# SUSTAINABILITY TRACK

## Session 6

GovEnergy
www.govenergy.gov

GSA

Phoenix, AZ

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TETRA TECH

# Facility-Wide Approach to Managing for Sustainability

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**GovEnergy 2008**
**Phoenix, AZ**

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# The World of a Facility…

## NATURAL SYSTEMS

WATER

BUILDINGS

Outdoor Lighting

ENERGY

## SOLID WASTE & MATERIALS

# The Fundamentals of Managing for Sustainability

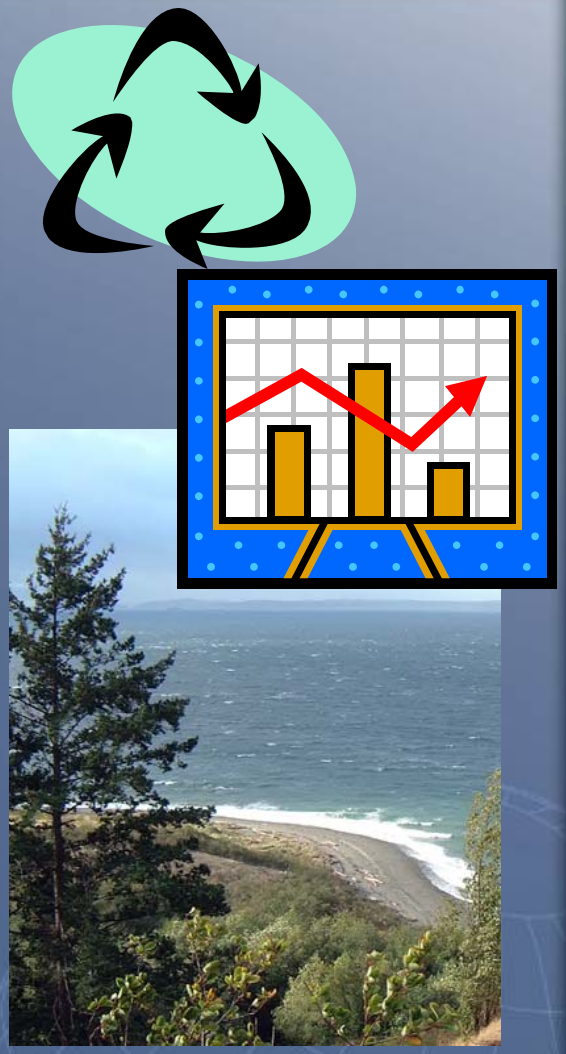
- ☑ **IMPROVE EFFICIENCY**

  *Reduce operating costs while conserving resources*

- ☑ **CONSIDER ENVIRONMENTAL IMPACTS OF DAY-TO DAY OPERATIONAL DECISIONS**

- ☑ **USE LONG-RANGE ENVIRONMENTAL PLANNING**

  *Develop policies and procedures for a permanently carbon- and resource-constrained world.*



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# Focus of a Facility-Wide Sustainability Program

***Typical Facility Systems relating to energy use:***

- ✓ Water Use
  (& possibly Distribution)
- ✓ Outdoor Lights
- ✓ Procurement
- ✓ Travel & Transportation
- ✓ Buildings

***Assume:***

1) Existing infrastructure (no new construction)
2) No industrial processes

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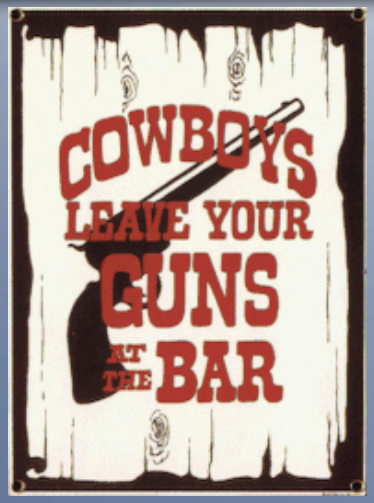
# WATER: The Oil of the 21st Century

