U.S. Water Supply and Distribution

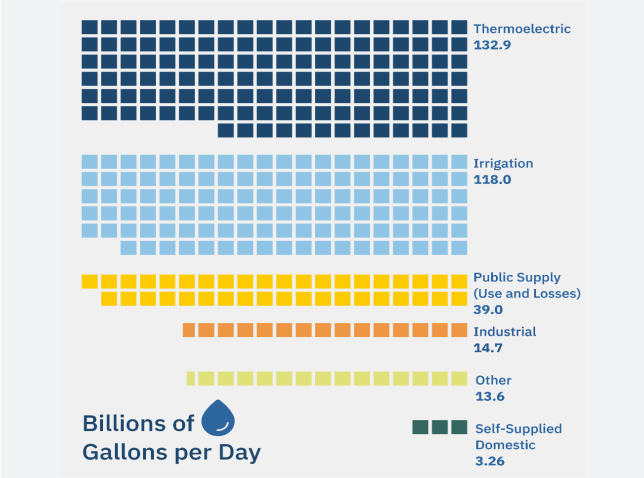
All life on Earth depends on water. Human uses include drinking, bathing, crop irrigation, electricity generation, and industrial activity, such as paper and metal production.[1] For some uses, water requires treatment beforehand. Over the last century, water treatment goals have remained consistent: producing water that is biologically and chemically safe, appealing to consumers, and non-corrosive and non-scaling. Water supply problems and solutions vary significantly by region. Failure by governments to enforce drinking water regulations and promptly protect public health resulted in lead contamination and cases of Legionnaires' disease in Flint, MI in 2014-2019.[2] The arid southwest faces droughts, and decreasing water levels at reservoirs like Lake Powell, Lake Mead, and Lake Oroville are impacting hydropower production.[3,4,5] In marine systems like south Florida, increased freshwater use has created the need for desalination plants.[6]

Patterns of Use

- In 2015, U.S. water use was approximately 322B gal/d, 87% of which was freshwater, leaving 13% from salt water.[7] Thermoelectric power plant cooling (133B gal/d) and irrigation (118B gal/d) were the largest withdrawals.[7] Water use increased by 7.5% from 2000 to 2020.[8] Though 41% of daily water use is for power plant cooling, only 3% of these withdrawals are consumptive, meaning 97% of the water is returned to the environment.[7] Irrigation includes water for agricultural crops and water used for landscaping, golf courses, parks, etc.[7]
- In 2015, California and Texas accounted for 16% of U.S. water withdrawals.[7] Florida, New York, and Maryland accounted for 50% of saline water withdrawals.[7]

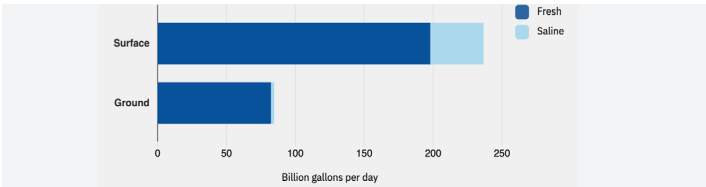
Sources of Water

Estimated Use of Water, 2015[7]



- Surface sources account for 74% of all water withdrawals.[7]
- Approximately 87% of the U.S. population relied on public water supply in 2015; the remainder, 43 million Americans,[8] relied on water from domestic wells.[7]
- Approximately 144,834 publicly owned water systems provide piped water for human consumption in 2026, of which 34% are community water systems (CWS).[9] The largest 9% of CWSs provide water to 79% of the population.[9]
- Nearly all rural populations rely on groundwater for drinking water.[11] Over 84B gal of groundwater is withdrawn in the U.S. every day; nearly 70% is for irrigation.[7]

Withdrawals by Source[7]



Energy Use

- 2% of U.S. electricity use goes toward pumping and treating water and wastewater.[12] Electricity accounts for around 40% of municipal water processing and distribution costs.[12]
- Groundwater supply from public sources requires 2,100 kWh/M gal, about 31% more electricity than surface water supply, mainly due to greater pumping requirements.[13]
- The California State Water Project is the state's largest single energy use: 2.5-9.5B kWh/yr, partially met by its own hydroelectric generation.[14] Delivering water from the San Francisco Bay-Delta to Southern CA uses 3-4% of all state electricity.[15] 19% of CA's electricity use is for pumping, treating, collecting, and discharging water and wastewater.[16]
- The Central Arizona Project moves water from Lake Havasu to Tuscon and is one of Arizona's largest electricity uses, spending $60-80M on electricity per year for pumping.[17]

Water Treatment

- The UN 6th Sustainable Development Goal aims to ensure access to clean water for all. Clean water and sound water resource management are essential for a sustainable future.[18]
- The Safe Drinking Water Act (SDWA), enacted in 1974 and amended in 1986, 1996, and 2018, regulates contaminants in public water supplies, provides infrastructure funding, protects drinking water sources, and promotes water system compliance capacity.[19]
- The U.S. EPA monitors drinking water for microorganisms, disinfectants, radionuclides, and organic and inorganic compounds.[21]
- 91% of CWSs are designed to disinfect water, 23% to remove or sequester iron, 13% to remove/sequester manganese, and 21% for corrosion control.[10] For nearly 50% of groundwater treatment plants, disinfection is the only treatment step.[10]

