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Saving Energy and Reducing Greenhouse Gasses through Water Use Efficiency

Hossein Ashktorab, Ph.D.

Jeannine Larabee

Kira Darlow

Santa Clara Valley Water District

WaterSmart Conference

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Santa Clara Valley Water District

Outline

- Introduction to the Santa Clara Valley Water District
- Water Use Efficiency in Santa Clara County
- The Water-Energy Nexus
- Energy Savings and Greenhouse Gas Reductions from Water Use Efficiency
- Selected Water Conservation Programs
- Recommendations

Santa Clara Valley Water District

Water – our mission for 75+ years

The mission of the Santa Clara Valley Water District is a healthy, safe, and enhanced quality of living in Santa Clara County through watershed stewardship and comprehensive management of water resources in a practical, cost-effective, and environmentally-sensitive manner.

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Santa Clara County

- A Semi-arid Region
  - Average annual rainfall is14 inches.

- Rapid Population Growth
  - County: approximately 1,800,000
  - 200,000 commuters
- Water Use
  - Total water use for county (2008) 383,000 Acre-Feet

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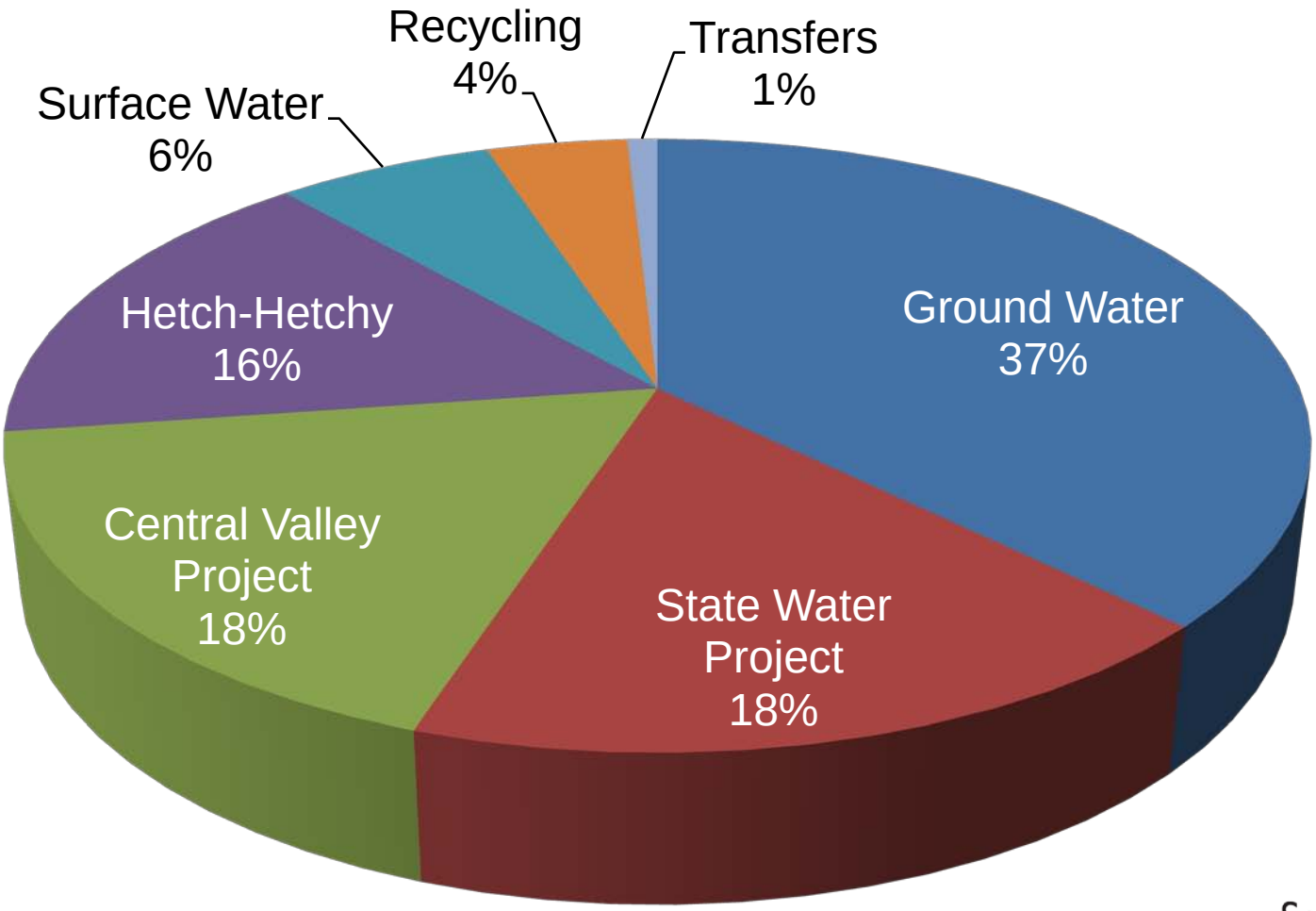
Variety of Water Supply Sources for Santa Clara County:



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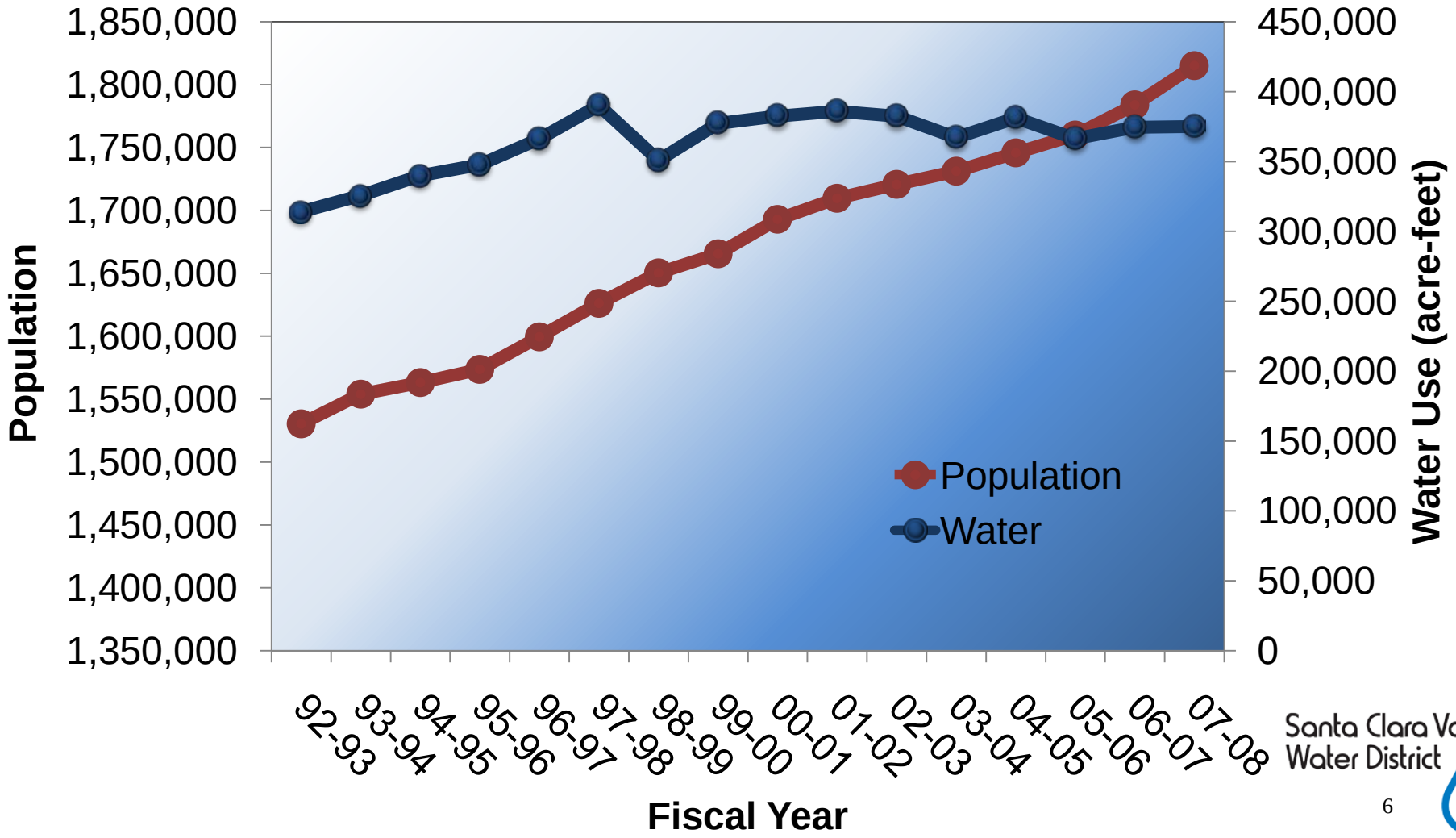
Population and Water Use

