

Overview of Executive Order Directive #2

EO B-37-16 Target Framework Workshop
Metropolitan Water District
September 8th, 2015

Erik Ekdahl
Office of Research, Planning and Performance
State Water Resources Control Board

Executive Order Directive #2

- ▶ These water use targets shall be customized to the unique conditions of each water agency, shall generate more statewide water conservation than existing requirements
- ▶ [Targets] shall be based on strengthened standards for:
 - Indoor residential per capita water use
 - Outdoor irrigation, in a manner that incorporates landscape area, local climate, and satellite imagery data
 - Commercial, industrial, and institutional (CII) water use
 - Water lost through leaks

Overview

- ▶ Welcome & Introductions
- ▶ Agenda
- ▶ Purpose and goals of today's meeting
- ▶ Review of Executive Order Directive #2

Terminology

- ▶ Standard
 - A metric used to indicate a level of water-use efficiency
 - Example: GPCD, evapotranspiration adjustment factor
- ▶ Budget
 - The volume (or GPCD) calculated by setting a standard
 - Example: the indoor residential budget = standard x pop. x days/year
- ▶ Target
 - The sum of each budget volume/GPCD
 - Unique to each supplier

Executive Order Directive #2

- ▶ DWR shall work with the Water Board to develop new water use targets as part of a permanent framework for urban water agencies
- ▶ These new water use targets shall build upon the existing state law requirements that the state achieve a 20% reduction in urban water usage by 2020.

Water Budgets 101

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Peter Brostrom
Water Use Efficiency Program Manager
California Department of Water Resources

Why a Water Budget Approach?

- ▶ Accounts for landscape area and climate (Eto)
- ▶ Customized target for each supplier
- ▶ Builds upon existing requirements
- ▶ Takes into account previous water use efficiency efforts– does not require a baseline.

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Indoor Residential Budget

- ▶ Indoor residential standard
 - Expressed in gallon per capita per day (GPCD)

$$(\text{Pop.}) \times (\text{GPCD}) \times (365 \text{ days/year}) = \text{volume}$$

Example: $1000_{(\text{pop})} \times 55\text{GPCD} \times 365_{(\text{days})} = 26,838 \text{ CCF}$
 –CCF =Hundred Cubic Feet

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Definition:

- ▶ Water Budgets: tool to quantify or estimate efficient water use.
- ▶ Can be implemented at a variety of scales:
 - Parcel
 - Household
 - Business
 - Service area

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Outdoor Water Use Budget

$$(\text{ETAF}) \times (\text{Landscape Area}) \times (\text{Eto}) = \text{volume}$$

ETAF is the Evapotranspiration Adjustment Factor

- = landscape plant factor/Irrigation Efficiency
- Used to quantify the type of planting and the level of water use in a landscape

Model Water Efficient Landscape Ordinance(MWELO) uses ETAF to establish water budgets for new landscapes

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EO B-37-16 Action #2

- ▶ Directs State agencies to establish a long term framework for new water use targets based on water budgets calculated from standards for 4 sectors
 - Indoor residential
 - Outdoor irrigation
 - CII
 - Distribution System Loss

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Landscape Ordinance 1993

1993–Set ETAF based on a landscape with

- 1/3 high water use plants
- 1/3 medium
- 1/3 low
- ▶ Average plant factor = 0.5
- ▶ Irrigation efficiency = 0.625

$$\text{ETAF} = \text{plant factor} / \text{Irrigation efficiency} = 0.8$$

New landscapes starting in 1993 designed/install to use 80% of Eto.

