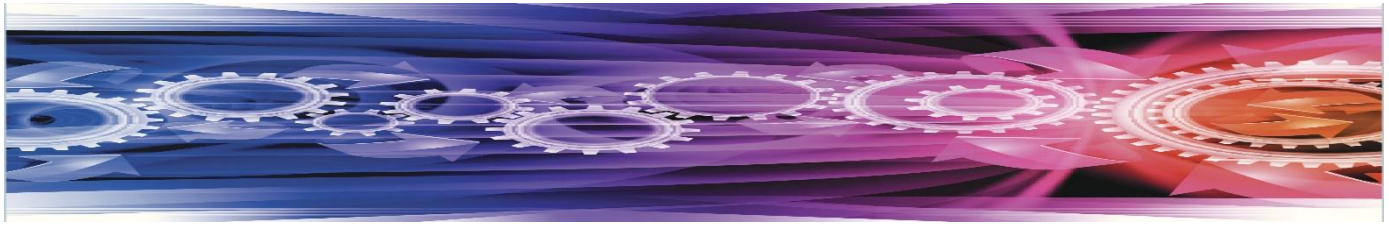
NARUC

128th Annual Meeting



Committee on Water

Budget-based approaches to incentivize conservation

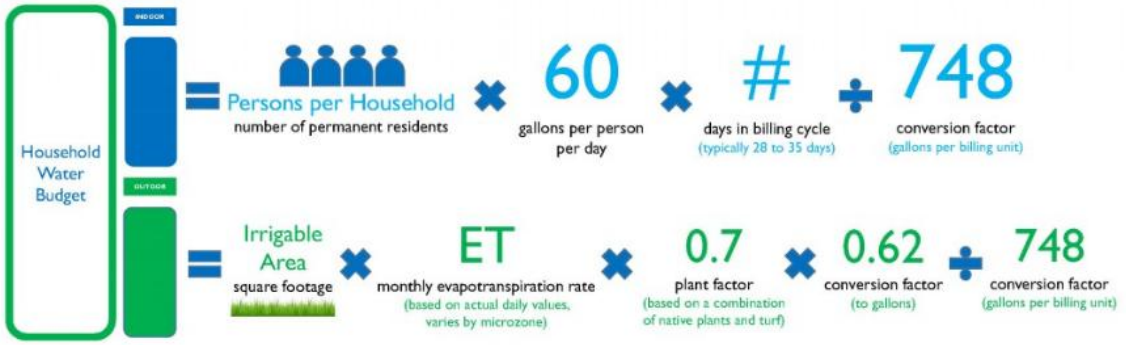
November 14, 2016

Defining Water Budgets

A **water budget** is a formal definition of the quantity of water that would be required by an efficient level of water use. (AWE, 2008).

Budget-based water rates—also known as individualized, goal-based, and customer specific rates — are block rates where the block is defined by using one or more customer characteristics. (AWE, 2008)

What are budget-based rates?

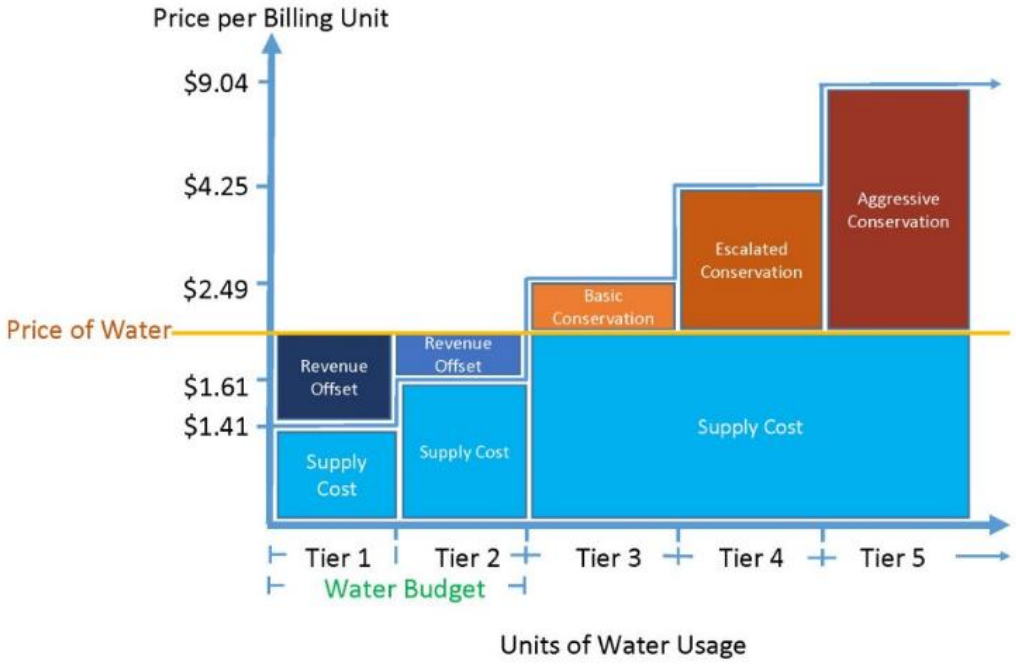


Benefits:

- Incentivizes conservation/ efficiency and reduction of water waste
- Equity/fairness

