EAST BAY MUNICIPAL UTILITY DISTRICT

Water/Energy Nexus Strategies

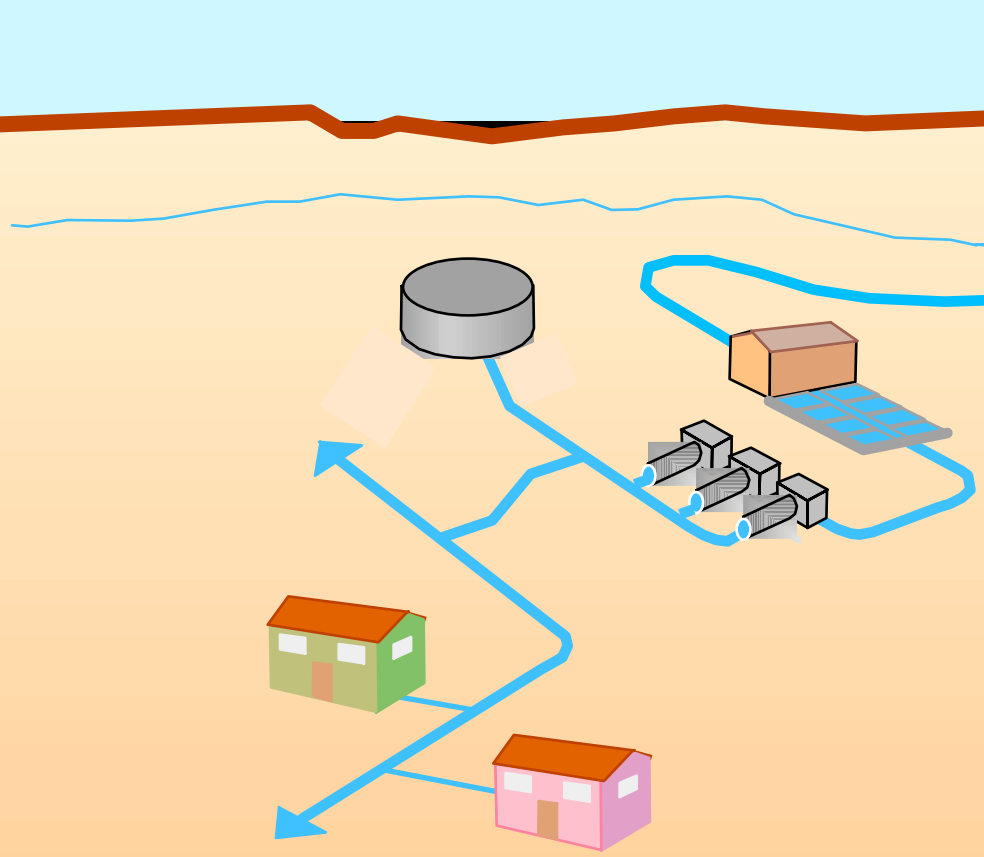
CPUC Water/Energy Workshop
March 20, 2013

Richard W. Harris
Water Conservation Manager

Overview

- EBMUD Energy Management
- EBMUD and PG&E Partnering
- W/E Technology Deployment Synergies
- Challenges & Opportunities

EBMUD Water System Facilities



2	Hydroelectric Plants (40 MW
3	Aqueducts (90 mi)
7	Water Supply Reservoirs
6	Water Treatment Plants
25	Rate Control Valves
132	Pressure zones (5 - 1450 ft)
135	Distribution Pumping Plants
180	Distribution Reservoirs
4200	Miles of Distribution Pipelin
400,000	Meters

~ 1.34 million customers

~ 180 MGD Production

EBMUD Background

- EBMUD annual energy expense ~$11 million*
- 90% of water supply from Mokelumne River Watershed
- Pre-Drought – Approximately 220 MGD average water production
- Post-Drought – Approximately 180 MGD average water production

**Potable water treatment and distribution only*

District Energy Use & Costs

Water System - Fiscal Year 2011

	Energy Use MWh	Cost (million $)
Distribution Pumping	44,000	$ 5.9
Water Treatment	20,000	$ 2.6
Raw Water Pumping	6,000	$ 0.9
Admin & Maint.	7,000	$ 1.1
TOTALS	**77,000**	**$10.5**