Due in part to conservation efforts, water use in Santa Clara County has not increased significantly despite the increase in population.



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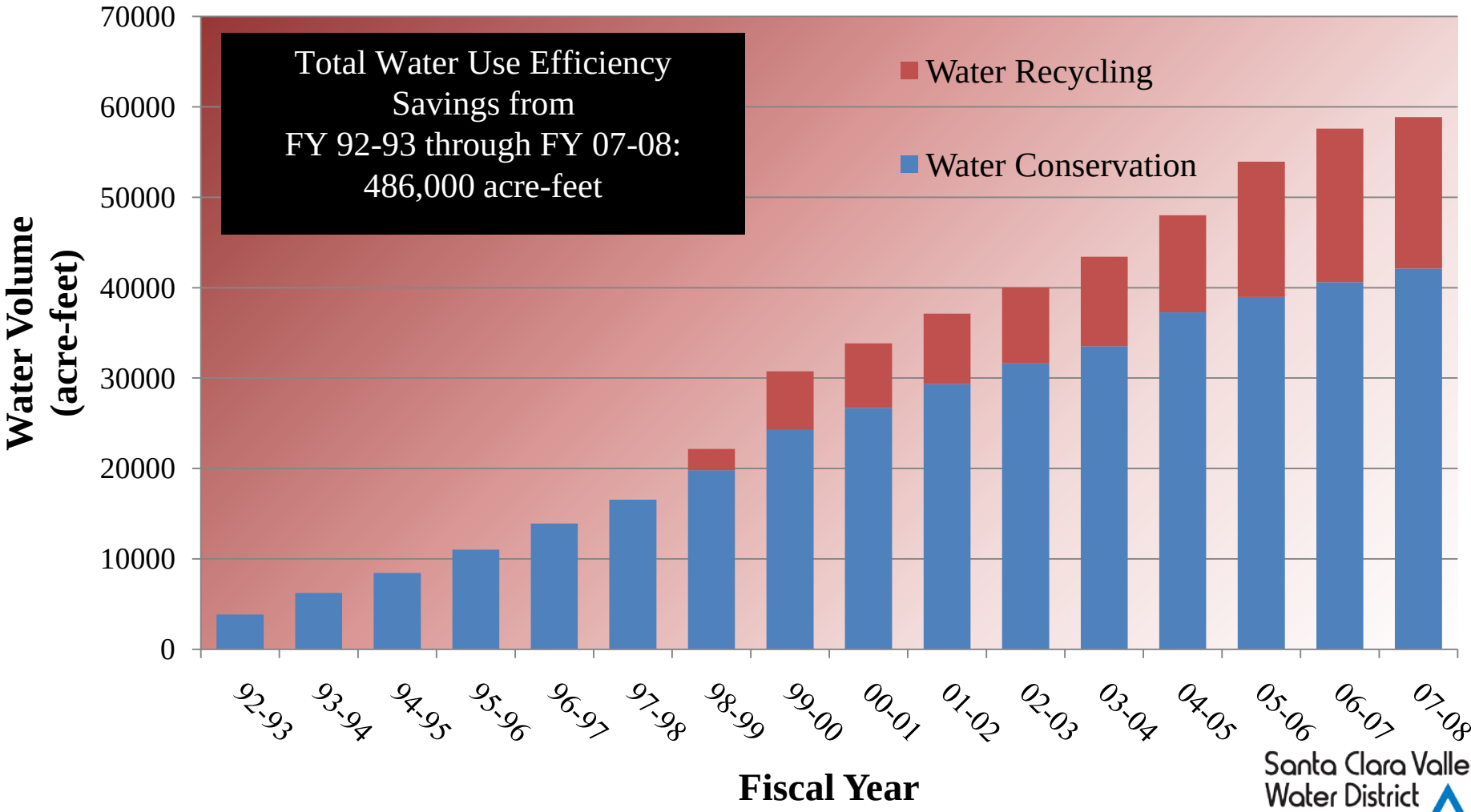
Water Use Efficiency Savings



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Benefits of Water Use Efficiency

- Water supply management benefits
  - flexible and diverse water supply portfolio
  - reliable source of water:

    60,500 AF of potable water saved during FY 08-09

    550,000 AF of potable water saved from FY 98-99 through FY 08-09

- Environmental Benefits
  - improved ecosystem function
  - restored wildlife habitat
  - aesthetic and recreational benefits
  - reduced surface water runoff

- Energy savings and air quality benefits

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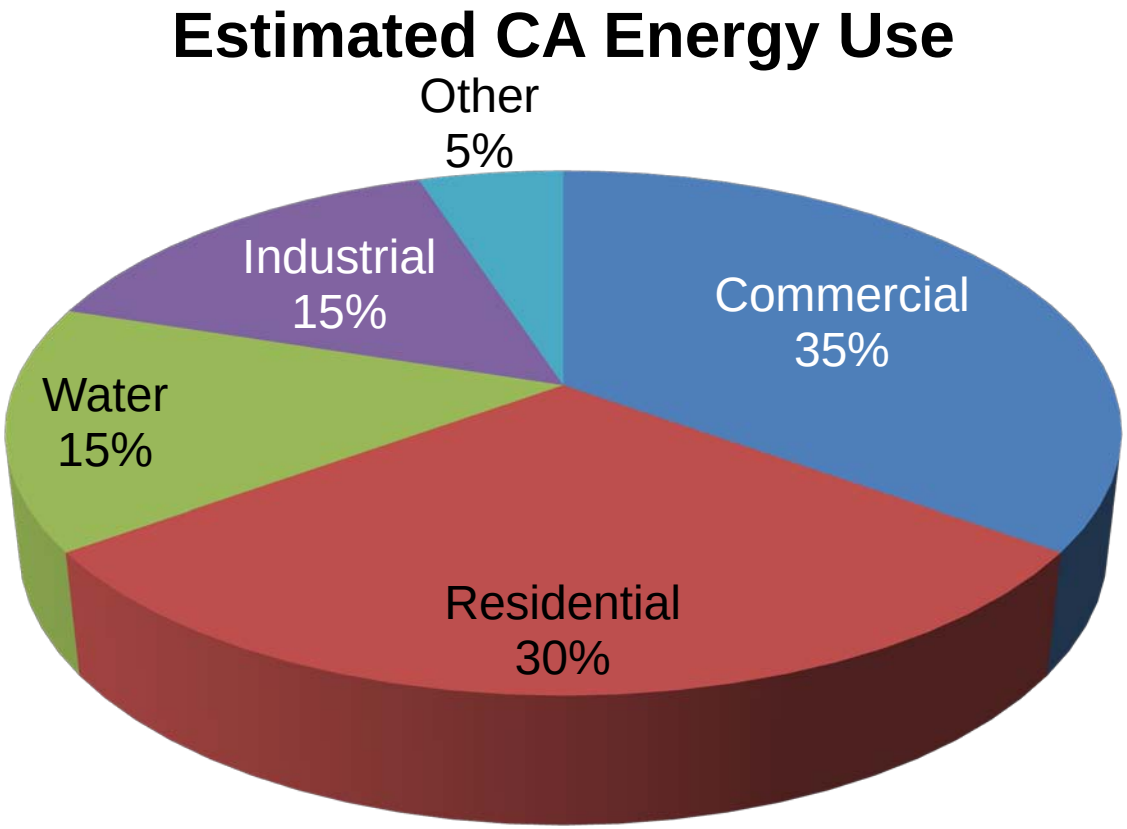
California's Water-Energy Nexus

