EPA Region 9 Sustainable Water Infrastructure and Climate Change Initiative

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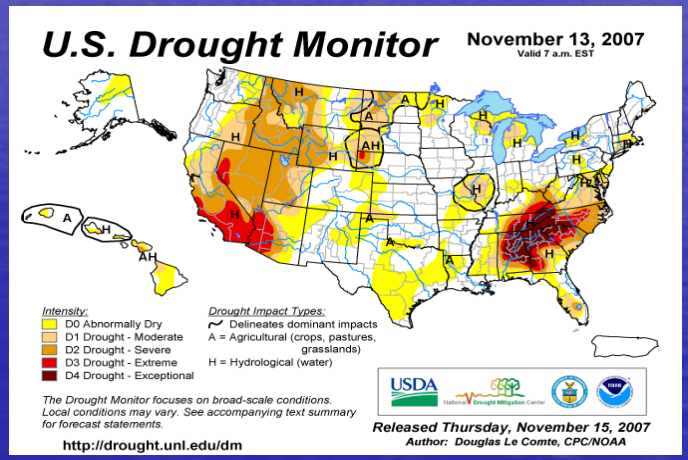
Today's presentation will cover…

- The water crisis
- Water Use in the United States
- Water-Energy Nexus
- Challenges to water and wastewater infrastructure
- Region 9 Sustainable Water Infrastructure and Climate Change Initiative

U.S. Drinking Water and Wastewater Systems Challenges	
Water Scarcity	A minimum of 36 states are anticipating local, regional, or statewide water shortages by 2013.
Climate Change	Changing precipitation patterns, shrinking snow packs, increasing runoff, rising sea levels, and greater saltwater intrusion will likely result in significant adaptation efforts to maintain water resource and infrastructure services.
Increasing Population	Between 1950 and 2000, U.S. population nearly doubled while the demand on public supply systems more than tripled. Increased demands are depleting aquifers at rates exceeding their recharge.
Energy Uncertainty	Fewer sources of conventional fuels and increasingly expensive extraction costs are driving up oil prices, destabilizing the economy and causing global shortages and uncertainty for utility operating budgets.
Aging Infrastructure	Repairing, replacing, and upgrading aging infrastructure will cost between $300 billion to $1 trillion over the next 20 years.



Water Use in the United States

Public supply, 11 percent

Richard L. Marella, USGS

Public supply water intake, Bay County, Florida

Irrigation, 34 percent

Jeff Vanuga, USDA NRCS

Gated-pipe flood irrigation, Fremont County, Wyoming

Aquaculture, less than 1 percent

Courtesy of Clear Springs Foods, Inc.

World's largest trout farm, Buhl, Idaho

Mining, less than 1 percent

Nancy L. Barber, USGS

Spodumene pegmatite mine, Kings Mountain, North Carolina

Domestic, less than 1 percent

Alan M. Cressler, USGS

Domestic well, Early County, Georgia

Livestock, less than 1 percent

Jeff Vanuga, USDA NRCS

Livestock watering, Rio Arriba County, New Mexico

Industrial, 5 percent

Alan M. Cressler, USGS

Paper mill, Savannah, Georgia

Thermoelectric power, 48 percent

Alan M. Cressler, USGS

Cooling towers, Burke County, Georgia

Water-Energy Nexus

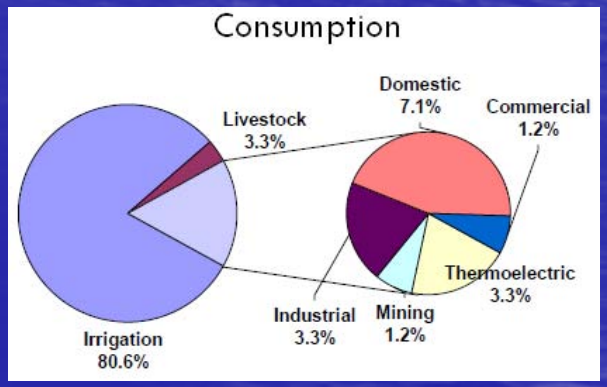
The use of water in the world of energy

Water is used to turn turbines for hydropower, to produce steam for thermoelectric power, and to cool equipment by absorbing the waste heat produced by power generation with once-through or closed loop cooling systems.

