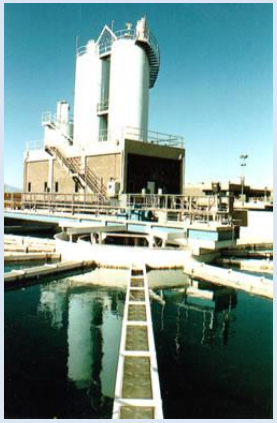
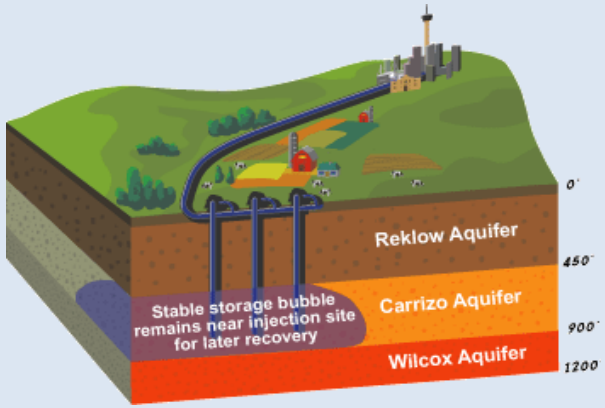
Trends in Water Planning and Water Reuse

James R. Brown, P.G.,
Associate Director of Strategic Planning
Water Quality Protection Division
US EPA Region 6
brown.jamesr@epa.gov





Disclaimer

This presentation was not peer reviewed or approved for publication. It is an informative presentation intended to educate the public on water planning and reuse trends. The contents of this presentation do not necessarily reflects the views and policies of the U.S. Environmental Protection Agency, nor does mention of trade names, commercial productions, corporations or publications constitute endorsement or recommendation for use.

Outline

- Water Footprint
- Continued Drought/Depleted Supplies
- Increasing Demand/Population Growth
- Energy Costs
- Corporate Stewardship
- Regulations and Guidelines
- Water Reuse Examples

"Water Footprint"

Beef	*1,799 gallons/lb*
Hamburger	*660*
Chicken	*468*
Wheat	*132*
Potato	*119*
Rice	*449*

Milk	*880 gallons/gallon*
Wine	*1008*
Beer	*689*

Natural gas	*0.15 gal/kWh*
Oil	*1.01*
Coal	*0.15*
Nuclear	*0.09*
Hydroelectric	*20.92*
Solar	*0.26*
Wind	*0*

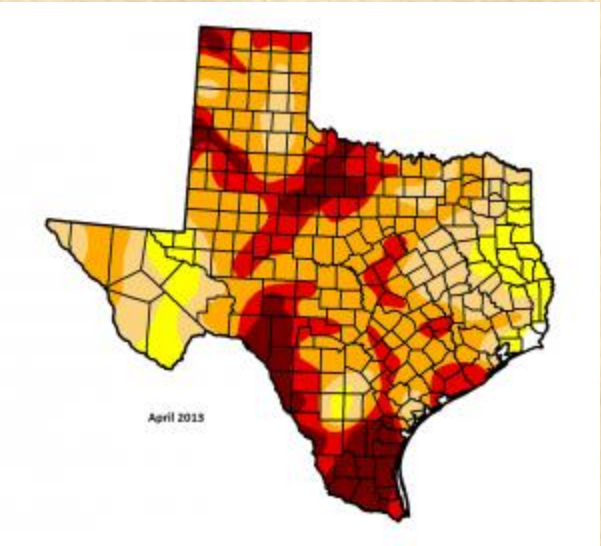
http://waterfootprint.org or

http://environment.nationalgeographic.com/environment/freshwater/embedded-water/

Texas Drought

• As of April 13, 2013, 99% of TX is in some form of drought conditions, and the state's reservoirs are 66% full. Nearly 11% of the state is in exceptional drought, the worst stage.

