This presentation premiered at WaterSmart Innovations

watersmartinnovations.com





HONEY I SHRUNK THE WATER BUDGET **Bringing Best Practices** to Single Family Homes

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EBMUD Water and Wastewater Services





<u>Water</u>

- 1.34 million customers
- 190-210 MGD demand
- 35 communities
- 330 sq.mi service area
- >4,000 miles of pipe
- 385,000 accounts

<u>Wastewater</u>

- 650,000 customers
- 75 MGD Avg. Flow
- 83 sq.mi service area
- 100% energy sufficient

Landscape Irrigation Demand





 Residential Outdoor ~ 40 MGD

 Irrigation Only ~ 11 MGD



Not Really What We had in Mind...



EAST BAY MUNICIPAL UTILITY DISTRICT

USTOM,



You can save the hard way.

Or the easy way.

Reducing your water use by 19% is easier than you might think. One way is to water your lawn no more than 3 days a week. We're all in this together, and EBMUD is here to help.

For more information, rebates, and water-saving tips, go to **www.ebmud.com**



We make it easy to conserve.

Not Really What We had in Mind...





(hardscape or xeriscape?)



Landscape Design & Maintenance: We Can Do Better











Landscape Water Budget Program (1999-2010)

- Obtained digital infrared image of 330 sq. mi. service area
- 9 separate image classifications: (irrigated grass, shrubs, trees, dry grass, buildings, and more...
- GIS-billing system integration developed in-house:
 - calculates irrigated area of each polygon.
 - captures daily weather data (from CIMIS weather stations).
 - files stored in EBMUD Oracle database



Water Budget Process



Weather Data (Et)

Oracle Database

Water Budget on Bill

"OLD" Water Bill w/Budget Info

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	TOTAL PREVIOUS	1,143.02-
BRAUD PAYMENT CENTER	TOTAL CURRENT	1,143.02
PO BOX 1000		
CARLAND CA 34043-0001		

EBN

The Right Circumstances At The Right Time...



- Received a grant from U.S. Bureau of Reclamation
- EBMUD was upgrading its customer billing system
- CA Department of Water Resources was upgrading their California Irrigation Management Information System (CIMIS)
- California Model Water-Efficient Landscape
 Ordinance (MWELO)
- California came out with its 20x2020 Water Conservation Plan

California 20x2020 Per Capita Targets



20x2020 Water Conservation Plan



February 2010

- Water utilities are provided four methodologies to reduce per capita water use
- EBMUD elected Target Method 2
 - A water budget approach

Where to Start...



- Our service area has 4 CIMIS weather stations
- Targeted toward irrigation customers
- We already had a program for irrigation customers, but challenges getting the information to right person
- We were creating customized water budget reports, but very time consuming
- Infrared (IR) has it's challenges with smaller properties

IR with Parcel Boundary Layer





Multiple ET Values Per Site





- All participants
 adjusted to
 80% ET
- 70% ET for new customers (after 1/1/10)
- 100% ET for
 special
 landscape
 areas (e.g.
 athletic fields)

Single Family Sites – Not So Easy



IR picks up all live vegetation ...





...which produces a lot of false positives

Small Parcel IR's False Positives





Street View...Different Story





Detailed Account Analyses



- Data from County Records
 - Parcel size, building size, number of stories
- GIS analysis
 - Roof Outline
 - Driveway
 - Sidewalk Pathways and Walkways
 - Patio and deck
 - Detached garage
 - Other Structures
 - Pool or other water features
 - Square footage of irrigated and irrigable areas

In-House Satellite Photo





Internet Satellite Photo





On-Site Field Measurements





Street Views





Lesson 1: Do County Records Agree w/GIS Measure of Parcel Lines?