Example: Eto =50 inches Water budget = (50) x 0.8= 40 inches

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Landscape Ordinance 2015

MWEL0 revised in 2015:

- ▶ Landscape plant factor lowered to 0.425
 - Assumes area with:
 - 25% high water use plants
 - 25% medium
 - 50% low
- ▶ Two irrigation efficiency standards established
 - 0.81 for drip/micro irrigation
 - 0.75 for sprinkler
- ▶ New ETAF
 - 0.55 for residential
 - 0.45 for commercial

Example: ETo=50" Res. Budget=27.5

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Commercial, Industrial and Institutional (CII) Sector Budgets

- ▶ Difficult to establish water budgets due to the wide range of water use.
- ▶ SB X7-7 Method 2 standard was a 10% reduction from the SB X7-7 baseline
- ▶ Considering 3 different approaches/options that will be discussed this afternoon

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Supplier Service Area Outdoor Water Budget

- ▶ Sum of outdoor water budgets for individual parcels
- ▶ Account for different ETo's and ETAF's
- ▶ ETAF's
 - Pre 2010 landscapes 0.8
 - 2010 to 2015 0.7
 - Post 2015 0.55 Residential
 - 0.45 Commercial
 - Special Landscapes 1.0

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Distribution System Loss

- ▶ State Board required to establish a threshold for water loss in 2019.

Example calculation:
 (30 gallons/day/con.) x (# of con.) x 365 days/year=volume

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Example: Single Family Residential Parcels

Parcels	ETo (in)	ETAF (in)	Landscape Area (Sq. ft.)	Volume (CCF)
100	45	0.8	200,000	600,000
30	45	0.7	45,000	118,125
10	45	0.55	20,000	41,250
Total				759,375

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Water Use Target Calculation

Targets calculated by adding the volume or GPCD from the 4 sector budgets

Indoor Residential	4,570,744	55
Outdoor Landscape	3,729,166	44
CII	1,025,401	12
<u>Water Loss</u>	<u>530,560</u>	<u>7</u>
Target	9,855,871 (CCF)	118 (GPCD)

Suppliers comply only with the water use target, the sector budgets are used only to calculate the target.

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Initial Proposed Timeframe

- ▶ 2025 suppliers document compliance with water use targets
 - 2021–2024– annual reporting on progress towards water use targets

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Questions?

- ▶ Contact:
- ▶ Peter.Brostrom@water.ca.gov
- ▶ (916) 651 7034

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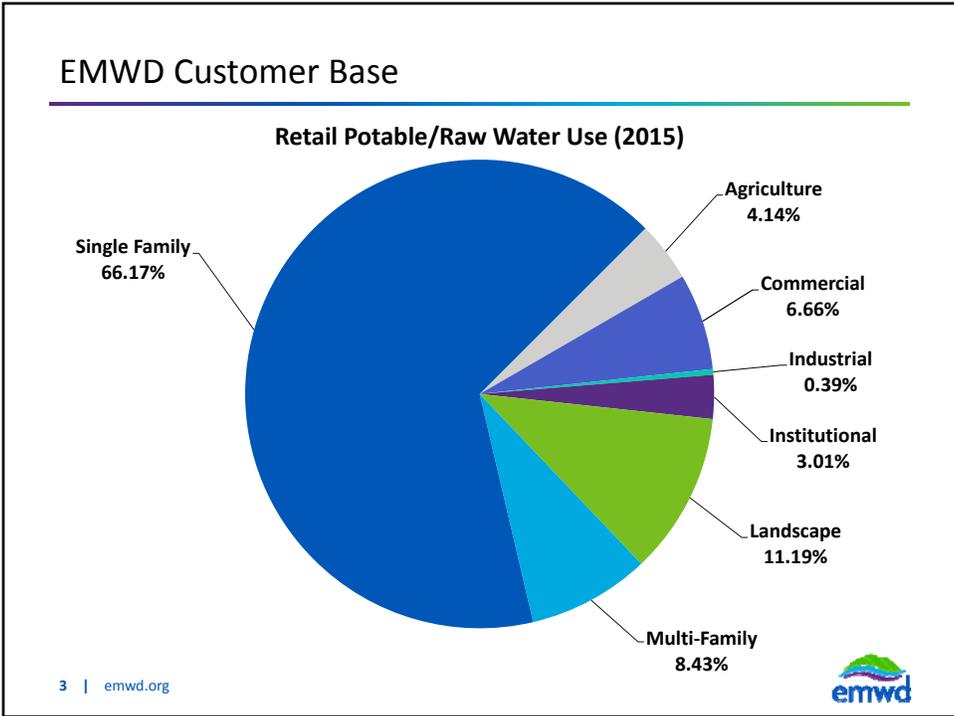
Water Budget Based Approach to Conservation Regulation Compliance

