

# **East Side Water Supply Project**

## **Conservation Vision Statement**

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### **Introduction**

We appear to be living on the brink of an environmental catastrophe. The carbon dioxide levels in the atmosphere are current 391 ppm, well above the generally accepted limit of 350 ppm. At the same time, we have reached what is believed by most experts to be “peak oil,” meaning we have extracted more oil than we have left and that the remaining sources, such as tar sands, are far more expensive and environmentally damaging to extract. To compound the problem, all branches of state government and the U.S. House of Representatives have been taken over by Republicans who believe that global warming is a hoax or caused by sun spots and other non-anthropogenic sources, meaning that significant progress in reducing global warming and therefore climate change is very unlikely to happen in the near future.

While these problems are much more likely to surface in other areas than water policy, especially in a region such as the upper Midwest with relatively abundant water, adopting strong conservation policies is definitely to be recommended. This vision statement briefly outlines conservation measures the water utility and its board should adopt as its part in mitigating global warming.

### **Purpose of the Advisory**

The purpose of this vision statement is to look at conservation, starting with the Water Utility’s 2008 Water Conservation and Sustainability Plan (CP) and continuing with the assertion that the CP presents a modest start and that we must seriously confront our overuse of water. It concludes with several measures we can take to drastically reduce our water consumption. However, it will be much harder to achieve any real conservation until we revamp our rate structure to eliminate the incentives for waste inherent in water rates.

### **Main Point**

We would appear to be flush with water, surrounded by lakes and living near to the Great Lakes. Yet, only 0.08% of all of the world’s water is available to humans. We should take care of this water. Water we use either returns to the aquifer or goes into the storm sewers and eventually into the Gulf of Mexico. The water we return to the aquifer is more polluted than when we first used it. Pumping the water out of our wells uses roughly 20% of the overall energy used in our area [does anyone have a source for this? I saw it once, but can’t find it now]. Several parts of the country, including heavily populated Los Angeles, Las Vegas, and Phoenix, which are built on deserts, have little or no water of their own. The Colorado and Rio Grande Rivers are barely a trickle at their mouths due to expropriation for human use. The Mountain West and the southeastern United States have water shortages. Closer to home, the city of Waukesha is running out of water. Suffice it to say that as time goes on, pressure will increase on areas of the country with relatively more water to export it to drier areas. In preparation for that, we must start serious conservation efforts.

The conservation goal, as outlined in the Conservation Plan, seems at first blush to be an aggressive goal. It strives to reduce per capita residential use by 20% by 2020. This would reduce the per capita usage from about 73 to 58 gallons per day. (For comparison purposes, according to the Pacific Institute for Studies in Development, Environment, and Security, a person needs about 50 liters (about 12 gallons) of water per day for bathing, drinking, sanitation, and cooking to “meet a minimum quality of life.”) Assuming a static population, the drop from 73 to 58 gallons is a reduction of 1.7% per

person per year. Yet, the *Indoor Water Use* (Vickers, on page 13 of the CP) data show that if everyone installed high-efficiency fixtures, we would see a per capita reduction of water use of 35%. Thus, if only half the people in the water service area installed high-efficiency fixtures, we would meet our “conservation” goals without actually making any conscious reductions in our water use. Yet, it is clear that most of us could reduce our water usage quite a bit without altering our “way of life” significantly.

## **Why Water Conservation Is Important in Madison**

There are many reasons to conserve water. Some obvious ones are:

- The less water we use, the less we draw down the aquifer; water that stays in the aquifer is always purer than water pumped to the surface;
- If we use less water, we will reduce the need to build a new well or at least delay the need for an expensive new well;
- Pumping water uses an extremely high amount of electricity; the water utility uses more electricity than all other city agencies put together, according to a 2003 report.

Despite these reasons, some people might question the need for water conservation in Wisconsin, when we seem to have an ample supply.

The CAP reviewed the east side’s water demands (see Demand advisory) and has concluded that our current public water system supply may not be adequate to serve the Pressure Zone 6-East services area, especially at current usage rates. Water conservation efforts could help mitigate the volume needed in the coming years, and could help offset the need for creating new municipal wells.

Secondly, the supply of clean municipal water is threatened by increasing chemical concentrations (see Water Quality advisory). Steps must be taken to provide our community with clean water—in some cases, using expensive technology to remove these contaminants. Water conservation can reduce the demand for clean water, thereby also reducing the annual cost of its remediation and provision.

