

Summary of Energy Use by Wisconsin Water and Wastewater Utilities

Draft – Prepared for the Governor’s Global Warming Task Force
4/28/08

Table 1
Energy Costs as a Percentage of Total O&M Expenditures¹
Wisconsin Water Utilities

Item	2006	2007
Number of Utilities Reporting ¹	559	516
Power Expenses ²	\$28,993,345	\$29,123,425
Total O&M Expenses	\$274,929,872	\$278,443,423
Percentage of Total Expenses	10.5%	10.5%

¹ Incomplete data because some utilities have not filed 2007 annual report as of April 15, 2008 and approximately 20 utilities reported no expenses for power in 2006 or 2007.

² Includes expenses recorded to accounts 621 – Fuel for Power Production, 622 – Power Production Labor and Expenses, and 623 – Fuel or Power Purchased for Pumping of the Uniform System of Accounts.

Source: Public Service Commission Annual Report Data

Table 2
kWh/1,000 Gallons Pumped¹
Wisconsin Water Utilities

Item	2006	2007
Average	1.77	1.80
Median	1.98	1.99
Interquartile Range	1.50 - 2.86	1.50 - 2.80
Number of Utilities Reporting	557	506

¹For some utilities, this may include energy used for treatment in addition to pumping because these costs cannot be broken out separately. For example, the Milwaukee Water Works reports all energy consumed in pumping and treatment in the same account. In contrast, the Green Bay Water Utility reports energy used for treatment separately. In 2007, the Green Bay Water Utility reported that an additional 0.127 kWh/1,000 gallons was used to produce ozone.

Source: Public Service Commission Annual Report Data

Table 3
Electricity Used for Water Production
 Wisconsin Water Utilities

Year	Estimated Volume Pumped (1,000 Gallons)	Estimated Energy Costs ¹	Estimated Energy Costs (\$/1,000 Gallons)	Total Purchased Power (kWh)	Purchased Power (kWh/1,000 Gallons)
2002	212,248,232	\$22,047,742	\$0.10	380,597,483	1.79
2003	217,805,225	\$23,886,347	\$0.11	380,247,615	1.75
2004	209,078,676	\$24,485,178	\$0.12	371,427,022	1.78
2005	216,442,846	\$27,657,396	\$0.13	377,717,553	1.75
2006	207,081,035	\$28,993,345	\$0.14	361,825,124	1.75
2007 ²	195,434,911	\$29,123,425	\$0.15	348,624,238	1.78
Average ³	212,531,203	\$25,414,002	\$0.12	374,362,959	1.76

¹ Includes energy costs reported in accounts 621, 622, and 623.

² Incomplete data – Only 516 utilities filed annual report as of 4/28/08.

³ Average includes 2002 through 2006 only.

Source: Public Service Commission Annual Report Data

Table 4
Electricity Used for Sewage Treatment
 Milwaukee Metropolitan Sewerage District

Year	Estimated Volume Treated (1,000 Gallons)	Estimated Energy Costs ¹	Estimated Energy Costs (\$/1000 Gallons)	Total Purchased Power ² (kWh)	Purchased Power (kWh/1000 Gallons)
2002	69,873,000	\$8,025,549	\$0.11	430,760,000	6.2
2003	62,256,000	\$10,619,140	\$0.17	508,140,000	8.2
2004	74,638,000	\$13,423,598	\$0.18	482,040,000	6.5
2005	62,900,000	\$17,786,452	\$0.28	463,380,000	7.4
2006	69,500,800	\$15,778,629	\$0.23	682,880,000	9.8
2007	67,404,100	\$14,990,160	\$0.22	604,170,000	9.0
Average	67,761,983	\$13,437,255	\$0.20	528,561,667	7.8

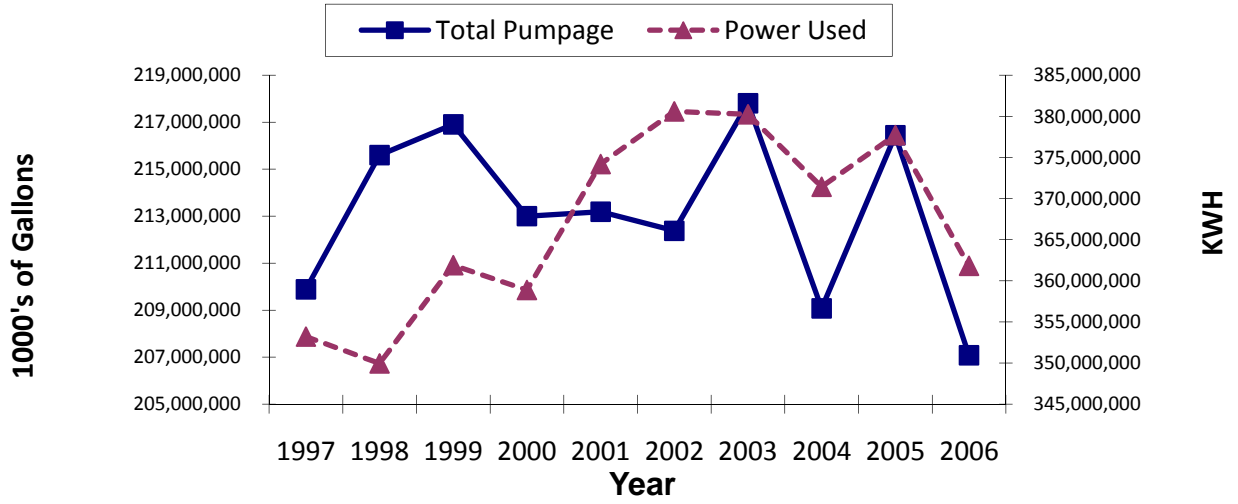
¹ Does not include natural gas used for heating and drying of biosolids.