Each kilowatt-hour (kWh) of thermoelectric generation requires the withdrawal of ~ 25 gallons of water, primarily for cooling purposes.

Water used to extract oil and coal

~ 2 gallons of water are lost to evaporation for each kWh consumed at the point of end use, though this number varies greatly State by State, depending on the energy mix. In Arizona, for example, 7.85 gallons of water are lost to evaporation per kWh consumed.



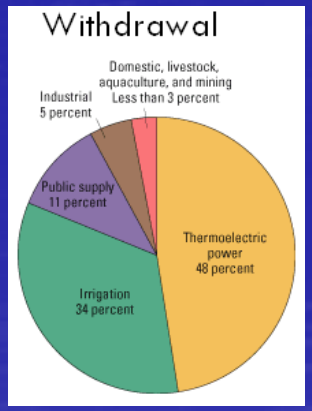
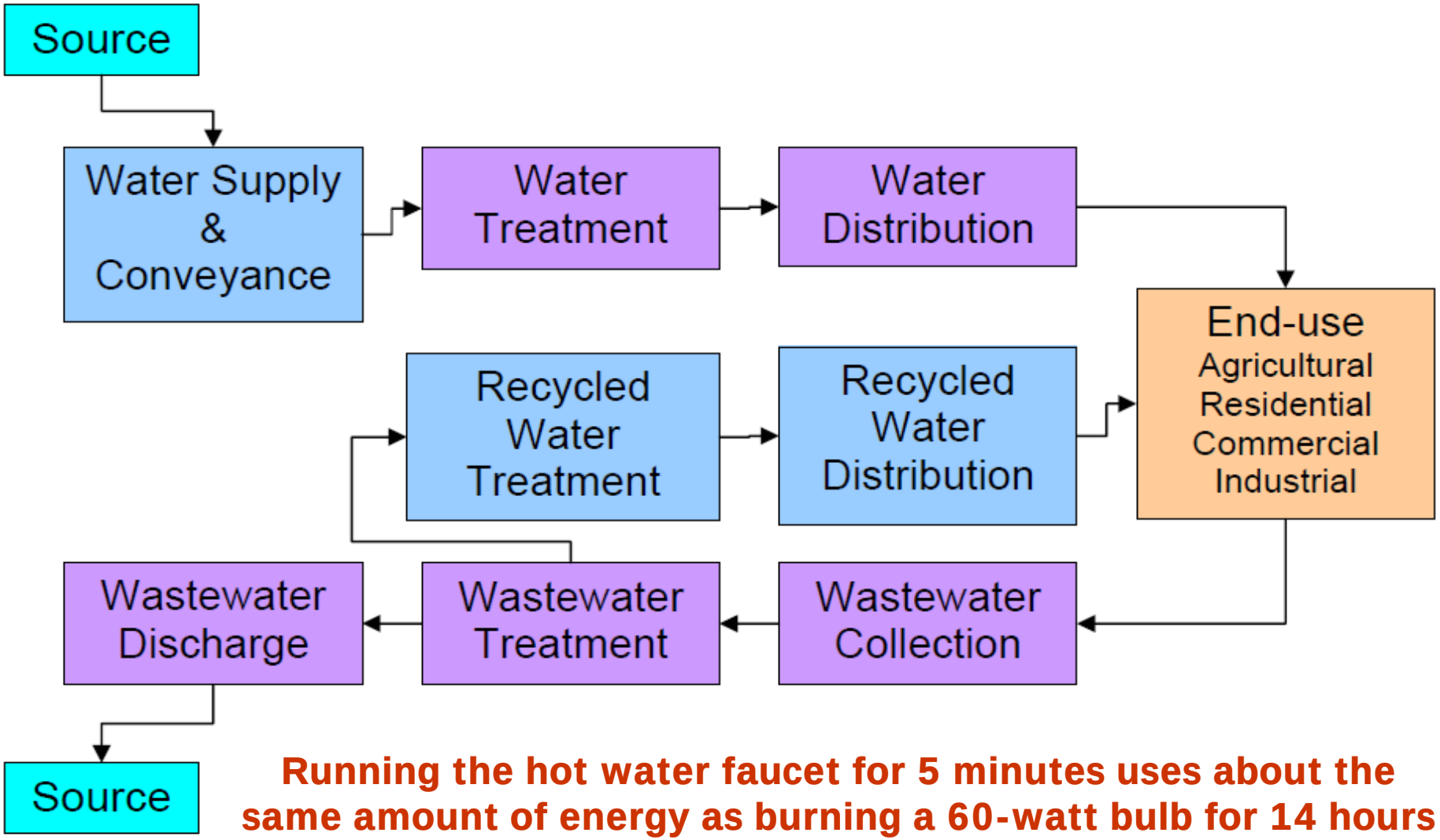