Water conservation can save money on your water bill. Although the rate structure involves a large percentage of fixed costs for residential use (and therefore reduction in use may not result in a significant reduction in the water bill), water conservation might provide tangible cost savings for large industrial and commercial users.

Finally, we need to ask ourselves as a community whether watering lawns planted with water-hungry grasses is a sustainable practice. The water utility installs special meters for heavy users of water for “irrigation,” both residential and non-residential. The customers who get these “sewer credit meters” installed do not pay for the sewage portion of their water use, as all other customers do. Should we be subsidizing people to use large quantities of water for irrigating their lawns, both in the actual water use and the water demand that leads to capital-intensive new well drilling? Watering lawns is not a sustainable practice and should be discouraged.

## **Water Conservation Activities**

There are several options to reduce overall water usage on the east side of Madison, depending on the frugality and commitment of its residents and commercial property owners.

### Easy No-Cost Water Conservation

- Get into the habit of thinking that water is a precious commodity and should not be used unconsciously.
- Don't let the sink run while you brush your teeth or wash your face.
- Many people overwater their lawns, not only wasting water, but causing excessive runoff, which is especially detrimental if that person uses artificial fertilizers or pesticides on their lawns. There are "smart irrigation" systems that control how much is watered and when;
- Toilets do not need to be flushed after every use; adopt the philosophy of: "If it's yellow, it's mellow; if it's brown, flush it down."
- Only run the dishwasher or washing machine with full loads.
- Install a low-flow shower head that uses 2.5 gallons per minute, and you could save 12% of your water usage.

### Moderate Water Conservation

- Check your house at least quarterly for drips and leaking pipes. A dripping pipe can use as much as 5,400 gallons per year! A wrench and some Teflon tape easily fix a dripping connection; washers are easily replaced.
- Use a rain barrel to collect water for your garden. Plant drought-resistant plants and rock gardens to minimize or eliminate the need to water a lawn.
- Install low-flow water appliances. Energy Star clothes washers use 40% less water than conventional models.
- Install high-efficiency toilets (these may also qualify for up to \$100 rebate). A toilet that flushes 1.28 gallons per flush may save over 19,000 gallons annually for a family of four over a more conventional toilet. Apply for the rebate by submitting the receipt with complete model information along with a completed application form (available at [www.madisonwater.org](http://www.madisonwater.org)). Refer to the website for additional requirements.

### Dedicated Water Conservation

- Capture water used for washing the body or dishes and transfer it into five-gallon buckets; this (gray) water can be used for watering gardens, plants, or flushing toilets.
- When running water to get it warm, capture the water and transfer it into gallon jugs; this water can be used for drinking or cooking.
- Before throwing today's worn clothes into the laundry, make sure they really are dirty and need washing (note: it's shocking to learn that clothes washing uses about 22% of the total water consumption, second only to toilets--27%).
- Install composting toilets to eliminate the need for flushing and provide fertilizer for ornamental plants.

### Commercial & Industrial Opportunities

A number of the personal water conservation choices can also impact commercial and industrial operations, like dripping/leaking pipe checks, installing low-flow appliances and toilets and setting up lawn maintenance to avoid wasting water. Some additional ideas are:

- install sensor-enabled sink faucets that only run when movement triggers them to avoid employees and customers leaving sinks running in the bathroom
- changing processes to use less water (i.e., sweeping instead of hosing off a sidewalk)
- reusing water in another process (i.e., using rinse water in a cooling tower)
- employees often let water run a very long time waiting for it to get hot to wash their hands in multi-story buildings where the water heater is in the basement; consider installing an in-line water heater that can provide on-the-spot hot water for a specific floor without the floor space for a water tank

- install sensors on automatic sprinkler systems so they aren't spraying when it's raining
- perform a water survey (to identify all water-using equipment) to determine conservation opportunities like water sequencing and water use reduction or elimination
- install interlock solenoid valves with power switches or timers to shut off water when equipment isn't being used
- in restaurants, use ice flake machines instead of ice cube machines

### Revamping the Water Utility Rate Structure

Discussing the rate structure can be complicated, because we receive one bill for both water and sewer. Our water bills contain several additional fixed, regressive charges, including "landfill remediation," "public fire protection charge," and "storm water charges." These have nothing to do with the individual water consumer, but make up 30% of the bill. More unfairly, the storm water charge is divided into "pervious" and "impervious," calculated from aerial shots of an individual property. Even if one's storm water from the roof goes into drain tiles, a rain barrel, a rain garden, or is otherwise diverted away from storm sewers and into the yard (and eventually the aquifer), no adjustment is made for these improvements, even though the "impervious" charge is almost 15 times higher than the "pervious" charge per square foot. The city has stated it will not adjust for these storm water diversion projects. That needs to change, although we understand that the water utility has no control over how or why these charges are on our bills. This is mentioned primarily to help people understand why they do not benefit as much financially from water conservation as they think they might.

