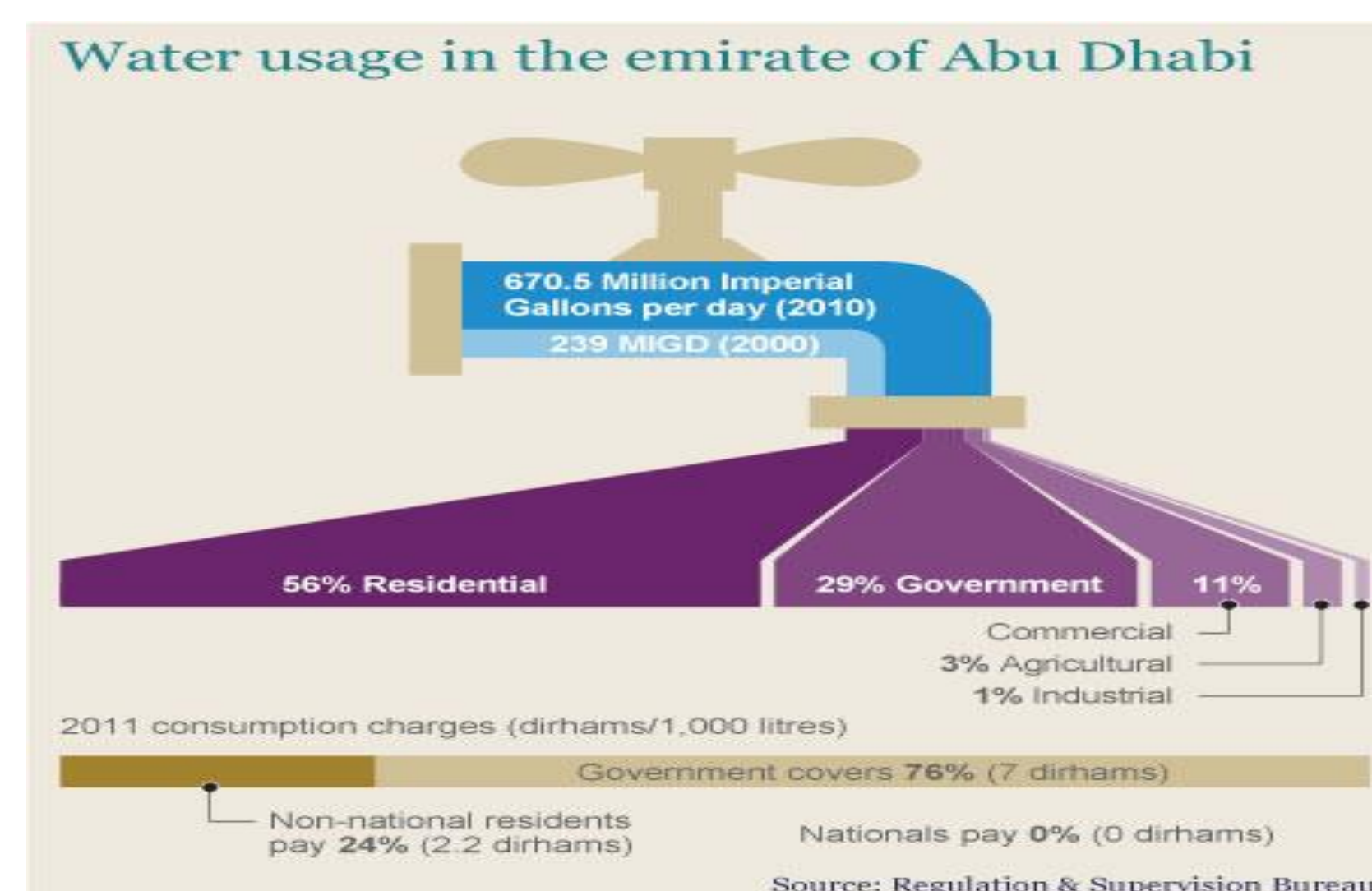
Situation



- The UAE lacks a renewable water resource that can sufficiently cover the population's needs.
- The UAE residents enjoy a luxurious lifestyle in all aspects thus causing a high consumption of water.
- The UAE has a fast growing population and Expo 2020 is expected to bring double UAE's population in visitors.
- There is a lack of intervention from the government concerning the consumption behavior of citizens.

Problems

- No taxes from the UAE government exist on water consumption. On the contrary, water is heavily subsidized which leads to a higher consumption.