² Does not include energy generated at South Shore from anaerobic digesters.

Source: Personal Communication, Steve Jacquardt, MMSD.

Figure 1

Trends in Energy Usage at Water Utilities
1997 through 2006



Estimated Annual Gallons of Water Saved from Focus on Energy Residential Program Initiatives

	18MCP to date				
	(July 2007 - March 2008)	FY07 (July 2006 - June 2007)	FY06	FY05	FY04
Clothes Washers	59,208,330	185,363,592	95,152,008	103,672,146	107,237,904
Dishwashers	-	5,083,460	3,344,970	2,903,790	1,581,540
ACES - Showerheads	46,991,925	2,163,994	1,375,594	56,448,619	10,019,250
ACES - Aerators	29,003,083	1,343,930	857,203	15,379,823	3,928,313
ACES - Pre-Rinse Sprayers	32,850	32,850	-	-	123,188
Total Gallons Saved Annually	135,236,188	193,987,826	100,729,774	178,404,377	122,890,194

Energy Savings from Focus on Energy Water and Wastewater Program

	18MCP (July 2007 - Dec 08)				
	07 Data only	FY07 (July 2006 - June 2007)	FY06	FY05	TOTAL
Number of Projects Implemented	8	10	17	15	50
Kilowatts	198	437	478	1,091	2,205
Kilowatt Hours	1,386,197	2,844,144	3,036,942	7,091,153	14,358,436
Therms	-	604	-	-	604

18 MCP Water and Wastewater program budget is \$1.3 million, of which incentives account for about \$900k.

Wisconsin Water/Energy Rules of Thumb

- Water supply: about 1,500 kwh per million gallons (see Table 2 below)
- Wastewater treatment: 1,200 - 4,200 kwh per million gallons (small systems are less efficient)

Quick Wisconsin Water/Energy Factoids

- Almost 400 million kWh per year for drinking water* (~\$30 million)
- 581 drinking water systems
- 75% of energy use is by the 76 largest systems
- Average energy expenditure is about 11% of total operating budget (AwwaRF)

* Source: Energy Use at Wisconsin's Drinking Water Utilities, Energy Center of Wisconsin, 2002.

Table 2 presents the average energy use rates for the various classes of drinking water utilities in Wisconsin⁴⁵. It should be noted that one-fourth of Wisconsin's drinking water utilities use less than 1.0 kWh per 1000 gallons.

Table 2
Energy Use Rates at Drinking Water Utilities

Type	kWh/1000 gallons
Class AB (>4000 customers)	1.51
Class C (1000-4000 customers)	1.85
Class D (<1000 customers)	1.89
Surface water source (US)	1.4
Groundwater source (US)	1.8

Note: The energy rates for the three classes of utility include distribution losses and delivery to customers. The average water loss for the state is 11% of the water produced.

Wisconsin Task Force on Global Warming

Focus on Water Pilot Program

Draft 4/30/2008

1. **Workgroup:** Ad Hoc Water Conservation
2. **Policy Name:** Focus on Water Pilot Program
3. **Policy Type:** Legislation and/or a PSC-initiated effort to create a dedicated funding source for water conservation and efficiency programs that will result in both water and energy savings.
4. **Affiliated Sectors, Sub-sectors and/or Entities:** Public water and wastewater utilities, water-intensive industries, agriculture, and residential.
5. **Estimated Greenhouse Gas Emissions Reduction Impact:** TBD

The production, distribution, use, collection, treatment, and disposal of water require significant energy inputs. Several studies have quantified the energy required to produce and treat water, but the amounts vary depending on system characteristics. Nationwide estimates for public water supplies suggest an average of about 1.5 kWh/1,000 gallons¹ to 2.0 kWh/1,000 gallons². One EPA study estimated that it takes 11.75 kWh to treat 1,000 gallons of wastewater.

EPA estimates that 3 percent of national energy consumption, equivalent to approximately 56 billion kWh, is used for drinking water and wastewater services³. This equates to adding approximately 45 million tons of greenhouse gas to the atmosphere. As a result, greenhouse gas emission reductions through water efficiency measures may be readily attainable through existing water-saving technology. For example, EPA estimates that if just one out of every 100 American homes was retrofitted with water-efficient fixtures, we could save about 100 million kWh of electricity per year and avoid adding 80,000 tons of greenhouse gas to the atmosphere.