• 2011 was the driest year ever for Texas, with an average of only 14.8 inches of rain. The only comparable drought occurred during the drought of record during the 1950s, but no single year during that drought was as dry as 2011

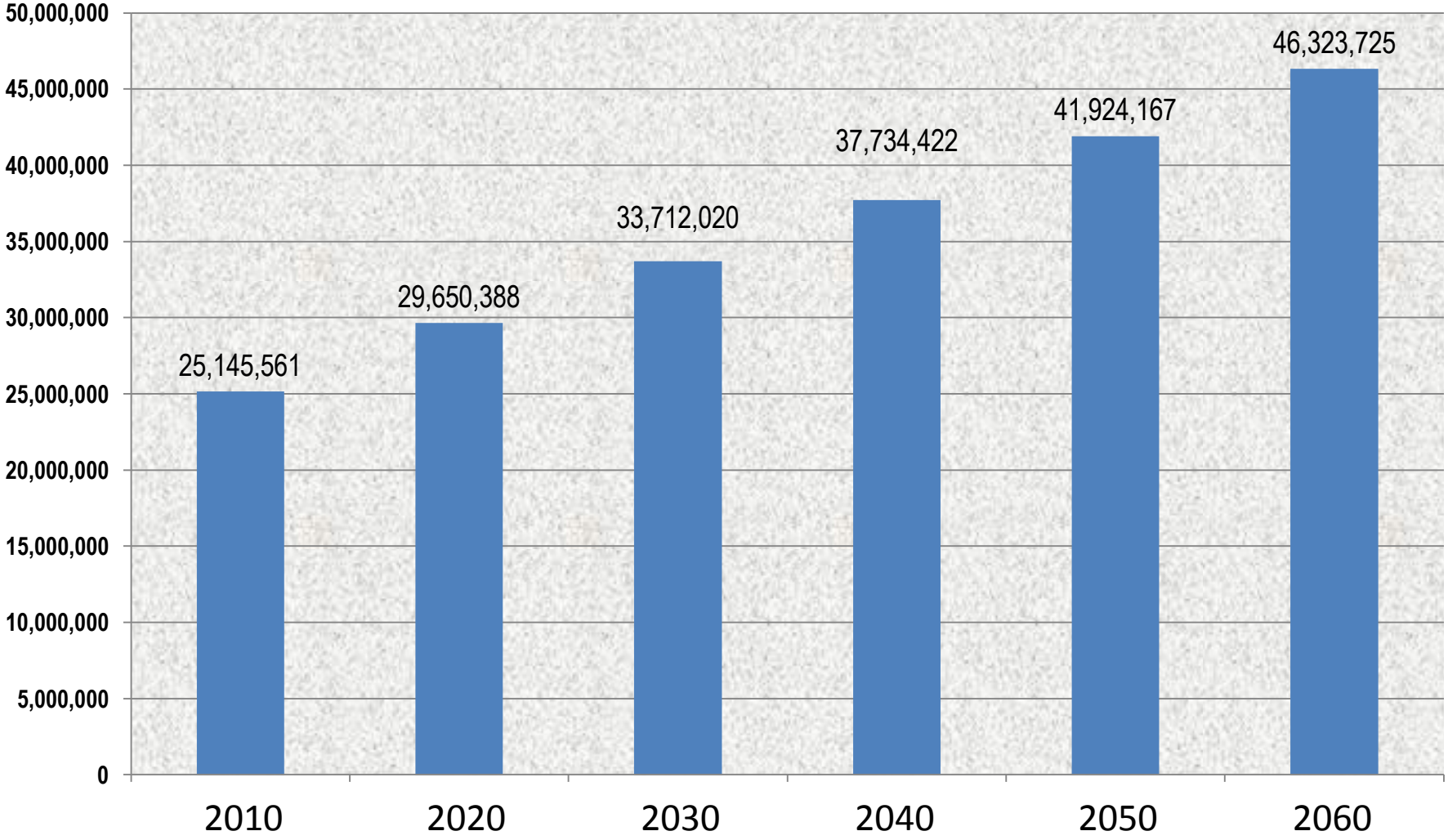


The latest NOAA outlook predicts the drought will "persist or intensify" in Texas in the coming months, and drought-free areas of the state are likely to see drought development.

http://droughtmonitor.unl.edu

Growth Projections in Texas

(~82% Increase from 2010 to 2060)