- About 15-20% of all energy consumed in CA is for the water supply chain
- CA State Water Project consumes about 2-3% of all electricity in the state



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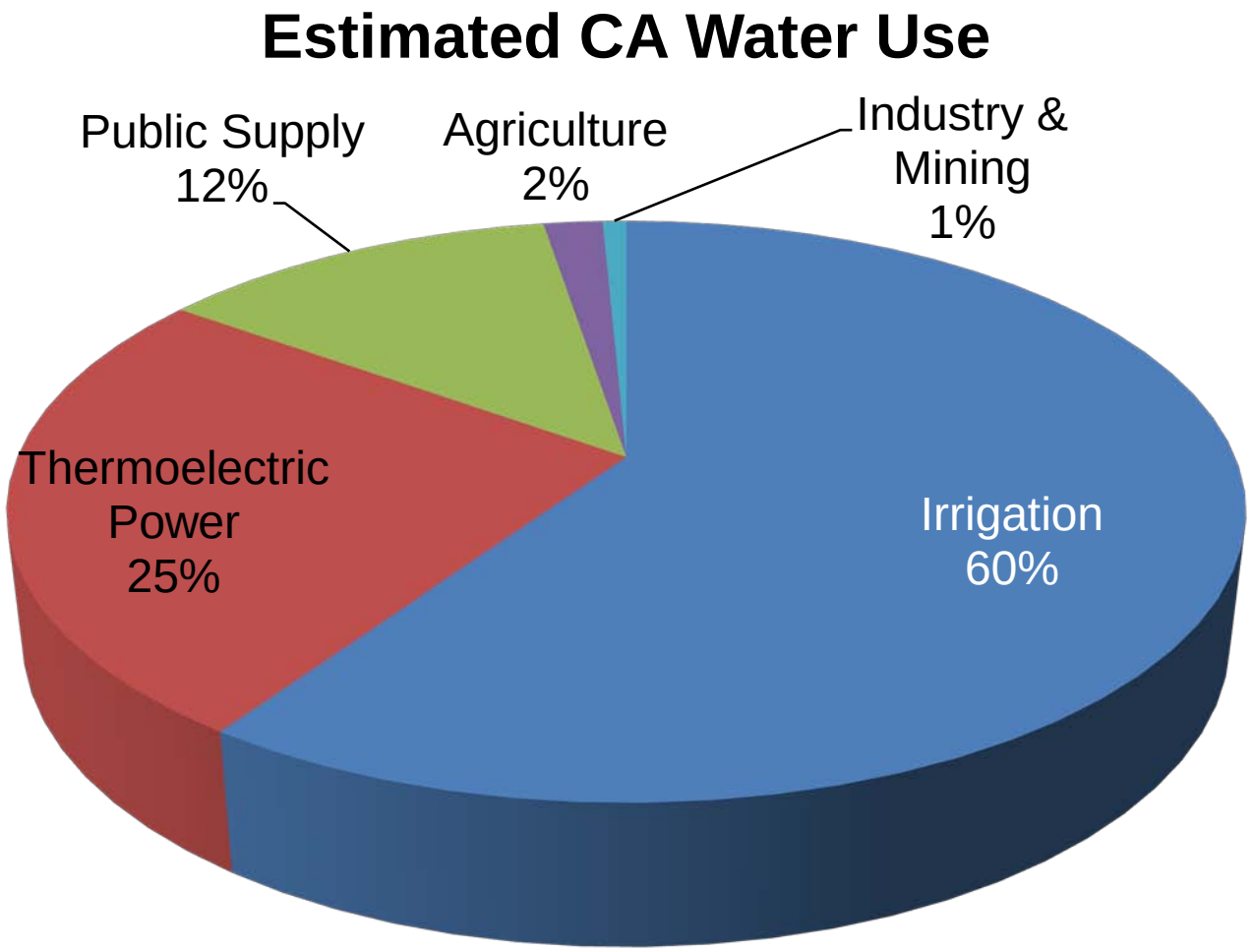
California's Water-Energy Nexus

- About 25% of all water consumed in CA is for thermoelectric power generation



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California's Water-Energy Nexus

- Energy production generates
  - carbon monoxide
  - reactive organic gases
  - particulate matter
  - sulfur oxides
  - nitrogen oxides
  - carbon dioxide, a GREENHOUSE GAS

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Water Supply/Climate Change Connection

- Increased precipitation as rain instead of snowfall
- Earlier snowmelt overwhelms reservoirs
- Increased drought in summer months
- Decreased Delta pumping

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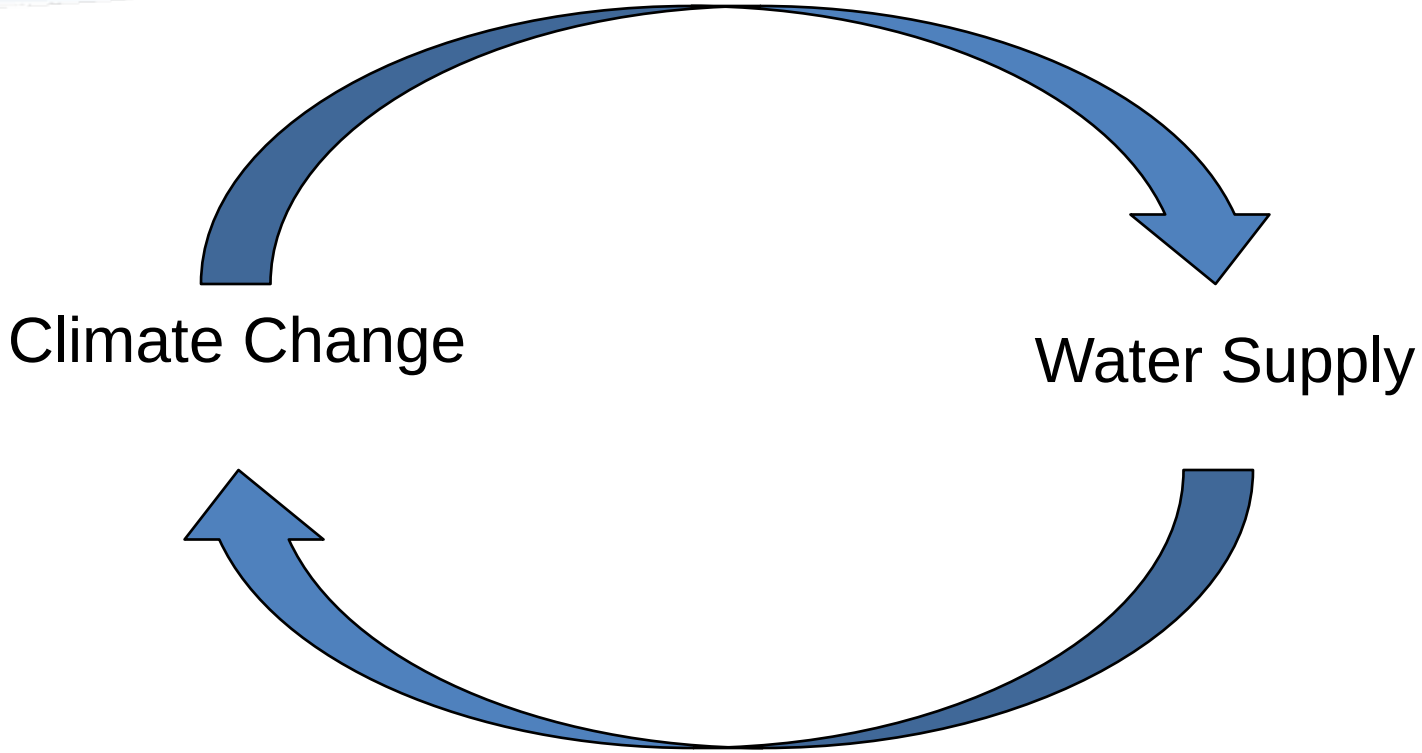
Water Supply/Climate Change Connection



