Resource Efficiency Helps Businesses Become Sustainable

OWRD Workshop
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Bend, Oregon

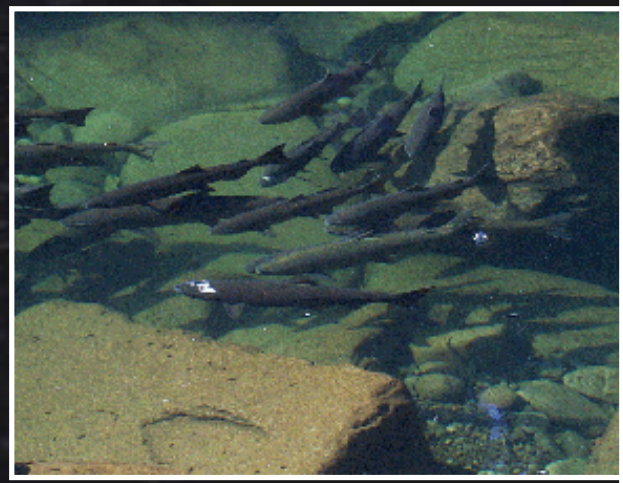
Teri Liberator
Senior. Engineering Associate
City of Portland
Bureau of Water Works

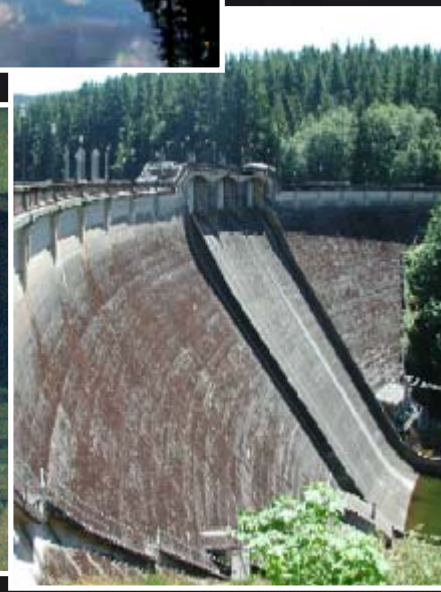
Presentation Overview

- Portland's Water System
- Setting the Stage - Why Conserve?
- BIG Program Services
- Energy and Water Interactions
- Customer Examples

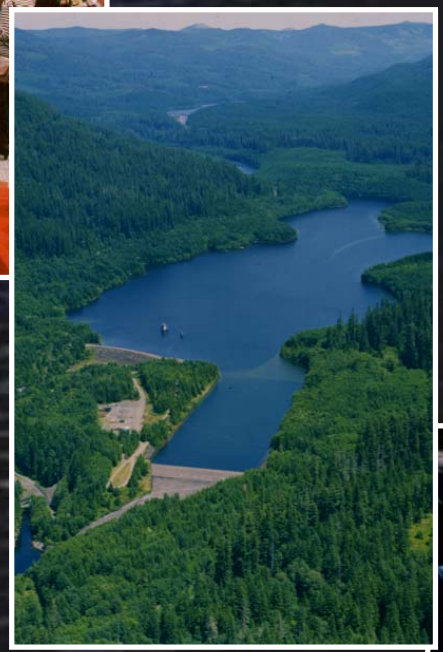
Bull Run Water System

- Rain driven, restricted access, unfiltered surface water supply
- Fixed storage volume (10.2 BG) and dry summers
- Fish protection may reduce summer supply
- Two hydro plants on main reservoirs





Why Conservation?



- Makes resources available for economic development
- Lowers costs for new supply development

- Provides more water for power, fish and recreation

Sustainability

The Oregonian

35¢

Greenhouse gases confirmed

Bush backs off controls for carbon dioxide

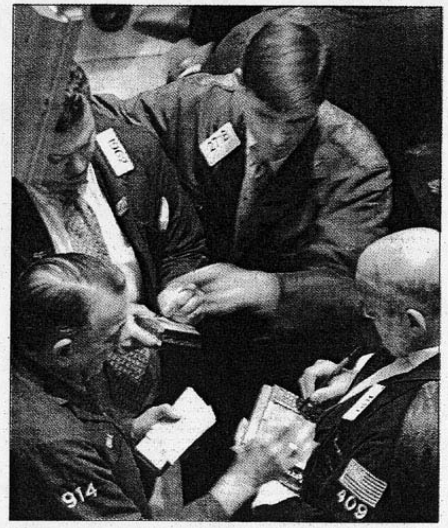
By DOUGLAS JEHL and ANDREW C. REVKIN
NEW YORK TIMES NEWS SERVICE

WASHINGTON — Bowing to pressure from conservative Republicans and industry groups, President Bush on Tuesday disowned a campaign pledge and said his administration would not seek to regulate power plants' emissions of carbon dioxide, a gas that many scientists say is a key contributor to global warming.