Whiskey is for *Drinkin'*




WATER is for *Fightin'*

# WATER USE: Landscaping

- ***Plant Selection***
  - Plant **water-efficient plants**
  - **Minimize** close-cut, highly maintained **turf**
  - **Group plants** with similar water needs
- ***Mulch and Soils***
  - **Mulch** exposed soil
  - Properly **prepare soil**
  - ***No Pesticides***

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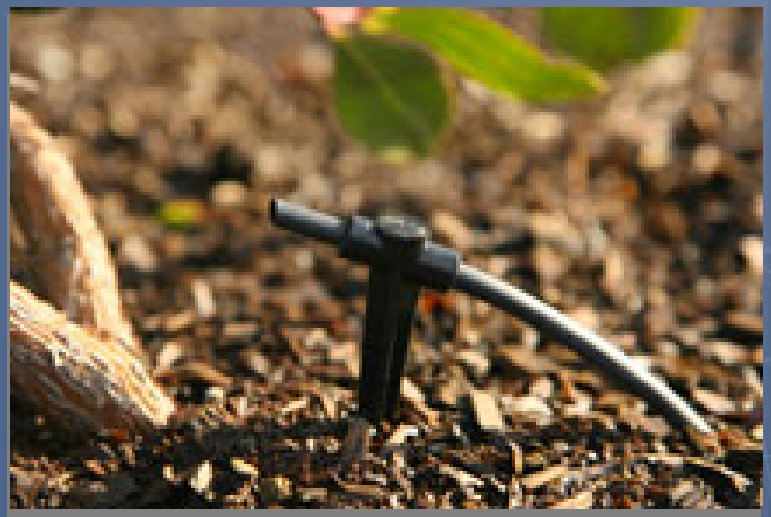
# WATER USE: Landscaping, continued

- **Irrigation System**

  *For the **efficient** and **uniform** distribution of water, **only where it's needed**.*

  - Separate circuits for different plant types
  - Direct application (e.g., drip, bubbler, or subsurface drip)
  - Account for slopes
  - Develop irrigation water budget to avoid over-use



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# WATER USE: Landscaping, continued

- **Non-Potable Sources of Irrigation Water**
  - Rain Water Harvesting
  - Reclaimed Water
  - Gray water

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# WATER USE: Indoor

*Mainly:*

- **Toilets:**
  - ✓ Low- or Dual Flush Toilets
  - ✓ Low-Flush or Water-Free Urinals
- **Faucets:**
  - ✓ Aerators
  - ✓ Automatic On/Off

*Where Applicable:*

- Water-efficient **dishwashers** & clothes **washers**
- Low-flow **showerheads**

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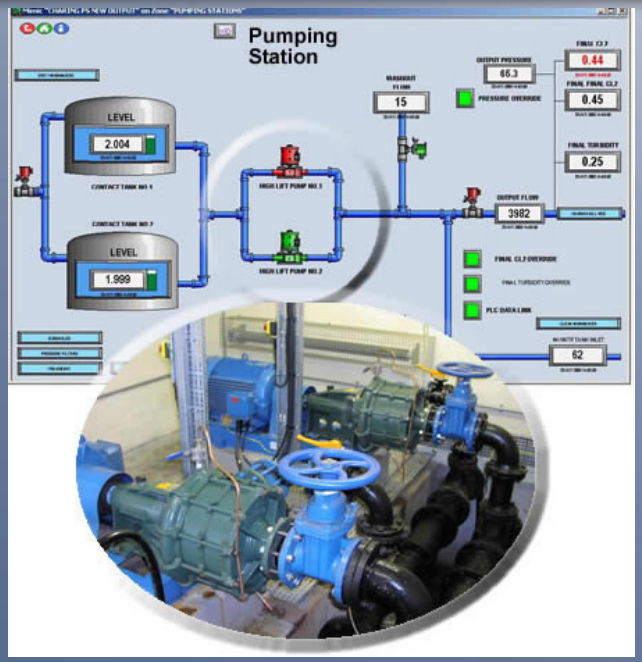
# Facility Water Distribution




1) Improve Pump System Efficiency
- ✓ Replace inefficient pumps
- ✓ Install variable speed drives
- ✓ Regular preventative inspection and maintenance

