



# Local Government Commission

## *Leaders for Livable Communities*

# WATER-ENERGY NEXUS

## Bridging the Gap in Your Community

**Danielle V. Dolan**

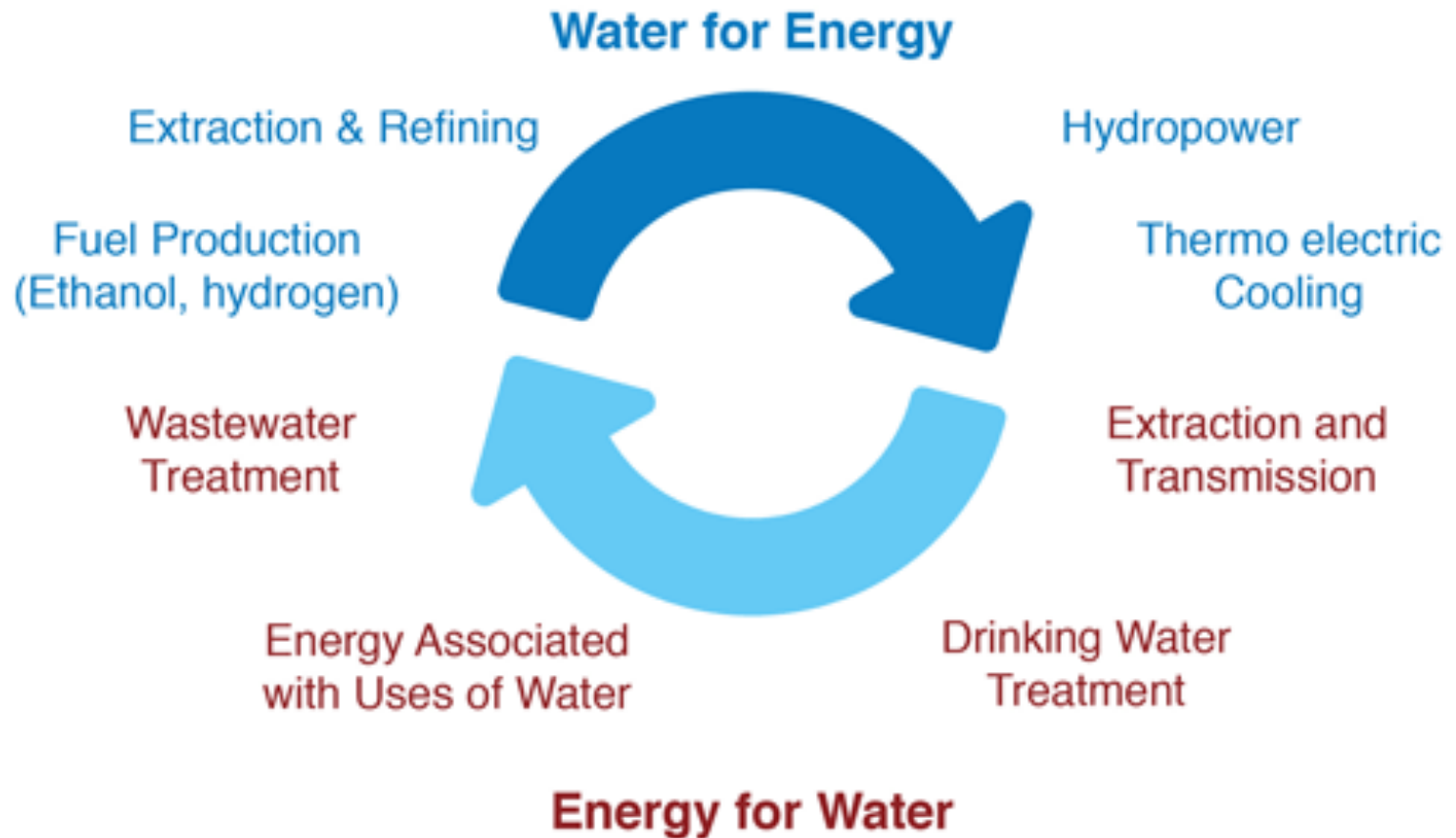
Water Program Manager, Local Government Commission  
SEEC Forum – Thursday, June 15, 2017



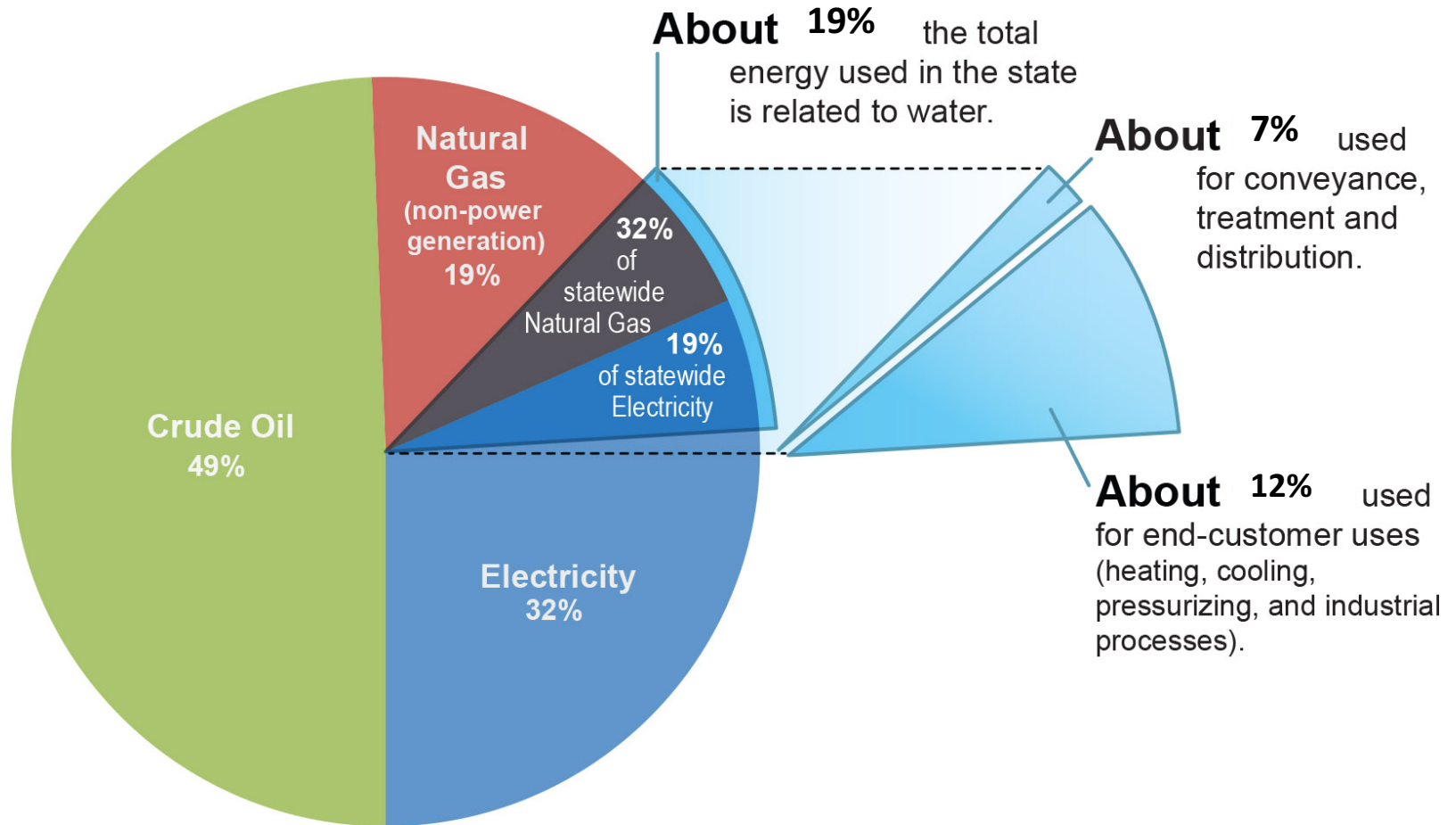
Local Government Commission  
*Leaders for Livable Communities*