Future Water Demand in Texas

Water for Texas 2012 State Water Plan

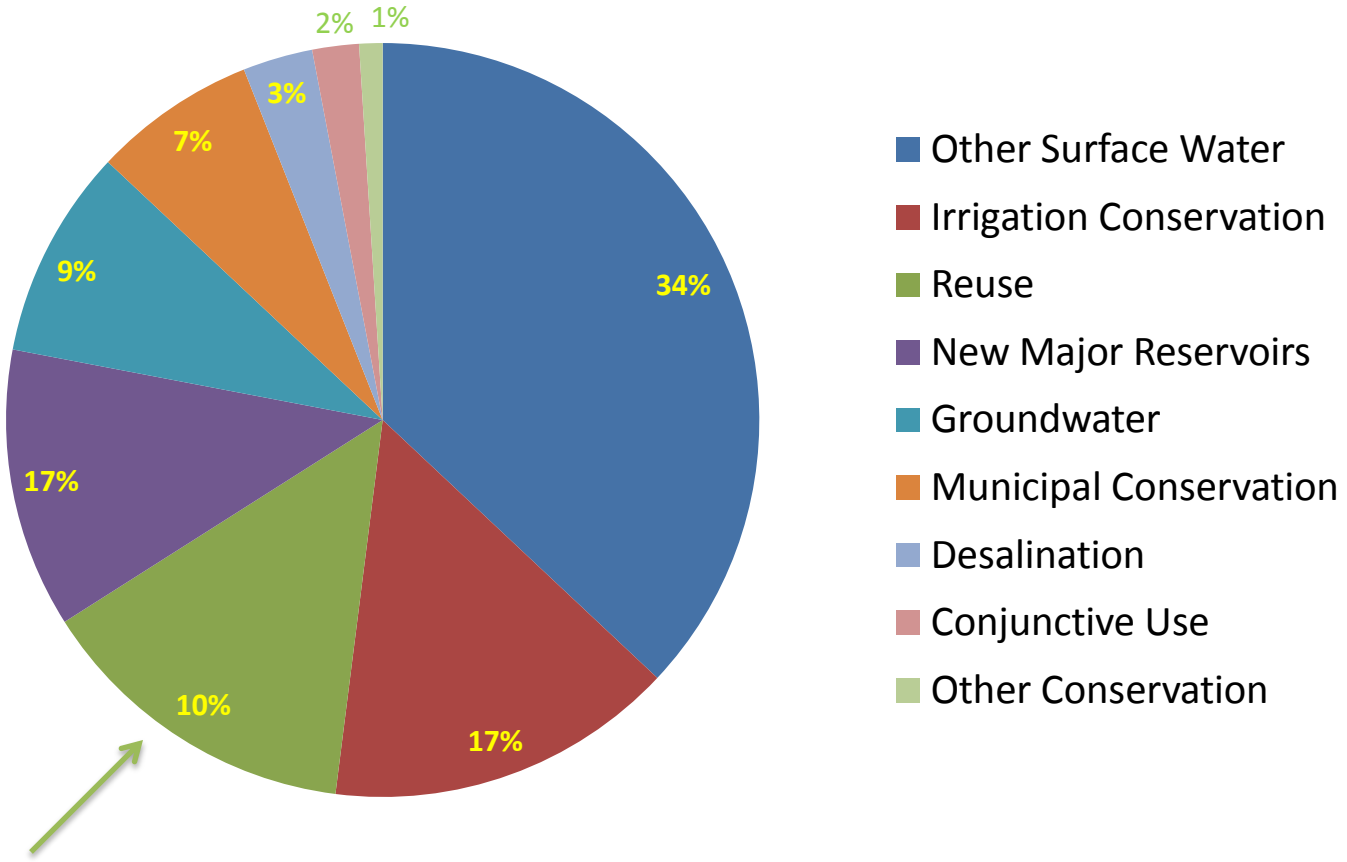
Category	2010	2060	% Increase
Municipal	4,851,201	8,414,492	73%
Manufacturing	1,727,808	2,882,524	67%
Mining	296,230	292,294	-1%
Steam Electric	733,179	1,620,411	121%
Livestock	322,966	371,923	15%
Irrigation	10,079,215	8,370,554	-17%
Texas	18,010,599	21,952,198	**22%**

acre-feet/year

EPA WaterSense

Projected New Water Supplies to meet the Demands of 2060

Water for Texas 2012 State Water Plan



Water Reuse increases from 5% of total in 2010 to 10% of total in 2060 (~100,600 to ~915,000 acre-feet)