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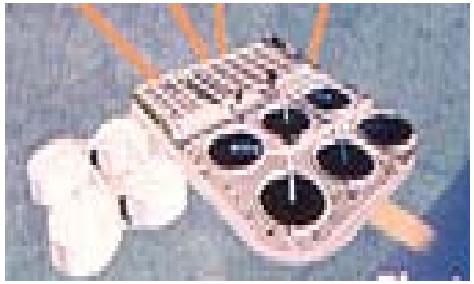
District's Water Supply Chain

Conveyance/Pumping
(0 – 905 kWh/AF)

Treatment
(87 kWh/AF)

Distribution
(488 kWh/AF)

End Use
(1,000 – 25,000 kWh/AF)



Wastewater
Treatment
(770 kWh/AF)

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Using the Water to Air Model

- **Model inputs:** Valley Water water supply data
- **Model outputs:** Energy savings and air pollutant emissions reductions

- Model estimated the difference between two scenarios: Presence vs. absence of water use efficiency

- Used Valley Water-specific energy factors (kWh/AF) and region-specific air emissions factors (grams/kWh)

- Analysis conducted for FY 92-93 through FY 07-08 and FY 30-31

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Assumptions for the Water to Air Model

- Water not conserved, supplied by 50/50 groundwater and imported water mix

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Energy Factors and Air Emissions Factors

Energy-Consuming Step	Energy Factor (kWh/AF)
Source: Ground Water	889
Source: Surface Water	0
Source: Recycled Water	640
Source: Imported Water	717
Water Treatment	87
Water Distribution	488
Wastewater Treatment	770

Air Pollutant	Air Emissions Factor (grams/kWh)
Carbon Dioxide	215
Reactive Organic Gases	0.015
Carbon Monoxide	0.211
PM 10	0.018
Sulfur Oxide	0.010
Nitrogen Oxide	0.103

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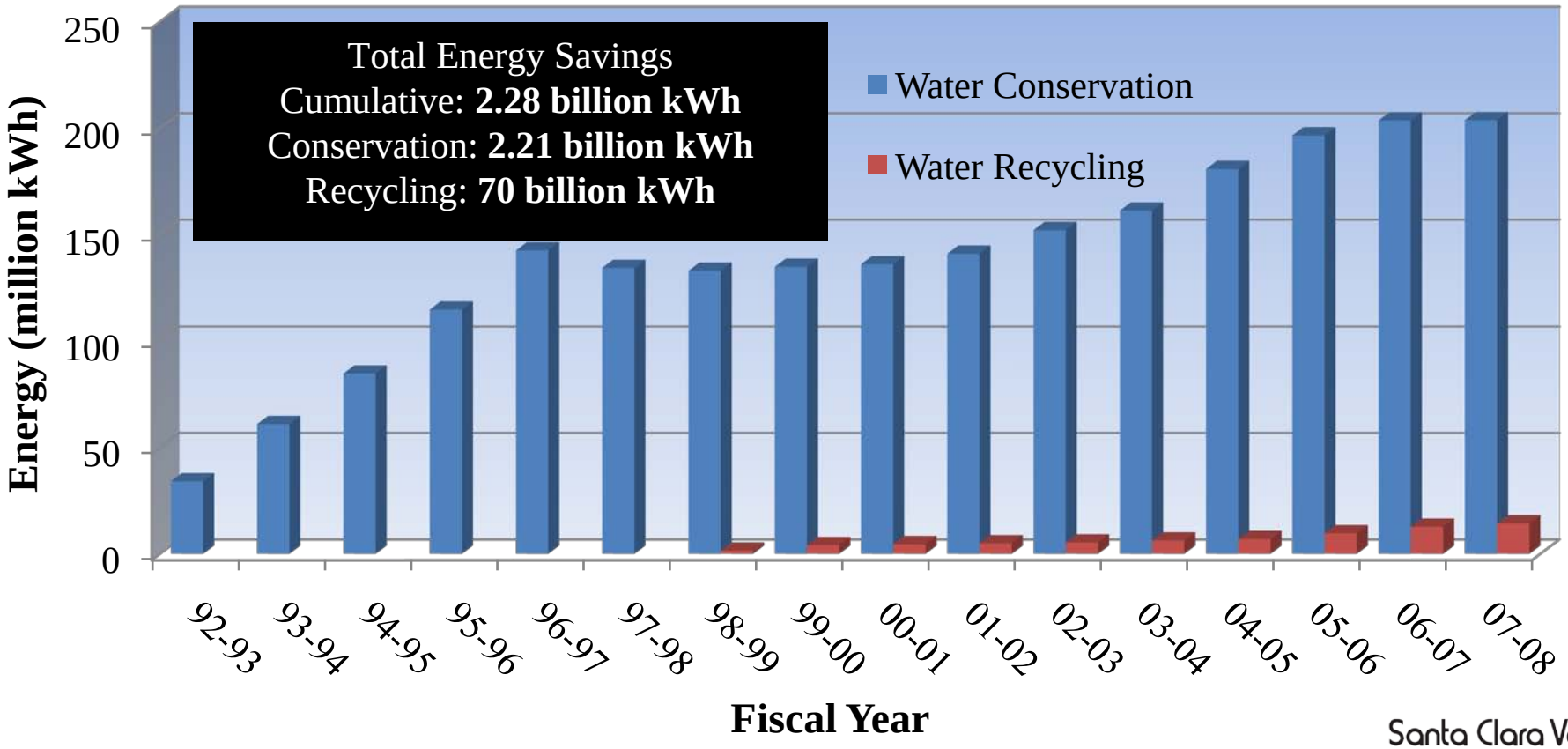
Energy Savings from Water Use Efficiency

Total energy savings equivalent to electricity required for 350,000 households for one year