Table 2. Water Consumption by Energy Type in the United States

Energy type	Total water consumed per megawatt hour (m3/MWh)	Water consumption required for U.S. daily energy production (millions of m3)[23]
Solar	0.0001	0.011
Wind	0.0001	0.011
Gas	1	11
Coal	2	22
Nuclear	2.5	27.5
Oil	4	44
Hydropower	68	748
Biofuel (1st generation)	178	1958

Source: "Linking Water, Energy & Climate Change: A proposed water and energy policy initiative for the UN Climate Change Conference, COP15, in Copenhagen 2009," DHI, Draft Concept Note, January 2008. See: http://www.semide.net/media_server/files/Y/l/water-energy-climatechange_nexus.pdf

Water-Energy Nexus



Running the hot water faucet for 5 minutes uses about the same amount of energy as burning a 60-watt bulb for 14 hours

Saving Water Saves Energy*Saving Energy Saves Water

Saving Water and Energy Saves Money and Reduces Greenhouse Gas Emissions!

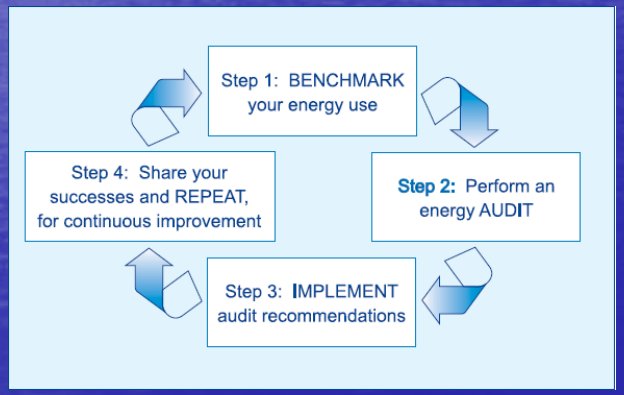
Our mission statement:

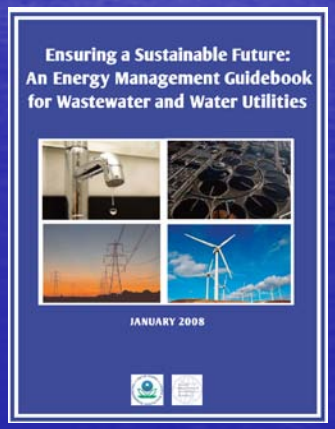
To Provide technical support and financial resources to states, tribes, and Island Territories to increase water and energy efficiency in water, wastewater, and stormwater infrastructure.