Lesson 2: 1 acre, No Irrigation





Lesson 3: Selecting the Right Property/Meter





Lesson 4: Use as Many Views as Possible





In The End, We Measured More Than 20 Million Square Feet

Calculations:

- Lot factor to represent percentage of hardscape to total parcel size
- Ratio of hardscape to county records of building square footage.
- Percent of irrigated vs. irrigable area
- Percent of total lot size irrigated

Correlations:

- Sidewalk, roofline and patio individually correlated better to building than lot
- Driveway, detached garage, other buildings, pools individually correlated better to lot size

California Irrigation Management Information System (CIMIS)



- Upgraded to spatial ET weather data by zip-codes (62 in EBMUD service area)
 - Previously only weather stations - 4 over 330 s.q. miles with very distinct and micro climate zones
 - Now a two sq. kilometer resolution



Single Family Water Budget



- Determine an indoor baseline:
- U.S. Census Population of 3 p/p/household as a default (before customer adj.)
- Assigned 50 gpd/person to define indoor baseline on report



Single Family Water Budget

- Calculate irrigated area: take recorded county parcel size multiplied by our lookup table
- Customizable with customer input (pilot phase has been exceedingly accurate)
- Default ET value at 80% (adjusted globally or individually)
- Used daily CIMIS ET value to determine water budget + indoor baseline

Location	Parcel Size (sq.ft.)	% irrigated area of parcel
EOH	0-4000	15%
EOH	4001-8000	22%
EOH	8001-12000	23%
EOH	12001-16000	23%
EOH	16001-20000	21%
EOH	20001-24000	18%
EOH	24000+	16%
WOH	0-4000	13%
WOH	4001-8000	18%
WOH	8001-12000	20%
WOH	12001-16000	21%
WOH	16001-20000	19%
WOH	20001-24000	17%
WOH	24000+	17%
CENT	0-4000	16%
CENT	4001-8000	21%
CENT	8001-12000	23%
CENT	12001-16000	22%
CENT	16001-20000	21%
CENT	20001-24000	18%
CENT	24000+	16%



Single Family Water Budget



 Email reports up to 4 recipients

- Customer usage from billing system
- Reports sent on bimonthly billing cycle
- Shows 2-years of water budget history

EAST BAY MUNICIPAL UTILITY DISTRICT

water

Home Water Use Calculator

Thank you for participating in our Single Family Water Budget Program. The following is your customized water usage profiles for the last two years. The graphical description compares your measured water usage versus your budgeted water usage for each billing period. The purpose of the budget report is to show customers how efficiently water is being used inside and outside the home.

Customer Name:	astomer Name: Charles Bo				
Service Address:	47 Bates Bl				
City:	Orind	a			
Account #:	13050400001				
Meter #:	92841187				
Est. Irrigated Area(sq. ft):	3105				
Household occupants	4				
Base Household use	200				
Water Budget Summary	Used	Budgete			
Gallons used last 12 months	150,348	142,80			
Gallons used previous year	114,444	143,30			
Percent of budget last 12 months		105%			
Percent of budget for previous year		809			
2 years estimated savings in gallons:		21,31			



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EBMUD estimates the average indoor water use per person with high efficiency fixtures at 50 gpd (gallons per day). Evapotranguization (ETG) represents the estimated water need of cool season grats (in inches) for each billing pendio. The Water Budget Calculati typically irrigation systems can be turned off for the winter months of November, Densory, and February.

The Maximum Allowable Water Budget for landscaping, effective January 2010, is calculated using 80% of ETo for the irrigated area of landscaping. If you feel the irrigated area is not accurate or would like more information on this program, contact EBMUD at (510) 287-1900.



Specifically Metered Budget Reports



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Maximum Allowable Water Budget - Recycled Water

Thank you for participating in our Landscape Irrigation Water Budget Program. The following is your customized water usage profiles for the last two years. EBMUD records indicate that this account primarily serves landscape irrigation. The graphical description compares your measured water usage versus your budgeted water usage for and billing pariod

Customer Name:	City Of San	Ramon		1.00	AND PERSONNEL	in rate i B	15-5		a	
Service Address:	9300 Alcost	a Bl		-		1.1 1	\mathcal{O}		and the	
City:	San Ramon						- AR	Dan Ba	P	
Account #:	5656700000	1					1. 1 - 4		Rea .	
Meter #:	R5014315			5.	1	3	$+ \sum$	#1		
Est. Irrigated Area(sq. f	t): 105716			1		7.	<u>ب</u>	11 98 1		
Water Budget Summa	ry	Used	Budgeted			184	5	1		
Gallons used last 12 mor	nths	2,970,308	3,369,937	- 11 C	and and a start of the second start of the sec	120	-		and the second	
Gallons used previous y	ear	3,011,448	3,047,045	-	and str	- Courter Co	E	1		
stage states and states and states			φ 1,039				Area at	0300 41	costa Bl	
22 535		1				Irrigated	Area at	9500 AI		
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does The Maximum Allowable Water Budget for recycled water, effective January 2010, is calculated using 100% of Reference Evapotranspiration (ETo) for the irrigated area of established landscapes, using the new Model Efficient Landscape Ordinance from the State of California, Department of Water Resources (DWR). If you feel the irrigated area is not accurate or would like more information on this program, contact EBMUD at (510) 986-7615.