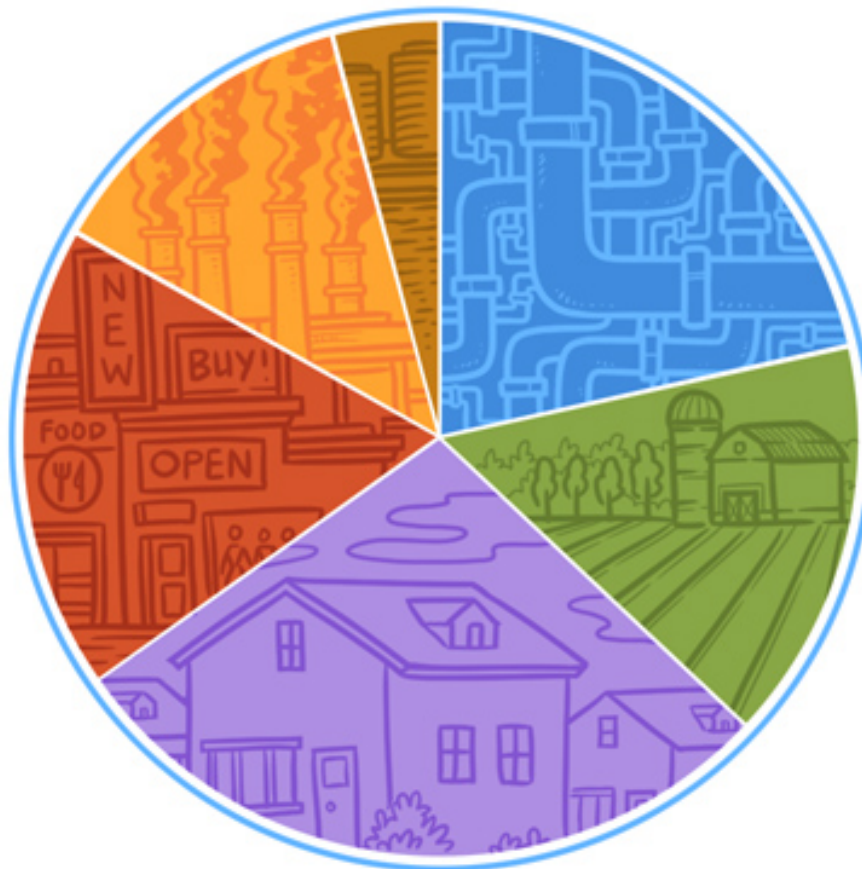
**Water & energy are inextricably linked: producing energy uses & pollutes a lot of water; providing & using water uses a lot of energy.**



# Nearly one fifth of all California's electricity use is for water.



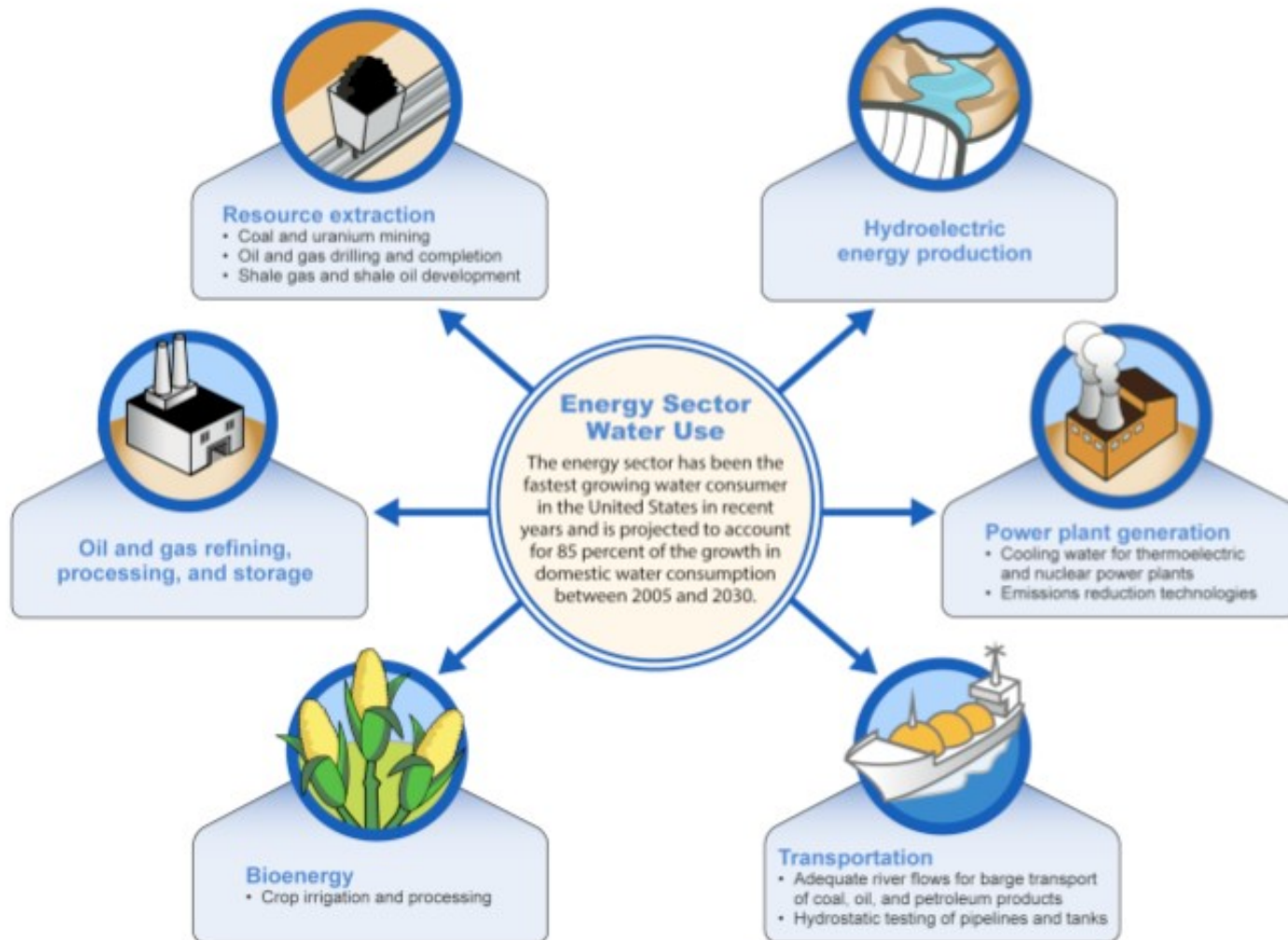
**Most of that is for end-user hot water (residential) & water delivery.**



- 22% Moving Water**  
Water pumping, extraction, transfer and distribution  
- 10,300 GWh
- 15% Farm Use**  
Irrigation, crops, livestock  
- 7,400 GWh
- 28% Household/Residential**  
Heating water, washing clothes and dishes. Essentially everything "after the meter."  
- 13,500 GWh
- 18% Commercial**  
Cooking, heating and cooling  
- 8,700 GWh
- 13% Industrial**  
Manufacturing sectors, construction, mining, airport usage  
- 6,000 GWh
- 4% Wastewater Treatment**  
- 2,000 GWh