Current Activities

1) **Coordinating with existing programs (SRF, "Pork," Border) and offices**

2) **Providing outreach, training, and workshops:**





3) **Promoting the four step process**

4) **Promote EMS workbook (Ensuring a Sustainable Future, 2008) through regional workshops** (Next one is October in Las Vegas)

Current activities continued…

5) Developing fact sheets on funding opportunities

6) Water conservation and efficiency (Water recycling, WaterSense)

7) Green Jobs in the Water Sector

8) Promoting energy efficiency and renewable energy

9) Awards/recognition

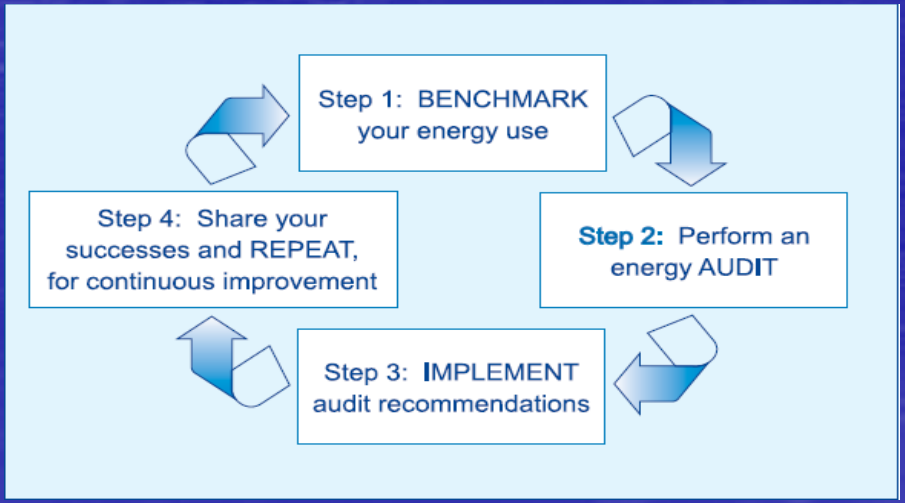
The four step process

1. **Benchmark** w/ ENERGYSTAR Portfolio Manager

2. **Audit** (electricity provider, DOE's IAC, contactors)

3. **Implement** (grants, SRF, "pork," stimulus, ESC, offsets, RECs)

4. **Repeat**



Watershed Approaches to Infrastructure

Green Infrastructure/LID approaches:

A tool for mitigating sewer overflows, reducing energy use and improving permit compliance (less water to treat at wwtfs) by using natural or engineered systems to capture, cleanse, and reduce stormwater runoff

www.epa.gov/greeninfrastructure

- Reduce heat island effect
- Improvements to water quality in streams and rivers
- Recharges aquifers
- Reduce pollutants in storm water
- Carbon sequestration
- Increase wildlife habitat, preserve sensitive environmental areas
- Preserve pre-development hydrology
- Reduce water/energy load of water infrastructure

Riparian Buffers

Permeable
Pavement

Rain Harvesting

Green Streets &
Highways

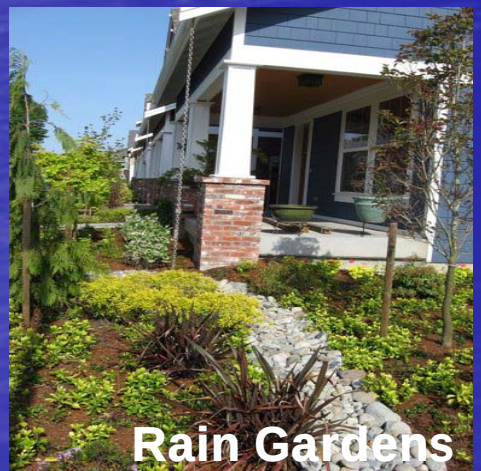
Pocket Wetlands

Swales

Green Roofs

Planter Boxes

Green Parking


Rain Gardens

RHYS
HAIR
Tobacco
Urban Forestry

Downspout
Disconnection

Renewable Energy Production

- Purchase/Expand/Improve digesters for methane capture
- Fund development of fats, oils, and grease collection program for methane/biodiesel production in digester
- Purchase/Install solar or wind energy generators, fuel cells
- Identify local energy user needs and design energy production program for it
- Partner with local waste generators to create feedstock for energy generation

Restaurant grease is converted into biogas at the WWTF in Millbrae, meeting 80% of the facility's energy needs.