EBMUD Energy Use (kWh/MG)

Water System	Normal Year	Dry Year*
Supply/Conveyance	177	1,423
Treatment	156	1,610
Distribution	917	917
TOTAL	1,250	3,950

* Dry Year Scenario: Includes Mokelumne supply, supplemental water supply, desalination, groundwater and recycled water

- Gravity Water Customers (~55%)= ~ 400 kWh / MG
- Pumped Water Customers (~45%) ~ 2000 kWh/ MG

Energy Management Strategy

- Water Conservation
- Energy Management Strategy
  - Diversify Energy Supplies
  - Minimize Energy Use
  - Minimize Energy Costs
  - Education and Information Sharing
- Ensure that energy related projects are prioritized based on best overall cost savings

Hydropower

- Two Hydropower Plants
  - Pardee 30 MW
  - Camanche 10 MW
- Average Annual Generation 185,000 MWh
- Average Annual Energy Use 100,000 MWh
- Net energy producer

Wastewater Cogeneration

- Renewable energy production doubled from 2 MW to 4.5 MW
- Power plant capacity expansion to 11 MW completed in 2010
- 2012 - “Net energy producer” generating more renewable electricity onsite than required for demand.

PV Power Purchase Agreements

- Purchase of electricity from a third party owned & operated PV system on District property
  - No capital investment or maintenance costs
  - Investors keep tax credits, Rebates, GHG and REC
  - Performance based, pay for power produced

Diversify Energy Supplies

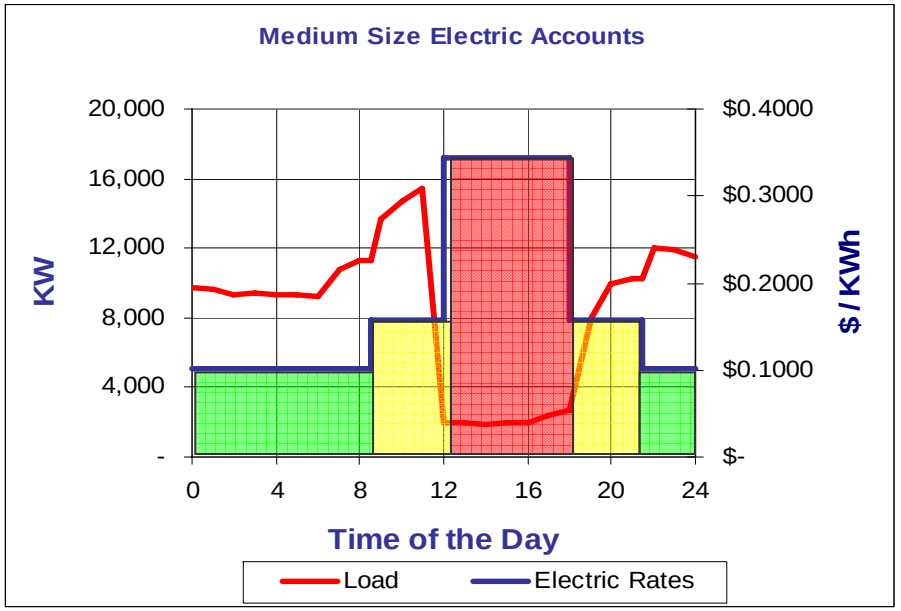
Project	Description	Rev. Savings
Hydropower	40 MW Total Capacity @ Pardee and Camanche Power plants	$8.1 Million in FY 11
PV Generation (Solar)	430 kW @ Sobrante WTP 30 kW @ Adeline Maintenance Center	$850,000 saving over 25-year 10% offset of utility purchases
	Power Purchase Agreements 5 District Sites 775 kW Total Capacity	$900,000 savings over 20-year contract