The decision left environmental groups and some congressional Democrats angered at what they called a major betrayal.

But the White House said a Cabinet-

Please see **BUSH,** Page A16



STUART RAMSON/ASSOCIATED PRESS

Still nervous: Traders work the floor at the New York Stock Exchange today. The Dow quickly tumbled 300 points to fall below 10,000, but at midday it was back at 10,013.29.

Scientists say they have the first direct evidence the gases are building in the atmosphere and retaining heat

By ALEX DOMINGUEZ
THE ASSOCIATED PRESS

A comparison of satellite data from 1970 and 1997 has yielded what scientists say is the first direct evidence that so-called greenhouse gases are building up in Earth's atmosphere and allowing less heat to escape into space.

The study contains no evidence on whether Earth's surface temperature is actually increasing. In fact, whether this greenhouse effect will lead to global warming or global cooling is unclear, the scientists said.

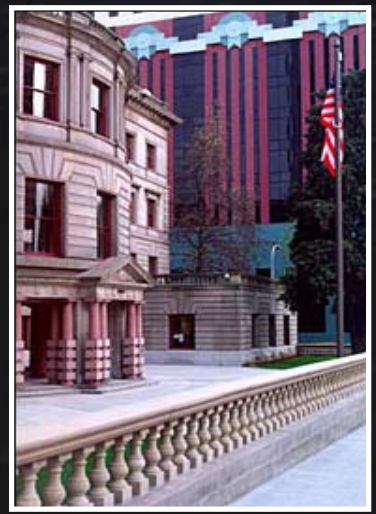
That is because the greenhouse effect could start a cycle in which more clouds are formed, stopping the sun's energy from reaching Earth's surface in the first place, said John Harries, who led the study.

Scientists have long theorized that carbon dioxide and other waste gases are increasing the trapping of heat close to Earth in what is called a greenhouse effect.

Harries and his colleagues at London's Imperial College com-

Please see **GASES,** Page A14

Oregon's Sustainability Ethic



- Governor Kitzhaber signed EO-00-07, an executive order to develop statewide sustainability strategy for Oregon
- Natural Step Network: National organization boasts largest membership here in Oregon
- Portland adopted Sustainable City Principles in 1994 and the Local Global Warming Action Plan April 25, 2001

Sustainability Principles

- City has committed to:
  - ✓ **ensure environmental quality & linkages with decisions on growth management, land use, transportation, air quality, energy, water, affordable housing & economic development**
  - ✓ **reduce demand for natural resources**
  - ✓ **prevent additional pollution through planned proactive measures**

What is Portland Doing?

- **Environmental impacts of government operations (‘98 and ‘00)**
- **Green Buildings Initiative (December ‘99)**
- **Office of Sustainable Development created (Fall ‘00)**
- **TNS pilot in Water Bureau (August ‘00)**
- **Local Global Warming Action Plan (April ’01)**
- **Best Awards and technical assistance(‘93)**
- **BIG water conservation assistance (‘93)**

Business, Industry and Government (BIG) Conservation Program

- Began after 1992 drought
- Customer outreach for the BIG sector
- Initially < 1 FTE dedicated to program

BIG Conservation Program

- 3.5 FTE, 1-4 student interns
- Focus on peak season
- Recommend only cost-effective actions

Program Philosophy

- Long-term perspective
- Emphasis on building relationships
- Look at overall utility savings (water, sewer and energy).
- Services free or very low cost, actions voluntary

BIG Program Focus:

- Cooling and Irrigation
- Largest water users

BIG Services

- Site visits & water use analysis
- Outdoor education and audits
- Cooling education
- Meter loans, flow measurement and leak detection
- Newsletter, conservation information
- Awards & recognition

Rates on the Rise!

BPA and utilities anticipate having to increase electricity rates later this year

Higher prices are coming

A streetlight at the intersection of Fourth Avenue and Washington Street in downtown Portland is set against a backdrop of a giant PGE poster reminding people to use energy wisely.

TRIBUNE PHOTO: KYLE GREEN

By DON HAMILTON
The Tribune

Aluminum plants are closing. Lights are shutting off. Businesses are getting paid not to use electricity.

