SWITCH

Briefing note: Water conservation measures in the domestic sector

prepared by the NTUA

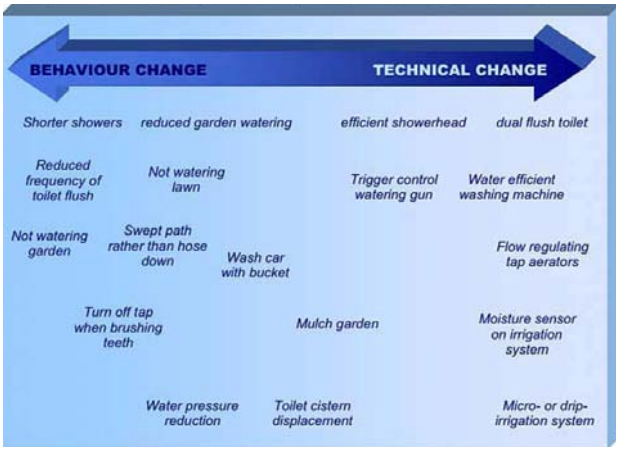
Water conservation is often associated with curtailment of water use and doing less with less water, typically during a water shortage, such as a drought. However, it also includes day-to-day demand management to achieve water efficiency: using improved technologies and practices that deliver equal or better service with less water.

Introduction

Although the agricultural sector is globally responsible for the majority of water consumption, significant savings in treated/potable water also are possible in the domestic sector. **Water conservation** in the domestic sector encompasses the **reduction** of **water losses**, **water waste** and/or **water use** resulting in greater water efficiency through the adoption of **improved management practices and water saving technologies**. These technologies and practices can be applied in private and commercial accommodation, care facilities, and any commercial or institutional / public establishments with connection to public or private water supply networks.

Water efficiency focuses on reducing water waste, and involves the use of the minimum necessary amount of water for the daily tasks and activities. Efficiency can be achieved in the domestic setting through the use of several water saving technologies and the application of simple improved management practices and without compromising on the quality of life.

Equipment changes may be perceived as a permanent method in achieving water efficiency. On the other hand, behavioural change may be seen as a quick and inexpensive alternative. In fact, both the technical and human side of efficiency improvements need to be addressed. Consistent education and awareness in combination with proper tools and equipment will achieve more permanent water savings.

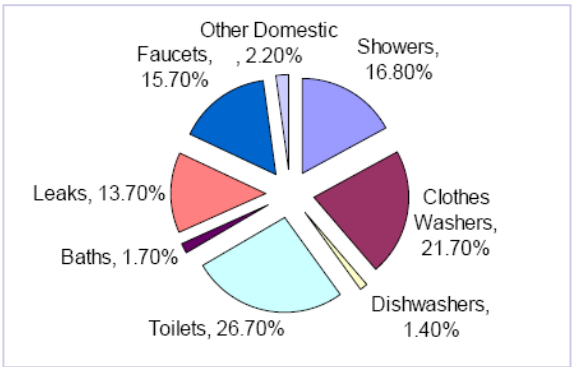


The range of available options for water saving

Water conservation programs are typically initiated at the local level, either by municipal water utilities or regional governments. They are promoted through public education campaigns and the offer of incentives such as subsidies for the adoption of promoted technologies.

Why save water?

Besides minimizing environmental impacts, water conservation has potential for significant cost and energy savings. This is an additional incentive for users, as water conservation devices are relatively inexpensive so that homeowners can easily replace old devices, and offer short-term payback through reduced water and energy bills. Reducing water waste also means smaller effluent volumes are produced, another area for potential cost and energy savings, and for user incentives.



Domestic water usage (EU level)

Domestic water use usually demands superior quality water, the treatment and transfer of which tend to be expensive and energy-demanding. However, domestic use, besides drinking and cooking, also includes water used for washing, toilet flushing, bath and shower, laundry, house cleaning, yard irrigation, private swimming pools, car washing and other personal uses (e.g., hobbies). Some of these uses do not require the same (high) quality water, and improved management practices, such as simple greywater recycling, can achieve further savings.