Size Categories of Community Water Systems[9,20]

System Size (Population Served)	Number of CWSs	Population Served (Millions)	% of CWSs	% of U.S. Population Served by CWSs
Very Small (25–500)	26,715	4.5	53.8%	1.4%
Small (501–3,300)	13,344	19.2	26.9%	5.9%
Medium (3,301–10,000)	5,012	29.4	10.1%	9.0%
Large (10,001–100,000)	4,104	117.8	8.3%	36.1%
Very Large (>100,000)	483	155.1	1.0%	47.6%
Total	49,658	326.1	100.0%	100.0%

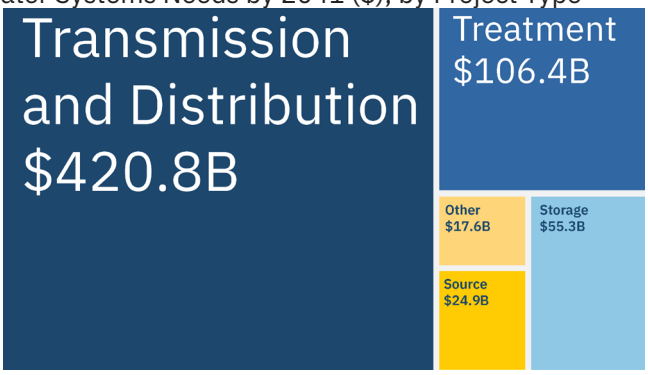
- Use the Municipal Drinking Water Database to learn more about the drinking water systems of over 2,000 U.S. cities and the communities that they serve.[22]

Life Cycle Impacts

Infrastructure Requirements

- The 2023 Drinking Water Infrastructure Needs Survey and Assessment found that U.S. water systems need $625B of investment by 2041 to maintain clean drinking water supply.[23]

Water Systems Needs by 2041 ($), by Project Type[23]



- Water systems maintain more than 2M miles of transmission and distribution mains.[8] In 2020, the average age of U.S. water pipes was 45 years, up from 25 years in 1970.[24]
- From 2018 to 2023, the rate of water main breaks per mile of pipe decreased by 21%.[8] This is large due the to replacement of cast iron asbestos cement pipes (which have the highest breakage rates) for ductile iron and polyvinyl chloride (PVC) alternatives.[8] In 2025, there were roughly 240,000 water main breaks, costing $2.6B in repairs and maintenance.[8]
- Aging infrastructure contributes significantly to water loss; 33.3T gal (worth $187B) is lost annually.[8]
- Lead is used in an estimated 3.9% of total U.S. water service lines.[25,26] In 2021, Congress passed the Bipartisan Infrastructure Law (BIL) allocating $15B towards lead service line replacement.[23]

Consumptive Use

- Consumptive water use draws water from a source within a basin and returns little or none.[7]
- Agriculture is responsible for 80-90% of total U.S. consumptive water use.[27] Of the 118B gal/d of freshwater withdrawn for irrigation, over half is lost to consumptive use.[7] Over the past 50 years, water consumption has tripled.[28]

Solutions and Sustainable Actions

Supply Side

- Continued federal funding through the Infrastructure Investment and Jobs Act will reduce the infrastructure investment gap and decrease service disruptions to water-reliant businesses, resulting in 46% cost savings and preserving over 200,000 jobs by 2043.[29]
- Periodic rehabilitation, repair, and replacement of distribution infrastructure would improve water quality and avoid leaks.[30] Right-sizing, upgrading to energy efficient equipment, and monitoring and control systems can optimize systems for the communities they serve, while saving energy and water.[16]
- Significant energy efficiency opportunities exist for pumps and motors.[31] Implementing on-site energy and chemical use efficiency measures, including sludge recycling and chemical recovery, reduces environmental impacts and chemical use.
- Effective watershed management is often more efficient than treating contaminated water. NYC invested $1-1.5B in a watershed protection project to improve the water quality in the Catskill watershed rather than constructing a new $6-8B filtration plant.[32] Over 25 years, the Watershed Protection Program has improved water quality with strong indications of continued effectiveness.[33]
- Two large scale desalination projects in the U.S. (CA and FL) provide a combined 75 million gallons per day. Brackish (less saline) water desalination is used by communities in CA, TX, and FL. There is significant research in the U.S. to improve existing desalination technologies in order to lower the cost and energy intensity.[34]

Demand Side

- *Better engineering practices*: plumbing fixtures to reduce water consumption (high-efficiency toilets, low-flow showerheads, and faucet aerators); water reuse and recycling (graywater systems and rain barrels); efficient landscape irrigation practices.[35,36]
- *Decrease consumption of water intensive foods*: corn,[37] soybeans,[37] and beef.[38]
- *Better planning and management*: pricing and retrofit programs; proper leak detection and metering; residential water audit programs and public education programs.[36,39]
- Communities experiencing environmental injustice can use environmental justice resources, such as the Water Justice Toolkit.[40]

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Sources for this factsheet are online, help with units and abbreviations is here. See css.umich.edu/publications/factsheets for other factsheets.