



# Leveraging Energy Efficiency to Improve Water Efficiency

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# Overview



- Saving energy and water are important
- Energy and water are linked
  - Use water to produce power
  - Use energy to deliver water
  - Use energy and water together
- Many opportunities to save water through energy efficiency programs
  - Clear opportunities with public water systems
- Many questions

# Energy and Water Challenges



## Water

- Adequate supply
  - Domestic, industry, agric.
- Safe drinking water
- Healthy ecosystems:
  - Wetlands
  - Coastal waters
  - Rivers and lakes
  - Groundwater

## Energy

- Reliable supply
- Emissions limits
- Global warming
- Low costs

*Cost-effective efficiency solutions meet all objectives*

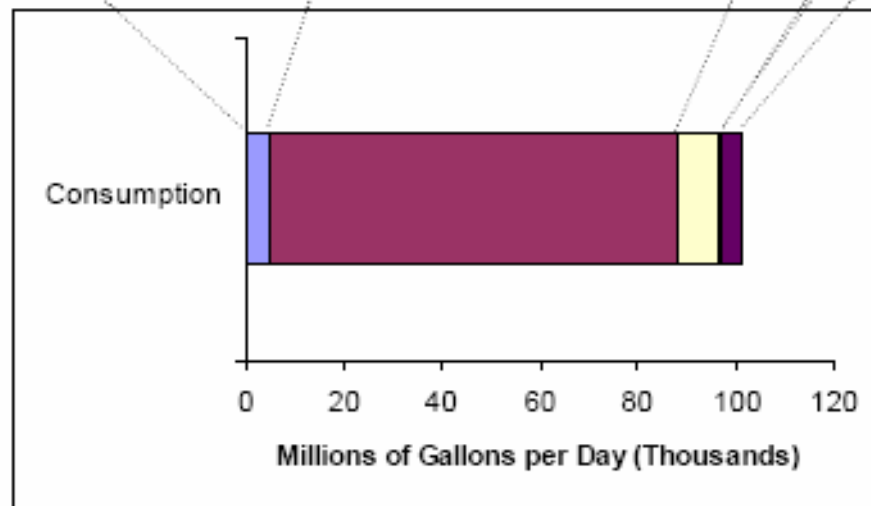
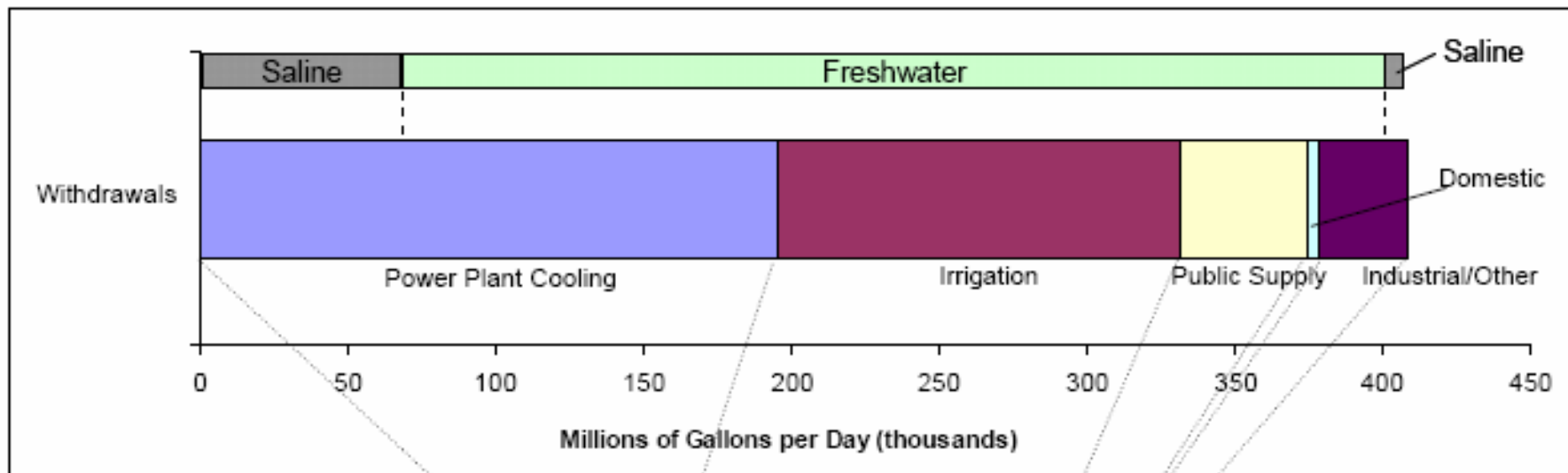
# Urban Water Challenges



