

# Water: Industrial Use, Technologies & Practices

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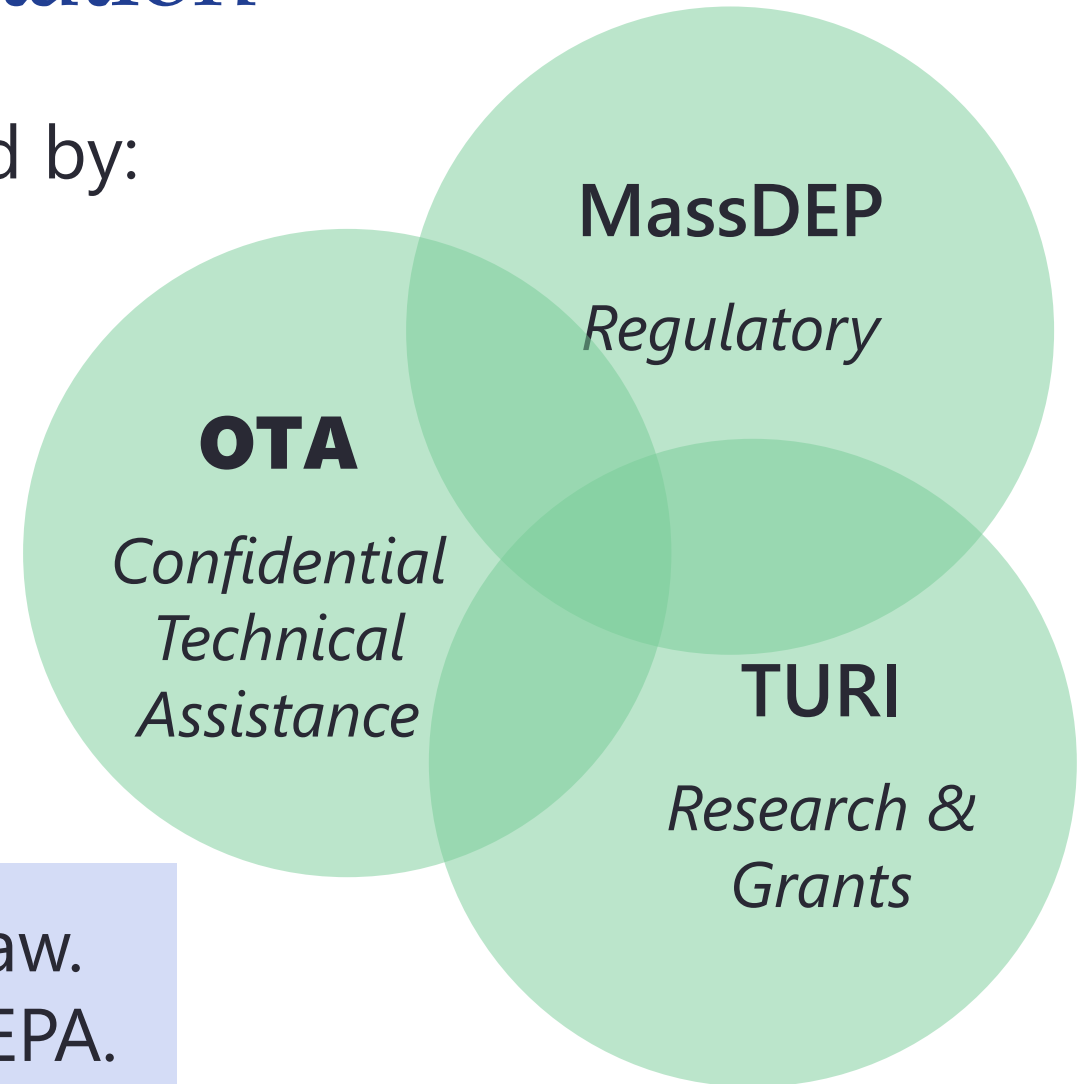
# Today's Presentation

- Why/why not conserve?
- Trends in recent years
- Industrial uses of water
- Conservation practices and technologies
- Exercise: Identifying water conservation opportunities

# TURA Program Implementation

The TURA Program is co-implemented by:

- The Massachusetts Department of Environmental Protection
- The Massachusetts Office of Technical Assistance
- The Toxics Use Reduction Institute at UMass Lowell



TURA is a state law, not a federal law.  
OTA, DEP, and TURI are not part of EPA.