Elizabeth Lovsted, PE
September 8, 2016

EMWD Overview

- Established in 1950
- 555 square-mile service area
- Service area population of 795,000
- Serving seven cities and unincorporated areas
- One of 26 MWD member agencies
- Four Regional Wastewater Reclamation Facilities
- Full service agency providing water, wastewater and recycled water service:
 - 145,000 water connections
 - 237,000 sewer connections





Conservation Program Overview

- Rebate Programs:**
 - Residential, Commercial, Institutional
 - Device retrofit (toilets, faucets, irrigation controllers, nozzles, industrial HVAC, etc.)
 - Turf Replacement Program
 - 3.9 million sf removed, another 1.8 million sf pending
- Direct Customer Outreach and Use Audits:**
 - Leak detection, landscape education, school programs, and multi-media communications
- Ordinances and Administrative Code:**
 - Landscape (Riverside County Model Ordinance – eliminates “non-functional” turf)
 - Water waste Prohibitions: penalties and citations
- Allocation-based Tiered Rate Structure:**
 - Individualized budget (residents and irrigated area)
 - Enforces water use efficiency with rates
 - Implemented 2009

4 | emwd.org

Allocation-Based Tiered Rates

	<u>Price/CCF</u>	
Indoor Usage Budget Persons x 60 GPD	Tier 1: \$1.861	Within budget
Outdoor Usage Budget Irrigated Area x ET Factor x Conservation Factor	Tier 2: \$3.405	
Excessive Use Up to 50% over budget	Tier 3: \$6.102	Over-budget
Wasteful Use More than 50% over budget	Tier 4: \$11.164	



SB X7-7 Compliance Method 2 – A Budget Based Approach



Method 2 - Urban Water Use Targets

- The per capita daily water use that is estimated using the sum of the following performance standards:
 - For indoor residential water use, **55 gallons per capita daily water** use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.
 - For landscape irrigated through **dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance** set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.
 - **For commercial, industrial, and institutional uses, a 10-percent reduction** in water use from the baseline commercial, industrial, and institutional water use by 2020.



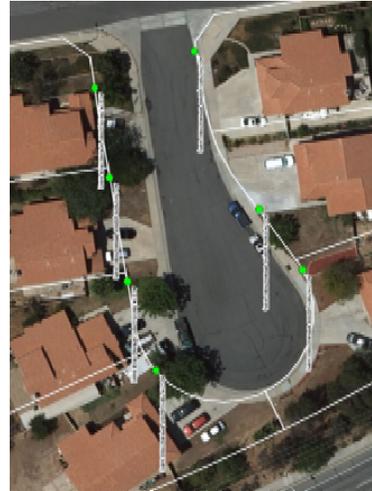
Why Select Method 2?

- Efficiency based approach
 - Takes into account density, climate, and growth
 - Consistent with conservation messaging focused on equity
- Compatible with EMWD customer base
 - 85% of water use is residential and dedicated landscape
 - Limited commercial, industrial, and institutional
- Required data is available
 - Landscape area for residential and dedicated meters
 - Agricultural irrigated area/crop types
 - Meter install dates
 - Evapotranspiration information



Landscape Area – Single Family Residential

- Developed with allocation based rates
- Initially used parcel based calculation
 - Irrigable area
- Large parcels measured
 - Water use deviated from budget calculations
 - GIS aerial or field verification
- Refined over time
 - Variances, targeted measuring
 - GIS aerial or field verification