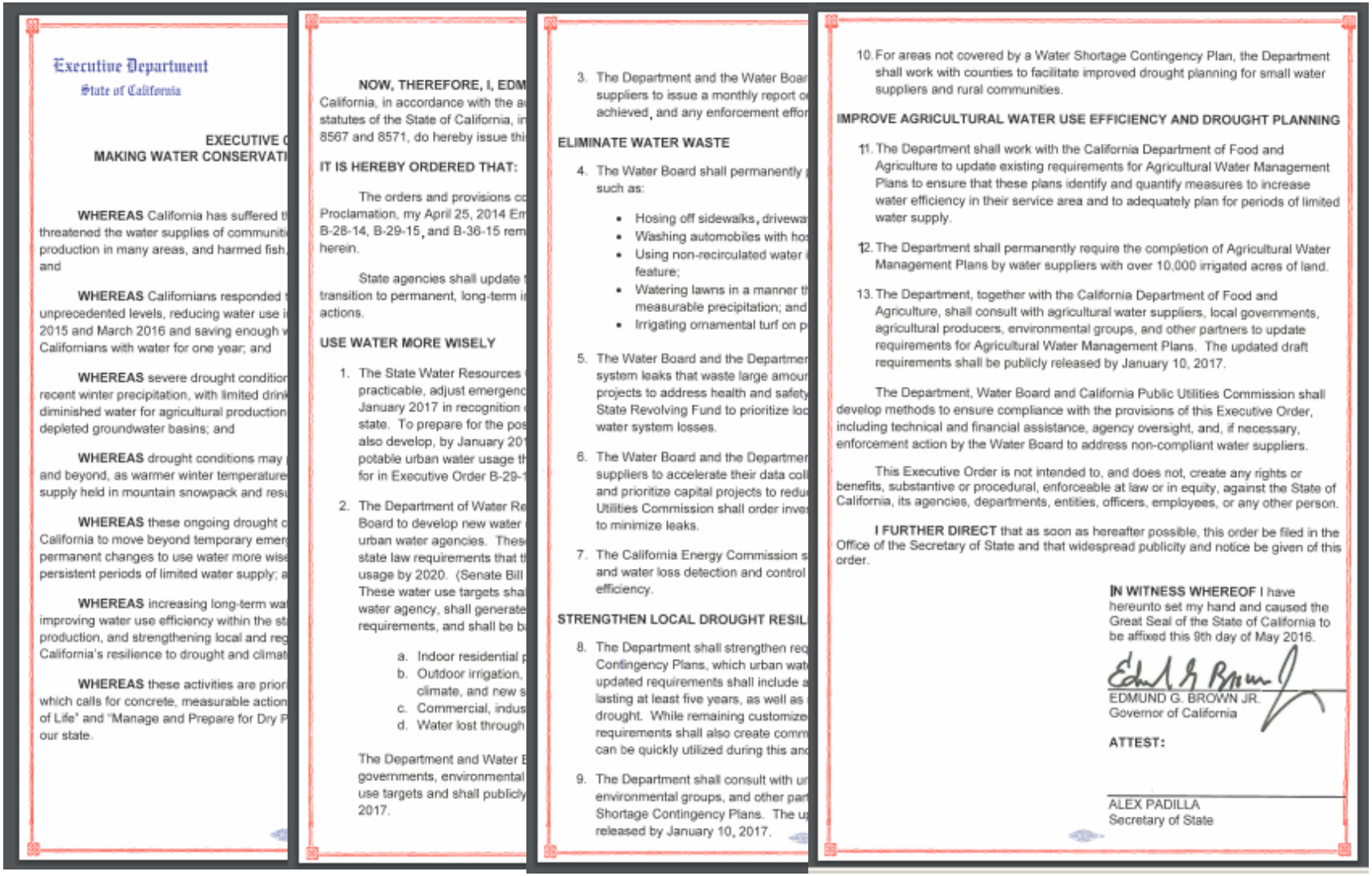
Disadvantage:

- Potentially higher implementation costs



Model Water Efficient Landscape Ordinance (MWELO)

Governor Brown's May 2016 Executive Order



Executive Department
State of California

EXECUTIVE
MAKING WATER CONSERVATI

WHEREAS California has suffered t
threatened the water supplies of communit
production in many areas, and harmed fish
and

WHEREAS Californians responded
unprecedented levels, reducing water use i
2015 and March 2016 and saving enough
Californians with water for one year; and

WHEREAS severe drought condition
recent winter precipitation, with limited drin
diminished water for agricultural production
depleted groundwater basins; and

WHEREAS drought conditions may
and beyond, as warmer winter temperature
supply held in mountain snowpack and resu

WHEREAS these ongoing drought c
California to move beyond temporary emer
permanent changes to use water more wis
persistent periods of limited water supply;

WHEREAS increasing long-term wa
improving water use efficiency within the st
production, and strengthening local and re
California's resilience to drought and climat

WHEREAS these activities are prior
which calls for concrete, measurable action
of Life" and "Manage and Prepare for Dry P
our state.

NOW, THEREFORE, I, EDM
California, in accordance with the a
statutes of the State of California, i
8567 and 8571, do hereby issue thi

IT IS HEREBY ORDERED THAT:

The orders and provisions c
Proclamation, my April 25, 2014 Em
B-28-14, B-29-15, and B-36-15 rem
herein.

State agencies shall update
transition to permanent, long-term i
actions.

USE WATER MORE WISELY

1. The State Water Resources
practicable, adjust emergenc
January 2017 in recognition
state. To prepare for the po
also develop, by January 20
potable urban water usage t
for in Executive Order B-29-

2. The Department of Water Re
Board to develop new water
urban water agencies. Thes
state law requirements that t
usage by 2020. (Senate Bill
These water use targets sha
water agency, shall generate
requirements, and shall be b

   a. Indoor residential
   b. Outdoor irrigation,
   climate, and new s
   c. Commercial, indus
   d. Water lost through

The Department and Water B
governments, environmental
use targets and shall publicly
2017.

3. The Department and the Water Boar
suppliers to issue a monthly report o
achieved, and any enforcement effor

ELIMINATE WATER WASTE

4. The Water Board shall permanently
such as:

   - Hosing off sidewalks, driewa
   - Washing automobiles with ho
   - Using non-recirculated water
   feature;
   - Watering lawns in a manner t
   measurable precipitation; and
   - Irrigating ornamental turf on p

5. The Water Board and the Departmen
system leaks that waste large amou
projects to address health and safety
State Revolving Fund to prioritize loc
water system losses.

6. The Water Board and the Departmen
suppliers to accelerate their data col
and prioritize capital projects to redu
Utilities Commission shall order inve
to minimize leaks.

7. The California Energy Commission s
and water loss detection and control
efficiency.

STRENGTHEN LOCAL DROUGHT RESIL

8. The Department shall strengthen req
Contingency Plans, which urban wat
updated requirements shall include
lasting at least five years, as well as
drought. While remaining customize
requirements shall also create comm
can be quickly utilized during this an

9. The Department shall consult with u
environmental groups, and other par
Shortage Contingency Plans. The u
released by January 10, 2017.

10. For areas not covered by a Water Shortage Contingency Plan, the Department shall work with counties to facilitate improved drought planning for small water suppliers and rural communities.

IMPROVE AGRICULTURAL WATER USE EFFICIENCY AND DROUGHT PLANNING

11. The Department shall work with the California Department of Food and Agriculture to update existing requirements for Agricultural Water Management Plans to ensure that these plans identify and quantify measures to increase water efficiency in their service area and to adequately plan for periods of limited water supply.

12. The Department shall permanently require the completion of Agricultural Water Management Plans by water suppliers with over 10,000 irrigated acres of land.

13. The Department, together with the California Department of Food and Agriculture, shall consult with agricultural water suppliers, local governments, agricultural producers, environmental groups, and other partners to update requirements for Agricultural Water Management Plans. The updated draft requirements shall be publicly released by January 10, 2017.

The Department, Water Board and California Public Utilities Commission shall develop methods to ensure compliance with the provisions of this Executive Order, including technical and financial assistance, agency oversight, and, if necessary, enforcement action by the Water Board to address non-compliant water suppliers.

This Executive Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this order be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 9th day of May 2016.