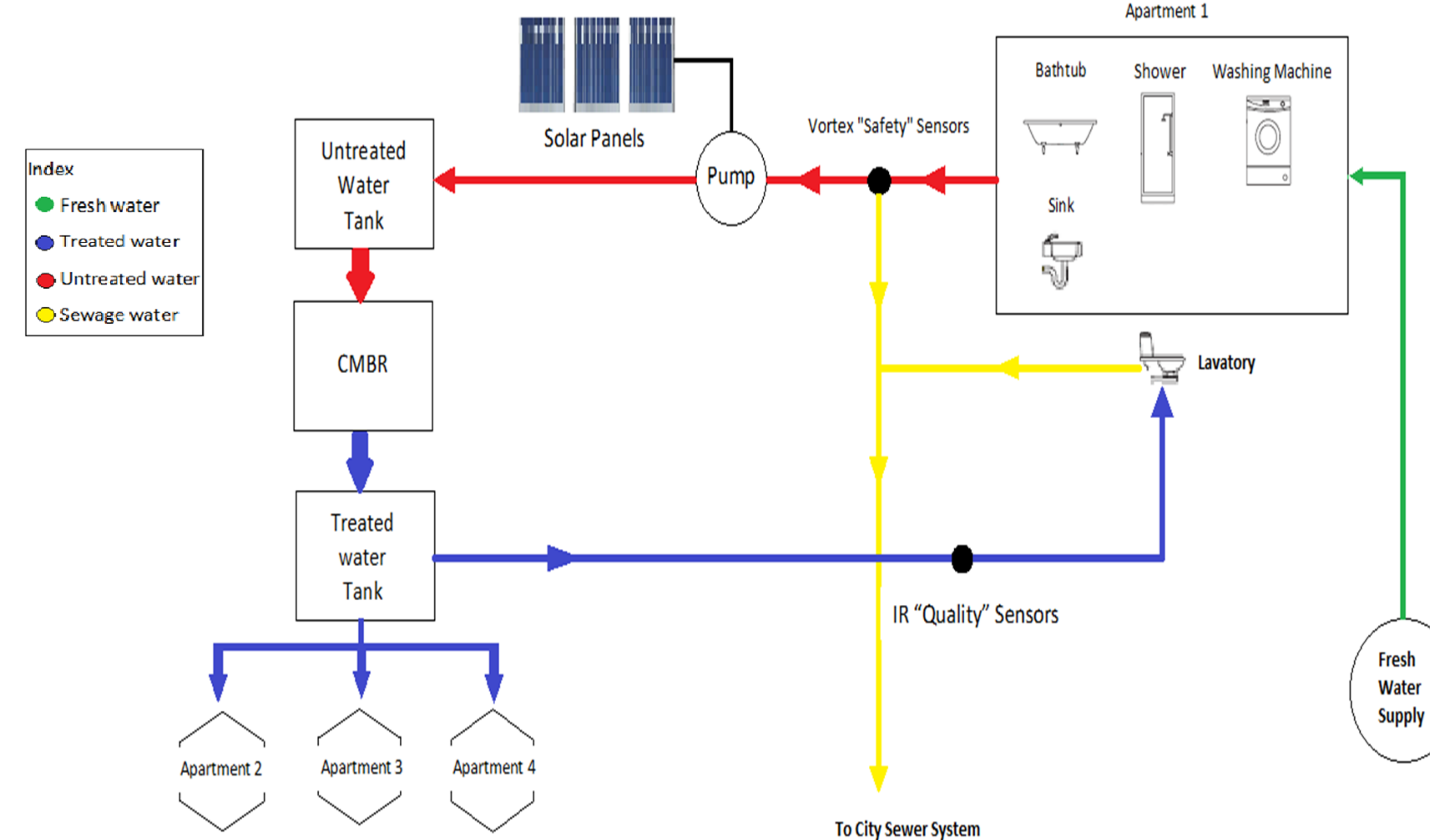


- As we approach Expo 2020 there will be a spike in water consumption caused by the sudden increase of population.
- Studies show that most water consumption in the UAE is residential and the high consumption is attributed to the hot weather.

- The desalination of sea water has caused salt concentrations to go up by about 50% which is harmful to the marine environment and its living organisms.

Solution

- UAE recycles water for irrigation use only.
- Most of the water in UAE is being consumed in residential usage.
- Grey water has no solid waste and can be treated easily.
- Most of the families in UAE are living in residential apartments.
- The available solutions for installing grey-water systems are for villas.
- Our solution is to retrofit a system into already constructed buildings
- Three main phases, the first phase is collection and screening, the second phase is to process and store the water and lastly we need to supply this water to individual apartments.