Irrigated Area – Dedicated Meters/Multi-Family

- Developed with allocation based rates
- Requires significant effort and customer participation
 - Required irrigated area be provided/verified by customers
 - Can rarely be determined with aerial imagery alone
 - Additional verified by EMWD staff as needed
- Functional areas identified over time
 - Tighten budgets
 - Increase efficiency



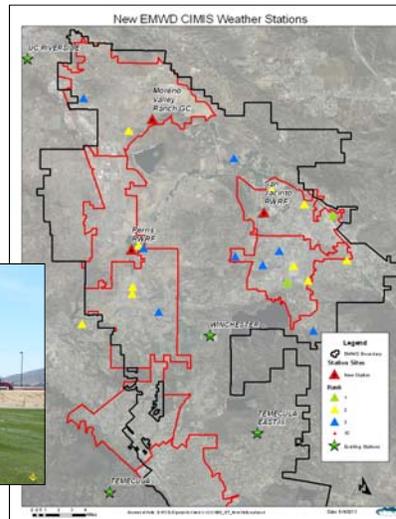
Irrigated Area – Agriculture

- Measured irrigated agricultural area dedicated to edible plants
 - Used latest aerial imagery
 - Requires frequent updating
- Customer supplies crop type



Evapotranspiration Data

- California Irrigation Management Information System (CIMIS)
 - One historical site (Winchester)
 - Added three additional sites since 2012
 - Maintained monthly
- Specific siting requirements



Challenges to Calculating Method 2 Target

- Defining Irrigated Area
 - Single-family residential can be developed through aerial imagery/parcel data
 - Multi-family and dedicated irrigated area take additional effort and customer feedback
 - Agricultural requires frequent updates and verification
- Accurate Evapotranspiration Data
 - Requires CIMIS or other reliable weather source
- Does not account for all unique conditions

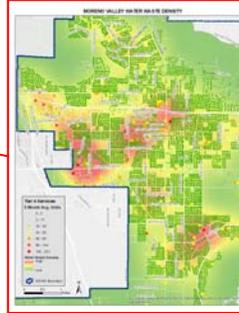
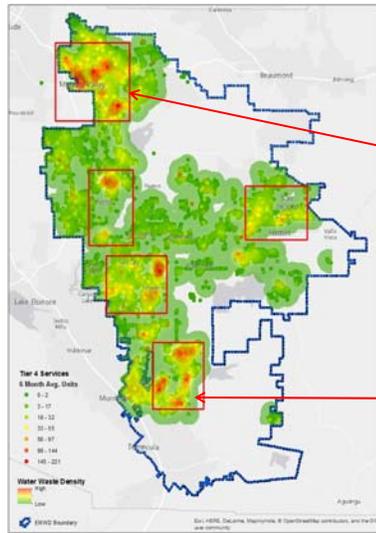


Benefits to Method 2

- Uses efficiency standard to determine conservation target
- Accounts for variety in climate, density, and growth
- Data driven approach informs conservation efforts



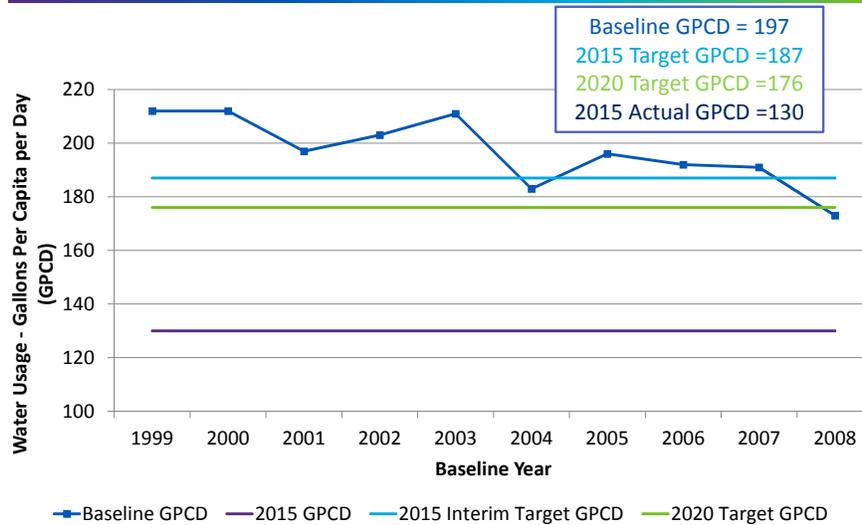
Budgets Allow Targeted Water Use Efficiency Efforts