EDMUND G. BROWN JR.
Governor of California

ATTEST:

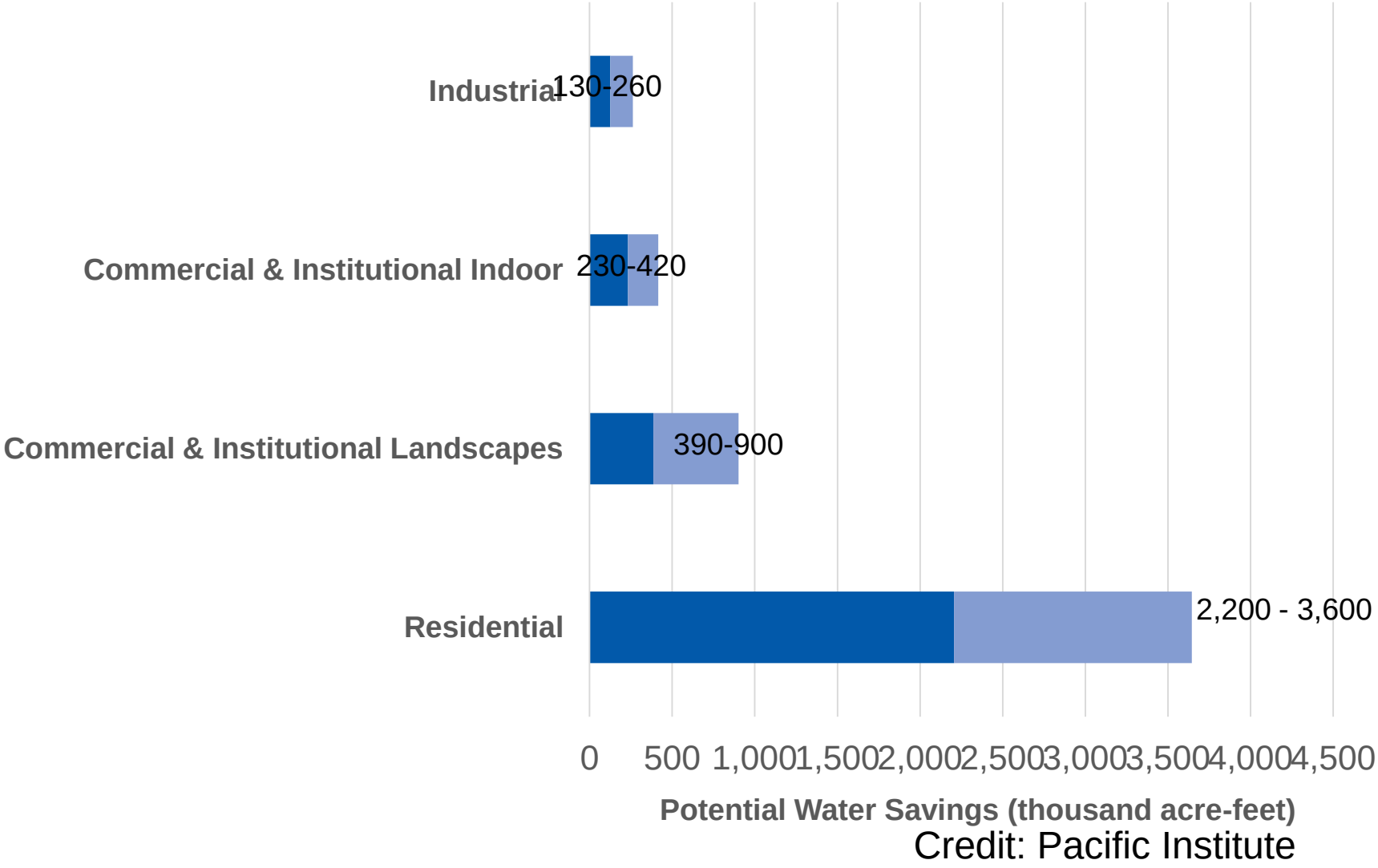
ALEX PADILLA
Secretary of State

Governor Brown's May 2016 Executive Order

1. Use Water More Wisely → New Water Use Targets
2. Eliminate Water Waste → Prohibit Wasteful Practices & Address Water Loss
3. Strengthen Local Drought Resilience → Improve Water Shortage Contingency Plans
4. Improve Agricultural Water Use Efficiency and Drought Planning → Improve Agricultural Water Plans

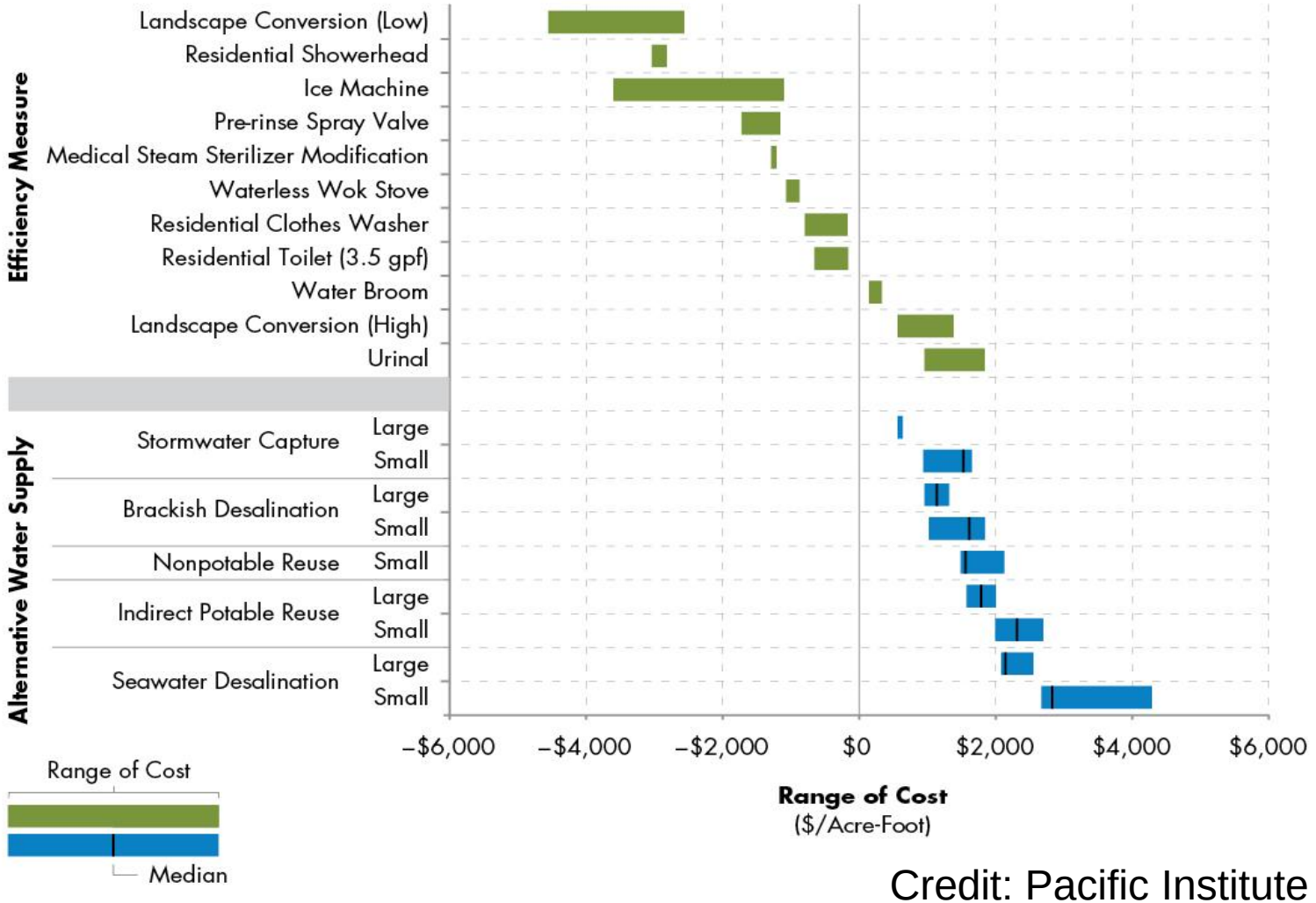
Budget-Based Targets

Conservation and Efficiency Potential by Sector (CA)



Credit: Pacific Institute

Cost Effectiveness: Conservation & Efficiency Measures



Credit: Pacific Institute

4 Elements of a Sustainable Landscape

Elements of a Smart, Water Efficient Landscape

Drought Resiliency

- Require less irrigation
- Healthy soils retain more water, reducing need for additional irrigation

Climate Resiliency

- Carbon sequestration
- Reduced heat island effect

Pollution Mitigation

- Stormwater retention reduces pollution in our rivers and oceans.