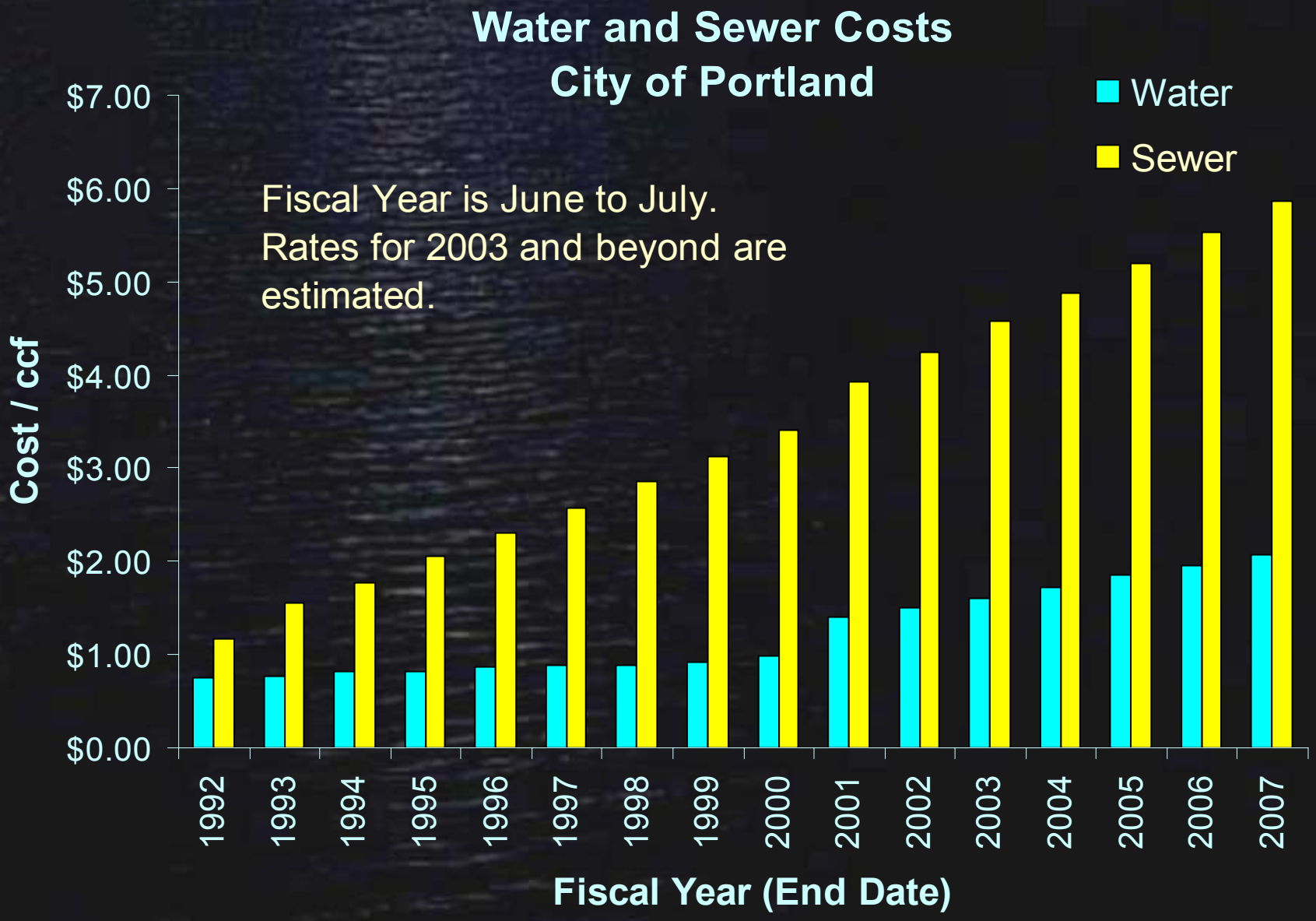
Good news: No summer shortage
Bad news: Prices may never drop

late 1990s provided extra power and masked the demand increase. The return of low-water years brought the energy industry to the supply shortage it faces today.

Short-term fix is costly

Portland Tribune, June 1, 2001

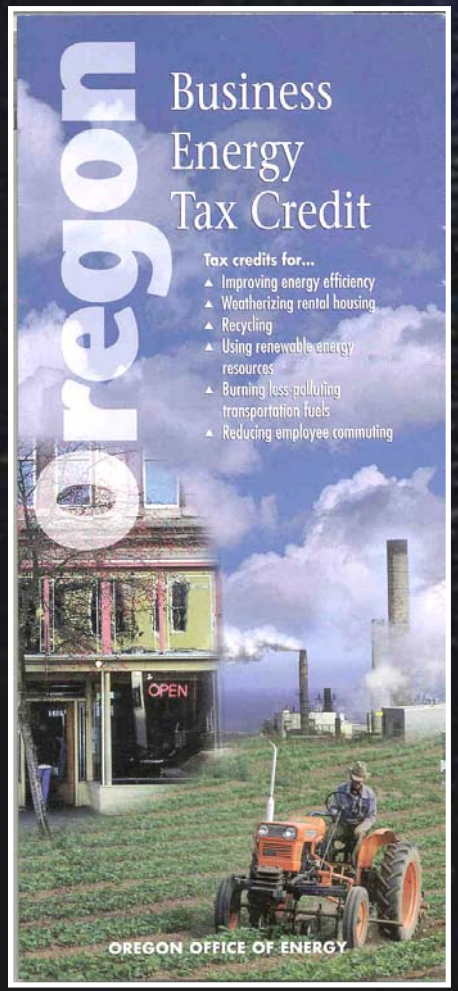
Rates on the Rise!