Diversify Energy Supplies
Future Plans

Project	Description	Savings/yr
Western Area Power Administration (WAPA)	Add 4 distribution facilities to the existing WAPA contract	$900,000
Wind	Collect wind data at potential sites and monitor CEC grant programs	$5,000
PV PPA	Evaluated additional PPA opportunities	NA
In Conduit Hydro	Evaluate potential in-conduit hydro generation	NA
Energy Audits	Administration building energy audit	$0-$20,000

Minimize Energy Costs
Energy Optimization Software

- EBMUD: > 30% ~$1M savings over 4 years
- Interface with SCADA System
- State Estimator Data Scrubber
- Water Demand Forecast
- Water Quality Module
- Energy Cost Forecast
- Pump Schedule Optimization
- System Monitoring & Alarm

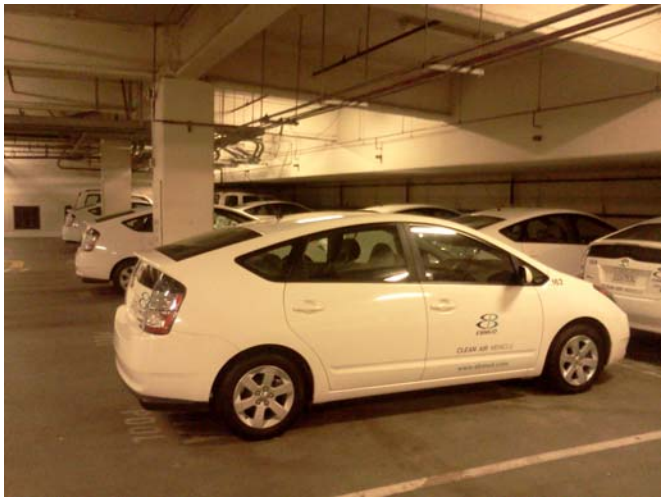


Minimize Energy Costs

Project	Description	Savings/Yr
San Ramon Valley Energy Management	Optimization – shift energy use from peak to part peak and off peak	$370,000
Demand Response	PG&E's Peak Demand Pricing Program	$100,000
Natural Gas Contract	Gas purchases from California's Dept of General services for microturbines	$65,000
Raw Water System Optimization	Maximize gravity flow on Moklumne Aqueducts and optimize operation of raw water pumping	$500,000

Minimize Energy Use

Project	Description	Savings/Yr
Natural Gas Microturbines	600 kW @ admin building	$125,000
WTP Lightning Upgrades	High efficiency lightning replacement at Lafayette, Orinda and Sobrante WTP	$44,000
Hybrid Fleet	Toyota hybrid fleet	$ 35,000



Energy Management Strategy Summary

- Net Energy Producer (157,000 MWh excess generation in FY11)
- Savings to Date
  - $ 1.2 million per year
  - PV Projects $1.8 million over 20/25 years
- Future Savings
  - Additional $1.0 million - $1.2 million per year

Energy Management Strategy Summary

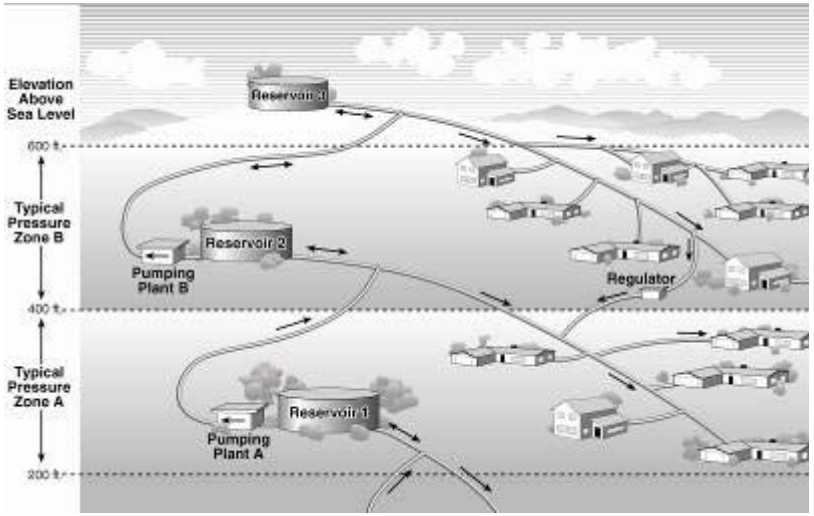
- Energy use will continue to be a **significant factor in the future**
  - Climate change may alter existing supplies and current energy use
  - Supplemental supplies typically require more energy
  - Cost of energy sources from fossil fuel difficult for water utilities to control
  - Renewable energy projects and water conservation mitigate greenhouse gas emissions and stabilize energy use