# Electricity production places a heavy demand on water supply.



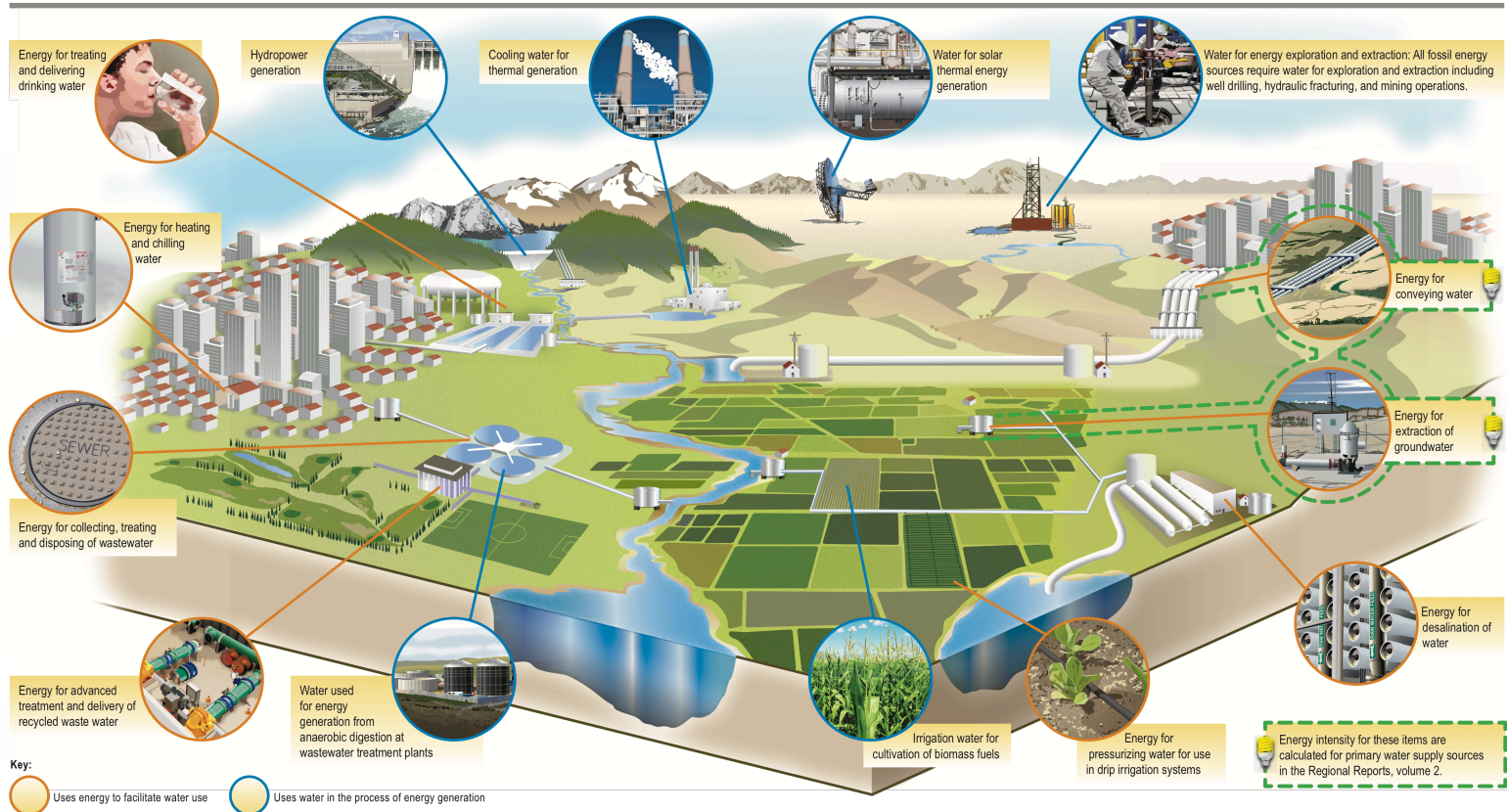
## Biofuels use the MOST water; solar uses the least.

Energy type	Total water consumed per megawatt hour (m3/MWH)	Water consumption required for U.S. daily energy production (millions of m3)
Solar	0.0001	0.011
Wind	0.0001	0.011
Gas	1	11
Coal	2	22
Nuclear	2.5	27.5
Oil	4	44
Hydropower	68	748
Biofuel (1st generation)	178	1958



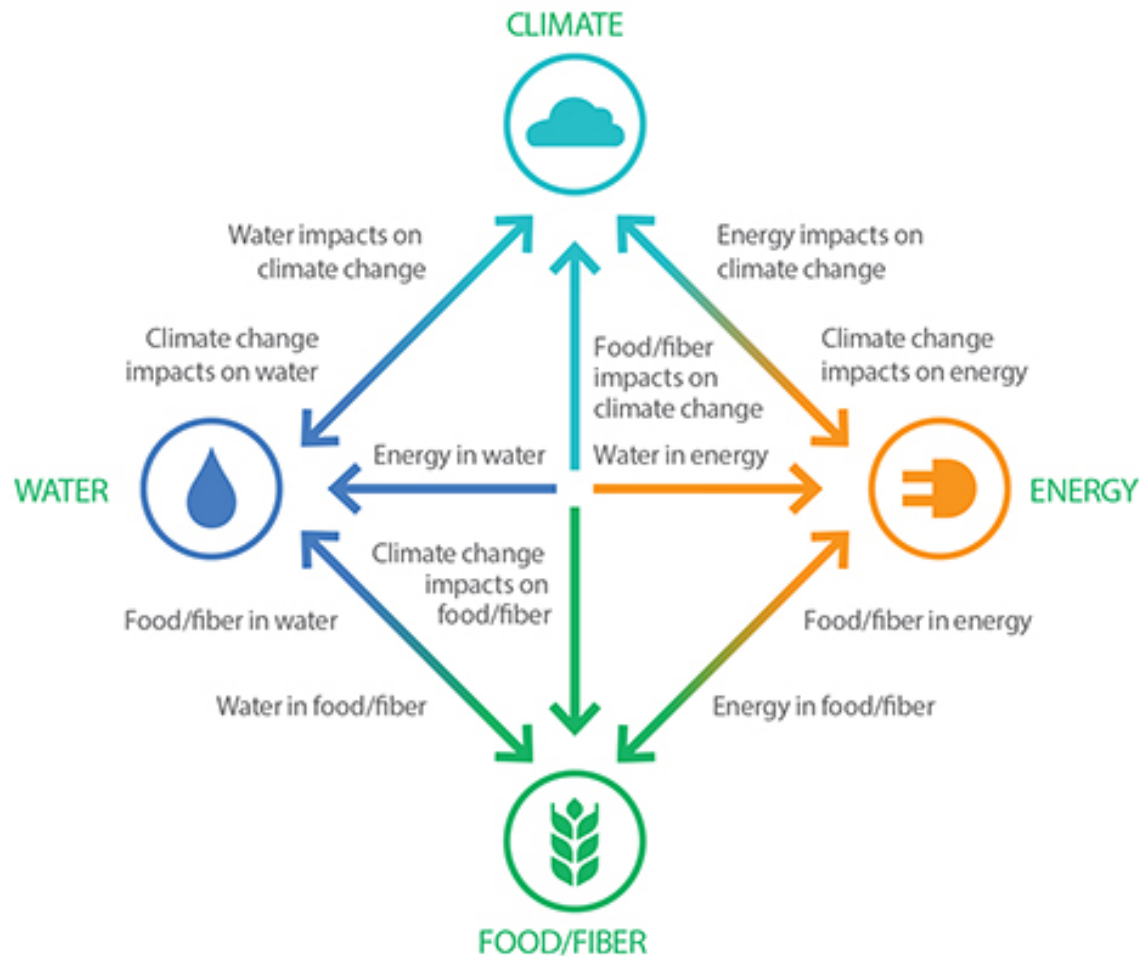
# Water / energy rely on complex human & infrastructure systems.

The Water and Energy Connection





# Reducing water and energy demand is a critical step in ensuring your community's resilience to climate change.



# Integrated Water-Energy strategies can improve public health and community climate resilience while saving industry and consumers money.



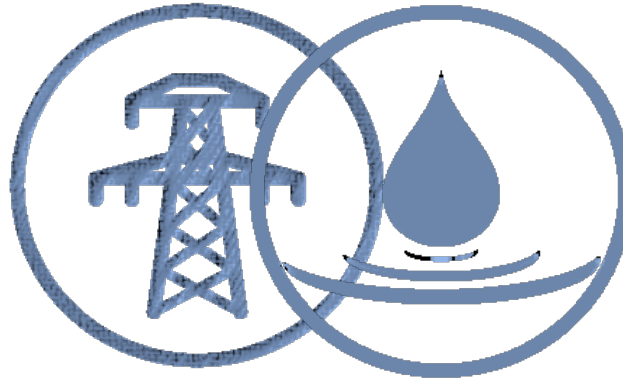
**WE CAN**



# This session will provide strategies for implementing water/energy efficiency programs at different scales.



1. Municipal, Planning Scale



2. Private, Utility Scale



3. NGO, Regional Scale





Water/energy strategies reduce local government operating costs & increase resilience.