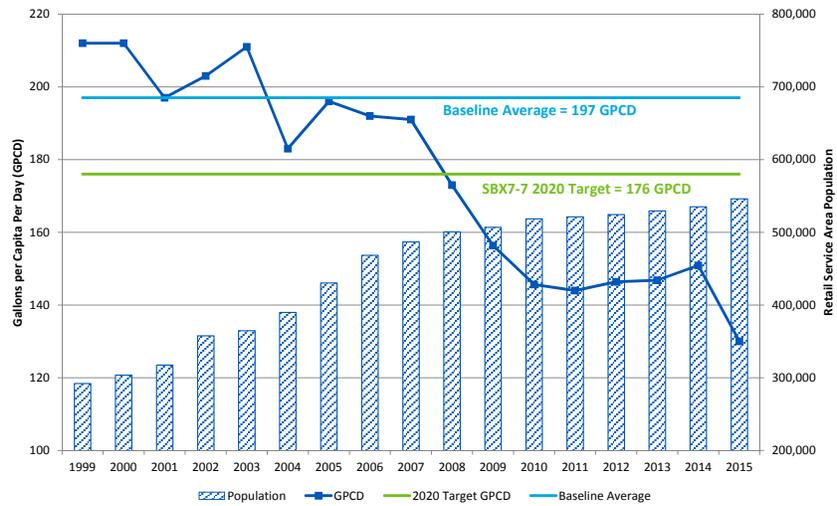
Example: EMWD geographically targets “over-budget” customers using landscape customer database and GIS



SBX7-7 Baseline Conditions vs. Current Day Conditions



Progress Towards SBX7-7 Target



EMWD's retail demands were at 130 GPCD in 2015, a 34% reduction from the baseline average



Contact Information

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Framework for Water Loss Control Actions and Standards

EO B-37-16 Target Framework Workshop
Metropolitan Water District
September 8th, 2015

Max Gomberg
Climate and Conservation Manager
State Water Resources Control Board

Energy Commission Proceeding

- ▶ Workshops will be scheduled for DATE
- ▶ Technical questions should be directed to Leah Mohney, at (916) 653-5851 or Leah.Mohney@energy.ca.gov
- ▶ Should the state provide a list of available water loss detection and control technologies along with their cost?

Multi-Agency Effort to Reduce Leaks

- ▶ State Water Board, Public Utilities Commission, and Department of Water Resources to fund, assist, and direct leak detection and repair actions
 - Use Drinking Water State Revolving Loan Fund (DWSRF)
 - Accelerate data collection
 - Accelerate system management and infrastructure replacement
- ▶ Energy Commission to certify innovative water loss detection and control technologies

Options for Acceleration of Data Collection

- ▶ Require large water suppliers to conduct component analysis to identify cost-effective water loss detection and control actions
 - CPUC to require specific water loss control investment budget proposals in General Rate Cases
- ▶ Prioritize DWSRF funding for smaller systems that voluntarily provide water loss data
- ▶ Require agricultural water suppliers to provide specific water loss assessment and reduction strategies in Agricultural Water Management Plans