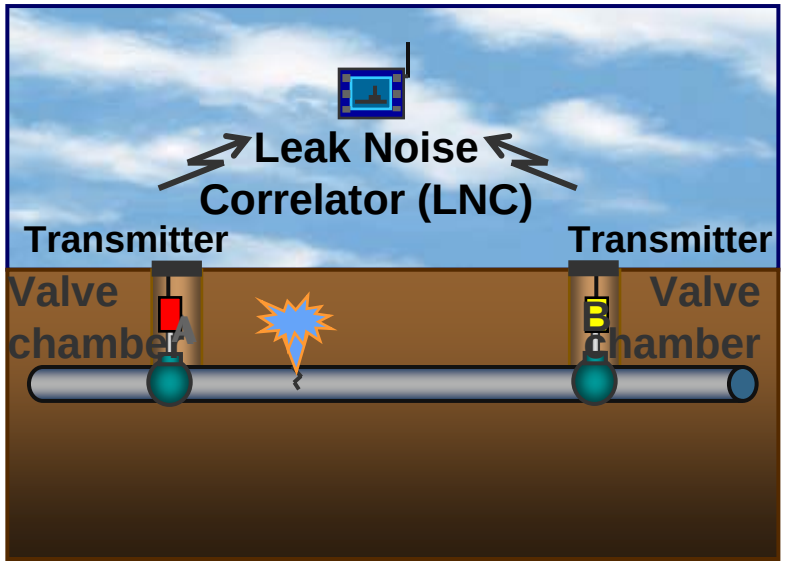
EBMUD – PG&E Partnerships

- Water/energy rebate for clotheswashers
- Joint customer water/energy audits/referral program
- Joint research with Service Technology Center
  - Ice machines
  - Connectionless Steamers
  - Pre-Rinse Spray Valves
- Energy rebates for utility scale projects (PV, micro-turbines, biodiesel, in-conduit hydro, etc.)

W/E Technology Deployment Synergies
Distribution System Applications

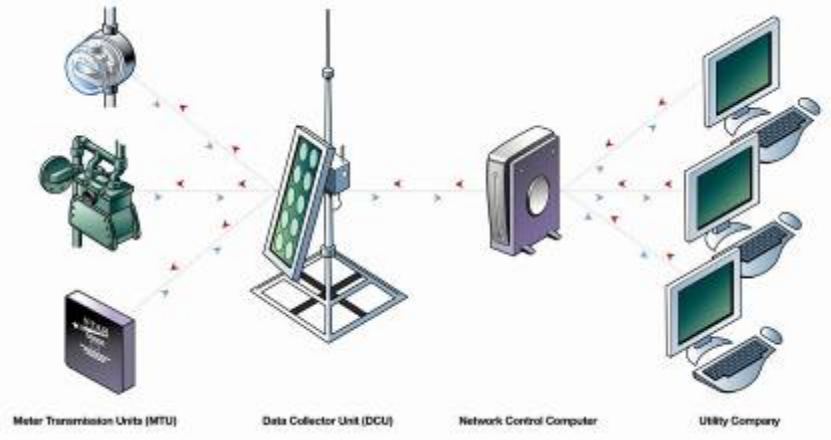
- Demand management:
  - Off peak pumping
  - Water treatment optimization
  - Better facility sizing
- Water Loss Control
  - Leak detection
  - Pressure management





W/E Technology Deployment Synergies
Smart Metering Infrastructure

- Potential to share/integrate infrastructure and/or services
- Provide customers with integrated website/usage reports
- Pursue water/energy and embedded energy savings