Rates on the Rise!

- Clean water to combined sewer rate eliminated July 1, 2001. Cost to discharge cooling water to combined sewers increased by $1.64/CCF.
- Commercial energy rates increased 53 percent on October 1, 2001.
- Water and energy conservation now more cost-effective than ever!

Saving Water and Energy (and Money!)



- UPW, HVAC and hot water projects generally more cost effective as they save water, sewer, energy, chemicals, labor, and other processing costs.
- Business Energy Tax Credits can offset costs.

Where is Hot Water Used?

- Hot water is used in:
  - ✓ **Boilers/steam systems**
  - ✓ **Laundries**
  - ✓ **Kitchens**
  - ✓ **Showers**
  - ✓ **Cleaning/sanitation**
  - ✓ **Chemical baths**

Plate and frame heat exchanger at a dairy plant

HVAC Energy/Water Efficiency Opportunities

Danfoss Graham VLT6000 Variable Frequency Drive

- HVAC Energy/Water Efficiency:
  - ✓ **VFD's/2 spd motors on cooling tower fans: Vary flow on condenser or evaporator pumps (some manufacturer's get nervous)**
  - ✓ **Increase chiller efficiency**
  - ✓ **Capacity control dampers on tower fans**

System Interactions

- Combining Water and Energy Efficiency:
  - ✓ Energy efficient fan improves heat exchange across fan coil units, lowers chilled water requirements. Cooling tower runs at lower speed, less often. Evaporation is reduced.
  - ✓ Example: Customer replaced fan, changed fan belts, reducing cooling tower run time 260 min/day, cutting water use by 12 million gallons per year.

System Interactions

Effect of Scaling on Energy Costs

	$/Year Energy Loss	*$/Year Energy Loss*	*$/Year Energy Loss*
A/C Tonnage	Scale Thickness Light 1/84 in	Scale Thickness Moderate 1/42 in	Scale Thickness Heavy 1/32 in
500	$ 4,100	$ 8,800	$ 12,500
1000	$ 8,200	$ 17,800	$ 25,000
Assumptions	Unit operates 240days/year, 8hr/day	One Ton of A/C consumes 0.7kWh	Electricity @ $0.06/kWh

Source: Ibera Efficiency Services, March 2000

Water/Energy "Thiefs"

- Leaking Duct Work: Lawrence Berkeley Laboratory Building Study: 30-50% of current energy use is energy loss from poorly sealed air ducts.
- Constant speed fans: VFD's save about 7% on tower evaporation, up to 45% on energy. Payback is under 2 years, per J.C. Penny study.
- Single-Pass Cooling: reusing in a hot process like boiler make-up saves energy:water is already warm!
- Inefficiencies in UPW production: Saving UPW yields large energy savings. It costs $10-15/CCF to produce.

Chiller Efficiency

Year	Average peak load kW/ton	"Best" peak load kW/ton
1976	0.9	0.8
1980	0.75	0.7
1990	0.7	0.65
1993	0.6	0.55
1996	0.6	<0.5
1998 (est.)	0.59	<0.49

http://yosemite1.epa.gov/estar/business.nsf/webmenus/Business

Energy/Water Efficiency Web Resources:

- http://www.waterwiser.org/
- http://www.nwalliance.org/
- http://es.epa.gov/partners/wave/wave.html
- http://www.eren.doe.gov/femp/techassist/softwaretools/softwaretools.html
- http://www.eei.org/
- http://www.aceee.org/briefs/ace-mtr.htm
- http://www.facilitiesnet.com/NS/NS3b96j.html

Energy/Water Efficiency Web Resources:

- http://www.eren.doe.gov/femp/procurement/le_chiller.html
- http://www.weea.org/Sampler/default.htm
- http://www.pprc.org/pprc/pubs/topics/semicond/semicond/html
- http://yosemite1.epa.gov/estar/business.nsf/webmenus/Business
- http://www.nam.org/tertiary.asp?TrackID=&CategoryID=295&DocumentID=22523

