



Northern Great Plains Water Consortium *Water Use Fact Sheet*

The Demand for Water

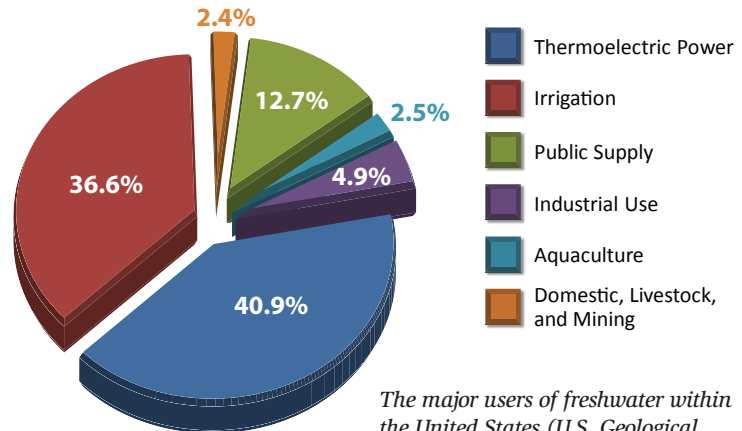
Water is the most critical limiting resource throughout the world. Sustainable economic growth requires a reliable supply of water for energy, agriculture, and a growing population. Water is necessary for urban development, power production, growing and processing high-value crops, oil and gas development and processing, and industrial manufacturing. Satisfying all of these competing needs requires a better understanding of water resources and new approaches to water management. Energy, agriculture, industry, and municipalities all urgently need a scientifically valid basis upon which to make management and regulatory decisions related to water use and quality.

The Northern Great Plains Water Consortium® (NGPWC) is a partnership between the Energy & Environmental Research Center (EERC), the U.S. Department of Energy (DOE) and key energy-producing entities in the northern Great Plains to address issues related to water availability, reducing freshwater use, and minimizing the impacts of facility and industry operations on water quality. The key goals of the NGPWC are:

- To evaluate water demand and consumption from competing users in the northern Great Plains region, including energy production, agriculture, industry, and domestic/municipal users.
- To assess, develop, and demonstrate technologies and methodologies that minimize water use and reduce wastewater discharge from energy production and agricultural processing facilities.
- To identify nontraditional water supply sources and innovative options for water reuse.

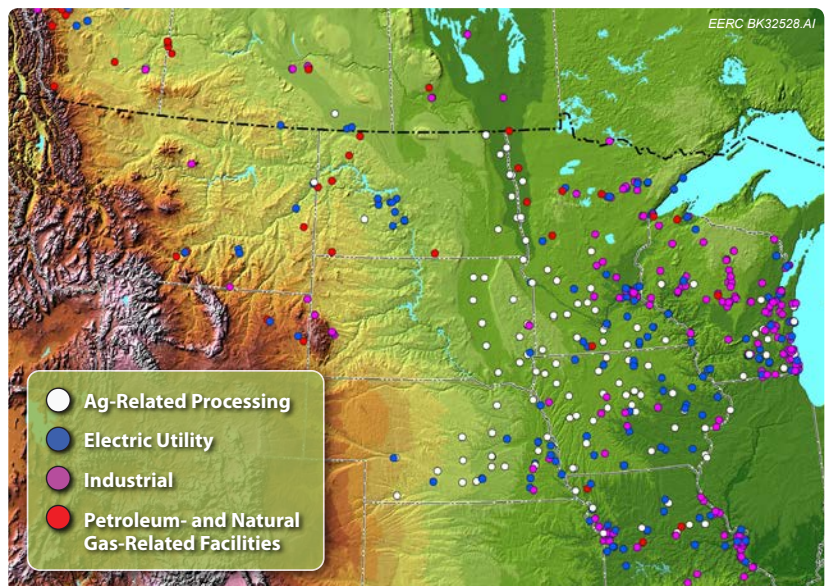
Thinking Outside the Box to Address Water Issues

As the United States continues to pursue economic development and the population increases, demand for ever-increasing amounts of energy to support that growth will require water. In areas where water resources are limited or become scarce because of overallocation and/or drought, competing interests for water could



The major users of freshwater within the United States (U.S. Geological Survey Circular 1344, 2009).

limit energy development and production. With the vibrant oil, gas, and utility interests in the region, potential water reuse synergies among energy-related industries should be explored. For example, in 2005, thermoelectric power generation was the largest domestic user of water, accounting for nearly 41 % of all freshwater withdrawals in the United States, as illustrated in the figure above. A portion of that cooling water effluent could be used in other industries. Significant volumes of water are also used in the drilling and completion of oil and gas wells. Wastewater from other industries could be used to supply water needed for drilling operations, and options may exist to treat and reuse the produced water from oil and gas operations. Finding innovative solutions that expand water resource options for the energy industries in the region is one of the key goals of the NGPWC.



NGPWC region showing the locations of key energy, agricultural, and industrial facilities.

Putting Regional Water Use in Perspective

The various industries and water users within the region often use different units of reference when referring to water consumption and discharge. To gain a perspective on the relationship between municipal, industrial, and

agricultural water use, below are comparisons of some common units and examples of water use among the sectors.

Approximate Volumetric Equivalents

barrels	gallons	acre-feet	cubic feet	cubic meters
1	42	0.000129	5.6146	0.15897
7758	325,851	1	43,560	1233
23,810	1,000,000	3.1	133,681	3785

Conversion Factors

1 cubic foot = 7.4805 gallons
 1 gallon = 3.785 liters
 1 cubic meter = 1000 liters
 1 acre = 43,560 square feet

Approximate Flow Equivalents

barrels per day (bbl/day)	million gallons per day (Mgd)	gallons per minute (gpm)	cubic feet per second (cfs)	cubic meters per second (m ³ /s)
23,810	1.0	694.4	1.55	0.04381
34.3	0.00144	1.0	0.0022	0.00006
100	0.0042	2.9167	0.0065	0.000184

Water Use Comparisons

Use	gallons (millions)	barrels (thousands)	acre-feet	cubic meters
Typical Daily Use for a 50,000-Person Midwestern City (including industrial users)	10	238	30.7	37,850
Daily Pumping Volume for a Center-Pivot Irrigator for 130 acres (irrigated portion of ¼ section)	1.008	24	3.1	3815
Average Daily Water Withdrawal for Once-Through Cooling at a 400-MW Coal-Fired Power Plant	365	8691	1120	1,381,525
Water Used to Fracture the Formation for an Oil Well in the Bakken Formation (one-time use)	1.0–5.0	24–119	3.1–15.3	3785–18,920
Proposed Maximum Daily Volume of Water Imported for the Red River Valley Water Supply Project	77.56	1847	238	293,556

Interested in Participating?

The EERC is actively seeking commercial partners to complement DOE funding and to help direct the program's efforts. The NGPWC recently completed Phase I of the program, wherein current program efforts and demonstration projects were prioritized and selected. Phase II of the effort, begun in late 2009, focuses on demonstrating the selected water minimization and beneficial reuse strategies and technologies.

The NGPWC is a partnership of key public and private water users in the northern Great Plains region. New members are welcome. To learn more, contact:

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