Improving water efficiency:
Managing water consumption of a building to preserve its quality and sustainability

- Planning for sustainable water solution:

Discussing solutions to enhance water system efficiency

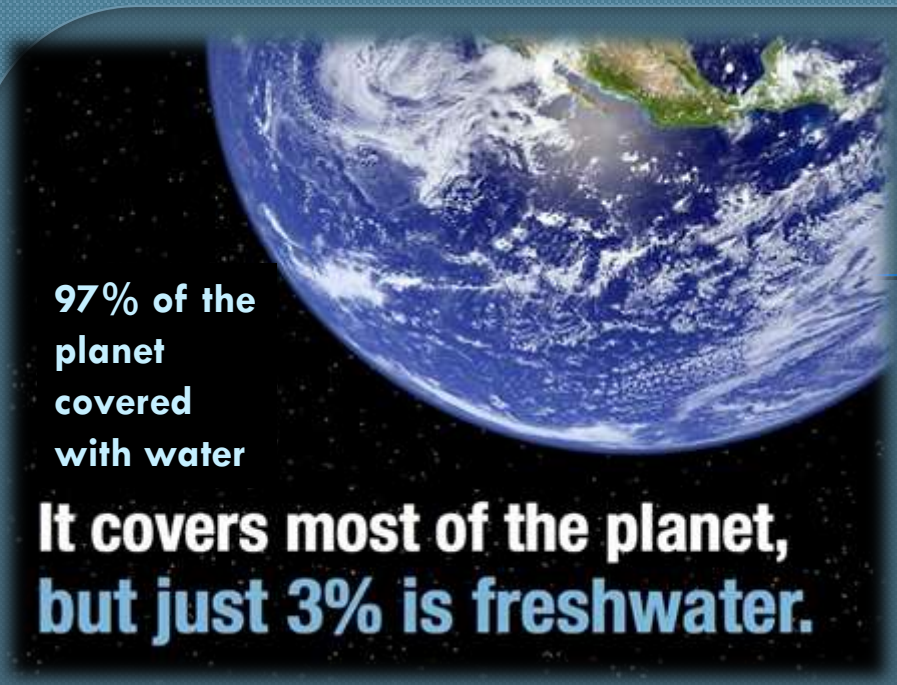
Evaluating water-efficiency measures through water metering and monitoring

Adopting water efficient landscaping and irrigation system to address the scarcity of water

- Wastewater reuse and water conservation plan:

Reducing water usage while eliminating wastewater contribution to the sewer system

- Use of water cooling towers


97% of the planet covered with water
It covers most of the planet,
but just 3% is freshwater.


(and most of that is ice)


Less than 0.007%
of all the water on Earth
is available
to drink.


Less than 1% of all freshwater
is readily accessible
for human use.

The Water-Use Cycle

- Water is constantly in motion by way of the hydrologic cycle. Water evaporates as vapor from oceans, lakes, and rivers; is transpired from plants; condenses in the air and falls as precipitation; and then moves over and through the ground into water bodies, where the cycle begins again.
- The water-use cycle is influence of human activity Dams, reservoirs, canals and ground water wells .
- Water is withdrawn and moved from a source to a point of use , such as an industry, restaurant, home, or farm

Categories of Water use

Commercial:

- fresh water for hotels, restaurants, office buildings, other military institutions.

Domestic:

- water for normal household such as drinking, food, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens.

Irrigation :

- water for farm irrigation, golf courses, parks, nurseries, turf farms, and other landscape irrigation uses.

Industry :

- water use for industries such purposes as processing, cleaning, transportation, dilution, and cooling in manufacturing.

Livestock :

- water use for stock animals, fish farms, and other nonfarm needs.

Mining :

- water use for the extraction of naturally occurring minerals; such as coal crude petroleum; and natural gas.