The Energy-Water Connection: Municipal water/sewer plant energy use

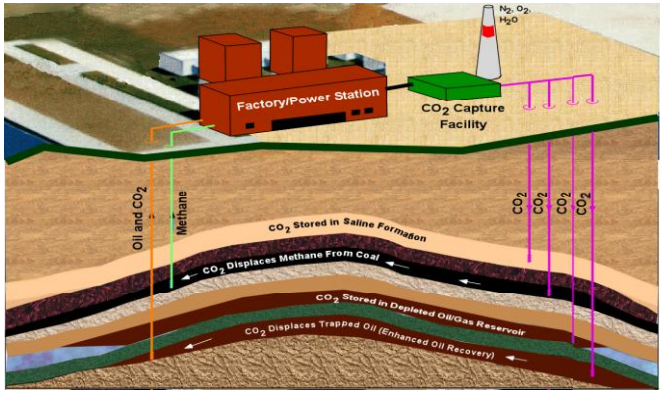
- U.S. annual total* = 75 billion kilowatt hours per year
- 3% to as much as 14% of total U.S. consumption of electricity
- Equal to entire residential electricity demand of California
- More than entire energy-intensive pulp/paper and petroleum sectors *combined*
- Public bill = Already $4B/yr. Increasing
- Residential water heating uses 104 Bkwh annually!

* 60,000 drinking water treatment plants + 15,000 sewage treatment plants

Sources: US EPA, Alliance to Save Energy, Pacific Institute & NRDC

Hidden Energy Costs in Water Use

- *Running a hot water faucet for 5 minutes consumes the same energy as a 60W light that's on for 14 hours!*



EPA WaterSense SM

Corporate Social Responsibility

Some CSR Trends, Jan. 2012, Forbes Magazine Article

- **Globalization:** increasing accountability for supply chains.
- **Transparency:** Last year more than 5,500 companies around the world issued sustainability reports, up from about 800 a decade ago.
- **Employee Engagement Emerges:** morale was 55% better, business process were 43% more efficient, public image was 43% stronger, and employee loyalty was 38% better.
- **A Growing Population, 7 Billion:** Everything from energy efficient semiconductors to electric cars to water conserving plants will find new markets in 2012 and beyond.