Water Efficiency Measures

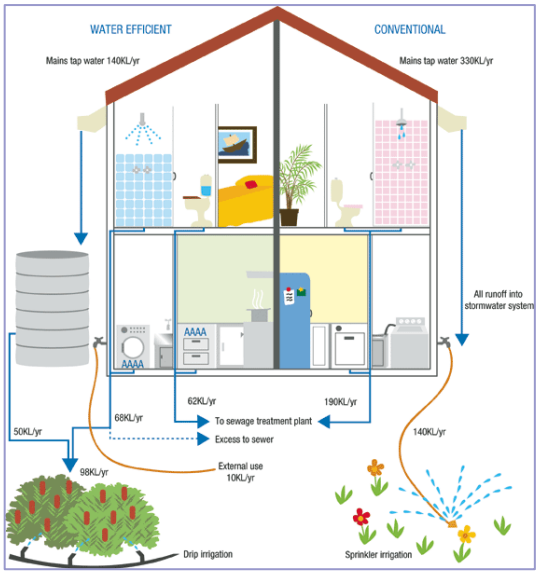
There are three categories of Water Efficiency measures to better manage how and when water is used:

- **Reducing losses**
- **Reducing overall water use**
- **Employing water reuse practices.**

Reducing Losses

Leaks account for more than 10% of domestic use; a single faucet leaking one drip per second can waste 28 lt of water per day. It is easy to minimize water losses by simply ensuring that water fixtures are properly shut, and conducting a regular check for leaks.

Water **Metering** can further contribute in this effort, by providing a means for cross-checking for leaks. If the meter is still running when all fixtures are secured and no appliances are working, there may be a leak in the pipes.



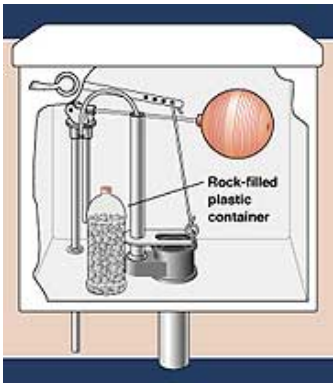
Water efficient vs. Conventional house

Furthermore, conducting a regular **water audit** to assess current water uses and costs can identify potential efficiency opportunities, particularly in the cases of large public and commercial establishments, such as hospitals, shopping malls and government buildings.

Reducing water use

There is a wide range of available technologies and practices that can be employed to achieve water savings, targeting different uses within the domestic sector.

Toilet flushes are responsible for more than a quarter of domestic use on average. The replacement of an old gravity toilet with a water efficient alternative could achieve reductions in use of 50% or more. Common available options are low-flush conventional (gravity) toilets, which consume about 6 lt per flush, dual flush toilets for liquid and solid wastes on average using less than 4 lt per flush. In addition there are air-assisted toilets that use as little as 2 lt per flush, which require a more complicated installation that is nevertheless not difficult. Costs are not proportional to the water savings achieved; even simple measures, such as placing a brick or water bottle in the toilet tank can achieve significant savings in the long term.



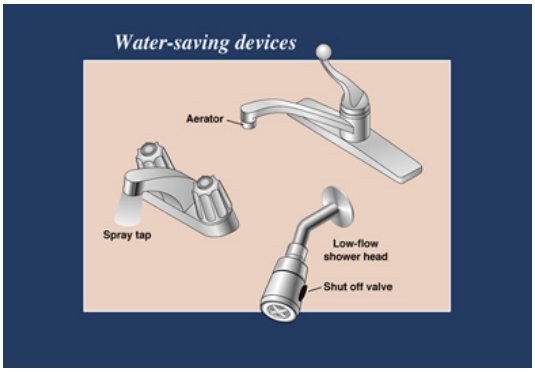
Reducing flush volume the easy way

Clothes washing is the second largest use by volume in the home. The installation of a high-efficiency washing machine can result in an average reduction of up to 40% in the wash volume, and a large reduction in energy consumption. Similarly, water and energy savings can also be achieved by using a high-efficiency **dishwasher**.

Water-saving devices on **taps and showerheads** also have potential for large water savings, in the range of 15% for showerheads and up to 50% for faucets. There is a multitude of options available, some of the most common ones being:

- Replacement of conventional showerheads and faucets with low volume fixtures, a low cost and very effective solution. An alternative is the application of flow restrictors in the existing fixtures, which are also cheap and easy to install.

- Use of aerators for faucet flow controllers on existing faucets. Aerators are attached to the faucet head and add air to the water flow, while reducing water flow by more than 10%.
- Installation of flow regulators in the hot and cold water feed lines to the faucet/showerhead.



Saving water at the faucet and showerhead

- Installation of showerheads with temporary cut-off valves, to allow interrupting the water flow while soaping, shampooing, or shaving. These can be reactivated at the previous temperature without need to re-adjust hot and cold water valves.
- Installation of automatic shutoff or metered shutoff faucets is particularly effective for public and commercial establishments. Both use a photocell or handle/pedal; in the case of the automatic shutoff a valve is opened and shut by the user, while the latter triggers a water flow for a pre-set time period.