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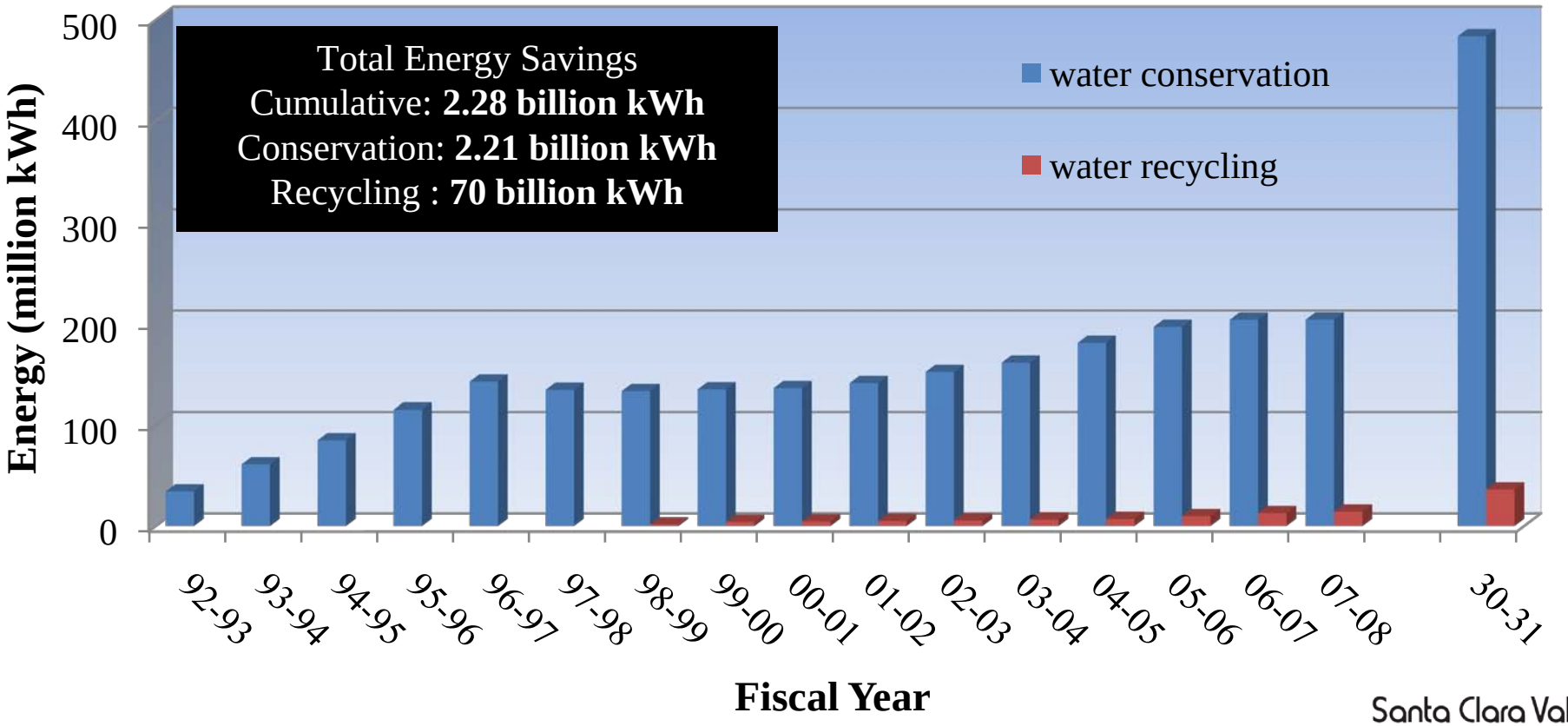
Energy Savings from Water Use Efficiency



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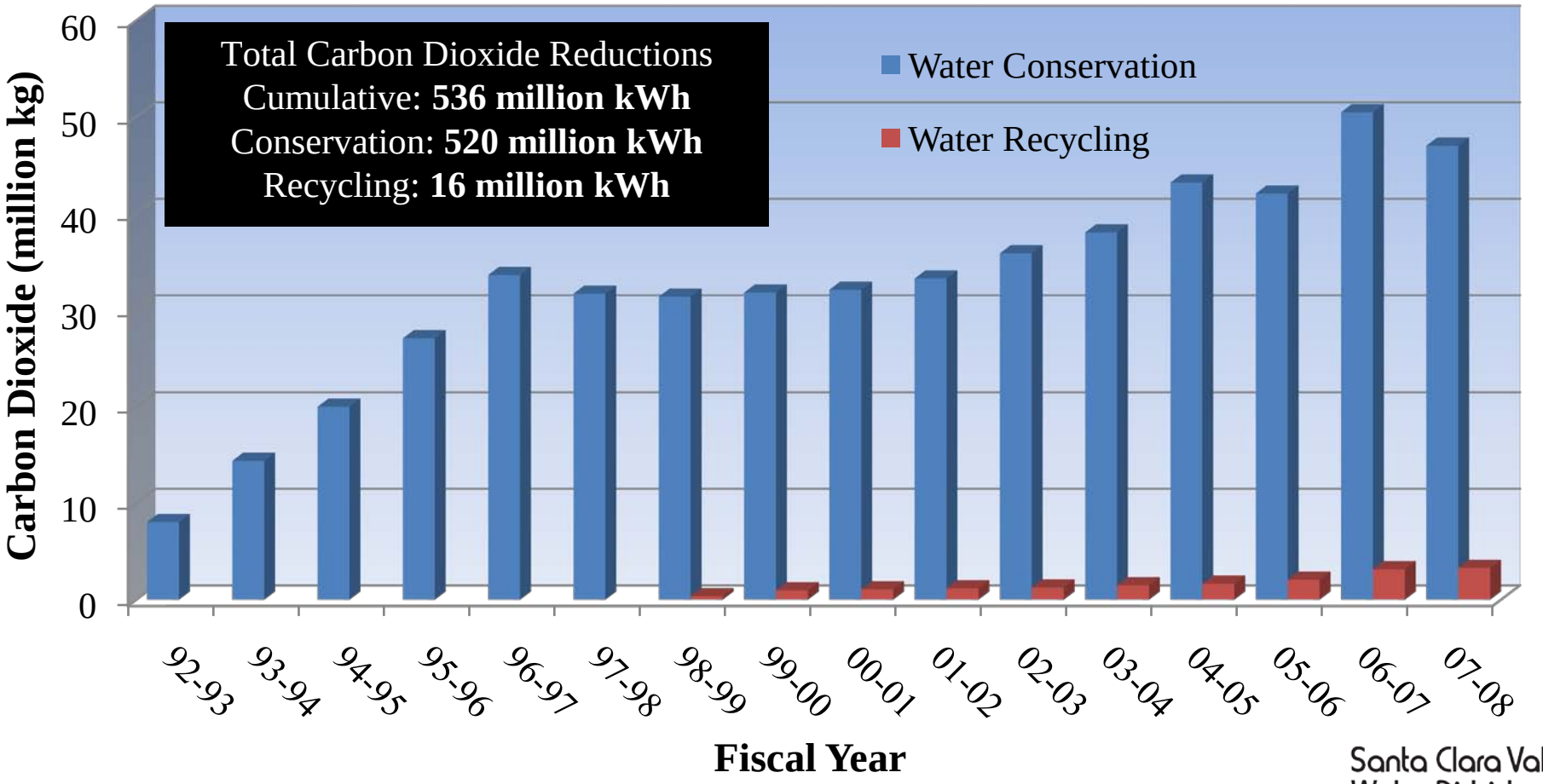
CO_2 Reductions from Water Use Efficiency

Total CO_2 reductions equivalent to removing 98,000 passenger cars from the roads for one year