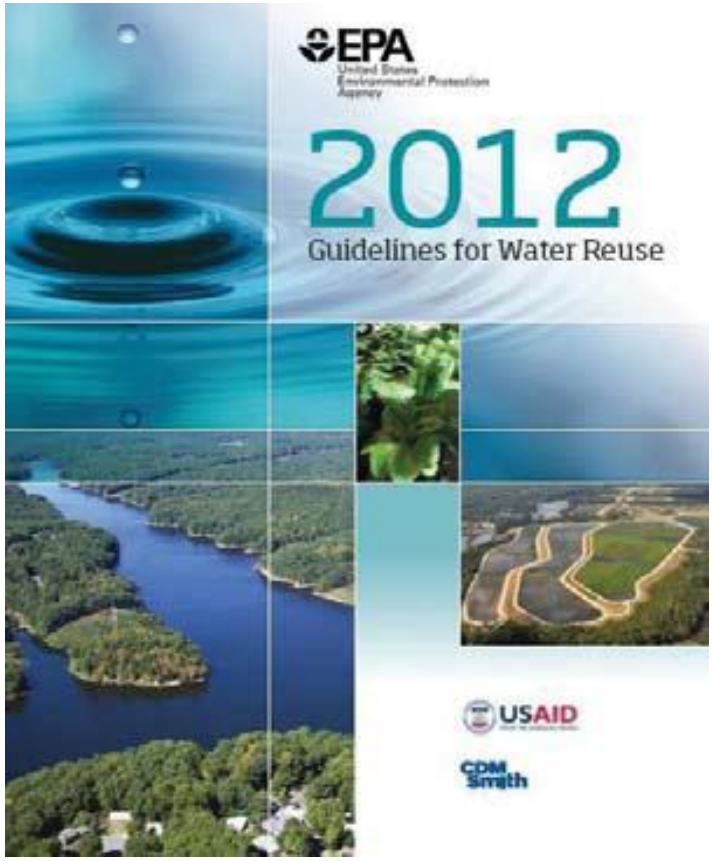
Reuse Water

Reuse water is used as a conservation measure for potable water supplies.

Fire protection
Irrigation for Golf courses, Schools
Parks and athletic fields, nurseries, landscaping
Street sweeping
Agriculture, Irrigation, Livestock
Cooling towers
Power Plant Cooling
Scrubbers
Dust suppression at construction projects
Supplementing base flows in creeks and rivers
Industrial manufacturing processes
Potable water




Water Reuse Regulations and Guidelines



http://nepis.epa.gov/Adobe/PDF/P100FS7K.pdf

Water Reuse: Endless Possibilities

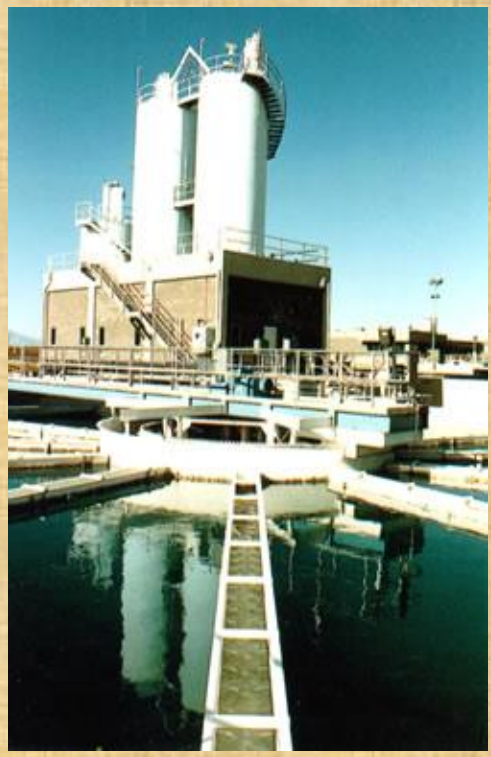
Aquifer Storage & Recovery

San Antonio, Texas: Twin Oaks facility

- *Operates 29 injection wells*
- *Stores water from Edwards aquifer in the Charrizo-Wilcox aquifer*
- *Around 30 billion gallons of water stored underground.*

El Paso, Texas: Fred Hervey water Reclamation Plant

- *Stores reclaimed water in the Hueco Bolson aquifer*
- *Over 500 million gallons stored underground*



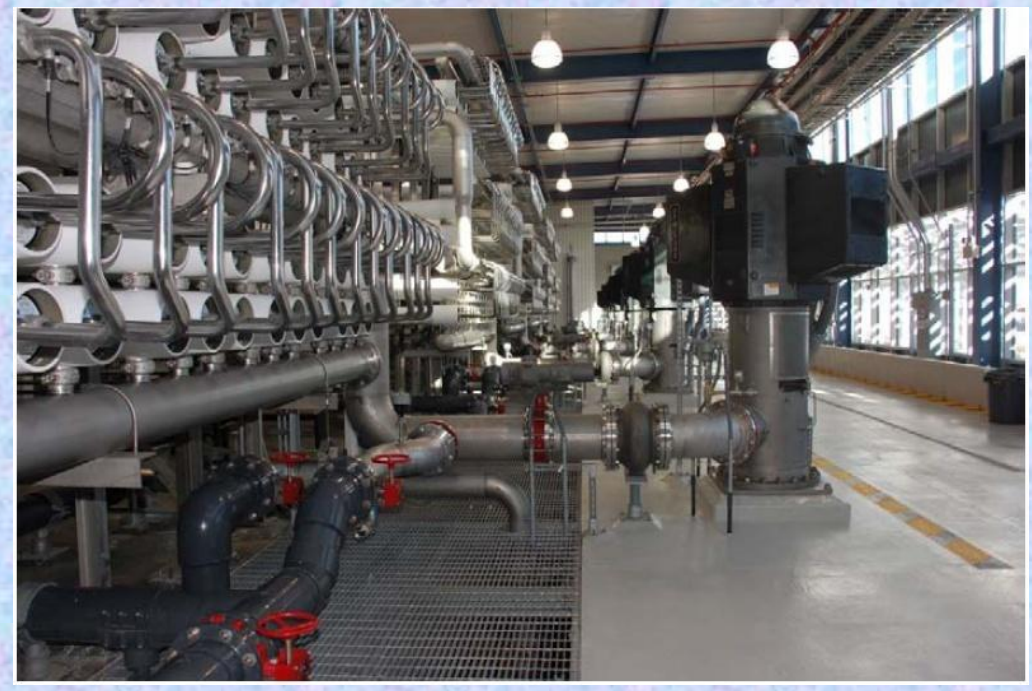
Kerrville, Texas (upper Guadalupe River Authority)