Other

- Less maintenance, save money.

Questions?

THANK YOU

TRACY QUINN, P.E.

SENIOR POLICY ANALYST

NATURAL RESOURCES DEFENSE COUNCIL

TQUINN@NRDC.ORG

(310) 434-2300

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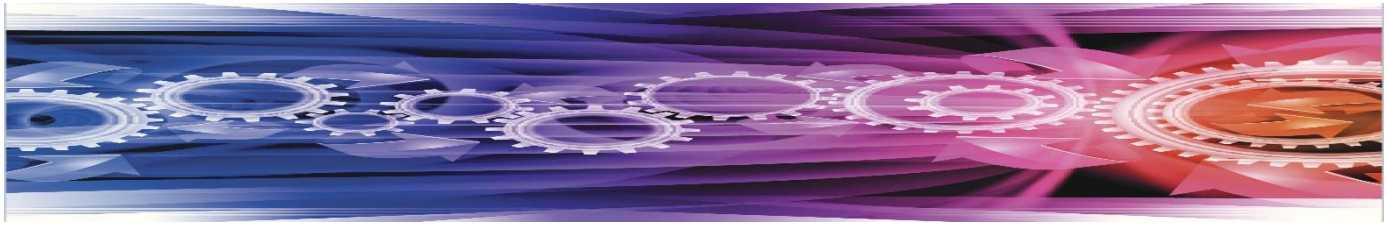


Committee on Water

TECHNOLOGY-DRIVEN RESIDENTIAL IRRIGATION CONSERVATION METHODS

AGENDA

Information sources

Smart Irrigation Technology (SIT) Solutions

- Cost Trends
- Market penetration
- Identifying Over-watering

Potential Savings from SIT

- Water Research Foundation
- SUEZ

Conclusions and lessons learned

SUEZ Next Steps

SOURCES OF INFORMATION

- **Water Research Foundation's "Residential End Use Study (#4309) – 2016"**
  - Aquacraft, Water Demand Management, Univ. of Southern Illinois and Hazen & Sawyer.
  - 23 utilities (U.S. and Canada) provided billing data from 1,000 single family homes each as well as surveys and end use monitoring
- **Water Research Foundation's "Smart Irrigation Controller Demonstration and Evaluation in Orange County, Florida (#4227) – 2016"**
  - Orange County Utilities, University of Florida
  - 167 Test sites/homes who over-water
- **SUEZ "ET-Based Irrigation Impact Study"**
  - Pleasant Valley Analytics, Pencilbrook and SUEZ engineering
  - Funding: Green Innovation Grant Program (NY), SUEZ global research program and local Business Units
  - 480 customers in device trial and control groups in Delaware, New York and Idaho,,

SMART IRRIGATION TECHNOLOGY (SIT) SOLUTIONS

SIT DEFINED

Technology	Description
Historical ET	Historical Evapotranspiration (ET) values control sprinkler
Sensor-based	Parameters such as temperature and solar radiation determine ET values which are used to control irrigation
Real time ET	ET values from weather station via wifi or phone
Onsite weather Station	Weather station equipped with sensors that measure air temperature, relative humidity, solar radiation, rainfall, and wind speed, directly connected to controller
Soil moisture sensors	Device connected to automatic sprinkler systems to cause shutoff when soil moisture is below a certain threshold.

Source: Baselinesystems

COST TRENDS

BRAND	MODEL	COST 5/12	COST 12/12	COST 10/15
Cyber-Rain	XCI System	$500	$374	$400
Hunter	IC-600 I-CORE	$619	$518	$400
Irritrol	RAIN DIAL w CLIMATE LOGIC	$ 399-899	$229-341	$254-310
Nds Raindrip	Weathersmart Pro RSC600is	$90	$60	$124
Rainbird	ESP-SMT	$350	$152	$227
Rainbird	ET Manager	$665	$460	$425
Toro	TIS-06,09,12,24,240,612	$399	$210-307	$165
Toro	TMC 424E W/ CLIMATE LOGIC	$235	$165	$195
Weathermatic	SL1600	$ 300-816	$230-422	$212-252
AVERAGE		**$452**	**$291**	**$283**