**Cory Downs**

*Conservation Specialist*

City of Chula Vista

**Water/energy strategies reduce water utility operating costs, secure utility assets, & provide customer savings.**



**Cody Coeckelenbergh**

*Director of Program Services*

Lincus Incorporated



Local Government Commission  
*Leaders for Livable Communities*

**NGOs serve as critical partners to implementing water/energy programs for multiple benefits.**



**Susan Wright**

*Water/Efficiency Program Manager*  
Ecology Action



Local Government Commission  
*Leaders for Livable Communities*



**You can achieve multiple resilience benefits by implementing water/energy programs in YOUR community.**



# Water Stewardship & Energy Efficiency



Cory Downs  
Conservation Specialist

2017 SEEC Forum  
6/15/17

# GOALS



The Office of Sustainability's  
mission statement

# WATER STEWARDSHIP PLAN



WATER STEWARDSHIP PLAN

Approved  
Nov. 2016

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Part of  
Climate Action  
Plan

# CONNECTEDNESS



Sustainability is bigger than any one issue



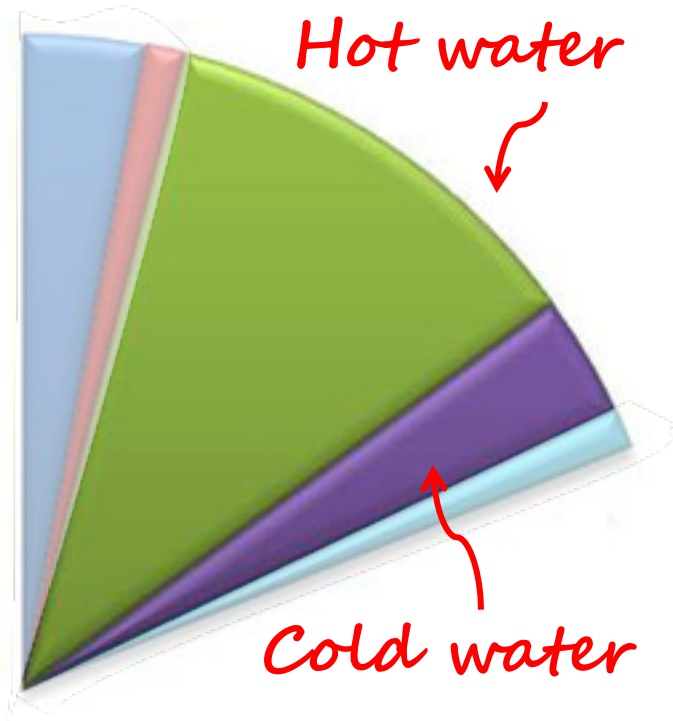
# ENERGY & WATER



- Agricultural End-Use: 3%
- Agricultural Water Supply and Treatment: 1%
- Residential, Commercial and Industrial Water End-Use: 11%
- Residential, Commercial and Industrial Water Supply and Treatment: 3%
- Wastewater Treatment: 1%

48 terawatt-hours (TWh) per year

# ENERGY & WATER



- Agricultural End-Use: 3%
- Agricultural Water Supply and Treatment: 1%
- Residential, Commercial and Industrial Water End-Use: 11%
- Residential, Commercial and Industrial Water Supply and Treatment: 3%
- Wastewater Treatment: 1%

35 terawatt-hours (TWh) per year

# ENERGY & WATER

## Five Overarching Actions

1

Raise the Profile of Water Use & Reuse Performance

2

Promote & Expand Water Capture & Reuse

3

Improve Water Efficiency & Reuse Capacity in the Built Environment

4

Encourage Water Efficient Landscape Decisions

5

Promote Green Infrastructure & Low-Impact Development

# FUNDING THE PLAN



The San Diego  
Foundation  
Growing a Vibrant Region

[www.sdfoundation.org](http://www.sdfoundation.org)

Bloomberg Award for Local Sustainability Matching Fund – A  
project of the Funders' Network for Smart Growth and Livable  
Communities

[www.bloomberg.org](http://www.bloomberg.org)

*Also a challenge*

# CREATING THE PLAN

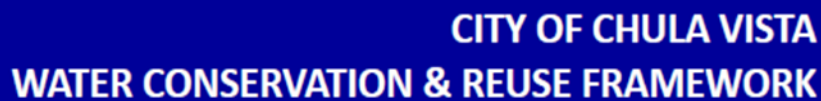
Community engagement process with many community stakeholder

Vision Statement



The City of Chula Vista is a proven steward of water resources, where local residents, businesses, utility providers and municipal staff are **proactive, accountable and engaged** in **eliminating water waste**, and embracing the region's natural landscape.





## BUILT ENVIRONMENT IDEA BOARD



Toilet  
Conversions to  
1.6 GPF

Reuse of water  
from  
dewatering  
activities

Toilet  
Conversions to  
1.6 GPF

## Water Conservation Ordinance

Require pre-plumbing for laundry-to-landscape

### Water Conservation Workshops & Classes

NPDES  
(stormwater  
quality permit)  
outreach  
program

Green business  
verification  
program

Real time  
water use  
monitoring at  
all facilities

**Provide a non-potable supply for indoor water reuse**

## Expand leak detection to facilities

Real time  
water use  
monitoring at  
all facilities

Create a 1-800 number to report leaks

Require pre-plumbing for laundry-to-landscape

Provide a non-potable supply for indoor water reuse

Create a 1-800 number to report leaks

Provide a non-potable supply for indoor water reuse

Create a 1-800 number to report leaks

Provide discounted rainwater collection systems

**Develop a City building retrofit strategy**

Convert all watering vehicles to use reclaimed water

Mandate dual purpose plumbing for new construction

Mandate dual  
purpose  
plumbing for  
new  
construction

Provide toolkits for evaluating household water use

Provide discounted rainwater collection systems

**Mandate dual-purpose plumbing for new construction**

Require water efficiency audits at point of sale

Provide resources for conducting water audits

Faster  
response time  
to address  
leaks

Explore waterless and low-flow toilets and technologies

Require green building certification for new buildings

Require water efficiency audits at point of sale

### Moratorium on car washing activities

Develop a water efficiency certification program

Improve the efficiency of commercial cooling towers and chillers

Promote water efficiency in cleaning and washing operations

## YOUR IDEAS

# ENERGY & WATER ACTIONS

1

Raise the Profile of Water Use & Reuse Performance

2

Promote & Expand Water Capture & Reuse

3

Improve Water Efficiency & Reuse Capacity in the Built Environment

4

Encourage Water Efficient Landscape Decisions

5

Promote Green Infrastructure & Low-Impact Development

# ENERGY & WATER ACTIONS

## Raise the Profile of Water Use & Reuse Performance

1.1

Initiate a citywide challenge for water stewardship

1.2

Make City Departmental water use visible to the public

1.3

Optimize existing leak and water waste notification and reporting systems

1.4

Expand engagement and education opportunities around water stewardship initiatives in Chula Vista

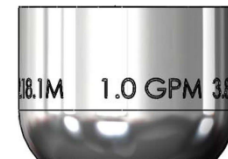
# ENERGY & WATER ACTIONS

## Raise the Profile of Water Use & Reuse Performance

1.1

Initiate a citywide challenge for water stewardship

*Coordinated energy & water outreach*



1.4

Expand engagement and education opportunities around water stewardship initiatives in Chula Vista

# ENERGY & WATER ACTIONS

## Promote & Expand Water Capture & Reuse

2.1

Incorporate rainwater harvesting infrastructure into new and existing development projects

2.2

Promote the reuse of graywater for indoor applications

2.3

Enable the synergistic reuse of water across property lines

2.4

Maximize the use of incentives and rebates for graywater and rainwater harvesting



# ENERGY & WATER ACTIONS

## Promote & Expand Water Capture & Reuse

2.1

Incorporate rainwater harvesting infrastructure into new and existing development projects