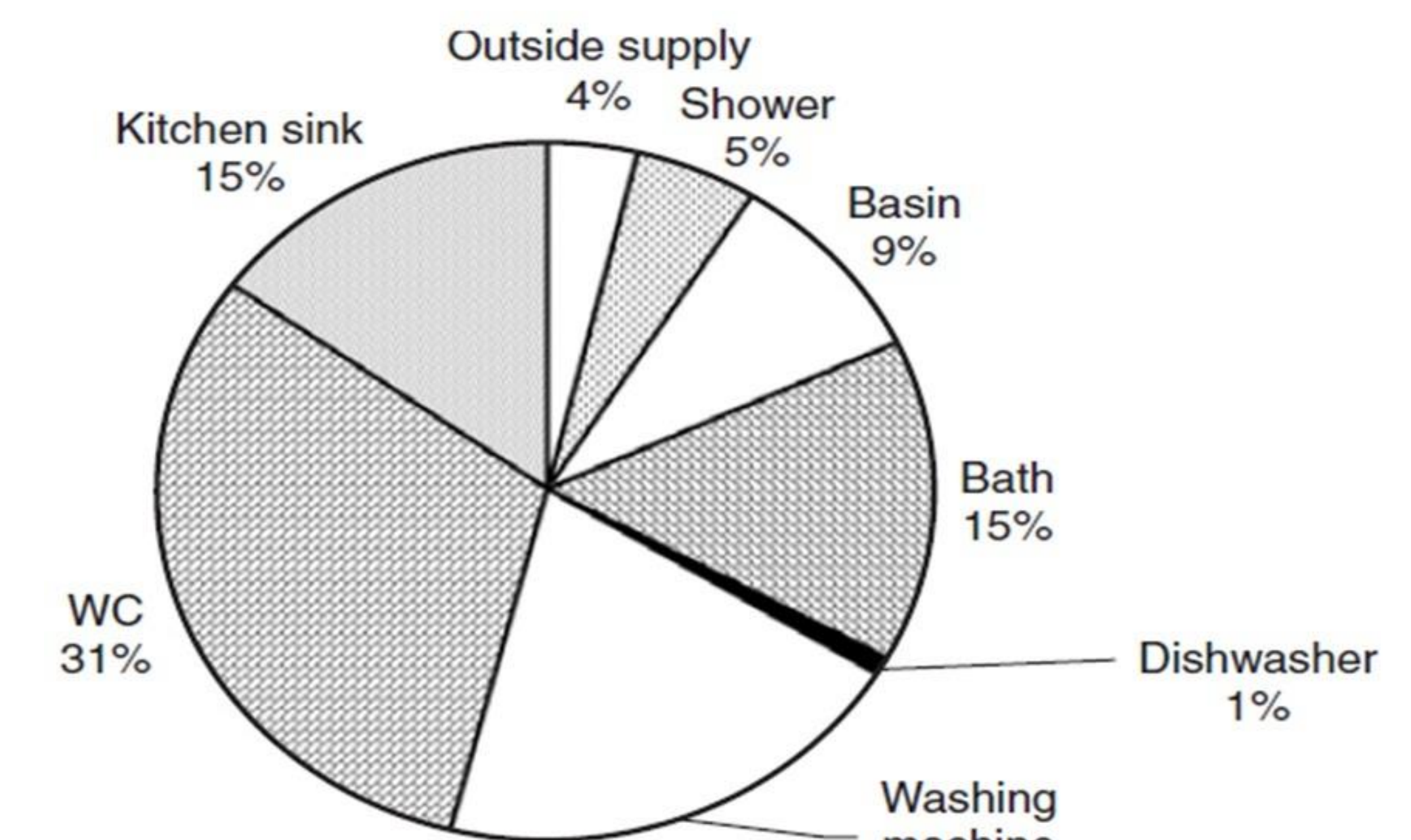


- A "safety" sensor which uses the technique of vortex flow measurement will detect if there are any unwanted chemicals passing through the system and would hence open a safety valve which discharges the incoming water.
- A pump will be powered using polymer solar cells; this type of solar cells will convert light into electricity, by converting a flux of photons into a flux of charged particles.
- Dirty water will be stored in a big reservoir, moving it all towards a huge tank which uses **Compact Membrane Bio Reactors (C-MEM)** technology that consists of a three dimensional filtration mesh that can remove impurities at a molecular level.
- Clean water will be stored in a big reservoir and can work independently from the pump, as it can provide water to the whole building for domestic applications such as flushing the toilet.

- IR cameras; a technology which uses infrared radiation to identify pipe leakages that are buried within the piping network and pinpoint the location of the leakage.

Evaluation

- It can be safely used because
 - A safety sensor is provided to detect any buildup of toxic chemicals.
 - Gray water is being used to be treated instead of sewage water.
- This solution can be applied on a mass scale, therefore helping many families in reducing their water consumption.
- The cost of our system is broken down into two types, purchase and maintenance.
- It maintains a:
 - Low maintenance cost since the treatment technology has a long life span.
 - Low construction cost by using existing piping network
- This will help people to reduce the amount of water consumed by:
 - Quality sensors that detect leakage
 - The 30% percent of water that is used up for flushing.
- Electrical load will not be added since our system will be powered by solar panels.



References

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