EBMUD WaterSmart Toolbox

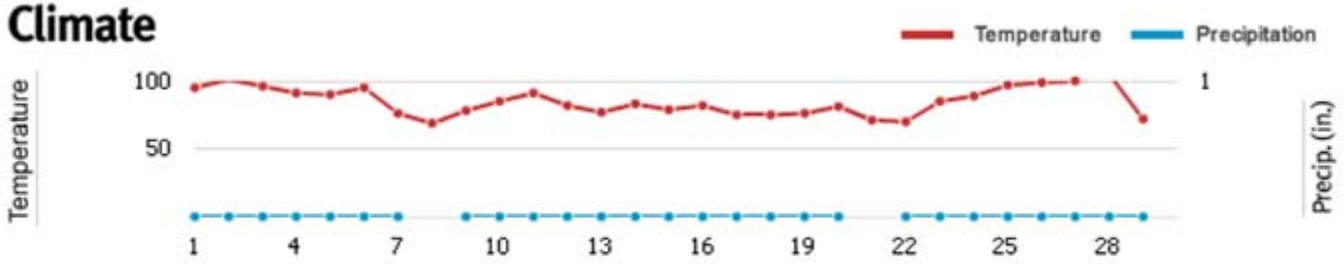
User Lookup

Account #123452

Daily Water Usage

Daily usage for September 2010

Climate



Quick View

Yearly | Monthly | Daily | Hourly

Table View

Climate

Temperature

Precipitation

Settings

Edit

Daily Limit: **ON**
Alert sent at 500 Gallons

Leak Detection: **ON**
Threshold set at 10 Gallons

Download Report

Enter timeframe

Water Use:

Choose ...

DOWNLOAD

W/E Technology Deployment Synergies
End User Applications

- **Food Service & Hospitality Sectors**
  - Self-contained (connectionless) food steamers
  - Commercial dishwashers
  - Pre-rinse spray valves
  - Air-cooled ice machines

- **Health Care/Medical Sector**
  - X-ray film & photo processors
  - Steam sterilizers

- **General Application**
  - Weather-based irrigation controllers
  - Hot water delivery systems
  - Laundry equipment
  - Car washing
  - Gray water systems

W/E Technology Deployment Synergies

Landscape Irrigation Water Budgets

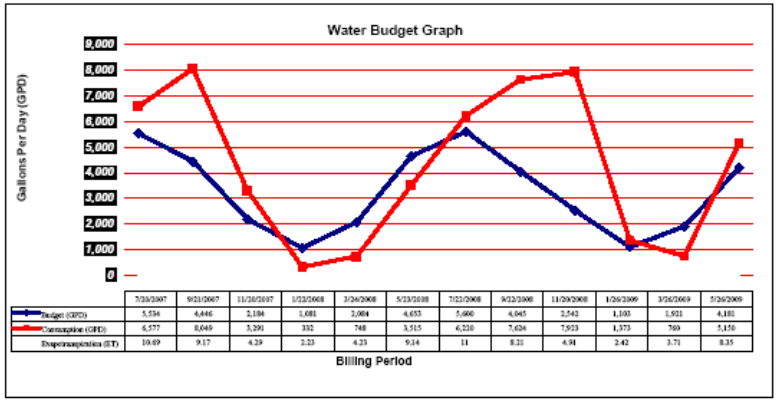
East Bay Municipal Utility District
Water Conservation Division
Maximum Allowable Water Budget

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 verse your budgeted water usage for each billing period.

Customer Name:	[redacted]
Service Address:	
City:	San Leandro
Account #:	[redacted]
Meter #:	
Est. Irrigated Area (sq. ft.):	49,000

Water Budget Summary	**Used**	**Budgeted**
Gallons used last 12 months	1,743,000	1,178,973
Gallons used previous year	1,350,720	1,214,098

Percent of budget last 12 months	148%
Percent of budget for previous year	111%
2 year "irrigation season" estimated savings in dollars	$ 3,342.76
2 year "irrigation season" estimated savings in gallons	969,142



