The Wind/Water Nexus
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Water Use

Irrigation
Second largest water user in the United States; irrigation accounts for 137 billion gallons per day, about 34% of water withdrawn
About 14% of U.S. farms are irrigated, representing 55 million acres of irrigated land
Irrigation systems use diesel, gasoline, electricity, propane, or natural gas, depending on local economics, availability, and pump size.

Public Supply
In 2000, total freshwater withdrawals for public supply were 43.3 billion gallons per day
Population/urban growth stress water supplies, and the highest population growth is projected in regions with limited water resources
The states with the largest public supply withdrawals are (in descending order) California, Texas, New York, Florida, Illinois, Ohio, Pennsylvania, Georgia, Michigan, and Arizona.

Desalination
One strategy to address impending water shortages is the development of new water sources, such as brackish aquifers and seawater. Desalination is utilized by coastal cities as well as inland municipalities with access to brackish water sources. The United States is home to 20% of the world’s desalination facilities
Desalination requires a constant power supply, and electricity is the major cost for these plants: for brackish water, electricity use is 11% of total cost, and for seawater, it is 44% of operating costs for the plant.

Water Withdrawals

Nine of the top 10 irrigation states (California, Texas, Idaho, Arkansas, Colorado, Nebraska, Arizona, Kansas, Washington, and Oregon) have good to excellent wind resources
The rising and uncertain future costs of diesel, natural gas, and even electricity increase the opportunity for wind energy and its predictable and competitive cost
Hybrid wind-gas or wind-diesel systems provide another option.

Water & Population

Twelve of the 15 fastest-growing states (1995–2025), eight of the 10 states with the largest public water supply withdrawals, and nine of the 10 states with the highest per capita water consumption have good to excellent wind resources
Offshore (including the Great Lakes) wind resources are particularly robust and close to large and growing metropolitan areas
Wind energy is relatively economically competitive, predictable, and renewable—all benefits to municipal electricity/water providers.

Characterization

Solutions

Desalination requires a constant power supply, and electricity is the major cost for these plants: for brackish water, electricity use is 11% of total cost, and for seawater, it is 44% of operating costs for the plant.
Many growing coastal cities with high energy costs are located in good wind resource areas
Desalination systems can be installed off-grid, powered by wind or hybrid systems (such as wind-diesel).