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Energy-Water Nexus: The Water Sector's Energy Use

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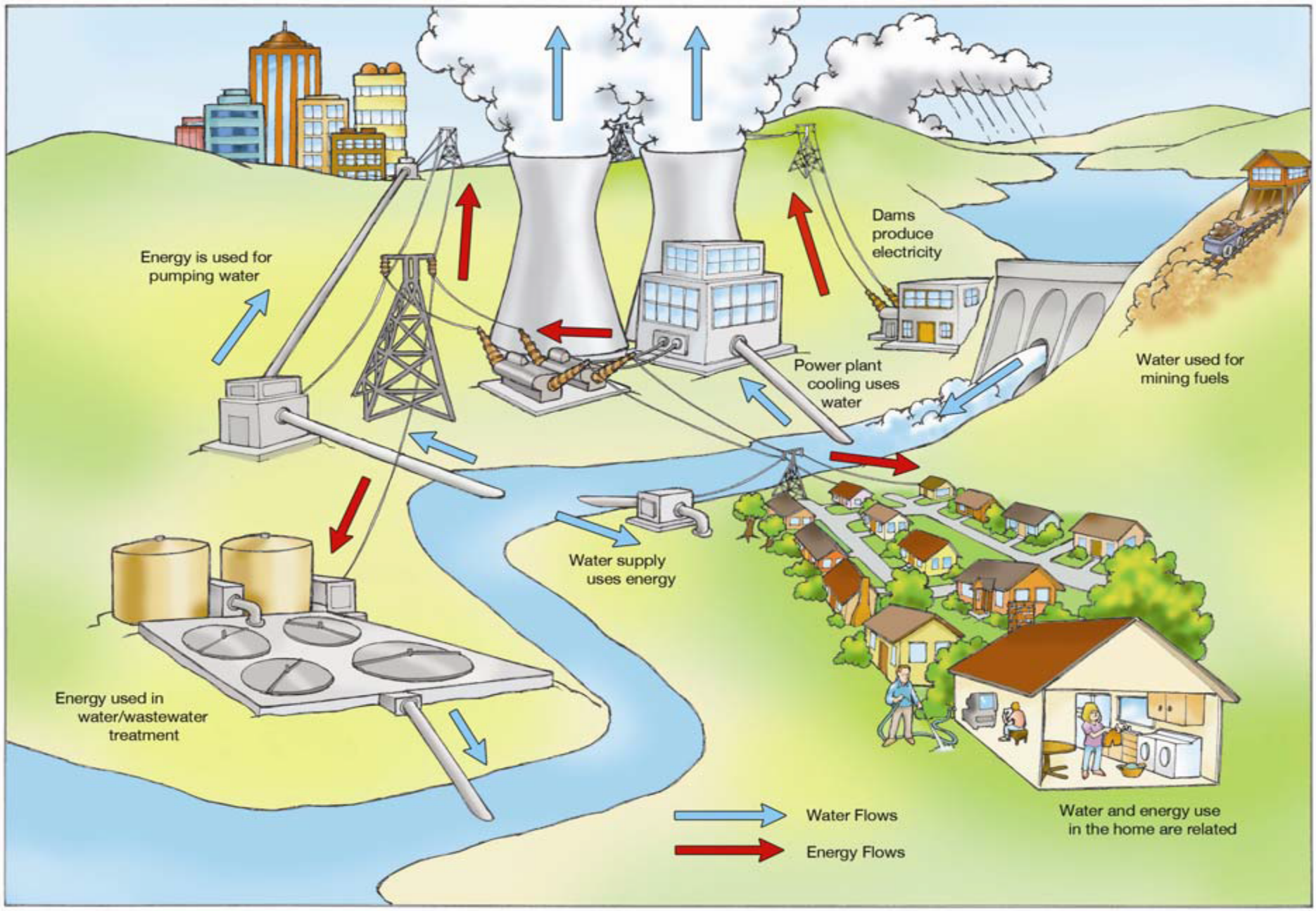
Interrelationships between Water and Energy



Electricity Consumption for Water Supply and Wastewater Treatment (2000)

Public water supply	30.6 billion kWh
Publicly owned wastewater treatment	21.0 billion kWh
Subtotal: public water and wastewater	*51.6 billion kWh*
Domestic and commercial self-supply	1.3 billion kWh
Industrial and mining self-supply	3.8 billion kWh
Agriculture self-supply (irrigation & livestock)	24.6 billion kWh
Power generation self-supply	14.2 billion kWh
Privately operated wastewater treatment (e.g., industry and manufacturing)	42.0 billion kWh
Subtotal: private supply and treatment	*85.9 billion kWh*
TOTAL PUBLIC & PRIVATE:	**137.5 BILLION kWh**

Source: Electric Power Research Institute, *Water & Sustainability (Vol. 4): U.S. Electricity Consumption for Water Supply & Treatment – The Next Half Century*, 2002

National data can obscure regional or state-specific differences in water-related energy use

Water-related energy use in California consumes 19% of the state's electricity vs. 4% nationally

Lifecycle energy-intensity of water ranges from 2,700 kWh/million gallons in New York City to 5,000 kWh/million gallons in Austin

In California, energy intensity of the water cycle ranges from 4,000 kWh/million gallons in the northern part of the state to 12,700 kWh/million gallons in the south

Energy for public water supply and wastewater facilities

- Nearly all energy consumed by the nation's 200,000 public drinking water treatment systems is electricity; about 80% is used for pumping
- Nearly all energy consumed by the nation's 15,000 publicly owned wastewater treatment systems is electricity
  - Aeration, pumping and solids processing account for most electricity used
- Greater amounts of energy are needed for more advanced treatment processes and for infrastructure systems as they age and become less efficient

- Opportunities for efficiency exist
  - Optimizing system processes; upgrading to more efficient equipment and right-sizing equipment; improved energy management; generating energy on-site (wastewater)
- But there are barriers to improved energy efficiency by water and wastewater utilities
  - Cost; municipally-owned water utilities are risk-averse; lack of understanding by managers about energy costs and how to reduce or control them

Research and information needs

- Data gaps!
- Integrated research on water and energy operations
- Research on advanced technologies that save energy and save water
- Better understanding of linkages between energy, water, land, agriculture, and risks of climate change and extreme weather
- Education and outreach to water users, the general public, and public officials on energy-water nexus

Questions?

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