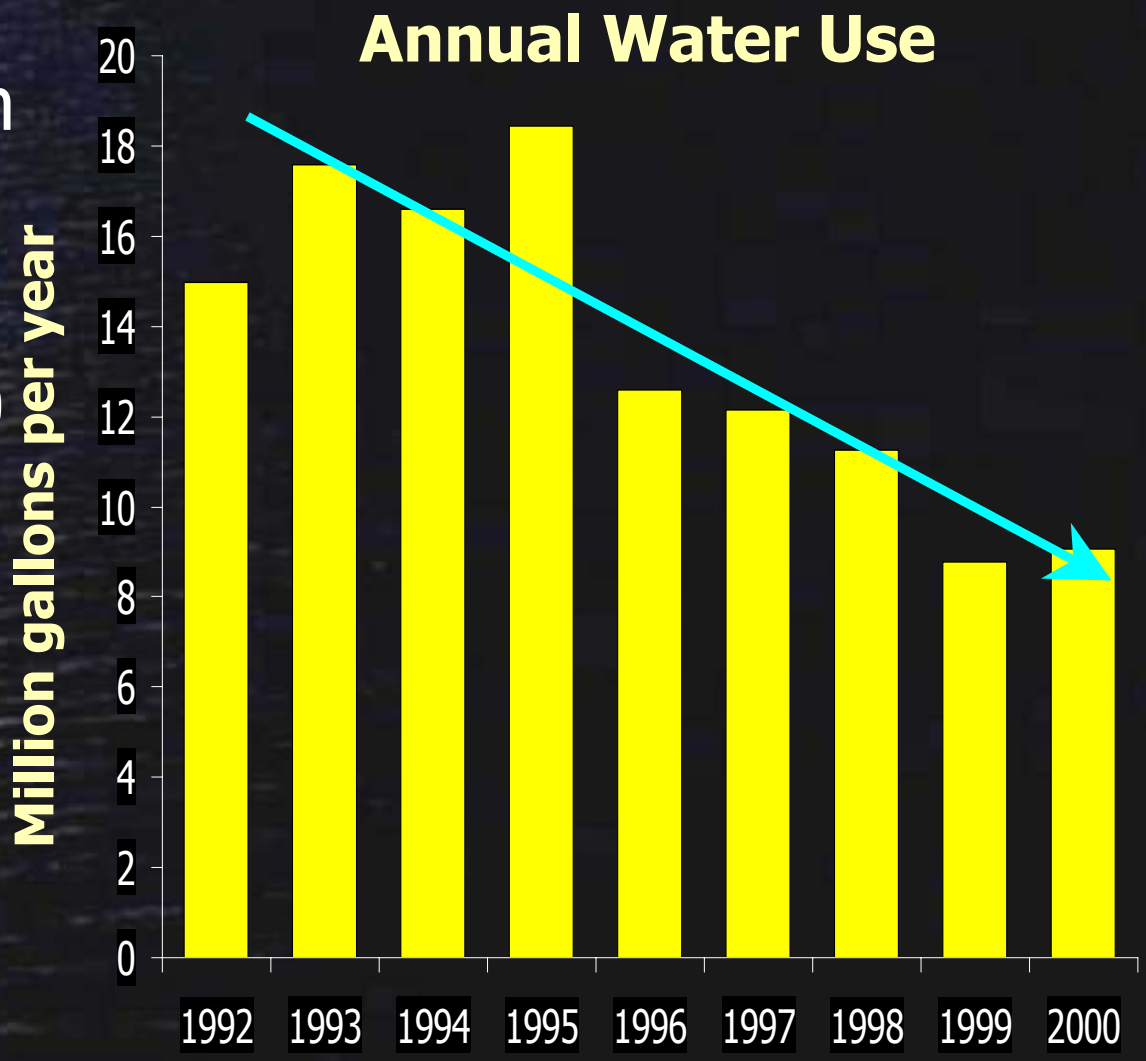
Customer Examples for Water/Energy Savings

- Thunderbird Laundry
- Calaroga Terrace
- Hercules
- Consolidated Metco (Clackamas customer)
- Wacker Siltronic
- California Glass Plant
- Ashforth Pacific: Lloyd Tower
- Board of Trade (feasibility)