- Reducing cost encourages purchases

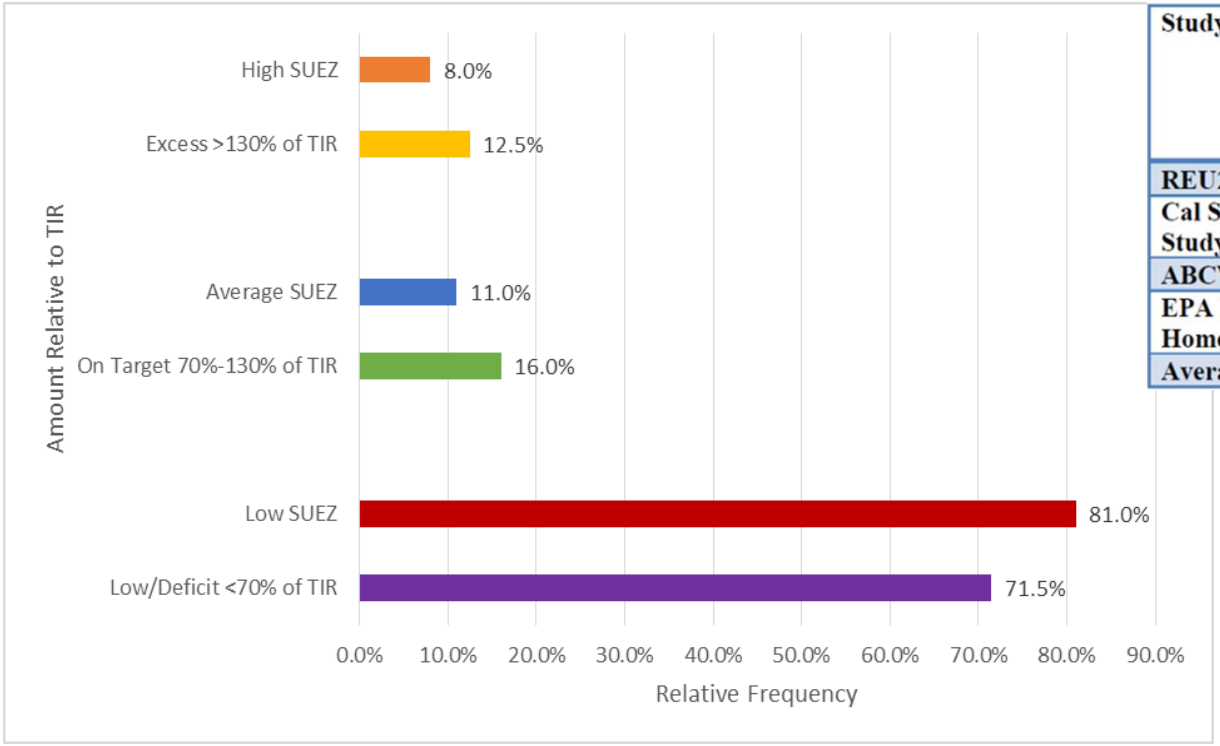
MARKET PENETRATION

Table 4.12 In-ground irrigation systems and their features

	Do you have an in-ground irrigation/sprinkling system? (Question #19)		Respondents with in-ground systems were asked if their irrigation system had: (Question #20)	
	Yes	No	Automatic timer/controller	Weather-based "smart" controller
All	53.0%	47.0%	87.9%	16.40%
North American Sample	52.4%	47.6%	85.2%	19.6%
Clayton County	15.5%	84.5%	57.9%	26.3%
Denver	74.1%	25.9%	93.9%	8.5%
Fort Collins	69.0%	31.0%	92.9%	8.4%
Peel	10.3%	89.7%	60.9%	26.1%
San Antonio	36.9%	63.1%	83.6%	34.2%
Scottsdale	88.8%	11.3%	91.6%	7.3%
Tacoma	33.3%	66.7%	80.7%	14.8%
Toho	76.9%	23.1%	87.5%	50.0%
Waterloo	13.1%	86.9%	76.7%	53.3%

- Potential for additional SIT devices
- SIT not for everyone (most effective for higher users)

MEASURING THE POTENTIAL FOR IRRIGATION SAVINGS (EXCESS-WATERING)

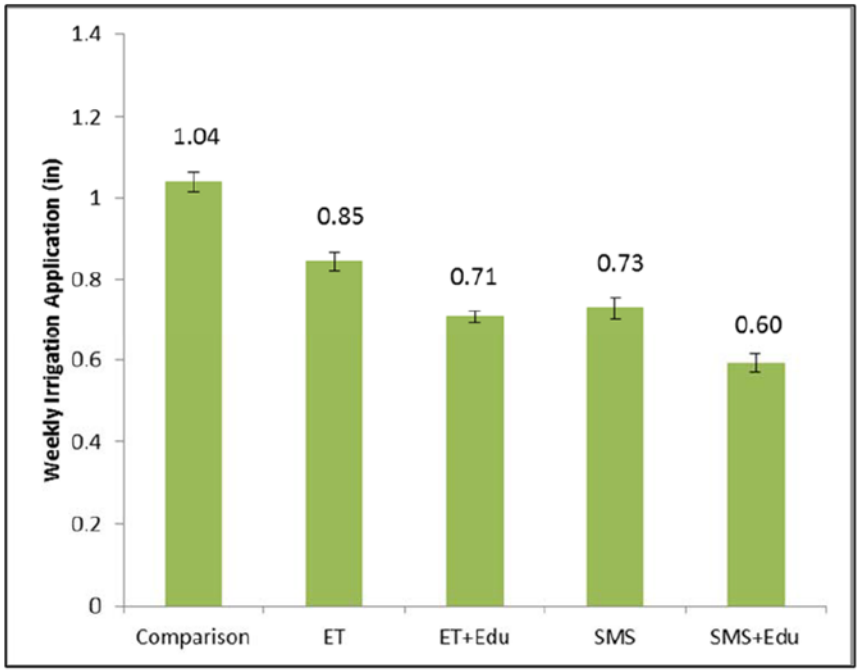


Study	Number of homes in study group (N)	Percent of Homes over-irrigating
REU2016	838	16.9%
Cal SF Home Study	614	54.0%
ABCWUA	209	15.8%
EPA New Home Study	235	63.4%
Average	474	37.5%

- Modest number of excess water customers but important
- Landscape programs may impact average/on target customers
  - Turf removal, drought tolerant plantings, drip irrigation
- Deficit irrigators – OK
- Variable results – site specific and local data collection

POTENTIAL SAVINGS FROM SMART IRRIGATION TECHNOLOGY

ORANGE COUNTY FLORIDA STUDY



- ET Controllers: Reduction of 18% (non-educ.) to 32% (educ.)
- SMS: Reduction of 30% (non-educ.) to 42% (educ.)
- Turf grass quality ratings same

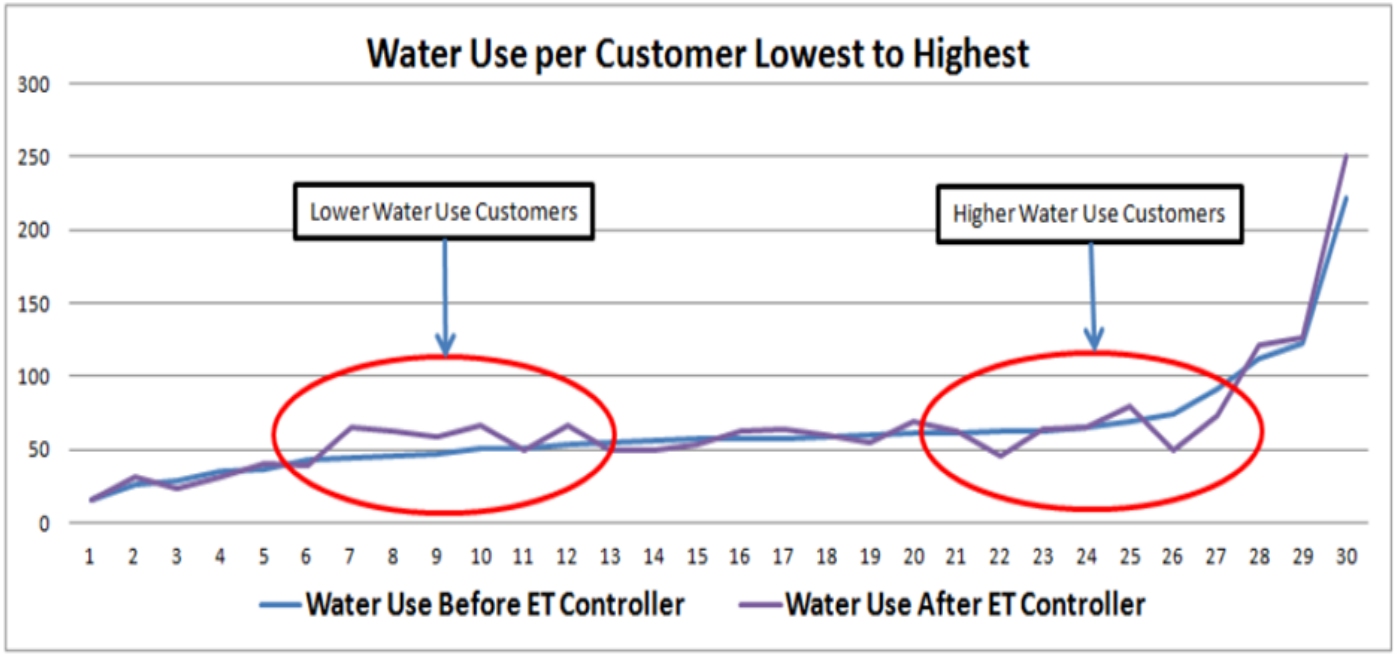
SUEZ PROGRAM RESULTS

- Evaluate impact of SIT without education component
- Over-waterers not sub-selected