2) Manage Leaks

3) Automate Controls

4) Metering & Monitoring
- ✓ Create regular monitoring protocol for pump & electrical systems
- ✓ Install and maintain water meters
- ✓ Develop metrics to track performance

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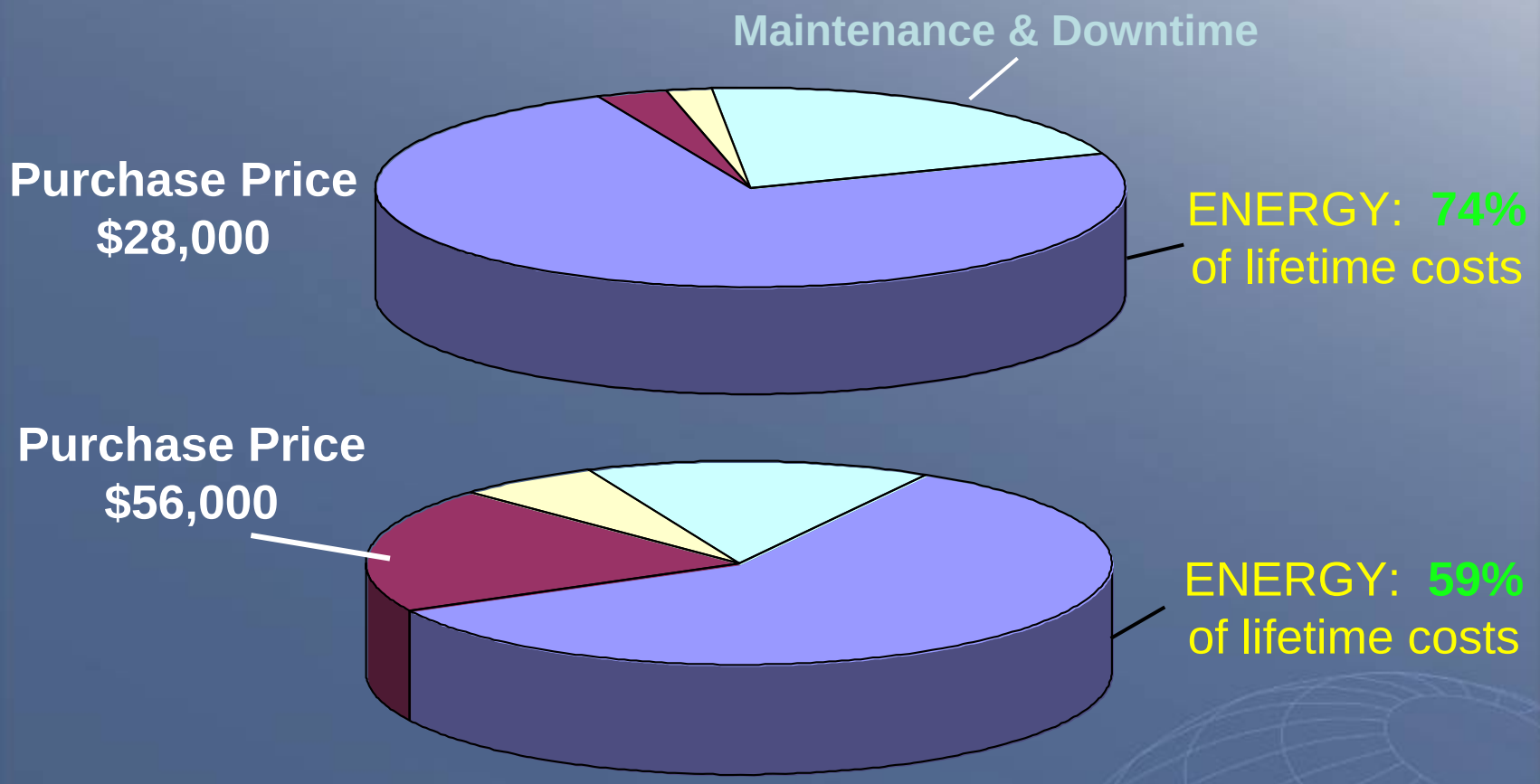
# Buy Pumps Based on Efficiency, Not Purchase Price




