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Water Use Reduction for Businesses

Introduction

Locally and globally, the importance of water as a resource for agriculture, manufacturing and sustaining life has become a prominent issue.

The freshwater that is available to meet the world's needs is only a tiny fraction compared to the major oceanic water sources. As world population grows, the demand for freshwater from competing interests will intensify. Water availability may be one of the most critical world policy issues of this century.

Fortunately, there are numerous water use reduction opportunities for Ohio businesses and citizens that can lower costs and provide benefits to Ohio's environment. Reducing water use can save money and increase process quality and productivity. As with any process component, water can only be managed if it is measured and goals are established.

Water users can be divided into two basic groups: system operators (such as municipalities, state and local governments, and privately owned suppliers) and system users (such as residential users, industries and farmers). These users can choose many different water use efficiency practices, which fall into two categories:

- **engineering practices:** practices based on modifications in equipment, plumbing, fixtures or water supply operating procedures; and
- **behavioral practices:** practices based on changing water use habits.

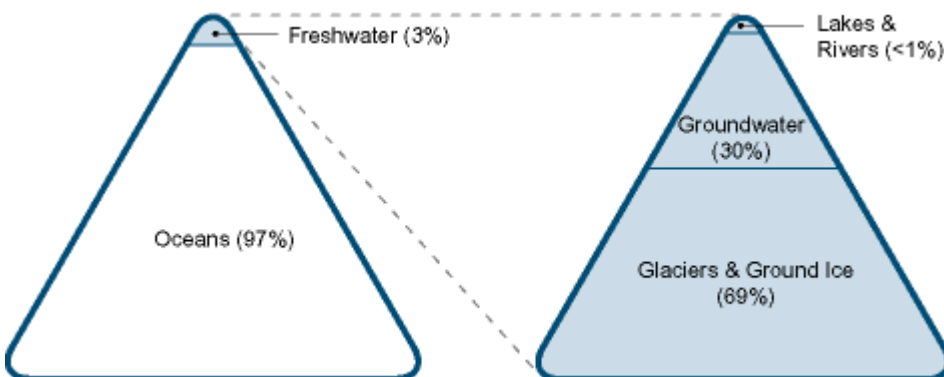
This fact sheet outlines some simple strategies and case studies to help your business identify ways to save money and improve performance while helping to conserve our valuable water resources.

The Hidden Costs of Water Use

For businesses, water can be used efficiently and strategically. It is important to consider water use as an equally significant process component as any raw material or energy input. Most businesses don't believe that water use is a significant source of lost revenue, but many have found that water conservation and reuse result in significant cost savings.

Many hidden costs can be associated with taking water use for granted. **Most companies pay for each gallon of water used a minimum of three times.** They pay for the initial **purchase**, again to **treat** before and/or after a process and a third time to **discharge/dispose** of "waste" water.

Businesses can often take easy and inexpensive steps to correct or upgrade process conditions to reduce water usage. Some process changes involve no more than measuring and reducing flows to optimal levels for a given process. Many facilities have unknown flow rates or established "historic" rates that current employees never consider changing. Re-evaluating these rates to see if lower water usage can still achieve your production goals is one big step toward identifying efficiency options.



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General Methods of Reducing Water Consumption

- 1) Identify unnecessary uses and fix leaks.
 - 2) Use minimum amounts of water to accomplish the task.
 - 3) Re-circulate water within a process or a group of processes, or reuse water sequentially.
 - 4) Treat and reclaim used water.
 - 5) Replace potable water supplies with water from non-potable water supplies when possible.
 - 6) Install meters on high-flow processes and equipment to track and reduce water use.
 - 7) Identify alternative processes that are less water-intensive.
- 2) As appliances or equipment wear out, replace them with water-saving models.
 - 3) Install spray nozzle aerators or faucets and high-efficiency shower heads.
 - 4) Install ultra-low flow toilets, or adjust flush valves on existing toilets.
 - 5) Use water-conserving icemakers.

Equipment Modifications

- 1) Eliminate "once-through" cooling of equipment with municipal water by recycling water flow to a cooling tower or replacing with air-cooled equipment.

However, when the process was broken down on a step-by-step basis and all costs associated with using the water were considered, it was concluded that the true cost of using the water was much higher. Including the value of process chemicals, energy, water purification measures and wastewater treatment, the total cost of using water, was actually **\$80 per 1,000 gallons (a 36-fold increase)**.

Before performing this analysis, the plant had been using about 90 million gallons of water annually because they perceived that water was cheap and conservation measures were not warranted. They estimated that the water cost them about **\$200,000 per year**. The results of the assessment showed them that using this quantity of water was actually costing them over **\$7 million per year**.

Within one year of the assessment, numerous conservation measures were implemented so that water usage was reduced by nearly one-third, resulting in cost savings of more than **\$2 million per year**. Understanding the full cost of using raw materials such as water — not

Water Efficiency Case Studies

Water Use Reduction at an Auto Assembly Plant

A 2004 assessment performed by the Illinois Waste Management and Research Center on a major automotive assembly plant's phosphating processes revealed that they perceived their water costs to be only **\$2.20 per 1,000 gallons** (the cost to purchase water from the city). At this low cost, water was used liberally throughout the plant to ensure adequate quality of cleaning and coating processes.

Using Water Efficiently: Keys for Businesses:

- Develop a mission statement, goals and a plan for reducing water usage.
- Educate and involve employees in water efficiency efforts.
- Designate a water efficiency coordinator.