Where water saving technologies have already been adopted, or where they are not financially feasible, changes in behaviours and everyday choices made can make a difference through:

- Using the dishwasher and washing machine with full loads only, to have the fewest wash runs necessary;

Reducing faucet running time

- Filling the sink or a basin, rather than running the faucet continuously, for handwashing dishes or rinsing fruits and vegetables, and reusing the water;
- Interrupting the water flow while brushing teeth, shaving, shampooing etc, and resuming it only when water is necessary;
- Opting for short showers instead of long ones or drawing a bath;
- Avoiding use of the water hose where alternatives are possible (e.g. watering potted plants with a watering can rather than a hose, and using a mop/sponge and bucket to wash balconies/cars);

Good Practice Example: US Energy Policy Act of 1992

The Energy Policy Act established water efficiency plumbing standards for certain plumbing devices, creating a set of unified national standards. The water efficiency standard was established to:

- *Preserve and protect water supply source, both surface and groundwater.*
- *Ensure water availability for all beneficial uses.*
- *Reduce water and energy costs.*
- *Regulate and standardize plumbing fixture trade.*
- *Protect health and the environment.*

Effective January 1, 1994, federal standards set for maximum water usage are:

Toilets - 1.6 gpf

Urinals - 1.0 gpf

Showerheads - 2.5 gpm @ 80psi

Lavatory Faucets - 2.5 gpm @ 80 psi

Kitchen Faucets -2.5 gpm @ 80 psi

The American Water Works Association estimates nationwide savings of 6.5 billion gallons per day will be achieved by the year 2025 through these standards.

- In garden landscaping, practicing of xeriscaping (selection of plants requiring very little water), selecting plants adapted to the local climatic conditions, and adopting efficient irrigation practices (drip irrigation or root delivery systems) can all contribute to minimizing water waste.

Employing water reuse practices

As not all domestic uses require as good quality water, it is important to identify opportunities for the collection and reuse of "grey" waters (domestic wastewater except from the toilet) wherever possible. Possible uses for greywater include toilet flushing, washing cars and patios, watering plants etc.

Benefits, Constraints and Implementation issues

The successful implementation of water conservation measures and practices requires the active involvement of citizens, stakeholders and authorities. Their promotion can be best achieved by combining:

- Education and awareness campaigns,
- Incentives for water savings, such as technology subsidies, and
- Counterincentives for water waste, such as tiered volumetric pricing or quotas.

Good Practice Example: Hosepipe bans

*In the **UK**, under conditions of drought, water companies try to reduce the demand by imposing hosepipe and sprinkler bans (in addition to other measures), in order to conserve supplies. As hosepipe and sprinkler use is most widespread during the dry summer months, the ban can reduce daily demand significantly at the time when water is most scarce.*

*In **Cyprus**, where water scarcity is an everyday fact of life, hosepipe use has been prohibited by law (Law 2571 of 1991, amended in 1998).*

The benefits to the user in the adoption of water conservation measures include the following:

- Systems are relatively inexpensive, and can easily be installed by the homeowner/ shopkeeper/maintenance personnel;
- Besides reducing water use, they also reduce wastewater flows and energy consumption;
- Their application results in lower water and energy bills for the user.

In terms of the water system as a whole, large-scale water conservation can offer substantial advantages by:

- Reducing pumping costs and the hydraulic load of waterworks and wastewater treatment plants;
- Increasing the lifespan of existing infrastructure;
- Reduced energy consumption and chemical costs for drinking and wastewater treatment, and reduced volumes of treated effluents and sludge
- Even the deferment of system expansion if demand is sufficiently reduced;
- The attenuation of peak flows would allow scaled-down designs and lower system investment costs for facilities designed to meet peak demands. Examples are water treatment plant, pumping station and storage and piping in the distribution system.

Promoting water conservation relies on public information and education. Influencing public attitude and behaviour requires a high investment in labour, cost and most importantly time. However, "aggressive" and resource- intensive campaigns can be limited to the initial implementation phase. Once conservation has penetrated the public conscience, schooling should be sufficient. Furthermore, particularly in the case of areas relying on tourism, the campaigns have the additional benefit of being able to influence the different water consumption behaviours of tourists, which could otherwise have significant impact.

Many authorities use mascots in awareness campaigns

In summary, the use of water saving technologies increases the need for new investments in the form of new equipment installation. Nevertheless, the pay-off for these investments is quick, and their application is in fact very cost-effective, particularly in areas applying volumetric pricing. However, modifications in the existing plumbing or fixtures are not imperative for water conservation, as changing habits can in itself be the most cost effective way of reducing water waste.

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