- Financial stress
  - Aging infrastructure
  - Increasing treatment requirements
- Increasing demand
- Limited access to additional resources (supply) in many areas
- Increasing marginal supply costs

*Efficiency can cost less than new water or energy infrastructure*

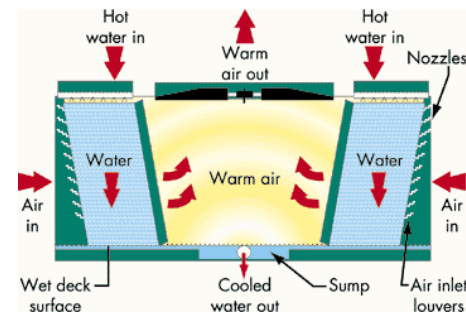
# Water Withdrawals and Consumption – 2000



# The Water-Energy Link



- Energy used to supply/treat water
- Water used to produce electricity
- Water/energy used jointly
  - Many products/processes
  - Both resources can be saved together in many cases



# Energy used to supply/treat water -- Urban Water Systems



- Water -- withdrawing 43,300 mgd (11% of total)
  - 8 to 10 percent unaccounted for nationally
- Energy -- using 50+ billion kWh annually
  - single largest energy expense for many municipalities
  - large portion is pumping energy
  - Identifiable opportunities for improvement

| Activity   | Energy Intensity (kWh/million gallons) | Total Annual Electricity Use (billion kWh) |
|--|--|--|
| Electricity Used in Water Supply                 | 1,500                                  | 30.0                                       |
| Electricity for Pumping in Wastewater Treatment  | 150                                    | 1.7  |
| Electricity for Aeration in Wastewater Treatment | 525                                    | 5.7  |

# Key Strategy



- ENERGY STAR Industrial Focus
  - Improved energy management
    - energy use benchmarking and tracking
    - best practices
    - peer exchange
  - Substantial savings possible
    - 5% energy savings -- 2 billion kWh
    - 5% leak reduction -- 225 mgd
  - Program in process of development
    - full roll out in one year