	ET TEST GROUP	CONTROL GROUPS	
	ET TRIAL GROUP	AUTOMATIC SPRINKLER	MANUAL WATERERS
UWDE DIFFERENCE BEFORE/AFTER	-0.2%	4.7%	6.2%
UWID DIFFERENCE BEFORE/AFTER	4.0%	1.3%	-1.1%
UWNY DIFFERENCE BEFORE/AFTER	18.2%	-0.8%	-7.6%

- Hands-off approach not a good strategy
- Educate customers and contractors
- AMI will allow for better characterization of irrigation & over-watering

SIT EFFECTIVENSS FOR HIGH USERS



CONCLUSIONS/LESSONS

- Collect sufficient data to identify the excess watering group.
- Non-targeted application of Smart Devices could cause unintended consequences
- Thorough training of contractors and customers needed
- Technology is continuing to evolve and costs decreasing
- AMI will allow for better understanding of irrigation use/needs
- Programs to stagger device activation can reduce peaking loads

NEXT STEPS FOR SUEZ

- **Rebate program to launch for SWNY 2017**
  - **Rebates for smart irrigation devices and rain sensors**
    - **Customer and Contractor education**
  - **Rebates for indoor devices as well**
  - **Collaboration with Energy Utility to manage rebates (Marketplace Rev model)**
  - **Audits of CII including outdoor usage**
  - **Continued Education**
- **Company-wide website upgrade**
  - **Allow customer access to usage data (monthly data ⟹ hourly – AMI)**
  - **Online surveys/calculators including outdoor water usage**
  - **Improve customer access to conservation tools and information**
- **Conservation program development underway for**
  - **SUEZ Water Westchester, NY (Collaboration with NYCDEP)**
    - **To facilitate DEP's plans to conduct major work on aqueducts**
  - **SUEZ Water Pennsylvania (Mechanicsburg)**
    - **To delay capital investment in water supply**

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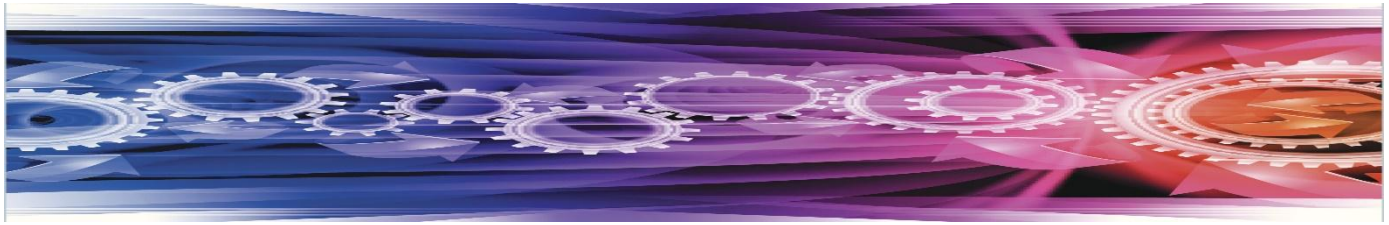


Committee on Water

Sustaining Agriculture at the Extremes

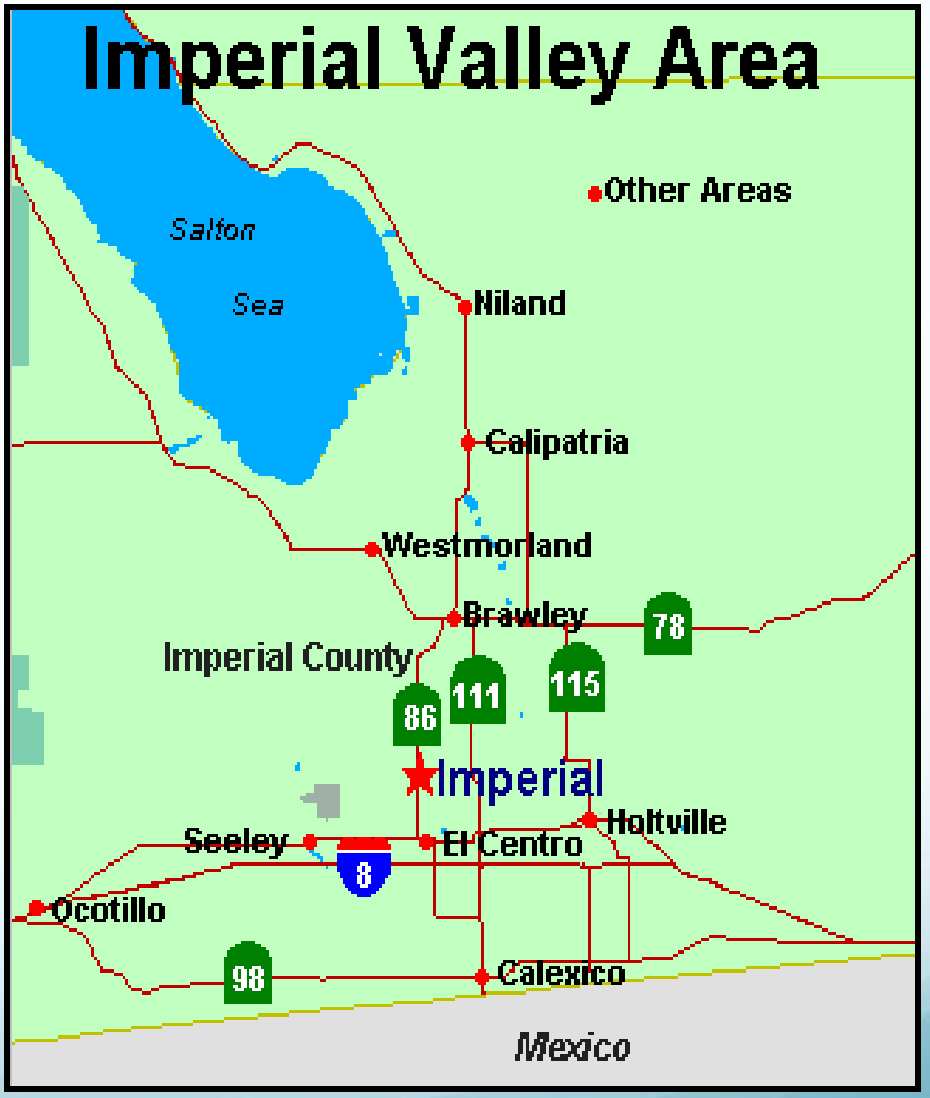
$ 20.00 per acre-foot water
IMPERIAL VALLEY, CA