Double Tree Laundry

Double Tree (Thunderbird) Laundry

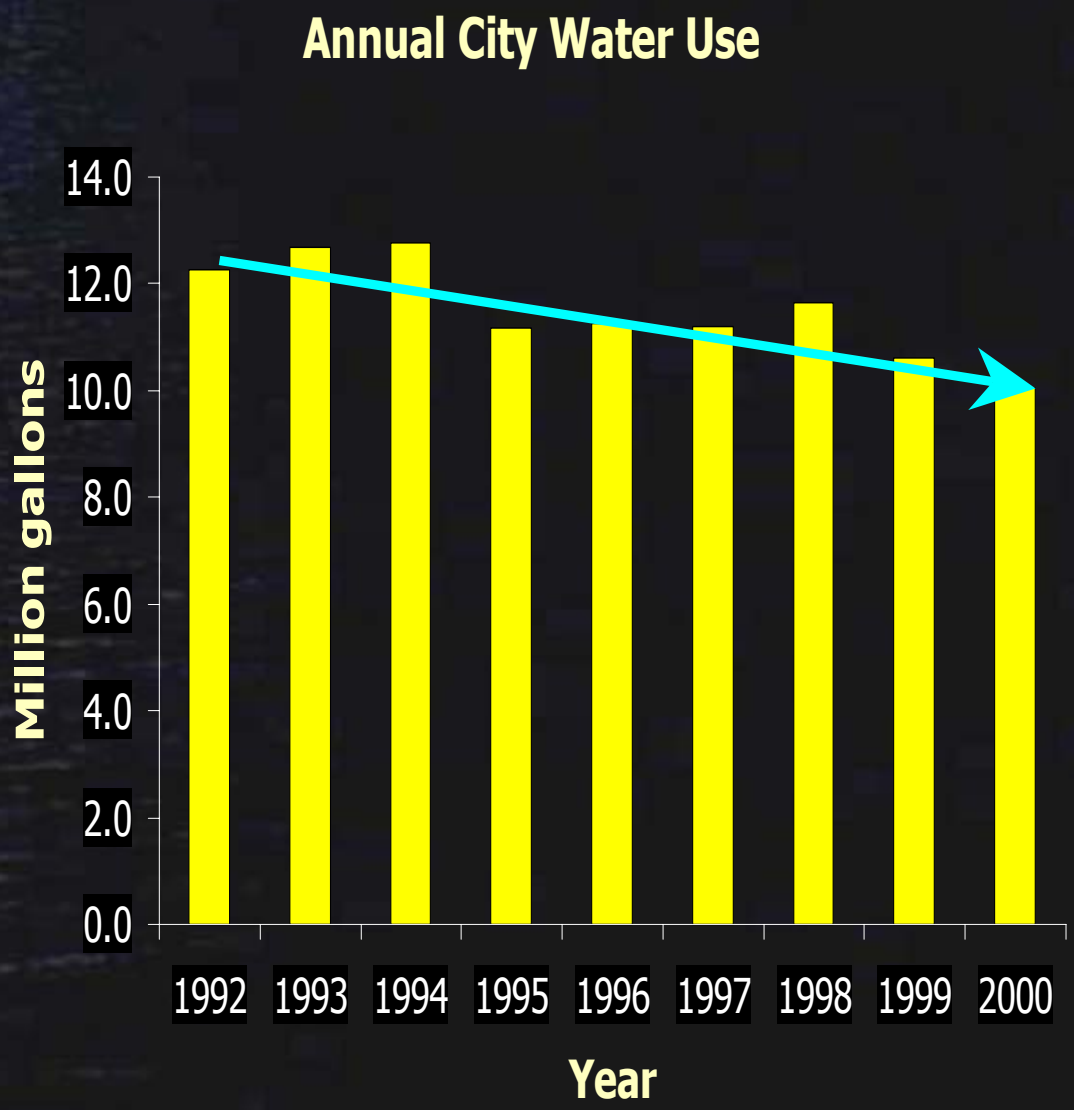
- Installed state-of-art recycling system for laundry wash water
- Received a $78,000 USDOE grant and donation from PGE
- Project saved 8 MG/yr and $40,000 on utility bills (at 1995 rates)