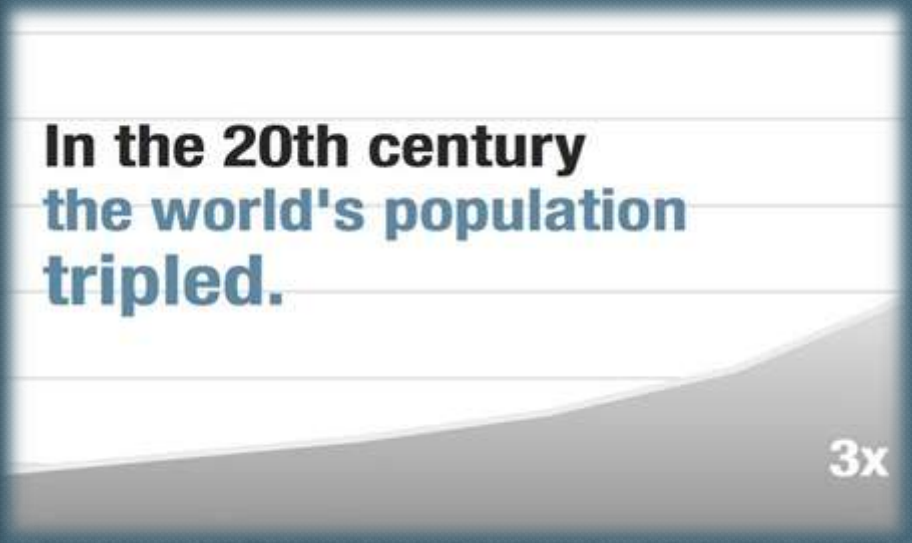
Categories of Water use

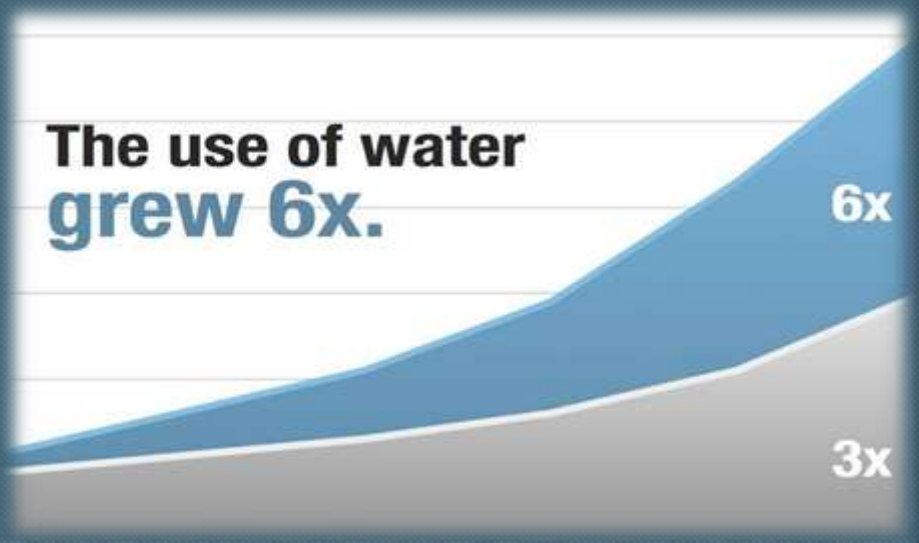
Thermoelectric Power :

water use is the amount of water used in the production of electric power generated with heat. The source of the heat may be from fossil fuels, nuclear fission, or geothermal. Fossil fuel power plants typically reuse water.

electricity generated by turning a turbine using steam power. After the steam is used to turn the turbines, it is condensed back to water by cooling it. The condensed water is then routed back to the boiler, where the cycle begins again

Our water resource are under pressure





What will that mean for water use?

It's been said,
we're going to
run out of water
before we run out of oil.


It's time to give water
a second thought.
Use less.
Save more.
Advocate always.

Eco-build project

- The ECOBUILD project was launched in 2007 with the support of the Sixth Framework Programme of the European Communities. The project provides policy makers and stakeholders with

  - an overview of the internationally most advanced concepts and technologies to achieve a very high energy-efficiency level (Eco-building level),

  - best practice solutions for implementing these concepts and

  - an assessment of the potential of and problems faced by different sets of policy measures adopted at the European and national levels.