- *Operates 2 injection wells*
- *Stores treated surface water*
- *Around 800 million gallons water stored underground*

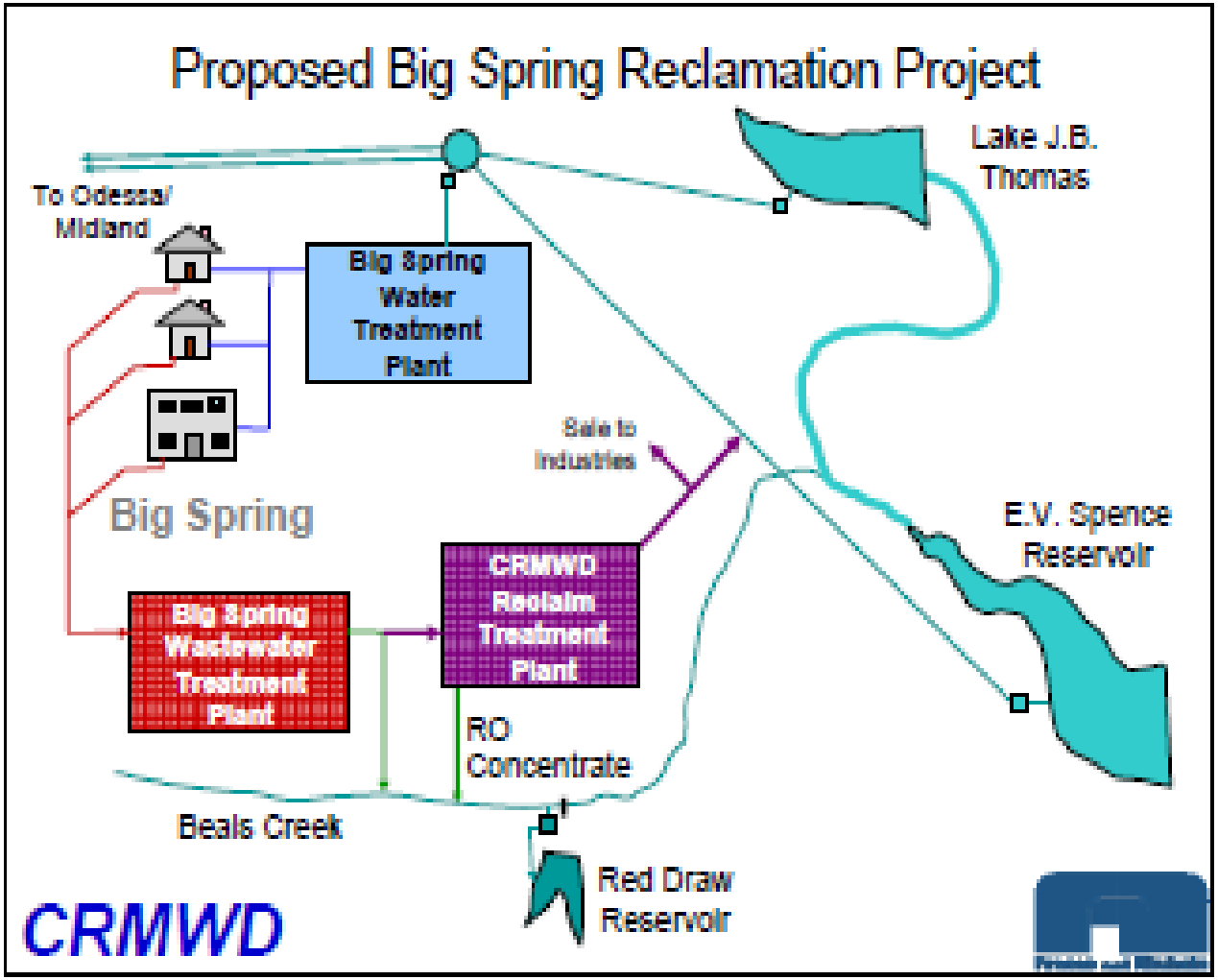
El Paso, TX Kay Bailey Hutchison Desalination Plant