Calaroga Terrace

Calaroga Terrace

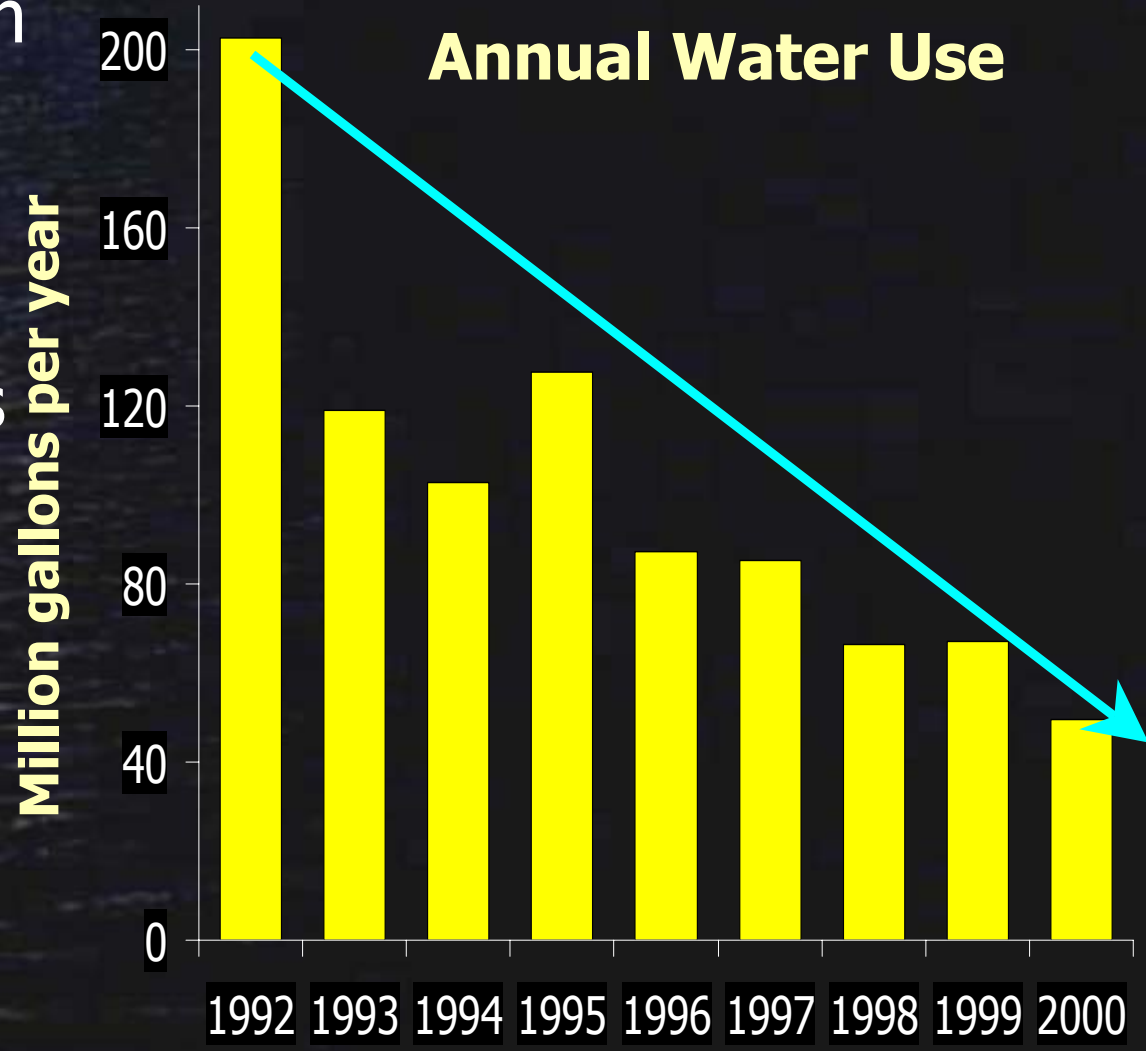
- Purchased high efficiency washers.
- Received Oregon Business Energy Tax Credit (28% of cost difference via NNG pass-through)
- Saving $1100/yr in energy, water, sewer and chemicals (99/00 rates)



Hercules

Hercules

- Environmental Team identified savings opportunities
- Boiler condensate used to wash trucks
- Single-pass water reused as boiler make-up water
- Numerous other changes captured additional savings



Wacker Siltronic

Wacker Siltronic

- Recycling sample port UPW into RO product storage tanks est. to save 26,000 CCF UPW, 37,000 CCF city water.
- Costs savings: $56,000/yr. water and over $250,000/yr on UPW production. About $60,000 of this is energy savings.

Glass Manufacturer

- World's largest manufacturer of optical thin film coated components (computer monitors, flat panel displays, photocopiers, fax machines,satellite power systems and aerospace and defense systems).
- Water provider offered rebates of $100 for every 1,000 gallons per month of sustainable reduction in water use and wastewater flow (excluding toilet/faucet/shower head replacement). Rebate <= cost of the materials and equipment.