*Build support for other sustainable features*



# ENERGY & WATER ACTIONS

## Improve Water Efficiency & Reuse Capacity In the Built Environment

**3.3**

Require “point-in-time” water audits and retrofits in existing homes

**3.4**

Capture and reuse condensate runoff from cooling equipment

**3.5**

Promote the use of hot water recirculation pumps

**3.6**

Promote optimization of cooling towers through operational and inspection schedule adjustments

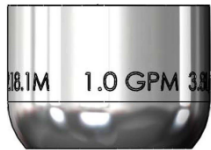
# ENERGY & WATER ACTIONS

## Improve Water Efficiency & Reuse Capacity In the Built Environment

3.3

Require “point-in-time” water audits and retrofits in existing homes

*Low Hanging Fruit*



*Energy Savings*

3.6

Promote optimization of cooling towers through operational and inspection schedule adjustments

# ENERGY & WATER ACTIONS

## Improve Water Efficiency & Reuse Capacity In the Built Environment

*Water from energy*



3.4

Capture and reuse condensate runoff from cooling equipment

3.5

Promote the use of hot water recirculation pumps

*Potential energy user*



# ENERGY & WATER ACTIONS

## Encourage Water Efficient Landscape Decisions

4.1

Employ advanced irrigation management and monitoring technologies

4.2

Encourage water audits of landscaped areas

4.3

Continue to promote drought tolerant landscaping and turf removal throughout the community

4.4

Align water stewardship and urban forestry objectives

4.5

Maximize the use of incentives and rebates for water-efficient landscaping and irrigation



# ENERGY & WATER ACTIONS

## Promote Green Infrastructure & Low-Impact Development

5.1

Leverage green infrastructure and water retention opportunities at City facilities and open spaces

5.2

Update Water Conservation Plan Guidelines

5.3

Maximize the use of low-impact development standards



A photograph of three people in an outdoor setting, possibly a community center or a field office. On the left, a woman with blonde hair is seen from the back, looking at a document. In the center, a young man with dark curly hair and glasses, wearing a light green polo shirt, is pointing at a document. On the right, an older man with dark hair, wearing a white polo shirt, is looking at the document. They are all standing in front of a white building with a wooden railing. The background shows some greenery.

# WaterLink: Pioneering Program Delivery in Disadvantaged Communities

A blue-tinted photograph of two men in a workshop or industrial setting. The man on the left is wearing a dark long-sleeved shirt and light-colored trousers, leaning against a workbench. The man on the right is wearing a light-colored polo shirt and dark trousers, holding a clipboard and a hard hat. They are both smiling and looking at each other. The background shows industrial equipment, pipes, and plants.

Ecology Action is passionately driven  
to help people take action today  
that accelerates environmental and  
economic sustainability.