***The efficient pump saves $21,000 in the first year and ~$50,000 per year, every year, thereafter.***

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# Outdoor Lights

- **BULBS**: *use highest efficiency option that meets color needs…*
  - ✓ **High pressure sodium** often the best compromise
  - ✓ **Low pressure sodium** more efficient but poor color rendering (yellow & grey)
  - ✓ **Metal halide**: less efficient & shorter life, but *white light*

- **BALLASTS**: **Pulse start** lamps (**electronic ballasts**) instead of probe start (magnetic ballasts).
  *(Can replace during routine lamp replacements.)*
- **PHOTOCELLS**:
  Install more efficient ones (for turning off lamps in morning)

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# Energy Efficient Procurement

☒ **FEMP Energy-Efficient Product Recommendations**
**www1.eere.energy.gov/femp/procurement/eep_requirements.html**
for guidelines on **47 types of products**:

- ✓ **Lighting** (e.g., CFLs, ballasts, exit signs, controls)
- ✓ **Commercial & Industrial Equipment** (e.g., chillers, boilers)
- ✓ **Food Service Equipment** (e.g., fridges, freezers, ice machines)
- ✓ **Office Equipment** (e.g., computers, copiers, printers)
- ✓ **Home Electronics**
- ✓ **Appliances** (e.g., microwaves, dishwashers and room A/Cs)
- ✓ **Residential Equip.** (e.g., thermostats, central A/C, heat pumps)
- ✓ **Plumbing** (faucets, showerheads, urinals, toilets)
- ✓ **Building Envelope** (windows, doors, skylights, roofing)

☒ **EPA's Comprehensive Procurement Guidelines Program**
**http://www.epa.gov/cpg/products.htm**

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# Reducing Energy Use from Travel

## *Do we travel too much?*

**The best way to reduce travel energy use (and costs) is to *do less of it*.**

- ✓ **Set a higher bar for Go/ No-Go decisions.**
- ✓ **Make the most of telecommu-nications.**

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# Reducing Energy Use from Travel: FLEETS

## Purchase

✓ **Require smallest, most fuel-efficient vehicle practical.**

***Case for HYBRIDS: Charlotte, NC***

✓ save fuel ✓ lower maintenance costs ✓ higher resale value

✓ Charlotte estimate: hybrid Toyota Prius or Honda Civic versus Ford Taurus: *$800-$1200 saved/year per vehicle*

→ *payback of 2.5 to 5.5 years*

## Operation & Maintenance *(other than minimizing miles traveled)*

✓ Set maximum road speeds

✓ Driver training

✓ Most efficient vehicle for a given task

✓ Keep vehicles maintained

## Heavy Duty Fleet

✓ Anti-idling technologies and practices

✓ Retrofits to improve aerodynamics

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# COMMUTING: Reduce Use of Cars, especially SOVs

***Overarching:***

1) Don't provide free parking to SOVs *if mass transit available.*
2) Allow taxis home if not an SOV

- **Public Transit**
  - ✓ Subsidize tickets in lieu of parking space.
  - ✓ Reduce taxable income by amount of ticket purchase
  - ✓ Provide a shuttle (if not close to transit)
- **Car Pooling**
  - ✓ Set up a system to match drivers and riders.
  - ✓ Preferential and/or free parking.
  - ✓ Recommend cost sharing system.
- **Biking & Walking**: provide showers

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# BUILDINGS: Lighting

- **Electronic ballasts** instead of magnetic (in fluorescent fixtures)
- Replace T12 fluorescent **tubes** with **T8**s—or better yet **T5**s, if can install new fixtures.
- Install **occupancy sensors** so lights on only when areas are occupied
- Install photosensor-activated dimmers that **adjust for daylight**
- Adjust intensity of lighting to match needs, e.g. high intensity only for **localized tasks**, not entire floor)