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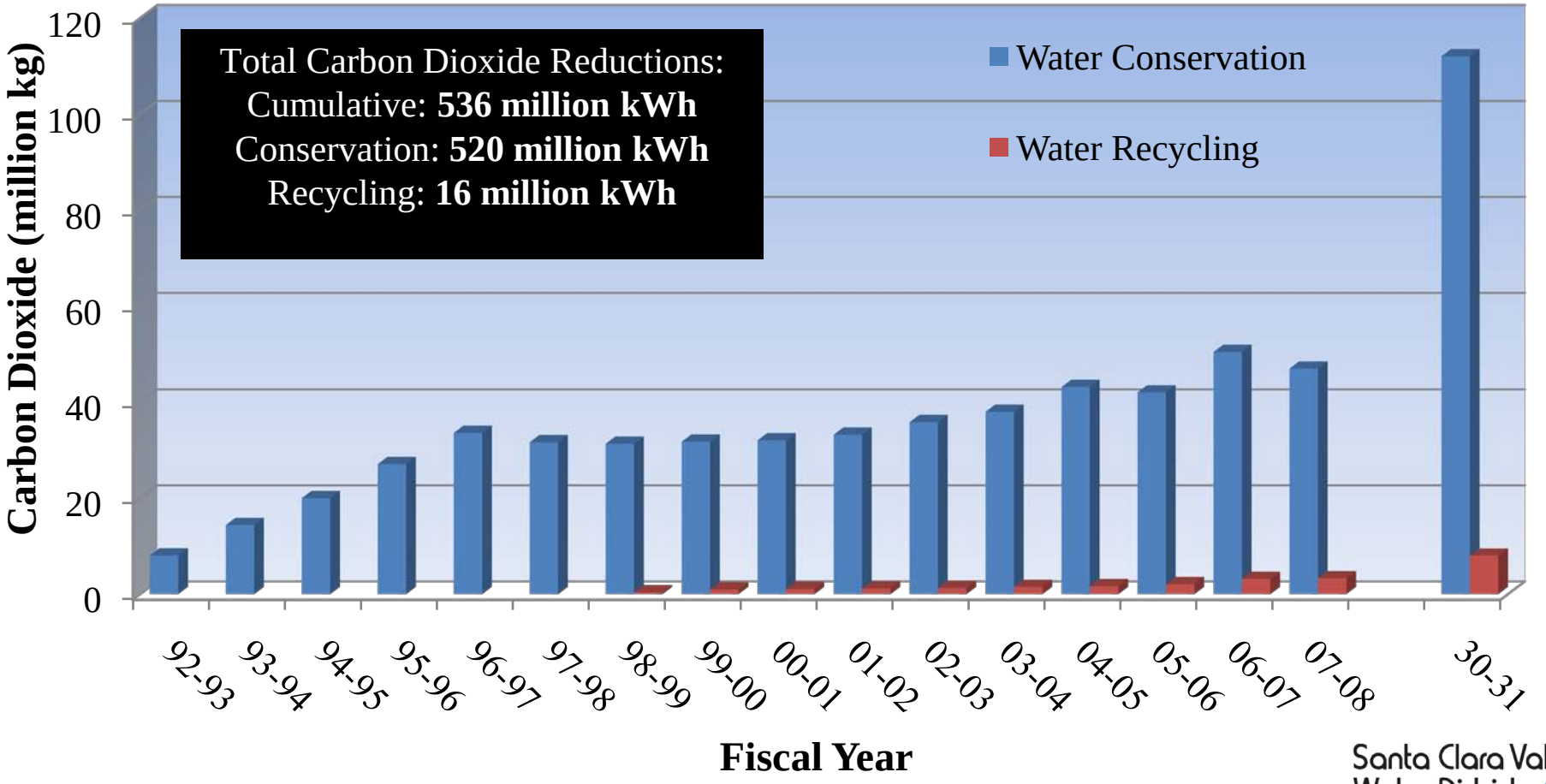
CO_2 Reductions from Water Use Efficiency



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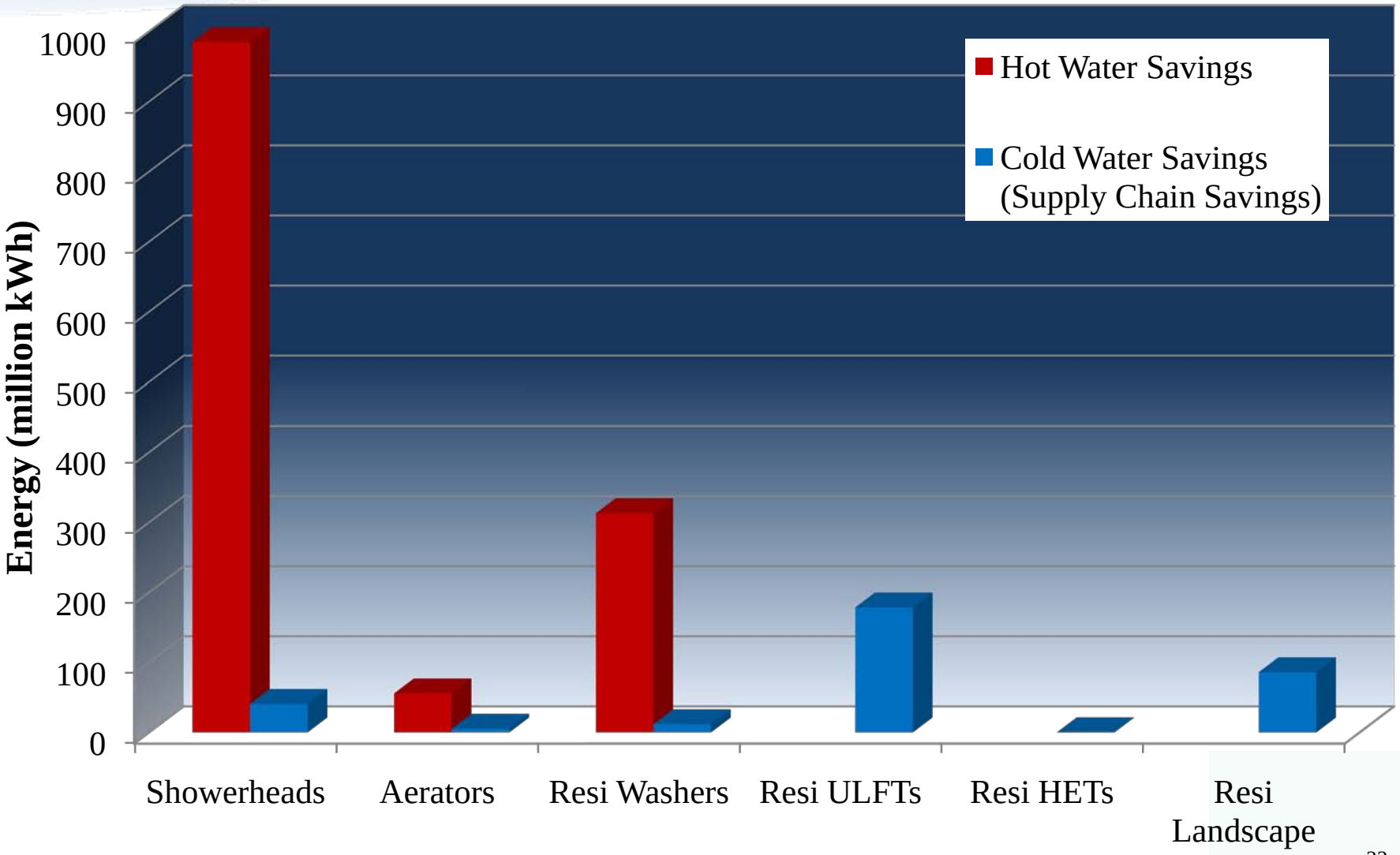
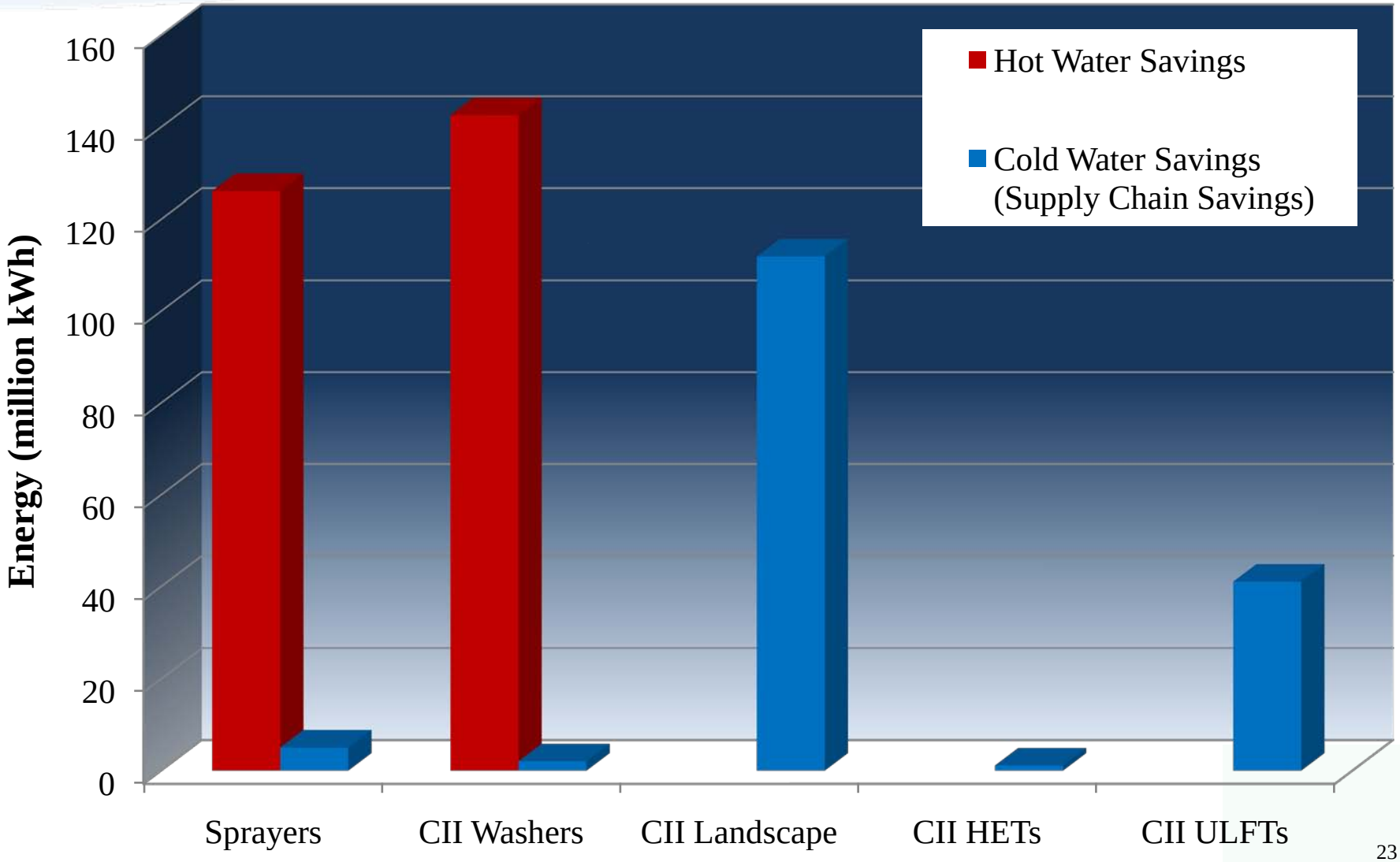
Energy Savings from Selected Residential Water Conservation Programs