$1000.00 per acre-foot water
FALLBROOK, CA

Brian J. Brady
General Manager, Fallbrook PUD

Imperial Irrigation District:

- Deliveries : 2.7 to 3.1 million acre-feet (no cost except for transportation)
- 97% agriculture use
- Over 975,00 irrigable acres
- 5200+ farm accounts
- Average farm account (gate): 160 acres
- Delivery canals and drains: 3100 miles
- Agricultural Water: $20 per acre-foot (all untreated water)



Imperial County Agriculture: $1.2 billion in annual economic value

IID farming Characteristics

- Predominantly large agribusinesses
- Dominated by lower value cropping patterns
- Longer paybacks for on-farm conservation investments (without QSA incentives)
- Conservation driven by:
  - Tightening up the system (reducing spills and seepage and farm gate measurement)
  - Fallowing
  - Converting agricultural land

Fallbrook Public Utility District

- 14,00 acre-feet in deliveries
- 50% (by volume) agricultural customers
- 700 farm accounts (9200 total accounts)
- Average farm account: less than 10 acres
- Agricultural water: $1,069 per acre-foot (all treated water)

San Diego County Agriculture: $1.8 billion annual economic value

Fallbrook Farming Characteristics

- High value cropping (often organic)
- Dominated by permanent crops
- Supplemental/retirement income
- Short term breakeven operation tolerated
- Lifestyle choice

Strategies for small farm sustainability

- Retooling existing permanent crops
- Utility incentives

Retooling Permanent Crops

- Stumping
- Grafting
- Spacing
- Salt tolerant rootstocks
- Irrigation technology
- Data mining
- Cultural methods

Utility Incentives

Rancho California Water District's CropSwap:

Avocados to wine grapes: $15,000/acre incentive

Citrus to wine grapes: $10,000/acre incentive

Avocados to citrus: $5,000/acre incentive

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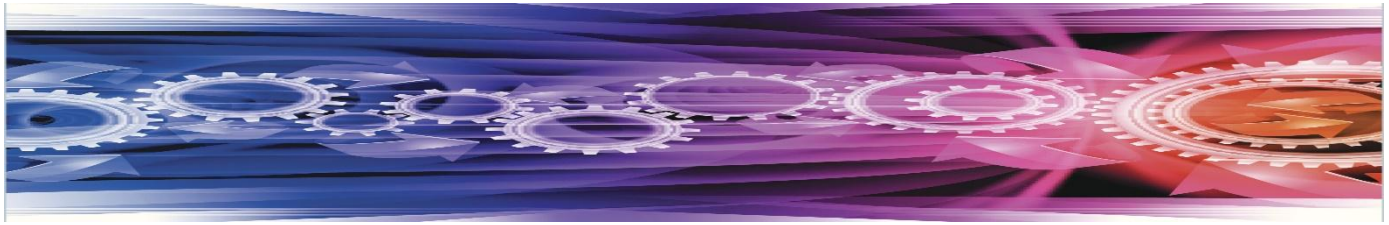


Committee on Water

RECLAMATION

Managing Water in the West

Irrigation and Large Volume Water Use: Reclamation's Conservation Efforts

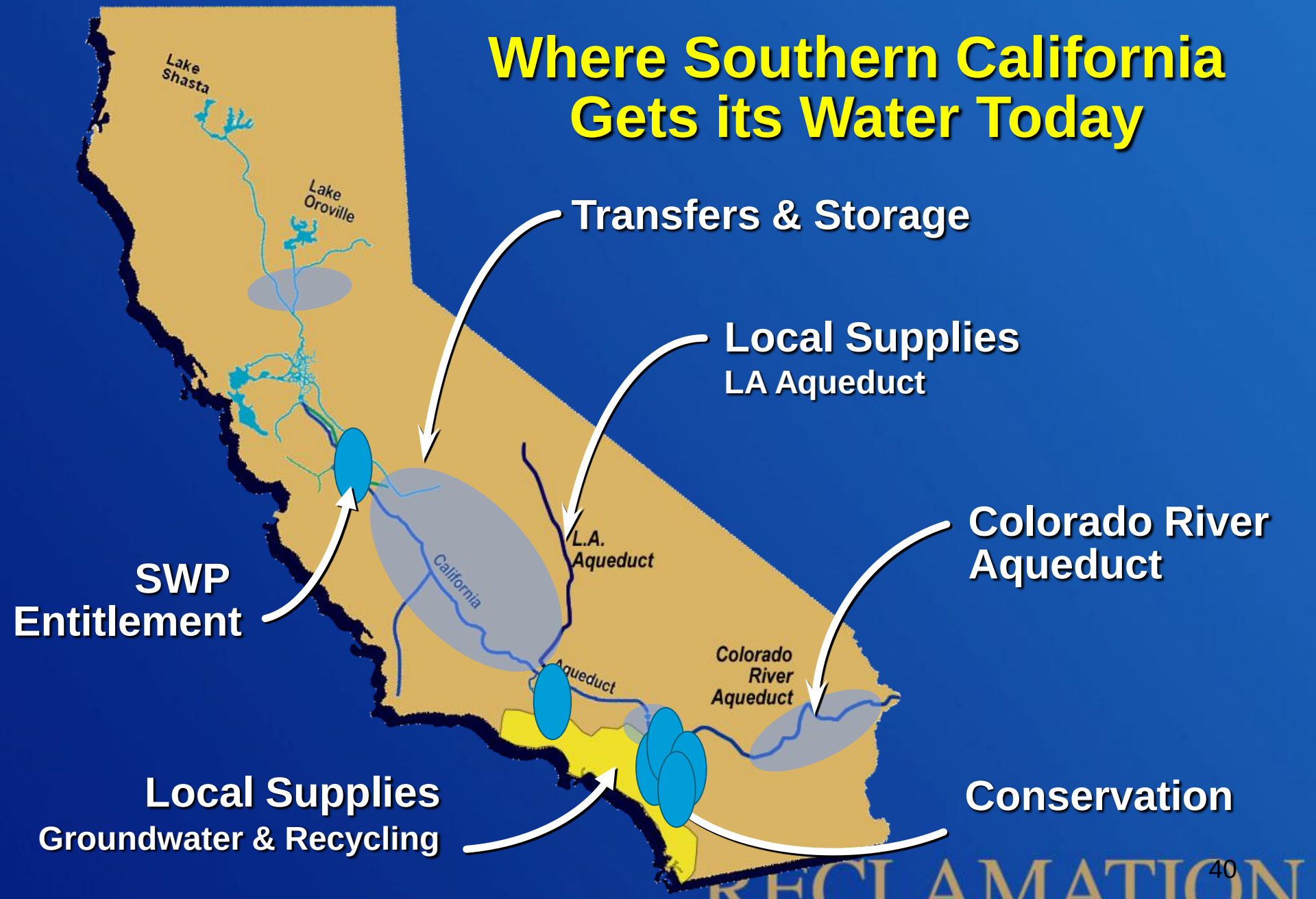
National Association of Regulatory Utility Commissioners (NARUC)