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EAST BAY MUNICIPAL UTILITY DISTRICT

water



Thank you for participating in our Landscape Irrigation Water Budget Program. The following is your customized water usage profiles for the last two years. EBMUD records indicate that this account primarily serves landscape irrigation. The graphical description compares your measured water usage versus your budgeted water usage for each billing period.

Customer Name:	Freeport Homeow	ners A	ssm
Service Address:	104 Orr Rd		
City:	Alameda		
Account #:	53829100001,537	043000	001
Meter #:	97298549,600112	53	
Est. Inrigated Area(sq. ft)	: 60580		
Vater Budget Summary	r ۱	Used	Budgeted
Gallons used last 12 mon	ths 2,68	5,320	1,292,351
allons used previous ve	2.19	9.868	1,222,567

Used: 4,885,188 Budget: 2,514,918 Percent: 194% Meeting your water budget could have saved you \$ 9,634





Billing Period	09/02/10	10/28/10	01/06/11	03/07/11	05/05/11	07/02/11	08/30/11	10/31/11	01/05/12	03/06/12	05/05/12	07/03/12
Budget(GPD)	5890	3871	1273	1690	3128	4578	4757	3148	1684	2075	3907	5837
Consumption(GPD)	12511	7654	555	885	3904	11607	11271	5960	3253	2869	5062	16228
Evapotranspiration(ET)	9.67	5.74	2.36	3.09	6.11	8.79	9.29	6.46	3.68	4.19	7.76	11.4

*ET=Represents the estimated water need of cool season grass (in inches) for each billing period. The Water Budget Calculation does not use rain, typically irrigation systems can be turned off for the winter months of November, December, January, and February. The Maximum Allowable Water Budget, effective January 2010, is calculated using 80% of Reference Evapotranspiration (ETo) for the irrigated area of established landscapes, using the new Model Efficient Landscape Ordinance from the State of California, Department of Water Resources (DWR). If you feel the irrigated area is not accurate or would like more information on this program, contact EBMUD at (510) 986-7615.

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Budgets – Can Identify Faulty Meters (zero use reports)



• Faulty Meter

- Note sent to meter shop
- Identify possible "looped irrigation"
- Site that has alternative water source
- Investigate for water theft

EAST BAY MUNICIPAL UTILITY DISTRICT

Maximum Allowable Water Budget

Thank you for participating in our Landscape Irrigation Water Budget Program. The following is your customized water usage profiles for the last two years. EBMUD records indicate that this account primarily serves landscape irrigation. The graphical description compares your measured water usage versus your budgeted water usage for each billing period.

Customer Name:	San Michele Ho	a			
Service Address:	134 Provence Ro	1			
City:	Danville				
Account #:	54803100001				
Meter #:	21679233				
Est. Irrigated Area(sq. ft): 35699					
Water Budget Summa	ry .	Used	Budgeted		
Gallons used last 12 mo	nths	831,028	878,524		
C-11		8 0 7 6	1 217 428		

water SMART

Used: 840,004 Budget: 2,095,951 Percent: 40% Congratulations, meeting your water budget saved you \$4,737





*ET=Represents the estimated water need of cool season grass (in inches) for each billing period. The Water Budget Calculation does not use rain, typically irrigation systems can be turned off for the winter months of November, December, January, and February. The Maximum Allowable Water Budget, effective January 2010, is calculated using 80% of Reference Evapotranspiration (ETO) for the irrigated area of established landscapes, using the new Model Efficient Landscape Ordinance from the State of California, Department of Water Resources (DWR). If you feel the irrigated area is not accurate or would like more information on this program, contact EBMUD at (S10) 986-7615.

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- EBMUD is changing the way we do business
- Demand firming is here
- And the information era is here
- Increasing shift toward delivering information into our customers hands
- New tools include web-based services, smart phones, and tablets

Thank You

Zion Wilderness, October 2014

water SMART

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