Energy Savings from Selected CII Water Conservation Programs



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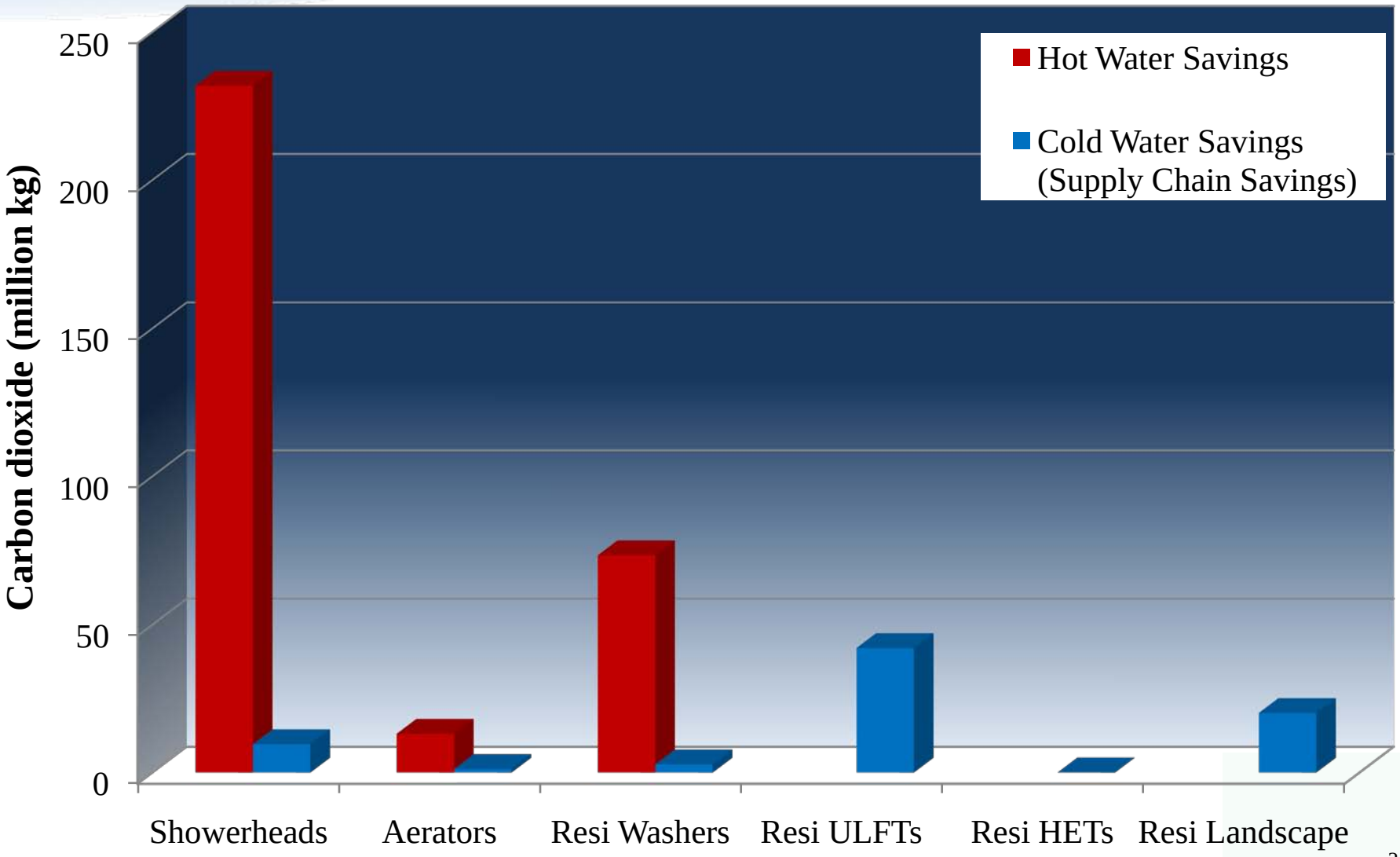
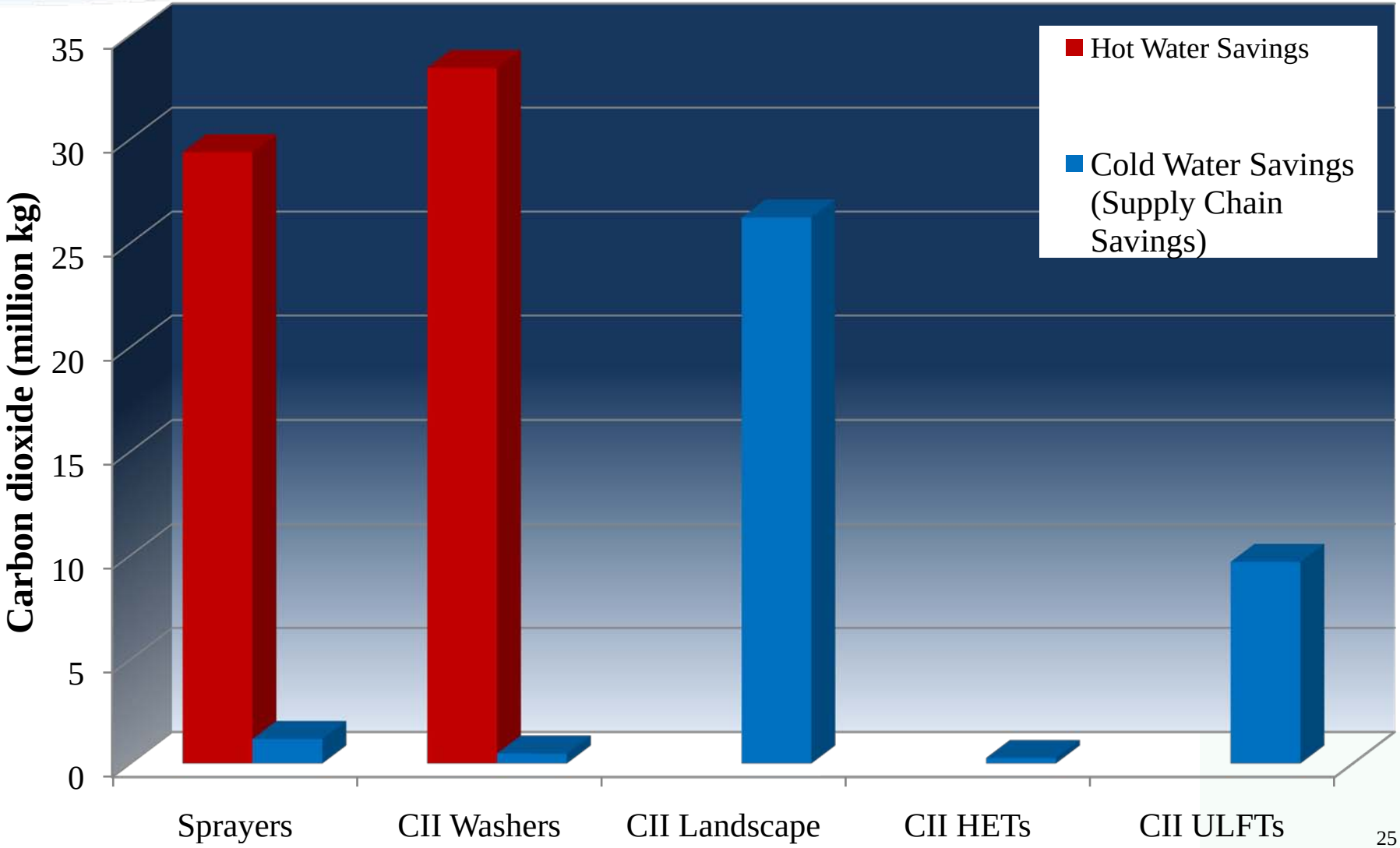