The Oroville Region WWTF is powered by a 520 kilowatt solar system.

At the EBMUD WWTF, food waste is co-digested with biosolids. Digesting 100 tons of food waste per day, 5 days a week, provides sufficient power for an estimated 800 to 1,400 homes!!!

Drinking Water Production, Treatment, and Distribution Ideas

- Install Leak Detection Equipment
- Implement energy EMS
- Perform energy audit
- Implement incentive program to replace fixtures with WaterSense products
- Install meters/implementing metering program
- Install energy efficient pumps
- Model recovery costs vs. water produced
- Grey water reuse for landscapes

Green Jobs

- EPA-DOL Competency Model
- WaterSense
- Urban Waters Initiative
- Curriculum development

Region 9: Sustainable Water Infrastructure

Serving Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations

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- Region 9 Home
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- Water & Energy Efficiency for Water and Wastewater Facilities:
  - Benefits and Challenges

- Step-By-Step Guide
- Step 1: Benchmark
- Step 2: Audit
- Step 3: Implement
  - Funding
  - Training
  - EMS
  - Efficient Technologies
  - Water Conservation
  - Affiliated Organizations
- Step 4: Repeat

- Water & Energy Efficiency by Sectors:
  - Agriculture
  - Businesses
  - Communities
  - Homes
  - Industry
  - Oil Refineries
  - Schools
  - Thermoelectric Power

Sustainable Water Infrastructure Quick Finder

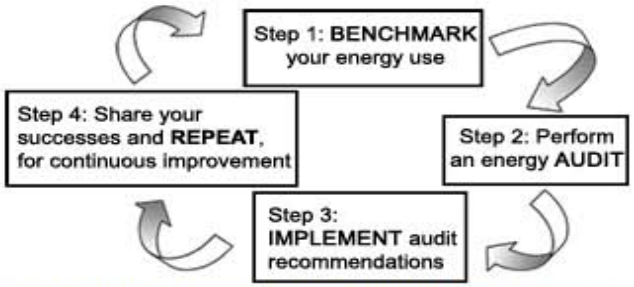
Anaerobic Digestion
Biodiesel: Fat to Fuel
Border Infrastructure
Climate Change
Economic Benefits
Environmental Benefits
Events & Training Calendar
Grants & Loans
News
Water-Energy Connection
Water Recycling
Water Conservation/Efficiency

Saving water saves energy! Saving energy saves water!

SAVING WATER AND ENERGY

Saves money & reduces greenhouse gas emissions!

EPA's Sustainable Water Infrastructure program provides technical support and financial resources to states to increase water and energy efficiency in water, wastewater, and stormwater infrastructure. See the step-by-step guide to learn how water and wastewater facilities can save water and energy and reduce greenhouse gas emissions.



This website provides water and energy efficiency information for industry, businesses, communities, homes, farms, schools, thermoelectric power generators, and water and wastewater facilities.

Workshop June 23, 2009
Innovative Energy Management Workshop for Water and Wastewater Treatment Plants
Irwindale, CA
Registration is now open.

EPA and the Recovery Act

Clean Water (CWSRF) & Drinking Water State Revolving Fund (DWSRF)

Sustainable Water Infrastructure News

All News »

Green Plumbers Wins 2009 EPA Region 9 Environmental AwardEPA recognized GreenPlumbers® as a recipient of Region 9's 2009 Environmental Awards program. Full story | GreenPlumbers Web Site EXIT Disclaimer

Arizona Wins WaterSense State Challenge Award
The state of Arizona is recognized for its efforts to use water efficiently. Feature story | WaterSense

National Resources

- Sustainable Infrastructure
- Climate Change & Water
- Climate Change
- WaterSense
- Water Efficiency Leaders
- Green Infrastructure
- ENERGY STAR
- Clean Energy