City of El Paso Water Utilities and Fort Bliss

- *Went into production in 2007*
- *Largest inland municipal desalination plant in the world*
- *Design capacity of approx. 27.5 million gallons per day (approx 30,800 acre-feet per year)*



Big Spring Water Cycle



Construction has been completed on a $13 million water-reclamation facility. That's a fancy way of describing a treatment plant that will turn sewage wastewater into drinking water. It’s in a testing phase now but is fully operational.

Water Reuse

Dos Rios WWTP and Sustainability

Sells every gallon of reclaimed water it produces to 65 big customers including the Alamo, and the River Walk.

98% of the sludge is recycled and sold through a commercial compost supplier.

SAWS cut the cost of disposal by more than half.

The bio-solids digesters produce 1.5 Mft^3/day of natural gas. SAWS sells it for $20,000 a mo. They are the only municipal wastewater plant in the United States to sell its bio-gas commercially.

No technological breakthrough was required to turn Dos Rios from a "waste" facility into a "recycling" facility. The only thing that had to be overhauled was the thinking of the people.

70% of the cleaned water returns to the Medina River through a 45' high spillway.

They are trying to figure out if they could put a small hydropower generator at this outfall.

Industrial Examples

2012 Water Reuse Guidelines; Chapter 3, section 3.5

Frito-Lay in Casa Grande, AZ Frito-Lay Process Water Recovery Treatment Plant, Casa Grande, Arizona. Set a goal of running a manufacturing facility almost entirely on renewable energy and reclaimed water and near zero waste.

Coca-Cola in GA Recovery and Reuse of Beverage Process Water: Installing recycle- and-reclaim loops in 12 of its water treatment systems in North America and Europe with goals of equipping up to 30 facilities. The loops save an average of 57 million gallons of water per system annually.

Industrial Examples

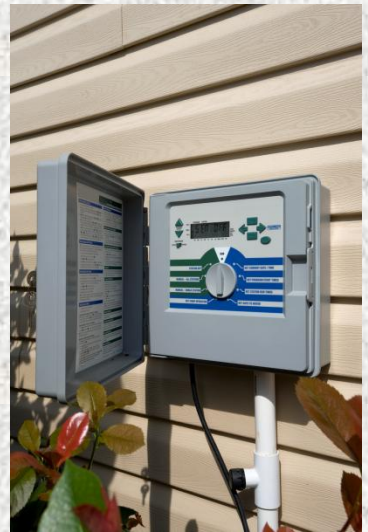
2012 Water Reuse Guidelines; Chapter 3, section 3.5

Intel: Improved the efficiency of the process used to create the ultra-pure water (UPW) required to clean silicon wafers during fabrication.

Previously, almost 2 gallons of water were needed to make 1 gallon of UPW. Today, Intel generates 1 gallon of UPW from between 1.25 and 1.5 gallons.

In 2010, Intel internally recycled approximately 2 billion gallons of water, equivalent to 25 percent of its total water withdrawals for the year.

Consumer Choices . . .




WaterSense
Meets EPA Criteria
Do one thing!