Eco-build project aim

- Eco-buildings projects aim at a new approach for the design, construction and operation of new and/or refurbished buildings, to reduce substantially, and if possible, to avoid demand for heating, cooling and lighting and to supply the necessary heating and cooling and lighting in the most efficient way and based as much as possible on renewable energy sources and poly-generation.

Enhance water system efficiency

- With the growing shortage of fresh water supplies in many parts of the world, it has become essential to find ways to conserve water and use it efficiently.

- improve Water resource management has traditionally focused on developing new water supplies and expanding treatment facilities while giving little thought to how efficiently existing water is used

Why Conserve Water

- wasteful habits can deplete water reserves quicker than it is possible to replenish them.
- Water conservation also has an effect on how much wastewater is produced, thereby having a direct impact on the performance and life of the wastewater system. This extends the life of onsite systems, improves performance of treatment plants that have flows near design capacity, and reduces operating costs of treatment plants.
- water efficiency measures can also lower the water, sewer, and energy bills of the homeowner, thus reducing the water utility operating cost.

Major steps toward conserving water.

Behavioral Practices for Residential Users.

- personal habits : to use water efficiently, reduce the overall consumption in a home could save thousands of gallons of water per person each year. Behavioral practices of residential users can be applied both indoors in the kitchen, bathroom, and laundry room, as well as outdoors(covering the pool, washing a car, rainwater collection).

Major steps toward conserving water.

Utility-Based Efficiency Measures.

- Metering and rate structures.
- leak detection and repair programs.
- pressure reduction programs.

Major steps toward conserving water.

Engineering Practices for Residential Users

- installation of indoor plumbing fixtures that save water(low-flow plumbing fixtures).
- installation Ultra low-flush (efficient) toilets.
- Use of Toilet Dams and Displacement Devices.
- Use of Low-Flow Showerheads.
- installation of Faucet Aerators.
- Pressure Reduction will reduce water flow .
- using high-efficiency front-loading washing machines

Major steps toward conserving water.

Engineering Practices for Residential Users

- *Gray water.*

- Gray water is domestic wastewater comprised of wash water from kitchen sinks and tubs, clothes washers, and laundry tubs.

- Reusing gray water can conserve potable water and lower water bills, reduce pollution of natural waters, and make use of nutrients in the gray water that would otherwise be wasted if the gray water was not segregated from blackwater

Major steps toward conserving water.

Engineering Practices for Residential Users

- Landscaping:

- lawn care accounts for 50 to 75% of outdoor residential water use. Outdoor residential water use is influenced by income level and local climate characteristics.

- To practice water-saving by choosing native or adaptive species of plants that do not require much water. Water lawns and gardens slowly, thoroughly, and as infrequently as possible. use drip irrigation systems with water timers instead of running water continuously.

Major steps toward conserving water.

Engineering Practices for Residential Users

- Landscaping:

Xeriscape™ Landscapes.

xeros (Greek for "dry") with landscaping, is a water-conservative approach to landscaping

Xeriscaping: has 8 Basic Principles,

1. Planning and Design.
2. Use Native Grasses for Turf Areas whenever possible.
3. Use Plants Matched to Regional Conditions.
4. Create a Healthy, Living Soil.
5. Use Mulches.
6. . Irrigate Efficiently.
7. Harvest Rain and Snow Run Off.
8. Maintain Your Landscape and Garden Properly.