La Quinta, California
November 14, 2016

William Steele Area Manager
Southern California Area Office

U.S. Department of the Interior
Bureau of Reclamation

Where Southern California Gets its Water Today



RECLAMATION

Future Water Supply Portfolio

New Water Supplies

- Seawater/Brackish Water Desalination
- Reclaimed Water Projects
- New Fresh Water Supplies
- Storm water Augmentation

Improved Use of Existing Supplies

- Water Conservation
- Ground/Surface Water Conjunctive Use
- Watershed/Integrated Resources Plans

Reallocation of Existing Water

- Water Banking/Water Transfers
- Indian Water Right Settlements

RECLAMATION

Authorities

- Section 201: Reclamation Reform Act of 1982
- Section 210: Water Conservation
  - (a) The Secretary shall, encourage the full consideration and incorporation of prudent and responsible water conservation measures in the operations of non-Federal recipients of irrigation water from Federal reclamation projects, where such measures are shown to be economically feasible for such non-Federal recipients.
  - (b) Each district that has entered into a repayment contract or water service contract shall develop a water conservation plan which shall contain definite goals, appropriate water conservation measures, and a time schedule for meeting the water conservation objectives.

Programs

- **Water Conservation Field Service Program**

  Water Conservation Field Service Program: These grants assist local districts in developing plans to support and complement existing State and local agency conservation programs.

  Water conservation has many meanings and includes methods of storing, saving, reducing or recycling water. As a federal agency with a vital role in the administration of Western water resources, the Bureau of Reclamation is a leader in water management planning, conservation education, innovative technology demonstrations, and conservation measure implementation through its Water Conservation Field Services Program (WCFSP).

Water Conservation Field Services Program - WCFS

- Applicant Cost Share: 50% or more of project costs
- Federal Funding Amount: Not to exceed $100,000 per agreement
- Federal Funding Available for Award: Estimated at up to $300,000
- Eligible Applicants: State and local governments, Tribes, and entities that have water delivery authority with a tie to a Reclamation project.

Projects (WCFS)

West Basin Municipal Water District - Landscape Irrigation Program - The program will provide landscape surveys and high-efficiency irrigation nozzles to residents and the Commercial, Industrial and Institutional (CII) sectors throughout the District's service area.

City of San Diego - Mapping Interface Enhancements to Urban Vegetation Satellite Imagery - The project will increase landscape efficiency through water audits with an estimated savings of 15% by using satellite imagery.

Long Beach Water Department - Outdoor Water Use Efficiencies - The purpose of this project is to implement three activities within an urban school: (1) replace irrigation system , (2) purchase and install of weather-based irrigation controller and (3) the design and construct a demonstration garden.

Authorities
WaterSMART (Sustain and Manage America's Resources for Tomorrow)
P.L. 111 - 11

- Water is our most precious natural resource and is increasingly stressed by the demands our society places on it.
- Adequate water supplies are an essential element in human survival, ecosystem health, energy production, and economic sustainability.
- Significant climate change-related impacts on water supplies are well documented in the scientific literature and scientists are forecasting changes in hydrologic cycles

Programs

- Through the WaterSMART Grants (formerly Challenge Grants) Reclamation provides 50/50 cost share funding to irrigation and water districts, Tribes, States and other entities with water or power delivery authority. Projects should seek to conserve and use water more efficiently, increase the use of renewable energy, protect endangered species, or facilitate water markets. Projects are selected through a competitive process and the focus is on projects that can be completed within 24 months that will help sustainable water supplies in the western United States.

Projects (WaterSmart)

- **Metropolitan Water District of Southern California, On-site Retrofit Pilot Program - Reclamation Funding: $700,000 Total Project Cost: $2,000,000**

  The Metropolitan Water District of Southern California will undertake an on-site retrofit incentive program to convert potable water irrigation water systems to recycled water irrigation systems. The retrofits will consist of improvements to existing irrigation systems in order to allow for the connection to the distribution system of an existing water recycling facility. The program is expected to result in annual water savings of 5,100 acre-feet through the offset of imported water with recycled water that is currently being discharged to the ocean. The District also estimates that the project will save an estimated 13,316,000 kilowatts per year by replacing imported water with recycled water. By completing these improvements, the District is implementing the municipal and industrial water conservation adaptation strategy identified in the 2012 WaterSMART Colorado River Basin Water Supply and Demand Study.

Projects (WaterSmart)

- **Metropolitan Water District of Southern California - California Friendly Turf Replacement Program -** The California Friendly Turf Replacement Program will transform approximately 2,000,000 square feet of irrigated turf to landscapes with climate appropriate plants, efficient irrigation, permeable surfaces. The program is expected to save 2,760 acre-feet per year.

- **Rosedale-Rio Bravo Water Storage District, Stockdale East Groundwater Recharge Project -** Reclamation Funding: $1,000,000 Total Project Cost: $4,094,125 - The Rosedale-Rio Bravo Water Storage District in Bakersfield, California, will construct 200 acres of recharge ponds to capture storm water and increase groundwater recharge. The project also includes the installation of additional pumping capacity (four pumps with pumping capacities of 140 cubic feet per second) at the Central Intake Pumping Plant. The project is expected to result in annual water savings of 5,700 acre-feet, which would otherwise cause significant flooding or go unused to the ocean. Conserved water will provide additional supply for District water users, provide enhanced protection against prolonged drought and climate changes, and provide intermittent wetlands for wildlife environmental benefits.

Projects (WaterSmart)

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Questions?

Bill Steele

951-695-5310

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RECLAMATION

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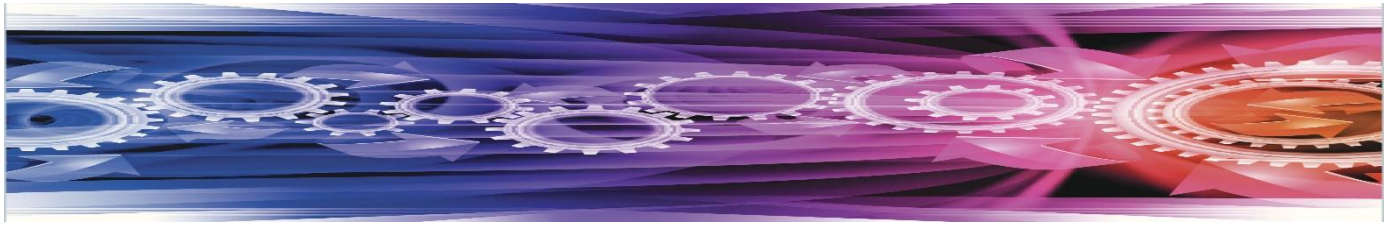

Committee on Water