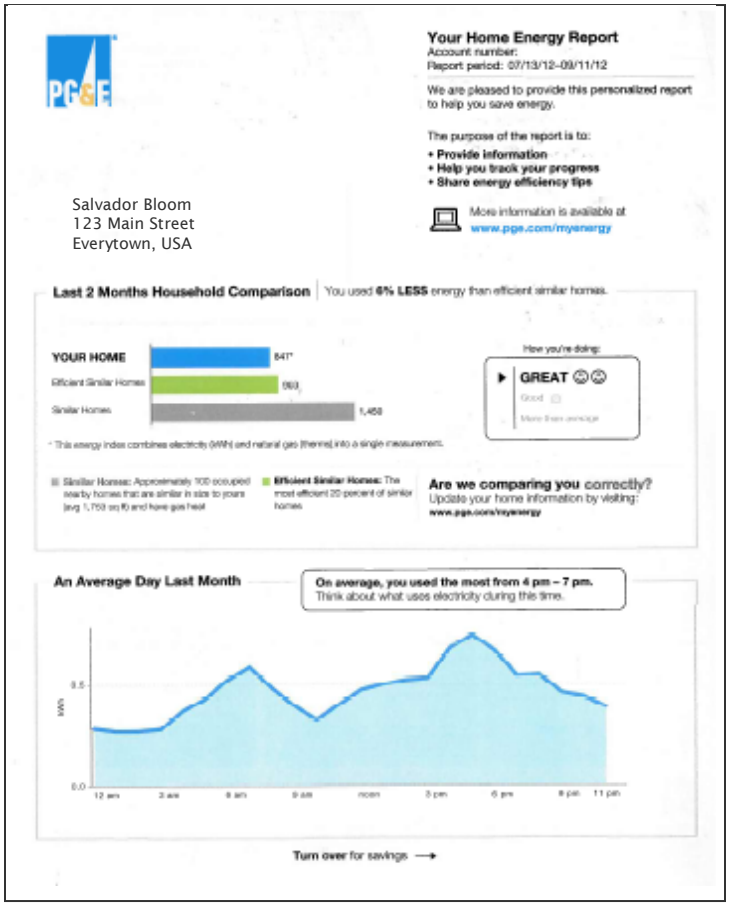
* ET = Represents the estimated water need of cool season grass (in inches) for each billing period. The Water Budget Calculation does not use rain, typically irrigation sytems can be turned off for the winter months of November, December, January, and February

The Maximum Allowable Water Budget is calculated using 100% of Reference Evapotranspiration (ETo) of the irrigated area for each billing period. If you feel the irrigated area is not accurate or would like more information on this program, contact EBMUD at 510 986-7615.

water SMART

W/E Technology Deployment Synergies

Home Water-Energy Reports



Your Home Energy Report
Account number:
Report period: 07/13/12–09/11/12

We are pleased to provide this personalized report to help you save energy.

The purpose of the report is to:
+ Provide information
+ Help you track your progress
+ Share energy efficiency tips

More information is available at www.pge.com/myenergy

Salvador Bloom
123 Main Street
Everytown, USA

Last 2 Months Household Comparison | You used 6% LESS energy than efficient similar homes.