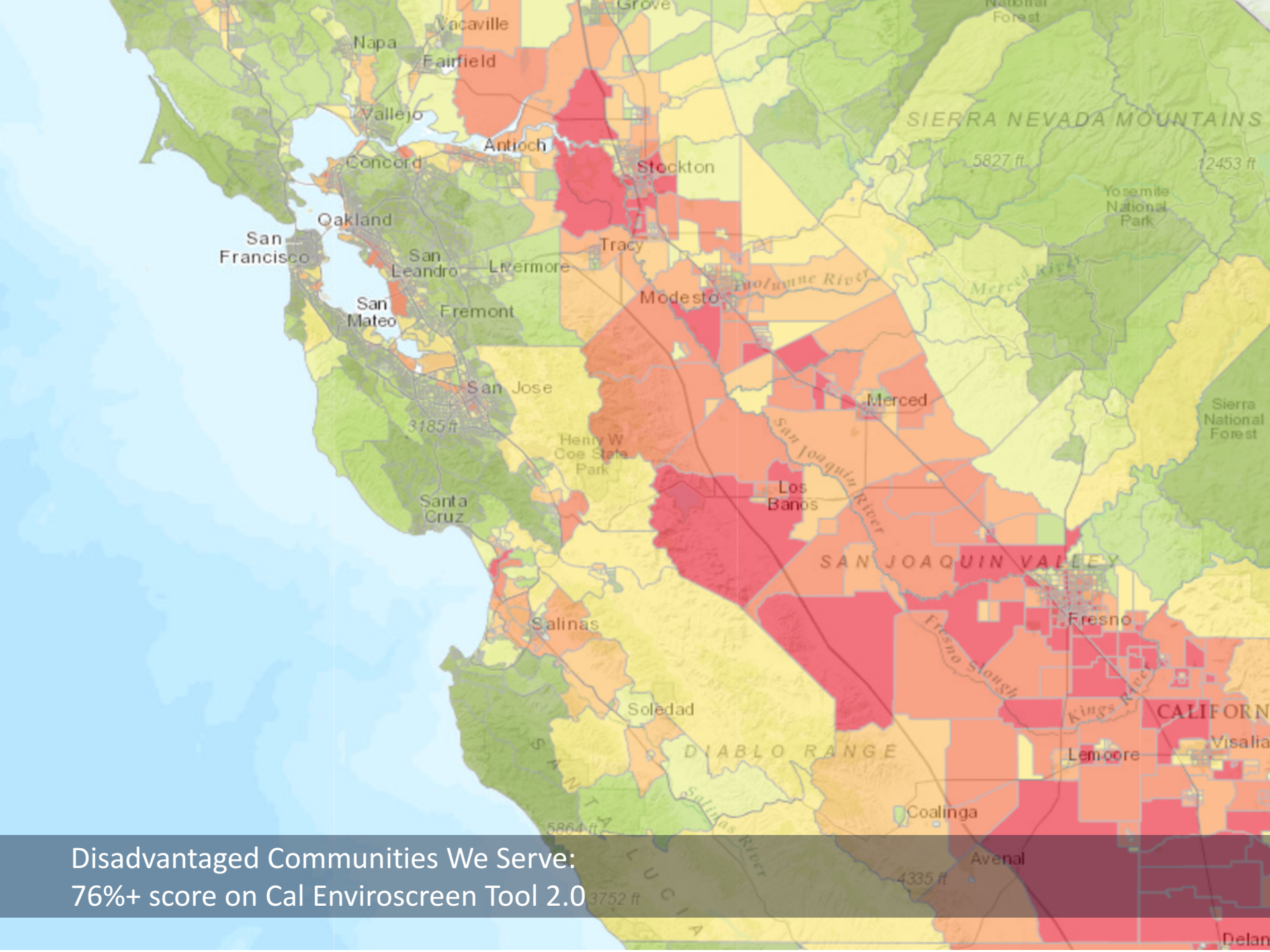
Meet Waterlink



## FUNDING SOURCE

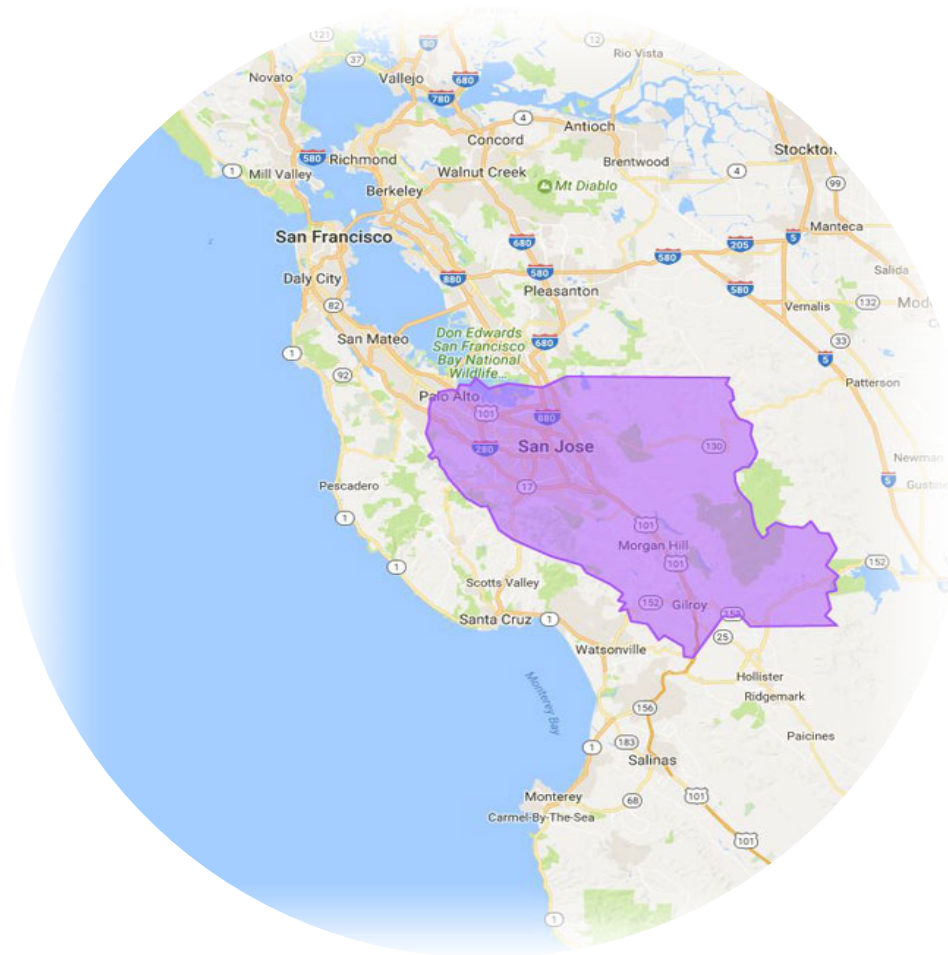






Disadvantaged Communities We Serve:  
76%+ score on Cal EnviroScreen Tool 2.0





Santa Clara Valley  
Water District











## Key Success Factors



- Multi-lingual team – English, Spanish, Vietnamese, Portuguese, Cambodian
- Culturally appropriate
- Collaboration with local partners
- Door-to-door approach layered with community engagement
- Agency recognition of the community commitment



SILICON VALLEY  
WATER CONSERVATION  
AWARDS

## Lessons Learned: Residential



- WaterLink reaches those underserved by other programs
- Door-to-door works best - appointments aren't efficient for the team
- Receptive community in 2016
  - Low-income residents generally let the team in if they were home
  - Biggest barrier – residents not home
- Unknowns for 2017
  - Impact of immigration concerns on trust
  - Receptivity to water conservation after rainy winter



A photograph of two men in a kitchen or food service environment. The man in the foreground, wearing a white short-sleeved shirt, is holding a black spray nozzle attached to a metal hose. He is spraying a fine mist of liquid onto a white plate held in his left hand. In the background, another man wearing glasses and a dark apron over a white shirt is looking on. The scene is brightly lit, and the background shows stainless steel kitchen equipment.

## Lessons Learned: Commercial

- Small businesses are skeptical
  - Many scams target small businesses
  - Is it really free?
- Outreach team may need to return several times to reach decision maker
- Coordinating with trusted organizations
- Working on testimonials

A background image showing a person's hands holding a chrome faucet aerator over a blue water-saving device. The image is semi-transparent, allowing the text to be overlaid.

# Program Impact

## Santa Clara region

- 534.6 million gallons of water
- 137,993,089 kilowatt-hours of energy
- 30,999,331 kg CO2 equivalent in greenhouse gas

## Bay Area region

- 535 million gallons of water
- 138 million kilowatt-hours of energy
- 31 million kg CO2 equivalent in greenhouse gas

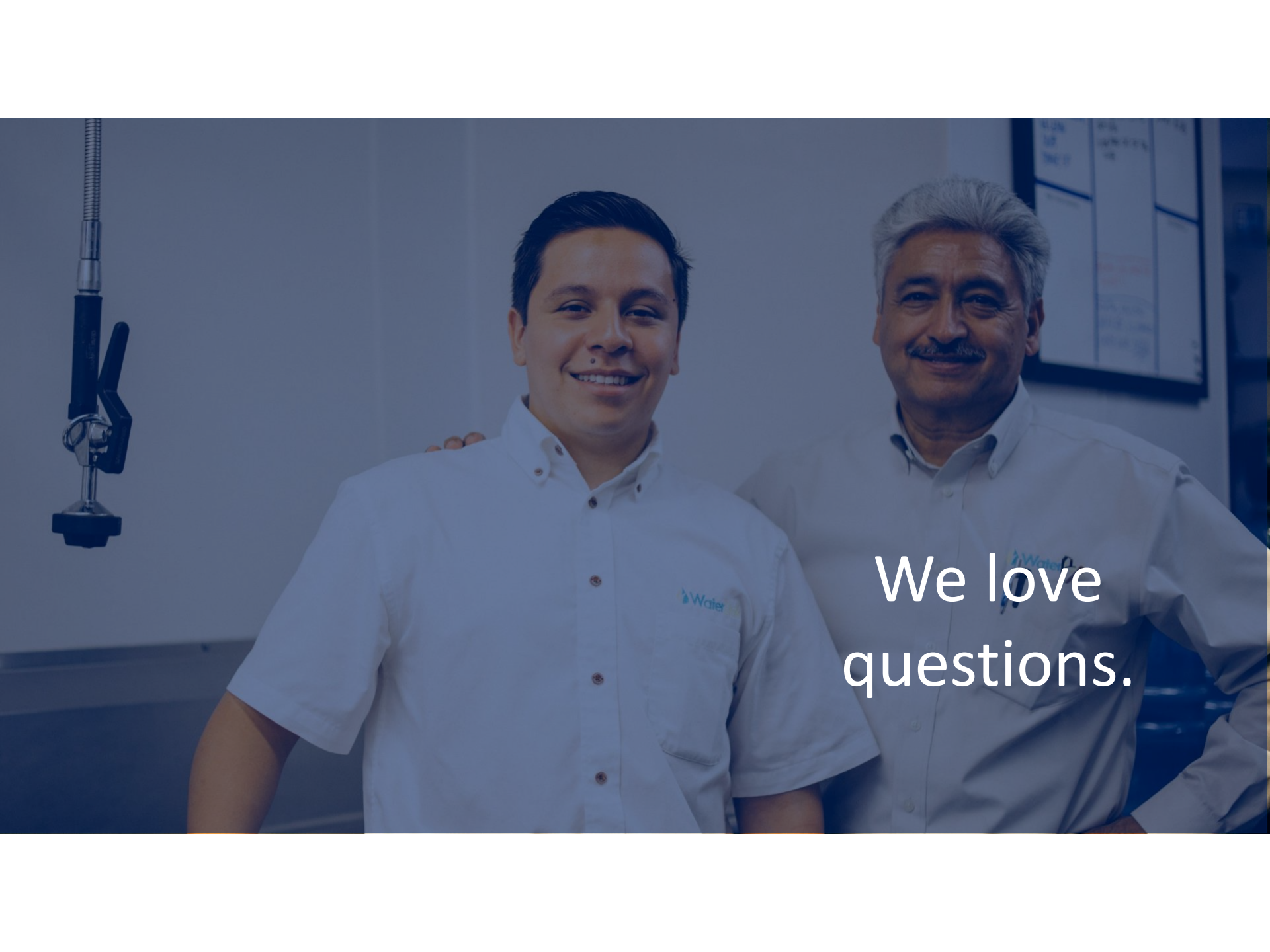
## Monterey Bay region

- 1.47 billion gallons of water
- 315,000 kilowatt-hours and 10 million therms of energy
- 55,000 MT CO2 equivalent in greenhouse gas



## Adapting This For Your Community

- Place-based targeting provides low barrier to participate
- How might multiple funding streams serving low-income customers be pooled to maximize cost-effectiveness?
- Water and energy savings are quantified by ARB calculator



We love  
questions.