CO_2 Reductions from Selected CII Water Conservation Programs



Residential HE Clothes Washer

Over the 12-year lifespan of a Residential High-Efficiency Clothes Washer:

61,000 gallons of water saved at end use step (70,000 gallons left in environment because of system losses)

AND

Upstream/downstream Savings

330 kWh

80 kg CO_2

End Use Savings

8700 kWh

2,000 kg CO_2

9,000 kWh

2,100 kg CO_2

$1,200 savings (residential rates)

1.5 households for 1 year

1 car off the road for 6 months

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Recommendations

- Expand water use efficiency, given its role in mitigating and adapting to climate change and limited resource availability
- Integration of energy policies and water policies
- Factor energy savings and air quality benefits into cost-benefit analyses of water use efficiency programs
- Develop water agency-energy utility partnerships

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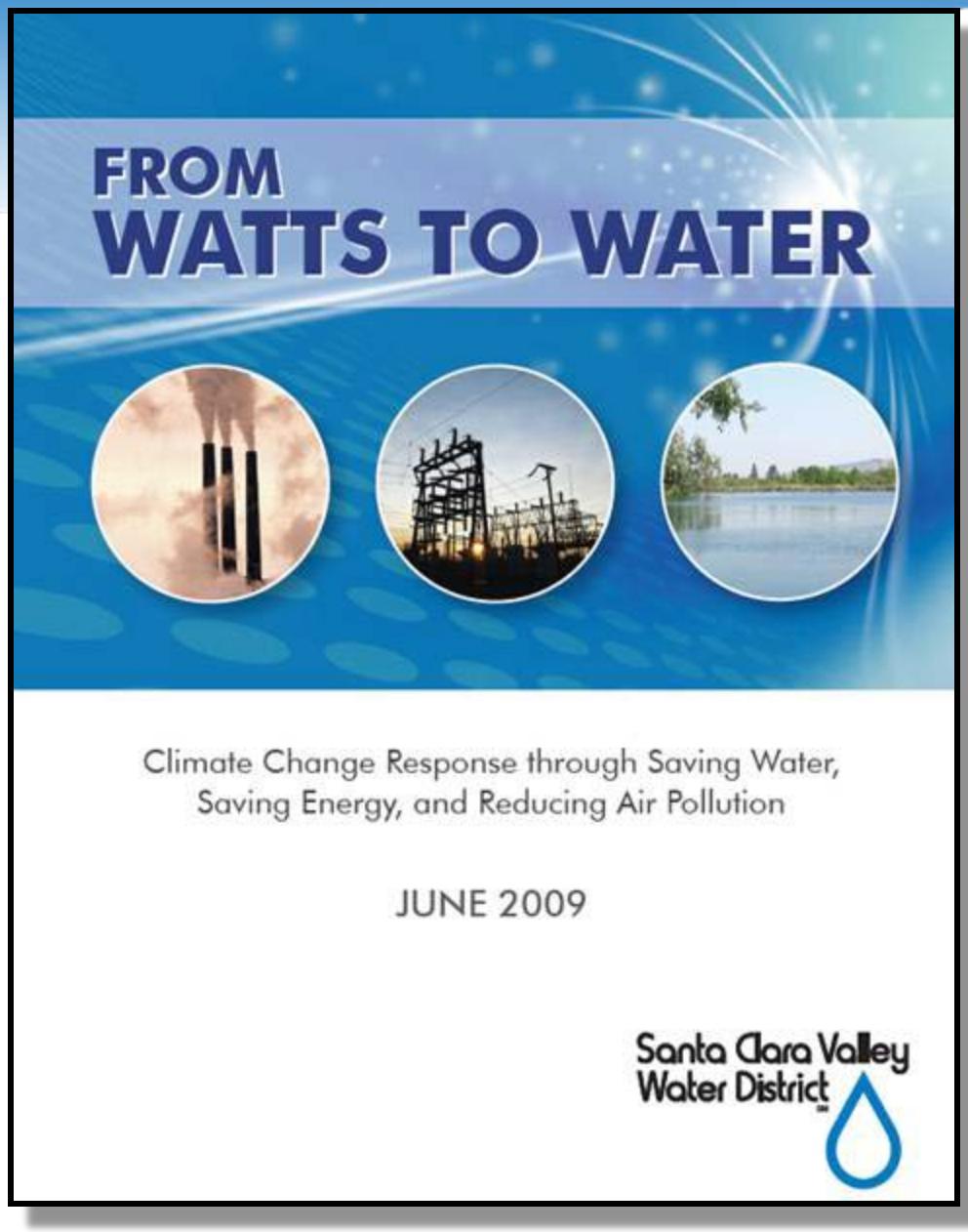

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Available at: http://www.valleywater.org/conservation/

Questions?

hashktorab@valleywater.org
408-265-2607 x2291

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