# Water used to Produce Electricity



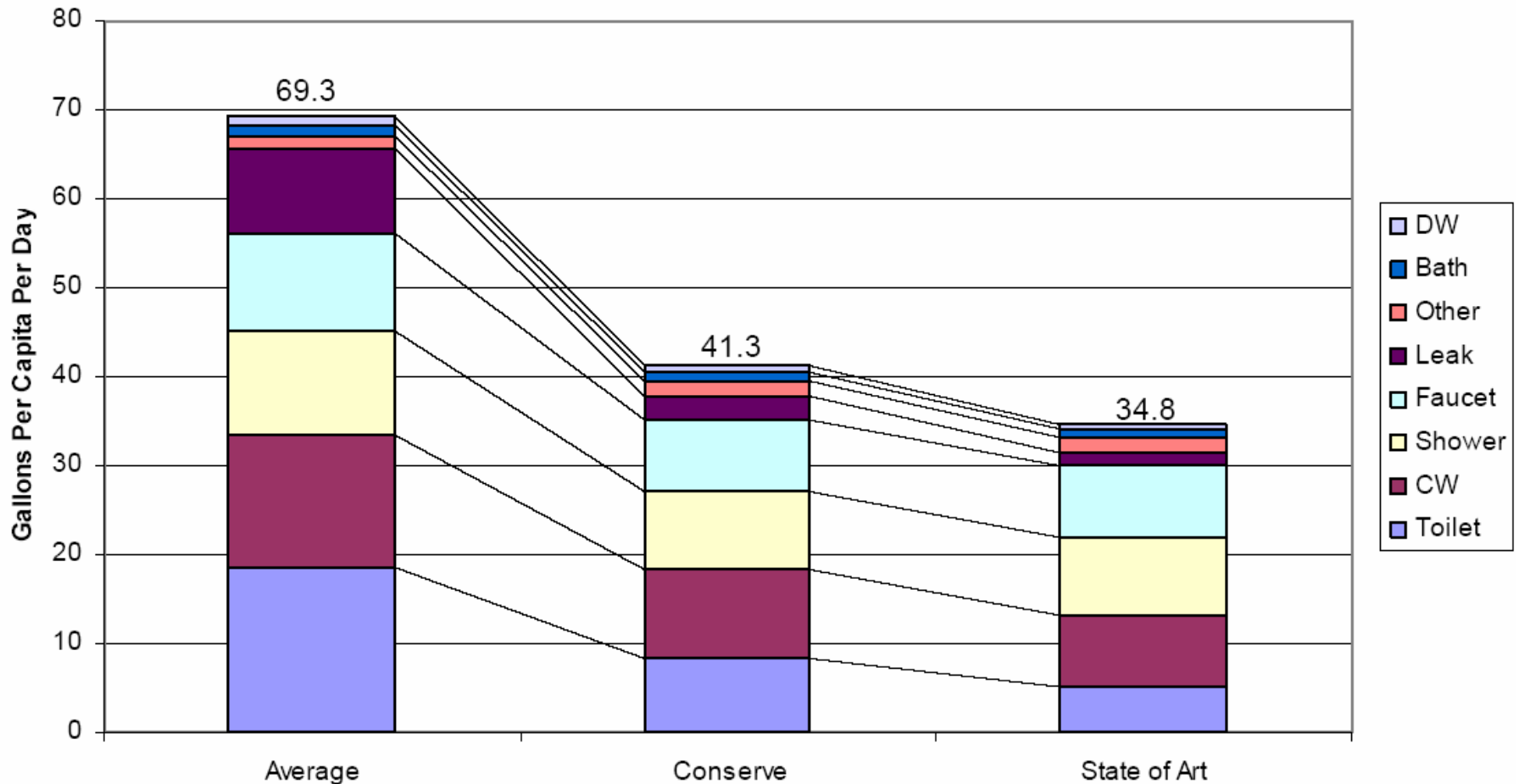
- Principal water use is for cooling water
  - Single largest water withdrawal
  - 5% of annual water consumption
  - about 1,000 mgd of freshwater
- Water consumption for power generation
  - Ranges for .15 to .6 gallons / kWh
    - depends on type of cooling and power technology
  - Average of about .45 gallons /kWh
- Saved kWh's save water

# Water and Energy Used Together



- Residential
  - Appliances, Showers
  - Hot water
- Commercial
  - Cooling systems
  - Commercial Kitchens
- Opportunity to Leverage Existing Programs and Reach the common audiences:
  - Manufacturers and distributors
  - Engineers and designers
  - Consumers