YOUR HOME
Efficient Similar Homes
Similar Homes

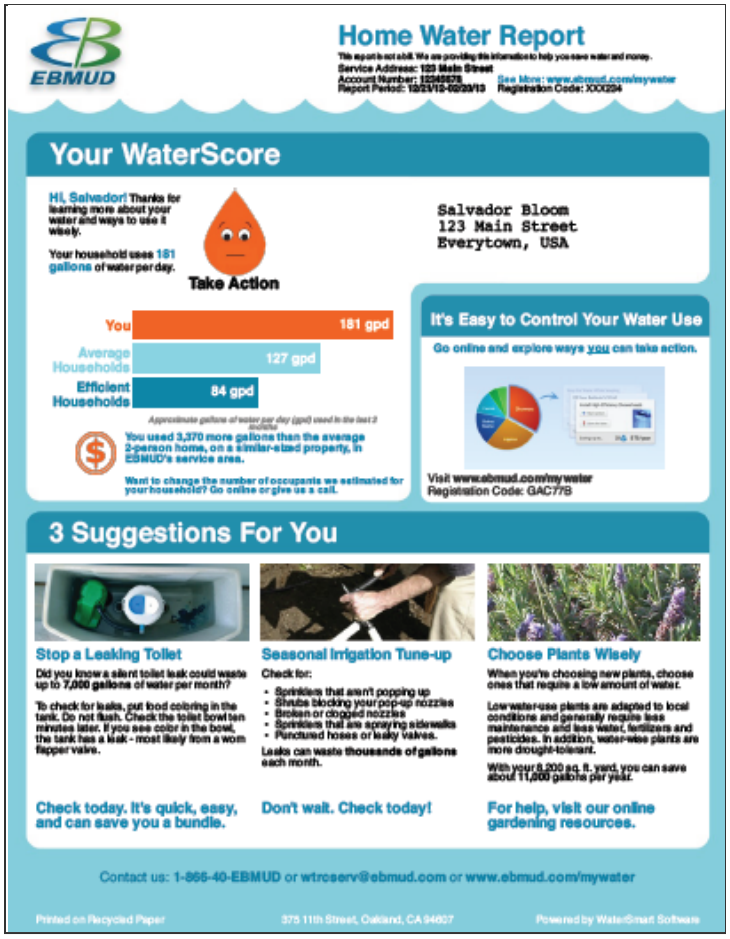
How you're doing: GREAT

An Average Day Last Month

On average, you used the most from 4 pm – 7 pm.
Think about what uses electricity during this time.

Are we comparing you correctly?
Update your home information by visiting:
www.pge.com/myenergy

Turn over for savings →



Home Water Report

Service Address: 123 Main Street
Account Number: 12345678
Report Period: 10/23/12–02/20/13
See More: www.ebmud.com/mywater
Registration Code: XXX234

Your WaterScore

Hi, Salvador! Thanks for learning more about your water and ways to use it wisely.

Your household uses 181 gallons of water per day.

Take Action

Salvador Bloom
123 Main Street
Everytown, USA

You 181 gpd
Average Households 127 gpd
Efficient Households 84 gpd

You used 3,370 more gallons than the average 2-person home, on a similar-sized property, in EBMUD's service area.

Want to change the number of occupants we estimated for your household? Go online or give us a call.

It's Easy to Control Your Water Use

Go online and explore ways you can take action.

Visit www.ebmud.com/mywater
Registration Code: GAC77B

3 Suggestions For You

Stop a Leaking Toilet

Did you know a silent toilet leak could waste up to 7,000 gallons of water per month?

To check for leaks, put food coloring in the tank. Do not flush. Check the toilet bowl ten minutes later. If you see color in the bowl, the tank has a leak - most likely from a worn flapper valve.

Check today. It's quick, easy, and can save you a bundle.

Seasonal Irrigation Tune-up

Check for:
- Sprinklers that aren't popping up
- Shrubs blocking your pop-up nozzles
- Broken or clogged nozzles
- Sprinklers that are spraying sidewalks
- Punctured hoses or leaky valves.

Leaks can waste thousands of gallons each month.

Don't wait. Check today!

Choose Plants Wisely

When you're choosing new plants, choose ones that require a low amount of water.

Low-water-use plants are adapted to local conditions and generally require less maintenance and less water, fertilizers and pesticides. In addition, water-wise plants are more drought-tolerant.

With your 8,200 sq. ft. yard, you can save about 11,000 gallons per year.

For help, visit our online gardening resources.

Contact us: 1-866-40-EBMUD or wtrcserv@ebmud.com or www.ebmud.com/mywater

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Challenges and Opportunites

Challenges

- Need to address efficiency gains and GHG/carbon credits double counting perceptions
- Cost of energy sources from fossil fuel difficult for water utilities to control
- Differential in water and energy costs and ROI

Opportunities

- Advance utility, market and consumer awareness
- Improve and expand on W/E data collection and metrics
- Analyze and promote incentive funding for cold and hot water efficiency programs that save energy
- Expand public-private efficiency partnerships