# Long-Term Energy Optimization Opportunities of California Water Systems

**LGC – Statewide Energy Efficiency Forum**

**June 15, 2017**

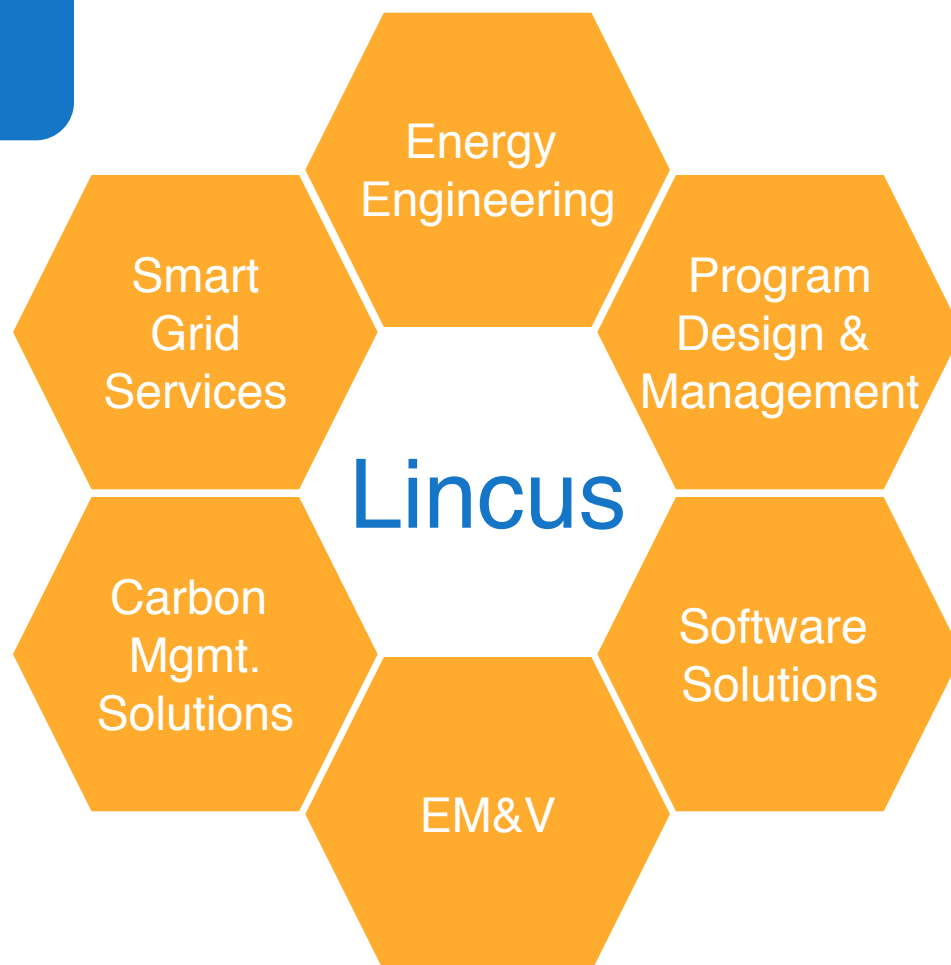
Presented by: Cody Coeckelenbergh

# Introduction

Established in 2003

## Offices:

- Tempe, AZ
- Monrovia, CA
- San Diego, CA
- Emeryville, CA





# Agenda

The Water-Energy Nexus

The Energy Impact of Water and  
the Water Impact of Energy

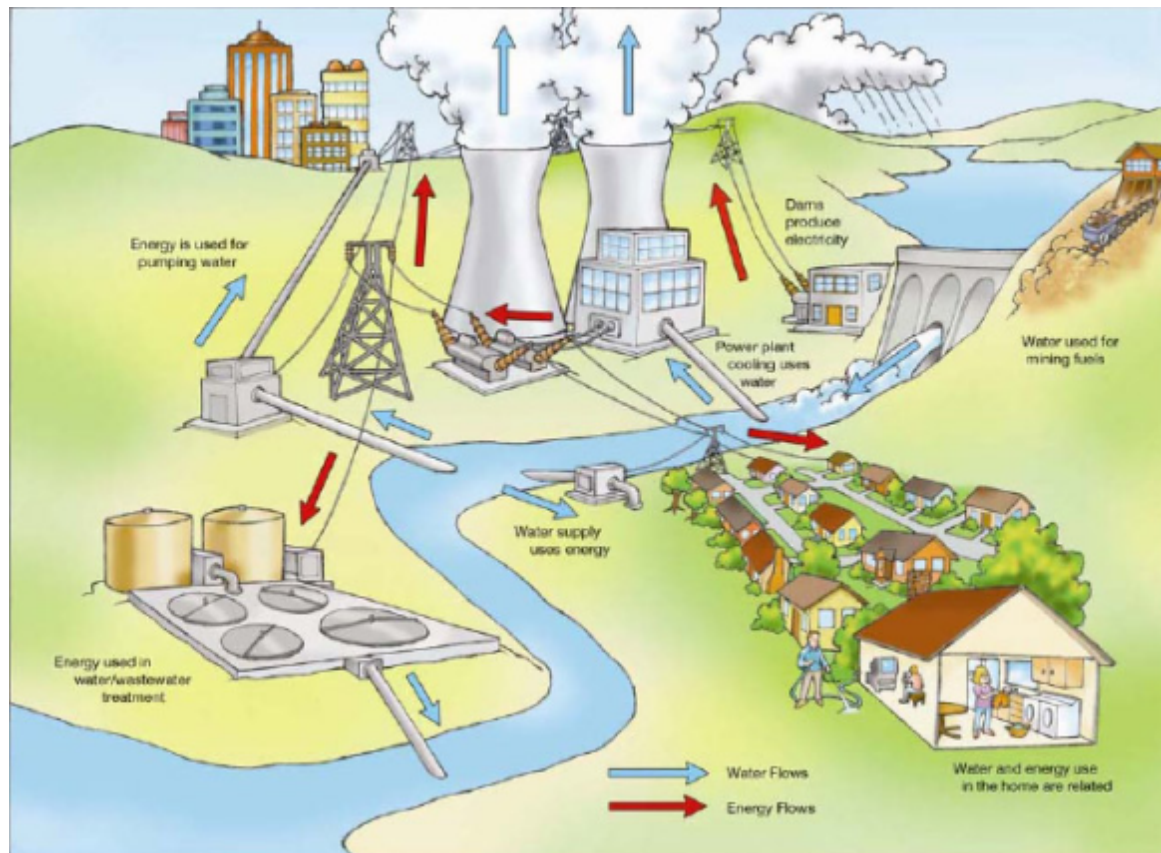
Lincus Water Infrastructure System  
Efficiency™ (WISE™) Program

Prioritizing Water Segment  
Opportunities

Why Leverage WISE™?



# Water – Energy Nexus



- Water required to produce energy
- Energy required to distribute the water to public
- Energy required to treat the waste water

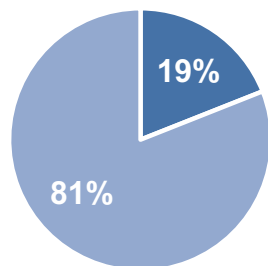
*"Energy demands on Water Resources" U.S. DOE Report to Congress on the interdependency of energy and water*

Water Conservation ↔ Energy Conservation

# Energy Impact of Water

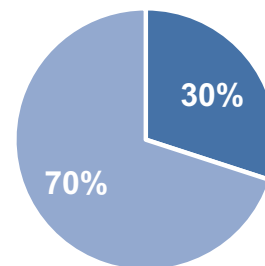
- In 2005, the CEC found that water-related energy consumption and demand accounted for 19% of the state's electricity requirements<sup>1</sup>. The 19% includes both:
  - Item #1: Energy Use by the Water Sector - the amount, timing, and location of energy needed to support water sector operations.
  - Item #2: Energy Use by Water Customers - the amount of energy used by water customers during the consumption of water, whether for pumping, heating or other purposes.

**CA Electricity Needs**



■ Water Related Use ■ All Other Uses

**CA Natural Gas Needs**



■ Water Related Use ■ All Other Uses

# Energy Impact of Water

- In 2010, the CPUC Embedded Energy in Water studies<sup>2</sup> determined that the Energy Use needed to support water sector operations was 7.7%

**Table ES-2. Statewide Water Sector Electric Use (GWH)**

	CPUC/GEI/Navigant	
Segment of the Water Use Cycle	Study 1	Study 2
Supply	15,786	172
Conveyance		
Water Treatment		312
Water Distribution		1,000
Wastewater Treatment		2,012
<b>Total Water Sector Electricity Use</b>	<b>19,282</b>	
<b>% of Total Statewide Electric Requirements</b>	<b>7.7%</b>	

Note: Excludes estimates of electricity consumption for water end uses.