Financial Assistance

- ▶ \$3.2 million from DWSRF to American Water Works Association for water loss data collection and auditing assistance
- ▶ Prioritize subsequent DWSRF funds for smaller systems with high loss volumes?
- ▶ Energy Efficiency funds available for water loss reduction projects with demonstrable energy savings

Existing Requirements Under SB 555

- ▶ SB 555 applies only to urban water suppliers
- ▶ DWR currently developing rules for validations of water loss audits
- ▶ Annual water loss audit data submission to DWR beginning October 2017
- ▶ State Water Board rulemaking to set water loss standards to commence in 2019

Projected Impact of Plumbing Codes and Appliance Standards on M&I Water Use

Water Conservation Executive
Order B-37-16
Long Term Water Use Targets
Workshop
September 8, 2016

Primary Data Sources

- DOF Population/Housing Estimates/Projections
- AHS Microsample Data
- WRF End Use Studies
- CUWCC CII Toilet Database
- CUWCC Urinal PBMP Study

Project Objectives

- Forecast impact of plumbing codes/appliance standards on M&I Water Use
- Impacts expressed in terms of:
 - Fixture saturation/average efficiency
 - Change in total M&I water use
 - Change in M&I GPCD
 - Change in R-GPCD
- Assess regional variability

Showerheads & Faucets

- Limited potential; Not modeled

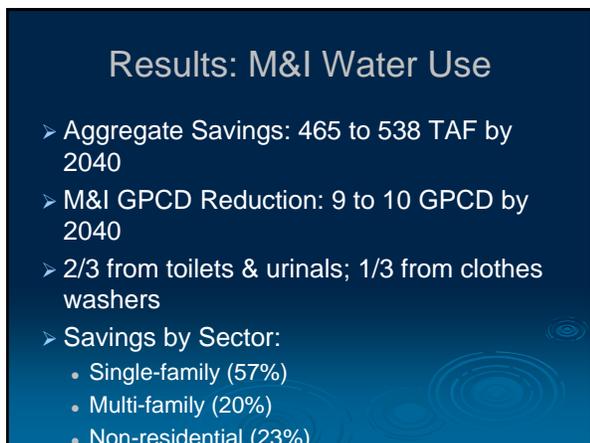
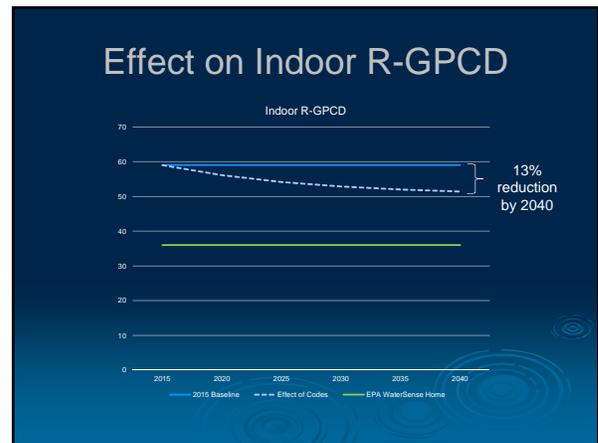
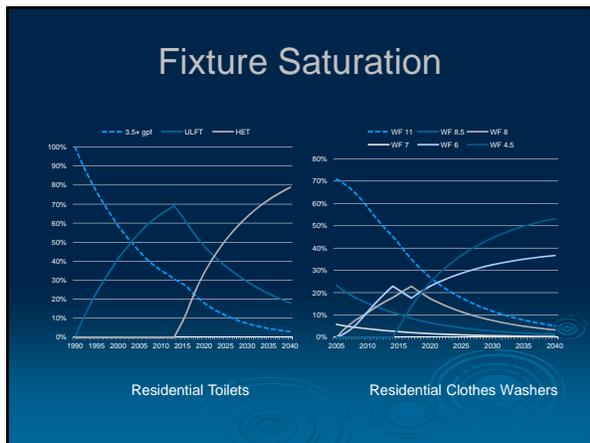
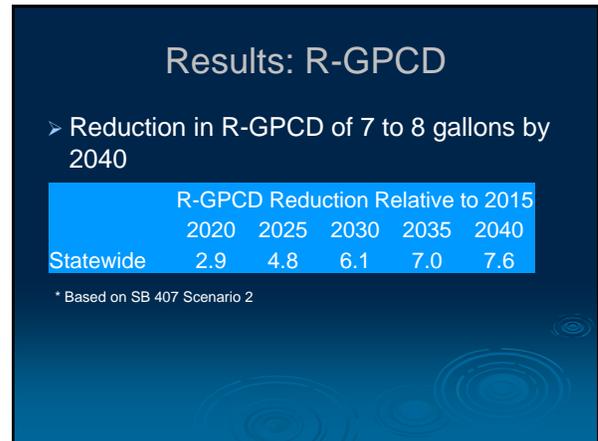
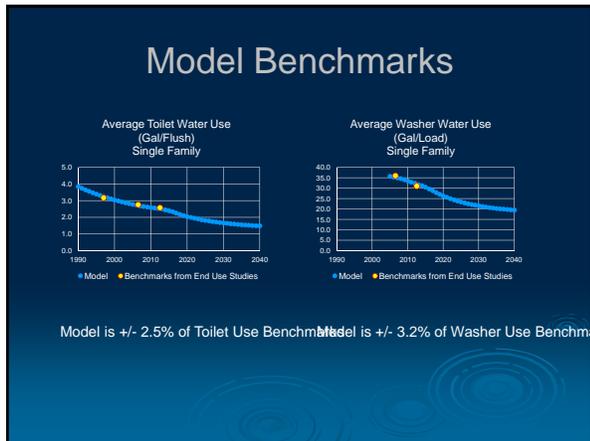