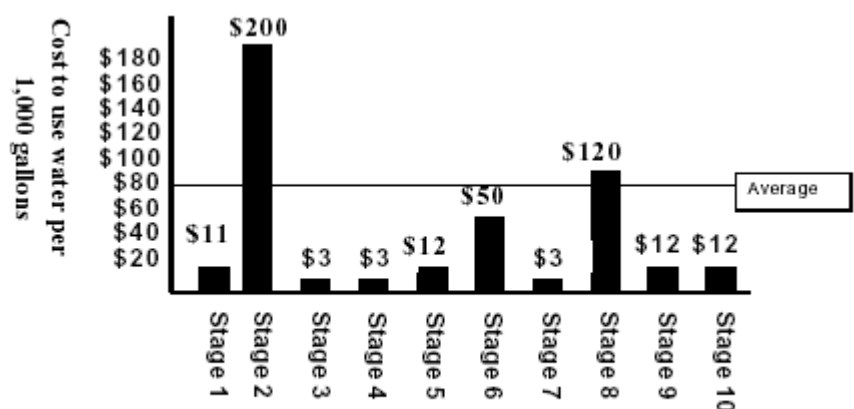


Figure 1. Cost to Use Water in an Automotive Plant Phosphate Line

Water Use Reduction for Businesses

materials — can provide the necessary incentives and justification for making changes that improve both economic and environmental performance.

Reducing Water Consumption

Appleton Papers Inc., West Carrollton, OH

Appleton compiled a waste inventory and investigated the potential for waste reduction or improved disposal/recycling. They also examined manufacturing processes for potential improvements, and assessed emerging technologies to improve efficiency. The results of Appleton's plant-wide assessment of operations yielded overall savings of more than **\$3.4 million**. The following projects demonstrate the economic significance of investing in water reduction.

- Reuse uhle-box seal water - annual savings \$288,185 and simple payback 15 days.
- Reuse centrifugal pump seal water - annual savings \$80,080 and simple payback four months.
- Re-circulate vacuum pump seal water - annual savings \$51,857 and simple payback six months.
- Feed dryer vacuum pump seal water to paper machine silos - annual savings \$40,407 and simple payback less than two months.
- Use condenser water for steam makeup - annual savings \$12,995 and simple payback 10 months.

The results of these and other changes allowed Appleton to reduce:

- fresh water consumption and pumping costs;
- chemical consumption for water softening;
- water heating costs; and
- overall waste streams and improve environmental compliance.

Water and Chemical Usage Study

Steelcase Inc., Grand Rapids, MI

Steelcase participated in the U.S. EPA sponsored Green Suppliers Network program and studied water and chemical usage at their Grand Rapids facility.

Two key process changes were implemented as a result of this study:

- use of purified water such as deionized (DI) or reverse osmosis (RO); and
- skimming of counterflow rinses.

With these changes Steelcase was able to accomplish the following reductions and cost savings:

- energy reduction - 60 percent reduction in BTUs required;
- water use reduction - 80 percent less water required;
- innovative chemistry - 20 percent less chemicals required;

- waste stream reduction - 85 percent less wastewater discharge; and
- labor to maintain process - >50 percent reduction.

Where to Get More Help

Ohio EPA's Office of Compliance Assistance and Pollution Prevention (OCAPP) can help you. For more information about the benefits of reducing water usage, please visit OCAPP's on-line pollution prevention training module at www.epa.state.oh.us/ocapp/p2/onlinep2training/onlinep2training.html.

OCAPP also offers free on-site pollution prevention (P2) assessments, and has extensive resources available with technical information to help you identify ways to reduce wastes and save money. For more information, contact us at 614-644-3469, or visit our Web site at www.epa.ohio.gov/ocapp/.

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References and Resources

Water Reduction Resource Center

<http://wrrc.p2pays.org/indsectinfo.asp?INDSECT=27>

Water Wiser

American Water Works Association Clearing house for water efficiency information

www.awwa.org/waterwiser/

U.S. EPA Water Sense™ Program for water-efficient products and services

www.epa.gov/owm/water-efficiency/index.htm

Water Efficiency Manual for Commercial, Industrial & Institutional Facilities

www.p2pays.org/ref/01/00692.pdf

Global Environmental Management Initiative (GEMI)- Connecting the Drops

www.gemi.org/ConnectingTheDrops.pdf

Reduction of Water Use in Wet Flue Gas Desulfurization Systems

www.netl.doe.gov/publications/factsheets/project/Proj432.pdf

Water Saving Tips for Food Processing Facilities

www.mde.state.md.us/programs/waterprograms/water_conservation/business_tips/food.asp

Water Use Reduction at an Auto Assembly Plant

www.wmrc.uiuc.edu/main_sections/info_services/library_docs/TN/tn07-086.pdf

Reducing Water Consumption - Appleton Papers Inc., West Carrollton, OH

www1.eere.energy.gov/industry/bestpractices/pdfs/newapple.pdf

Water and Chemical Usage Study - Steelcase Inc., Grand Rapids, MI

www.glrppr.org/meetings/Spring2007/presentations/3-13-1100-Mika-Warners-Harrington.ppt

Global water availability image on page 1

www.gemi.org/water/watertrends.htm

Phosphate graph (Water Use Reduction at an Auto Assembly Plant)

www.wmrc.uiuc.edu/main_sections/info_services/library_docs/TN/tn07-086.pdf