# Water Impacts

- 195 billion gal/day of fresh and saline water withdrawn for thermoelectric cooling
- 48% of total withdrawals (including saline)
- 39% of freshwater withdrawals (same as irrigation)

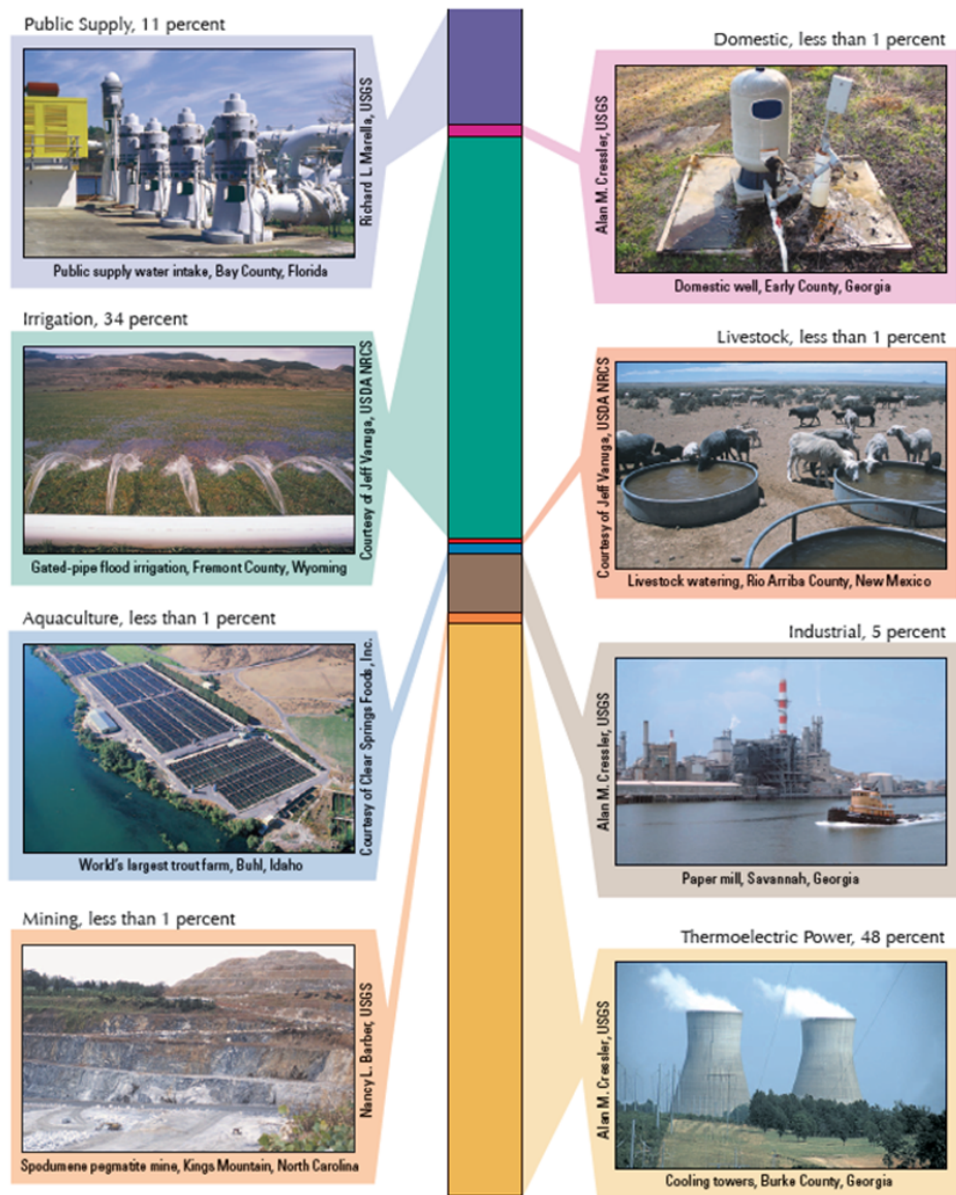
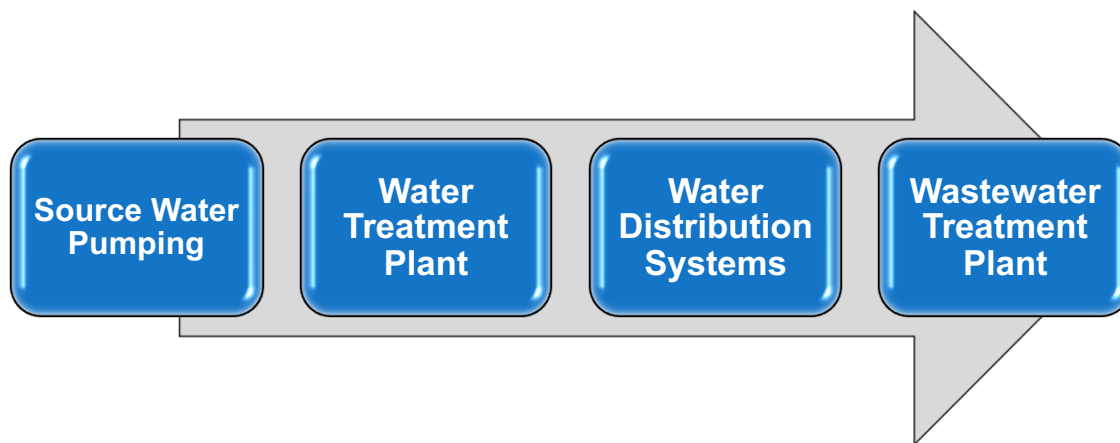


Figure 1. Total water withdrawals by category, 2000.

# Water Infrastructure System Efficiency (WISE) Program

## Summary

- Lincus' Water Infrastructure System Efficiency (WISE™) Program currently targets the major water-energy users in SCE's, PG&E's and SDG&E's service territory, namely Water Agencies, Special Districts, and city owned water systems.
- WISE focuses on the the major electric consumers of this segment.





# Water Infrastructure System Efficiency (WISE) Program



- **Water Source Pumping**
- **Water Treatment Plant**
- **Water Distribution Systems**
- **Wastewater Treatment Plant**

- **Source Water Pumping and Water Distribution Systems (WSO)**
  - Lincus uses a holistic approach, combining existing pump tests and hydraulic modeling to evaluate how a Water Agency's pumping system can be optimized.
- **Water (WTP) and Wastewater (WWTP) Treatment Plants**
  - In Wastewater Treatment Plants, WISE focuses on aeration systems and controls to minimize the facilities' electrical consumption
  - In Water Treatment Plants, we use a similar approach to WSO to optimize a plant's operations, focusing primarily on the pumps.

# Prioritizing Water Segment Opportunities



**Energy Efficiency – Component  
Optimization**

- Pump efficiency improvement
- Valve replacements
- Blower efficiency improvement

# Why leverage WISE?

- Lincus has thorough understanding of PG&E, SCE, & SDG&E-qualified measures and will evaluate cost-effective EE opportunities
- Lincus manages the utility incentive process directly
- Lincus will develop energy savings calculations as part of the program
- Lincus will maximize utility incentives and associated energy savings
- Lincus can process applications for On-Bill Financing (OBF) 0% loans
- If you are an eligible IOU Customer, the PROGRAM SERVICES ARE **AT NO COST TO YOU!**



# Contact

**Cody Coeckelenbergh**

[codyc@lincusenergy.com](mailto:codyc@lincusenergy.com)

<http://www.LincusEnergy.com>

# WATER-ENERGY NEXUS

## Bridging the Gap in Your Community

**Danielle V. Dolan**

Water Program Manager, Local Government Commission

**Cory Downs**

Conservation Specialist, City of Chula Vista

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