Model Overview

- Dynamic inventory growth and replacement models
- Based on AWE Tracking Tool
- County-level models (58 total)
- Annual time-step
 - Toilets & Urinals: 1990 – 2040
 - Clothes Washers: 2005 – 2040

SB 407

- Has potential to accelerate replacement of non-compliant plumbing fixtures
- Three Scenarios Modeled
 - No Effect
 - Equivalent to Retrofit-on-Resale
 - Full Compliance



Regional Variation

Hydrologic Region	Number of Counties	Average R-GPCD Reduction	Standard Deviation	Minimum	Maximum
Central Coast	5	7.6	0.2	7.4	7.8
Colorado River	1	7.3	0.0	7.3	7.3
North Coast	6	7.6	0.1	7.5	7.8
North Lahontan	2	7.7	0.1	7.6	7.8
Sacramento River	16	7.5	0.3	6.7	7.9
San Francisco Bay	8	7.8	0.2	7.6	8.1
San Joaquin River	8	7.4	0.1	7.2	7.6
South Coast	6	7.4	0.2	7.0	7.7
South Lahontan	2	7.9	0.6	7.3	8.5
Tulare Lake	4	7.5	0.1	7.4	7.6
Statewide	59	7.6	0.2	6.7	8.5

Framework for Indoor Residential Standard

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Office of Research, Planning and Performance
State Water Resources Control Board

M3 Study

- ▶ Current statewide use: 59 GPCD (M-cubed)
 - Additional studies will help confirm current indoor use
- ▶ Plumbing codes and appliance upgrades will further lower indoor water use through 2040
- ▶ Residential
 - Will decrease by 6.1 GPCD by 2030
 - Will decrease by 7.5 GPCD by 2040

Review

- ▶ Single family and mixed residential indoor water use accounts for significant portion of state's overall water consumption.
- ▶ SBX7-7 Method 2: 55 gallons per capita per day (GPCD) by 2020

Proposed Standard

- ▶ SB7-7 set existing standard as 55 GPCD
- ▶ Propose standard:
 - 55 GPCD in 2021
 - Revise downward based on additional studies
- ▶ State will reevaluate in 2025 to reassess 2030 standard

Proposed Formula

- ▶ Population x standard (GPCD) x days/year
- ▶ Resulting budget can be expressed as either a volume or GPCD

Seeking Feedback

- ▶ How to build upon existing state law?
 - Should the state seek additional efficiency from the indoor standard?
 - For example, set 2030 standards higher than projected trajectory (business as usual) model results?
 - If so, what should state aim for, and by when?