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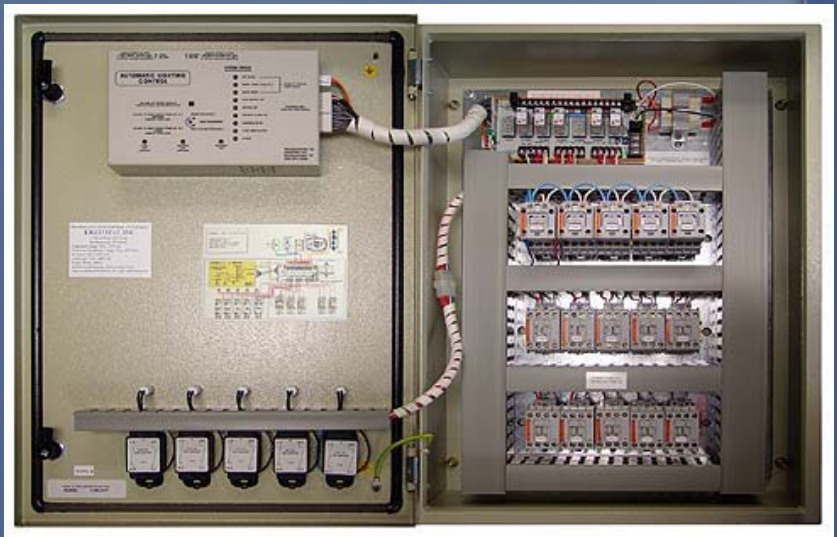
# BUILDINGS: HVAC

- Equipment only on when needed (e.g., using **timers**)
- Seal all **air ducts**; insulate if outside the heated or cooled space.
- Regularly **track and analyze** energy usage
- Maximize **controls** (programmable & simple **automation**)
- "**Energy tune up**" of controls (to optimize air flow, fans, boilers,...)
- Install **variable speed drives**
- Adjust **O&M protocols** for optimal efficiency (e.g., replacing filter); train staff as needed
- Lower thermostat on **water heaters**
- Replace old chillers, pumps, water heaters, etc with **efficient models**



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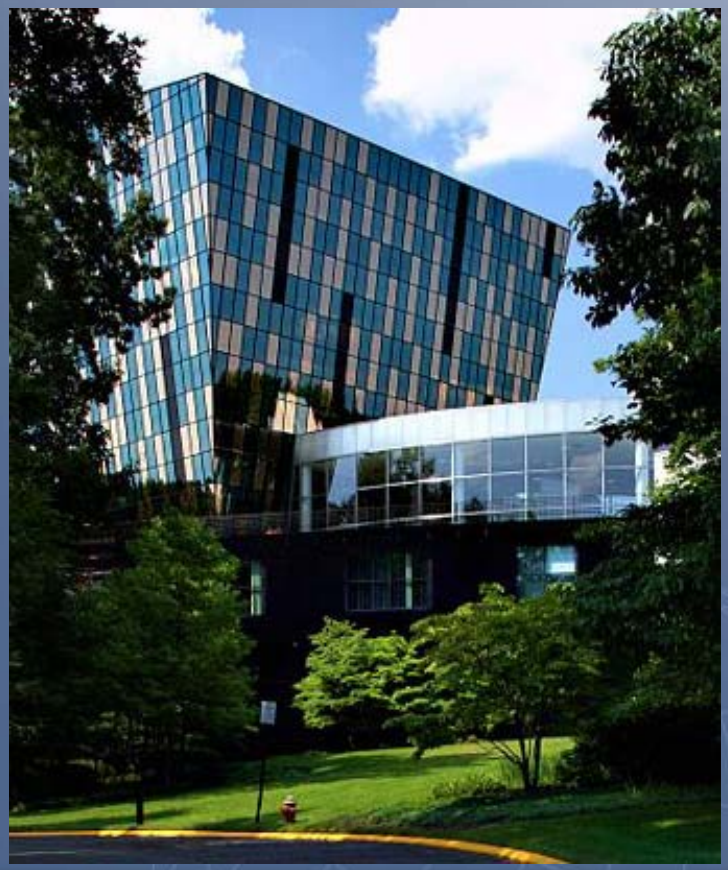
# BUILDING ENVELOPE: Windows

- **Block the sun**: awnings, landscaping, roof overhangs
- Window **Films/Coatings**: cost 10-15% more, but up to 30-50% more efficient
  - ✓ *Hot climates*: reduces IR component of sunlight (applied to *outside*)
  - ✓ *Cold climates*: reduces heat loss (applied to *inside*)
- Repair and **weatherize** inefficient windows
- **Replace** old windows with efficient ones