# Average Residential Water Use



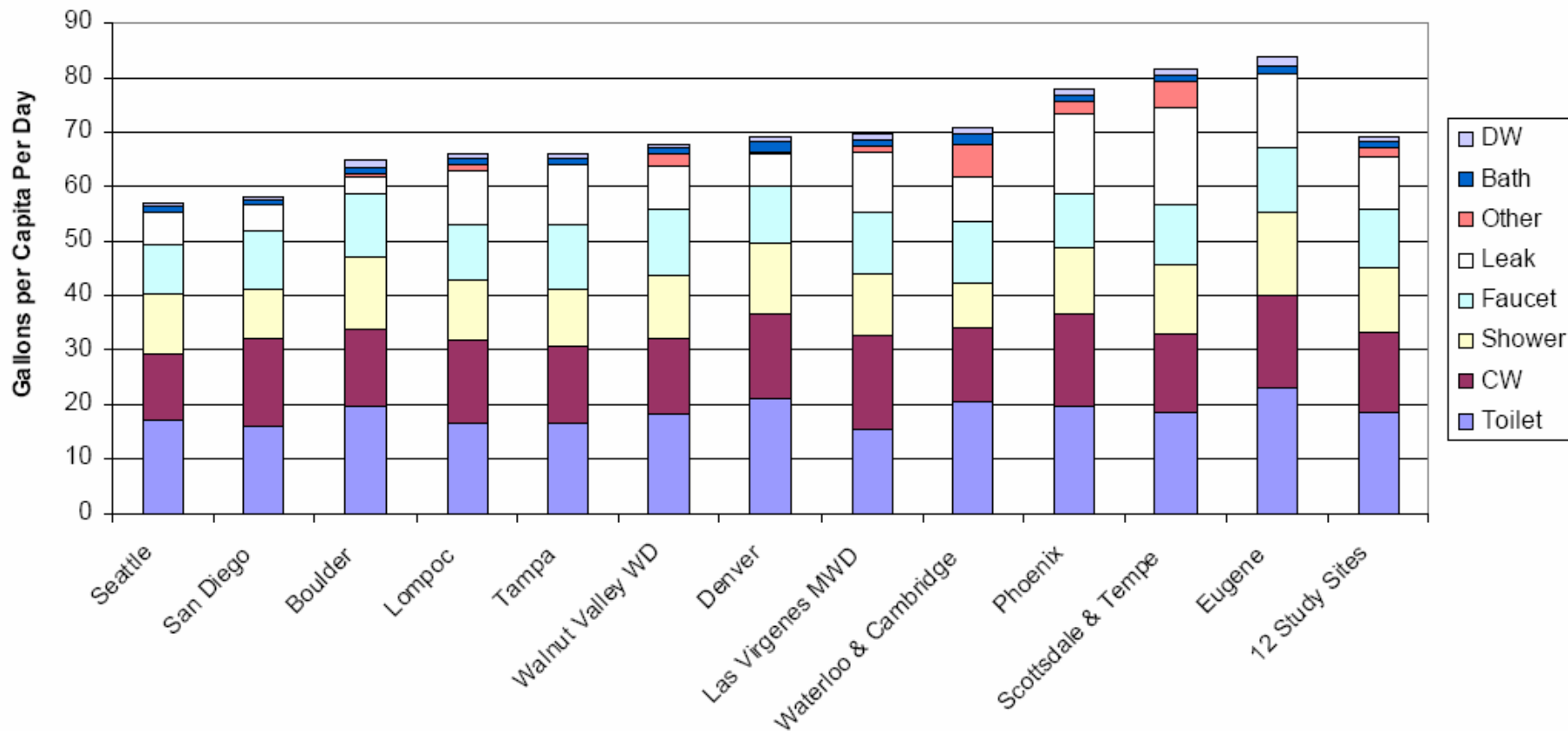
# Key Residential Strategies



## Leverage Energy Efficiency Programs

- Toilets meeting EPACT
  - get some leak reductionindirect
- Appliances
  - Clothes washers
  - DishwashersX  
X
- Leaks
- Showerheads and faucets
  - Not ready for product labeling?
- Outdoor water use