Glass Manufacturer

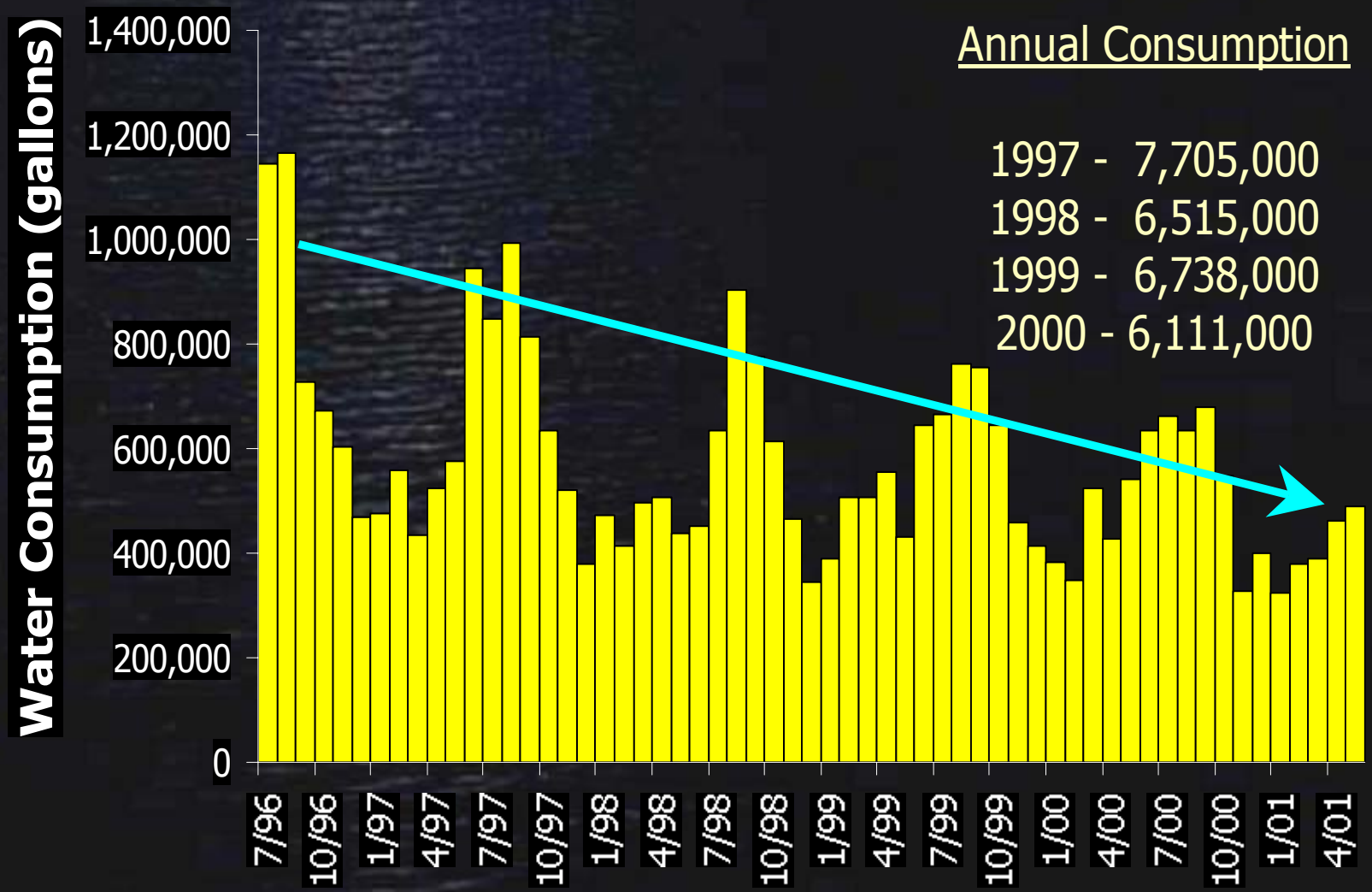
- Installed auto switches in glass washing lines (RO water used for washing):
  - ✓ **Water savings:15,000 gal/day**
  - ✓ **Water&sewer savings: $41,000/yr**
  - ✓ **DI water treatment savings: $72,000/yr about $14,000 of this is energy savings.**
  - ✓ **Installed Cost: $2400**
  - ✓ **Rebate : up to $2,400**
  - ✓ **FREE and DONE!!!**

Ashforth Pacific (Lloyd Tower)

Ashforth Pacific

- Active member of Oregon Natural Step Network.
- Studying rainwater harvesting for one site as U of P senior project in partnership with Portland Water Bureau
- HVAC study (2000) at Lloyd Tower showed adding VFD's to towers could save $13,000/yr in energy (45%) and 7-10% on evaporation loss (79,000 gallons/yr) for an $18,000 investment. Payback less than 18 months - from energy savings alone., before October rate increase!

Ashforth Pacific (Lloyd Tower)



Board of Trade Building

Board of Trade Building

- Water cost much higher per square foot compared to other properties.
- Two, 300 gallon electric water heaters heating 50-60 degree city water to 90-100 degrees, while 3-4 gpm of 85-95 degree water draining from A/C unit to sewer 15 feet away, 18 hours/day, 5-6 days/wk.
- Extracting heat from A/C water (about 1 million gallons/yr) could save $2,000-3,000 in annual energy costs. Water/sewer savings = $7,800/yr if recycled to cooling loop.

Summary

- Cost of water/sewer over $5.74/CCF as of 7/1/01. Clean water to combined sewer rate gone 7/1/01.
- Commercial energy rate increased 53% in October.
- Tax credits available for energy saving projects.
- Paybacks for water/energy saving projects are generally in the 2 months-2 year range.
- If you aren't sure where to start, help is available.

Thank you for listening!

For more information, call Teri Liberator at (503) 823-7483, or e-mail tliberator@water.ci.portland.or.us

Questions?