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# BUILDINGS: Insulation

- Insulate hot water **pipes** and **tanks**.
- Add insulation to **envelope**, *for example…*
  - ✓ *To Walls and Ceilings*: rigid **panels** (foam or vacuum cores)

- ✓ Cracks & *Uninsulated Cavities* between walls, or between roof & ceiling: **spray foam** insulation

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# Summary

*Making an energy efficient, lower carbon footprint facility includes **not just buildings** but…*

- ✓ Landscaping water use
- ✓ Indoor water use
- ✓ Water distribution
- ✓ Outdoor lighting
- ✓ Procurement
- ✓ Travel
- ✓ Vehicle Fleets
- ✓ Employee commuting

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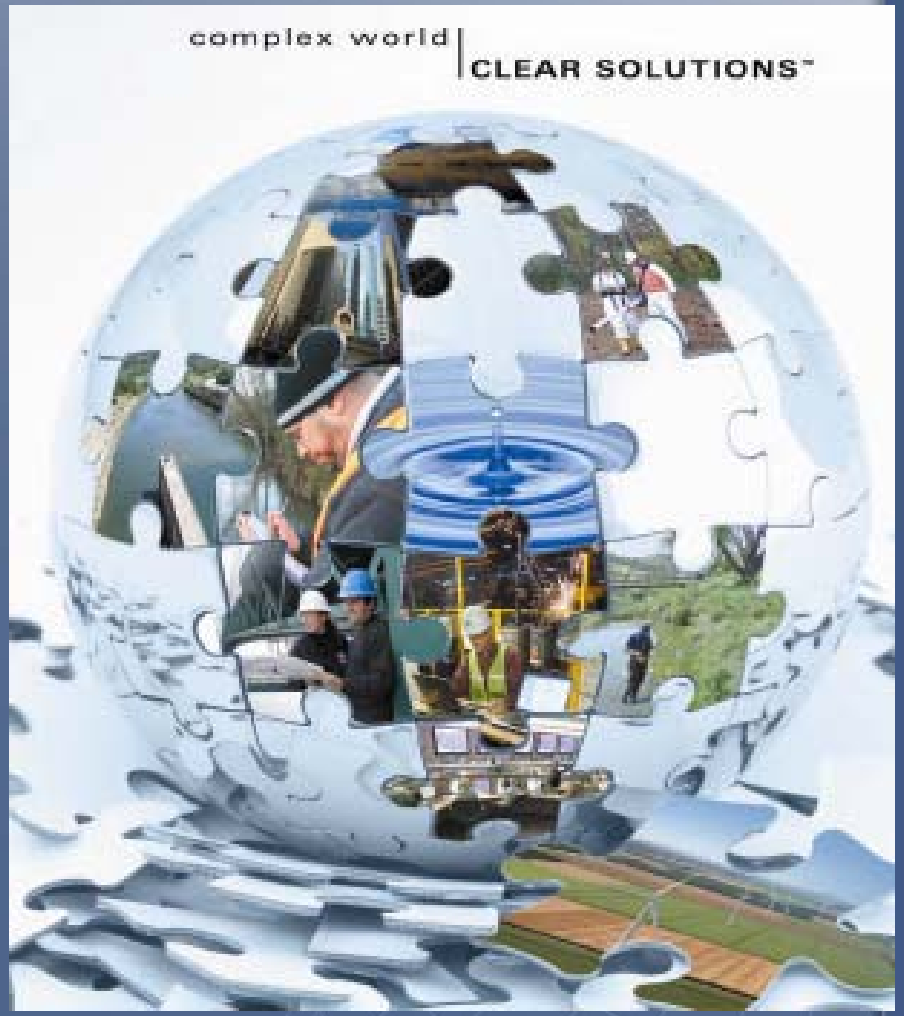
# Tetra Tech Overview

- Environmental & engineering firm
- Leading provider of **resource management** services for over 40 years
- 8,500 associates
- >275 offices worldwide
- Revenue $1.5 billion
- *Quantum Companies*: Tt is one of 100 companies that will **change the face of tomorrow's world**.

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