The energy savings that could be expected as a result of water conservation and efficiency programs in Wisconsin needs further evaluation. However, preliminary data suggest that measurable reductions in greenhouse gas emissions would result from enhanced water conservation and efficiency efforts.

Specifically, the Public Service Commission of Wisconsin estimates that energy costs represent approximately 10.6 percent of overall operation and maintenance expenses for public water utilities. From 2001 through 2006, water utilities pumped an average of

¹ "Ensuring a Sustainable Future: An Energy Management Guidebook for Water and Wastewater Utilities," EPA, January 2008.

² Pacific Institute, 2004, Water to Air Models, http://www.pacinst.org/resources/water_to_air_models/index.htm

³ EPA, 2008, http://www.epa.gov/waterinfrastructure/bettermanagement_energy.html.

212.7 billion gallons per year, using 374.3 million kWh, for an average of 1.8 kWh/1,000 gallons pumped. Preliminary data from the Milwaukee Metropolitan Sewerage District suggest that its wastewater treatment process requires approximately 7.8 kWh/1,000 to treat wastewater. Using these estimates, it is reasonable to conclude that water systems in Wisconsin use at least 10.0 kWh/1,000 gallons.

[We need a paragraph translating water efficiency into measurable GHGs here].

6. Estimated Costs: TBD

7. Funding Sources:

Various options for funding a Focus on Water program have been identified. These include:

- assessing a fee to water and wastewater utility customers, similar to the model used by the Focus on Energy program.
- assessing a one-time fee on persons constructing including residential, agricultural, industrial, and municipal wells.
- establishing a sales tax on bottled water; and
- allocating a portion of the revenue collected through the Focus on Energy program.

8. Specific Policy Description:

Recent legislative and policy changes have led to greater emphasis on water conservation and efficiency in Wisconsin. Specifically, both 2003 Act 310, the Groundwater Law, and the Great Lakes Compact are expected to lead to the implementation of additional water conservation and efficiency measures. In addition, the Wisconsin Department of Natural Resources (DNR) is working with other state agencies and stakeholders to develop water conservation goals and objectives for the portion of the state with the Great Lakes basin. Simultaneously, the PSC is working to assist water utilities to plan and implement water conservation and efficiency measures, including rates that encourage water efficiency.

Although water conservation and efficiency are becoming an important component of water utility operations and long-term water supply planning, funding to assist with water efficiency efforts has been limited. In addition, there has been little effort to evaluate the energy implications of water supply options, including water conservation. Furthermore, the energy savings that could be achieved through water conservation and efficiency efforts have not traditionally been considered in existing energy efficiency programs. For example, the Focus on Energy program does not consider the energy benefits that would result from a water conservation project unless it involves energy inputs made directly by the end user. However, there may be significant energy savings to the water and wastewater utilities as a result of reduced water demand, even for cold water uses.

A Focus on Water program could provide funding to implement water conservation and efficiency efforts statewide. These efforts would lead to measurable water savings,

protect important water resources, and reduce greenhouse gas emissions. Specifically, the funds could be used to:

- offer rebates or other incentives to utility customers to purchase, install, and use water-efficiency products and services;
- provide technical and financial assistance to water utilities in developing water conservation and efficiency plans;
- provide technical and financial assistance to large water users to assist with identifying solutions for reducing their water and energy use;
- develop education and outreach materials, including K-12 educational programs; and
- research water efficient technologies and practices and the connection between water and energy use.

The Task Force could consider a number of options in its recommendation to implement such a program. Some of these may require statutory changes, while others could be implemented under existing authority:

- creating an independent, statewide Focus on Water program;
- implementing a Focus on Water program as one component of the Focus on Energy program;
- establishing a limited, regional pilot program in an area of water supply concern, such as southeastern Wisconsin; or
- establishing water conservation and efficiency programs on a case-by-case basis for individual water and wastewater utilities.

9. Timetable, Duration and Stringency Option: TBD

10. Explanation of Rough Estimate of GHG Reductions: TBD

11. Rough Estimate of Costs for Selected Years: TBD

12. Barriers to Implementation:

Statewide implementation of a Focus on Water program may be hindered by the fragmentation of the Wisconsin water and wastewater industry. Currently, more than 580 public water utilities and 600 municipal sewer systems serve only half of the state's residents, while the remainder is served by private wells and septic systems. As a result, identifying an equitable funding source may be controversial and difficult.

Public utilities and municipal sewer systems likely will oppose efforts to assess additional fees on their customers. Private well and septic system owners are not currently charged an ongoing rate or fee, making collection of additional funding from these users controversial. Further, existing permitting fees collected by DNR are used to fund existing programs. Finally, electric utilities might oppose using Focus on Energy dollars

to pay for water conservation and efficiency projects that result in only limited energy savings.

13. Other Factors: TBD

14. Related Policies: TBD