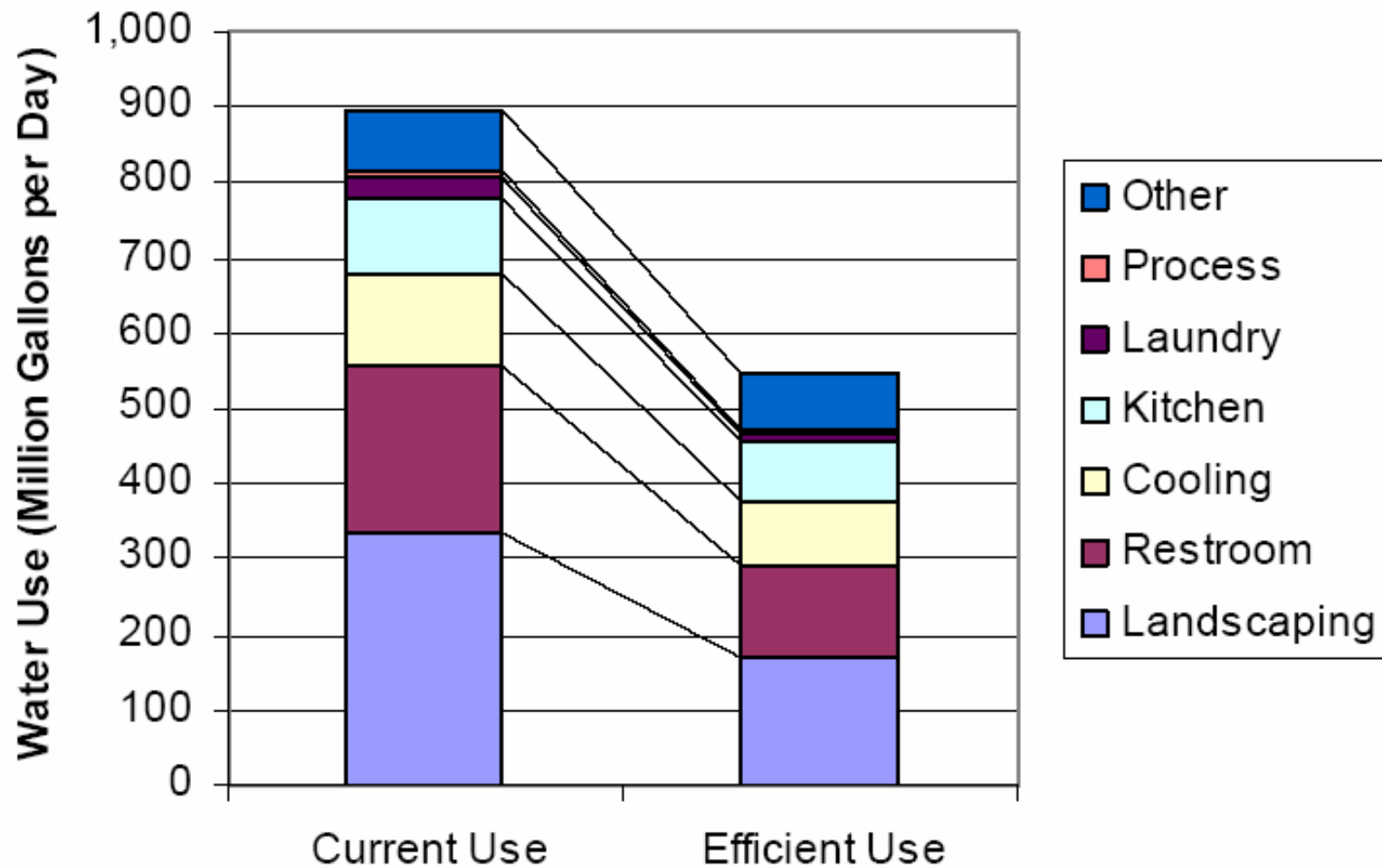
# Similar Potential in Many Regions



Source: Mayer, et al. (1999).

CW = clothes washer; DW = dishwasher

# Commercial Water Use



# Key Commercial Strategies



## WATER

- Outdoor landscaping
- Toilets/urinals meeting EPACT
- Commercial cooling
- Commercial cooking
- Commercial laundry

## ENERGY

- indirect
- indirect
- Part of high performance building
- Product labeling
- Product labeling

# ENERGY STAR Savings



- Through 2004
  - Energy savings
    - 110 billion kWh
    - 20,000 MW
  - Water savings
    - 110 mgd from products saved directly
    - 135 mgd saved in power plant cooling
- Savings will double by 2013 with current activities
- Potential to improve savings
  - Water factor in residential clothes washer

# Additional ENERGY STAR Opportunities



## Expanded Activities

- Intensified CW and DW efforts
- Improved cooling tower operations
- Additional labeled products
- Water supply/wastewater focus

## Savings

### *Water*

- 450 mgd directly
- 4 mgd in power plant cooling

### *Energy*

- 5,700 million kWh/year

# Leverage Energy Efficiency



- Energy efficiency programs provide a platform for building water efficiency initiatives
- Existing programs can help make important progress
  - urban water systems
  - be alert to tradeoffs
    - ice machines, power plant cooling
- New initiatives needed for landscaping and irrigation uses
- EPA developing new national initiative