Aside from these regressive fixed charges, the water and sewer bills (both of which are based on water consumption) encourage waste. For one member of the CAP who uses relatively little water, his water and sewer base charges are \$83.90, and the usage charges are \$17.64, meaning that actual water use makes up only 17.4% of the total water and sewer base bill. If this person had used twice as much water, the charges would have been \$83.90 and \$35.28. This means is that if this person doubles his water use, his bill only increases \$18 or less than 18%. Where is the incentive to conserve given these disincentives? (Comparing the late 2010 bill to that of late 2007, it appears that the Water Utility is taking some steps to reduce this disparity: in those three years, the base water charge increased 9.96% while the usage charge increased 78%, an enormous increase but at least mostly for usage rather than fixed charges.)

In addition, the Water Utility still rewards large users for using more, as rates are lower over a certain amount. This will be changing soon apparently, but, as is obvious from the above, the excessive fixed charges produce most of the disincentives to reduce consumption.

Many water districts around the country have rates that charge a higher marginal rate for using more water over average usage. In some districts, frequently those with severe water shortages, water rates are as much as five times higher at the higher usage rates. Boulder, Colorado, for instance, uses a rate structure with five "billing blocks." Each customer is assigned a "water budget," based on the size of the lot. The first increment of water used--up to 60% of the water budget--has the lowest rate. Usage between 60% and 100% of the budget is charged as the "base rate." The billing rate increases as more water is used; when a customer uses more than double the water budget, that water is billed as five times the base rate.

Even though it is commonly assumed that fixed charges reflect the cost to build and maintain the infrastructure, if we are serious about wanting people to conserve water, we should give them

incentives to do so. One way to do this would be to reduce the fixed charges and increase usage charges, while ensuring that the overall income of the utility from bills is actuarially equivalent. Instead of having one usage rate, we should have several rates that increase as one's marginal use increases, especially in summer when increased usage is likely attributable to lawn irrigation.

## **LONG-TERM WATER AND SEWAGE IMPERATIVE**

Long-term, the use of drinking water to flush away human "waste" is unsustainable. There are two problems with this: 1) the "waste" can and should be used for fertilizer; composting toilets exist currently and are odor-free; and 2) although we flush it "away," it does not just go away. It needs to be processed down the line and is expensive to process and uses an inordinate amount of energy and water to do so. Raw sewage in bodies of water due to sanitary sewage leaks or overflow during floods, for instance, cause enormous pollution problems. Currently, over a quarter of the water we use goes to flush toilets. Using other methods other than using drinking water to flush away "waste" is essential.

## **RECOMMENDATIONS**

We recommend that the Madison Water Utility promote water conservation activities such as the ones described in this advisory. We recommend that gray water usage laws be amended to allow safe reuse of gray water. California has recently "legalized" the use of gray water. We should too. We also recommend structuring the utility bill to recognize and reward water conservation efforts. We further recommend the Water Utility consider implementing summer watering restrictions to minimize the future need for more wells.

**Sources:** Madison Water Utility, "Water Conservation and Sustainability Plan."

Jeffrey Rothfeder, *Every Drop for Sale*

Joseph Jenkins, *The Humanure Handbook*

*Conserving Wisconsin's Water and Energy Resources: A Guide for Groundwater Guardian Communities*

(<http://www.co.portage.wi.us/groundwater/action/Conserving%20Wisconsin%20brochure.pdf>)

New Mexico Office of the State Engineer, *A Water Conservation Guide for Commercial, Institutional and Industrial Users*

City of Boulder, Colorado, *The Basics of Your Water Budget*,

[http://www.bouldercolorado.gov/index.php?option=com\\_content&view=article&id=6243&Itemid=2466](http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=6243&Itemid=2466)