# OTA Technical Assistance

- OTA can assist facilities with:
  - Toxics use reduction
  - Environmental compliance
  - Energy efficiency
  - Resource conservation
- Both onsite and remote assistance are available
- After a site visit, OTA delivers a report with tailored recommendations



# Trends in Massachusetts

## Regulatory context

Stricter standards for wastewaters discharged directly into the environment & for industries discharging to sewers/POTWs

Groundwater sampling and remediation efforts

Upgrades to publicly owned treatment works and company pre-treatment plants

## Sectoral trends

Loss of many facilities in water intensive industries  
*(to Mexico; SE Asia)*

Investment in Massachusetts by Europe  
*(to a lesser extent)*

Growth of biotech & other high-tech industries

Smaller facilities held to the more stringent standards of larger facilities

## Technological advancement

Improvements in instrumentation and controls

More reliable and sensitive testing methods

# Polling Question

What is the most likely reason companies **don't** conserve water?

- A. Billed to another department or location (corporate)
- B. Not aware of other associated costs (beyond water & sewer charges)
- C. No sub-metering and poor monitoring
- D. Included in overhead - Not a significant cost
- E. Greatly delayed or no feedback when excessive use occurs
- F. Other

# Polling Question

What is the most likely reason companies **do** conserve water?

- A. Seasonal restrictions on supply or quality
- B. Water rates or sewer rates suddenly increase (municipal upgrades)
- C. Company closely manages all operating costs
- D. To minimize size (costs) of new or replacement water processing equipment
- E. Corporate goals
- F. Other

# Industrial Uses of Water

## Water power and kinetic energy

Direct mechanical (1800s),  
Turbines & microturbines for electrical;  
Water jet cutting, power washing

## Cooling and heating

Fluids and solids; Contact (direct) or non-contact  
(indirect)

## Washing

Laundries, extraction, degreasing,  
separation/classification, electroplating...)  
Cleaning of containers, vessels, work areas,  
process equipment

## Transporting solids and ions

Pulp & paper, food, dyeing, electroplating, water  
treatment, microelectronics and semiconductors



# Industrial Uses of Water

## Gas and aerosol scrubbing

Products of combustion and other reactions; Water curtain for paint overspray

## Vaporization

Boilers, cooling towers, air humidification

## Lubrication and seals

Machining, conveyors, liquid ring vacuum pumps and other pump seals

## Uses in the product

Beverages, soups, cosmetics, cleaners, coolants, paints  
Chemicals in diluted, solubilized, or dispersed forms

# Practices and Technologies

## Reuse or recycling

- Return condensate to boilers
- Recirculate water for cooling or heating
- Eliminate uses of city water for once-through cooling (wasteful and can violate plumbing codes)
- Increasing cycles of concentration of cooling towers
- Closed thermal loop indirectly heated or chilled
- Find additional uses for reverse osmosis reject water (20-40% of feedwater)

## Production unit redesign Production unit modernization

- Extending use with filtration, coalescing, deionization, condensers, pumps
- Re-evaluate if process water quality standards can be relaxed in some areas
- Regulate pressures and line sizes for balanced distribution to facility loads – avoid oversupply/undersupply
- Cascading or countercurrent rinsing/washing
- Evaluate potential for dry processing

# Practices and Technologies

## Improved operations and maintenance

- Use sub-meters and flow meters
- Good monitoring & maintenance prevents declines in efficiency and overuse of water
- Implement spray regulation
- Add sensors and timers on valves to shut off when nothing being processed
- Zero Discharge considerations and precautions
- Check if water meters running when should be no use
- If regenerating ion exchange columns, make sure resins are not getting old and worn out
- Ensure sand or multimedia filters not lumping/channeling
- Minimize evaporation from scrubbers by not diluting process exhaust with uncontaminated air from general ventilation

## Product reformulation

If water is a major constituent of the product, see if producing a more concentrated formulation is feasible

# Contact Us

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# Exercise: Identify a Water Conservation Opportunity

1. Target a process step to evaluate for water conservation.
2. Suggest a practice or technology for water use reduction here.
3. What steps could you take to encourage this business to adopt your suggestion?