Framework for Outdoor Landscapes

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Peter Brostrom
Water Use Efficiency Program Manager
California Department of Water Resources

Setting Landscape Standards

- Outdoor standard will start with existing SBx7-7 outdoor standard using the MWELO ETAF that was in place when the property was developed:

pre 2010	0.8
2010 to 2015	0.7
2016 to present	0.55 residential 0.45 commercial
Special Landscape	1.0

Review

- (ETAF) x (ETo) x (Landscape Area) = volume
- SBx7-7 Method 2 outdoor landscape calculated using residential and dedicated irrigation landscape using the ETAF based on the year the property was developed.
- 3 suppliers are currently using Method 2

Future Standards

- EO directs that the water savings from the new targets exceed SB x7-7
- Will evaluate data from the pilot program and from agencies who have the data to consider how much to lower the outdoor standard in the future.

Outdoor Landscape Area Measurement

- Few agencies had the landscape area data in 2010 to select target method 2
- New remote sensing technologies have made landscape area measurement more feasible
- Close to 100 agencies now have landscape data
- The State's FY 16-17 Budget appropriated funds to measure urban landscape area across the entire state
- Plan to conduct a 30 agency pilot this fall, followed by a statewide program

Other Considerations: Irrigated vs. Irrigable



Lower income community. Red outlines show landscapes that are not being irrigated.

Other Considerations cont.

- ▶ Which Landscapes should be included in the landscape budget?
 - Residential
 - Dedicated Irrigation
 - CII mixed meters
 - Recycled water

Framework for Commercial, Industrial and Institutional Standards (CII)

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 Water Use Efficiency Program Manager
 California Department of Water Resources

Other considerations cont.

- ▶ Depending on which sectors are included as part of the landscape budget, suppliers may need to clearly identify how CII landscapes are being irrigated.
 - Separate areas irrigated through the following accounts:
 - CII mixed meters
 - Dedicated irrigation
 - Recycled water
 - Raw water deliveries

CII Water Budget Standard

- ▶ CII sector very diverse
 - EBMUD has 93 different classifications of CII water Use
 - Wide ranges of water use within classifications
 - Diversity and wide range of use makes it difficult to set CII standards or establish water budgets

Questions?/ Comments

Contact:
Peter.Brostrom@water.ca.gov
 (916) 651 7034

CII Water Budget Approaches

1. Calculate a water budget based on total CII Water Use
2. Separate CII Indoor and Outdoor and develop a separate standard for CII Indoor (CII Indoor= Total CII - Outdoor CII Estimate)
3. Exclude CII water use from a volumetric water budget and instead require implementation of performance measures

CII Approaches I and II

Considering two options for setting standards for the volumetric approach:

1. provisional standard
Example: percentage reduction from a 2013 baseline
2. Develop a methodology by which a supplier could self-assess potential CII reductions and establish a CII standard unique to their service area

- ▶ Contact:
- ▶ Peter.Brostrom@water.ca.gov
- ▶ (916) 651 7034

Performance Measure Approach

- ▶ Performance measures could include:
 - Classification of CII water use
 - Dedicated meters for landscapes over a certain size
 - Water audits and/or management plans for CII water users over a specified threshold

Feedback and Input

- ▶ Should CII water use be separated into outdoor and indoor components?
- ▶ Is it possible for water suppliers to develop a self assessed CII water budget standard?
- ▶ Can performance measures lead to water savings?
- ▶ Are there additional performance measures that should be considered?