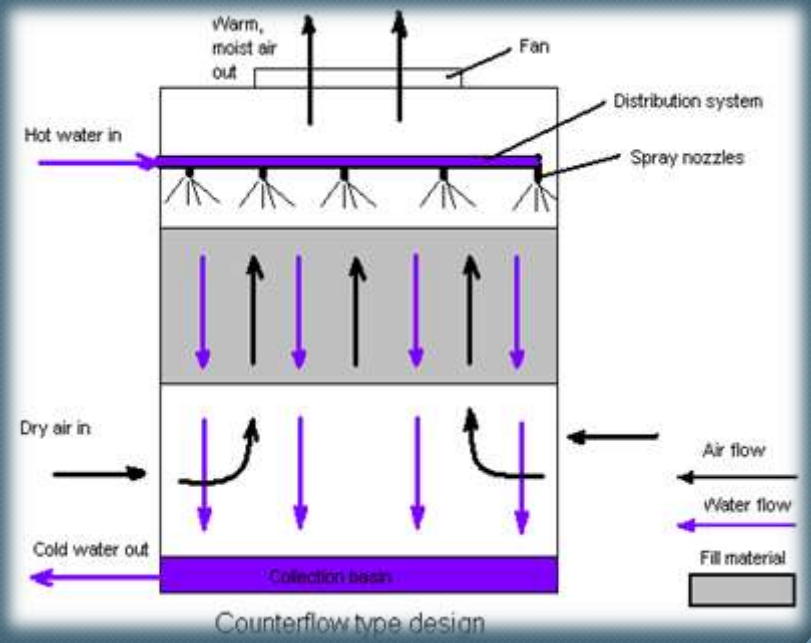
Use of water cooling towers

Air flow cooling system

- To achieve better cooling performance , a medium called *fill* (usually PVC) is used to increase the surface area and the time of contact between the air and water flows.

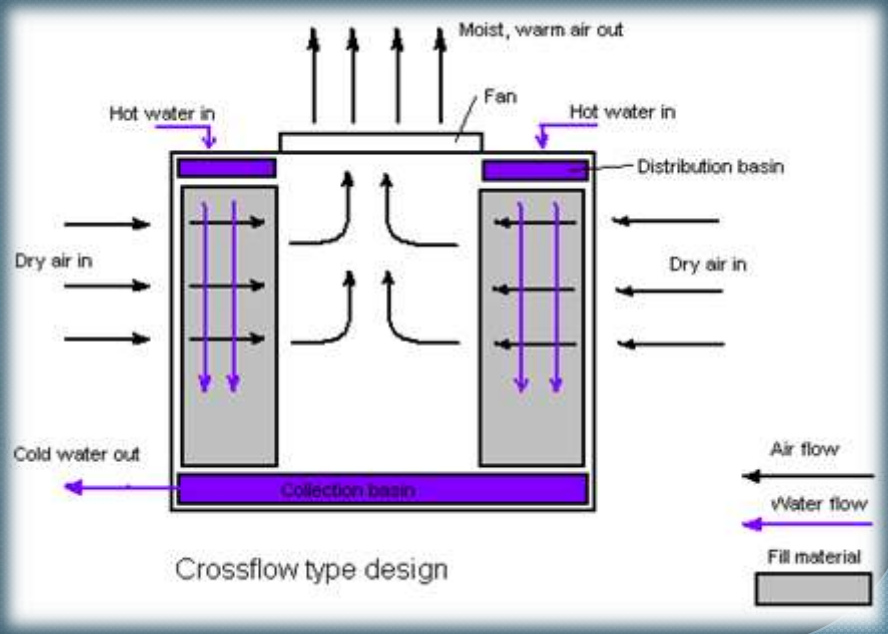
Counter flow

- In a counter flow design the air flow is directly opposite to the water flow (see diagram below). Air flow first enters an open area beneath the fill media and is then drawn up vertically. The water is sprayed through pressurized nozzles and flows downward through the fill, opposite to the air flow.



Cross flow

- Cross flow is a design in which the air flow is directed perpendicular to the water flow. Air flow enters one or more vertical faces of the cooling tower to meet the fill material. Water flows (perpendicular to the air) through the fill by gravity. The air continues through the fill and thus past the water flow into an open plenum area. A *distribution* or *hot water basin* consisting of a deep pan with holes or *nozzles* in the bottom is utilized in a cross flow tower. Gravity distributes the water through the nozzles uniformly across the fill material.



Crossflow type design