Emerging Metering Technologies

Presented By:

Michelle L. Johnson, P.E.
mjohnson@jub.com

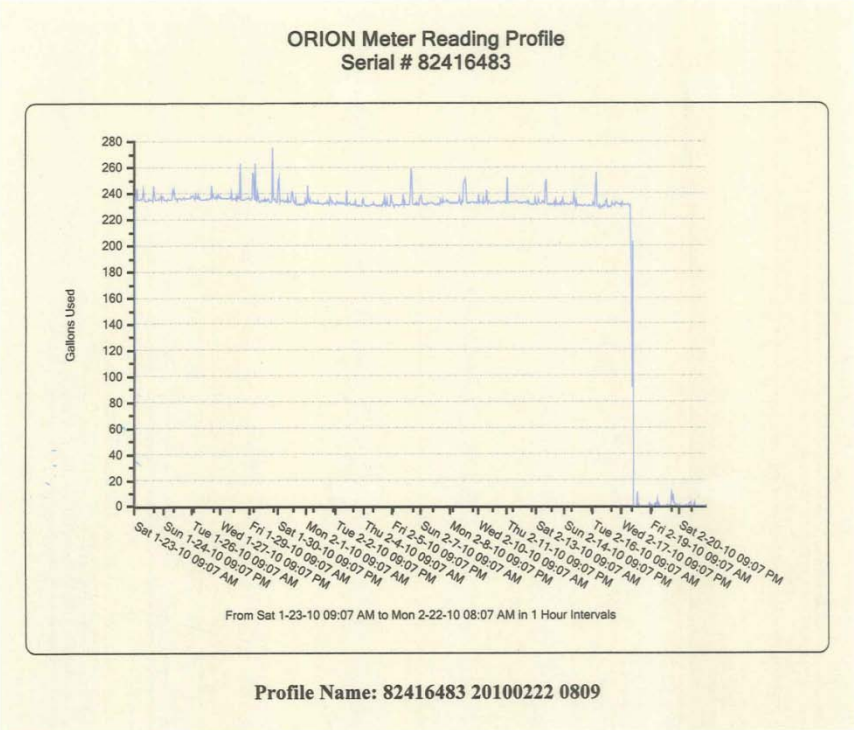
J-U-B ENGINEERS, Inc.
Coeur d'Alene, ID
(208) 762-8787

Overview

- Why meter?
- Meter reading options
- Automatic Meter Reading
- Data and water conservation
- Where systems are going
- Questions

Why Meter?

- Required by law
- Stipulation for funding
- Fairness/equity
- Allocate costs more fairly
- Reduce lost water
- Promote water conservation



J-U-B ENGINEERS, INC.

Meter Reading Options

- Remote displays
- Touch read
- Handheld – Manual Entry
- Radio Read - Automatic Meter Read
- Mobile AMR
- Fixed Network RF AMI

Automatic Meter Reading

- To collect data with little involvement from meter readers

- Systems are designed to increase meter reading efficiency and accuracy

Automatic Meter Reading

- Data is transmitted via radio frequency, Wi-Fi, satellite, telephone, hardwire
- Reliable technology
- Eliminates confined space entry
- Can be read in any weather
- Mobile AMR – Most used by water utilities

Automatic Metering Infrastructure

- Systems that collect and measure meter data on request

- Includes hardware, software and data communications

Automatic Metering Infrastructure

- Fixed Network
  - Transmits on a schedule or on demand
  - Data received by receivers in fixed locations
  - Meter data is stored in utility offices

Types of AMI

- One Way point to point
  - Meter endpoints send data to collectors
  - Collectors at high vantage points
  - Transmit every 6 to 12 hours
- Two way point to point
  - Meter endpoints transmit and receive
  - Data sent automatically or on demand
- Mesh
  - Transmitters talk to each other to send signals to collector

Why AMR?

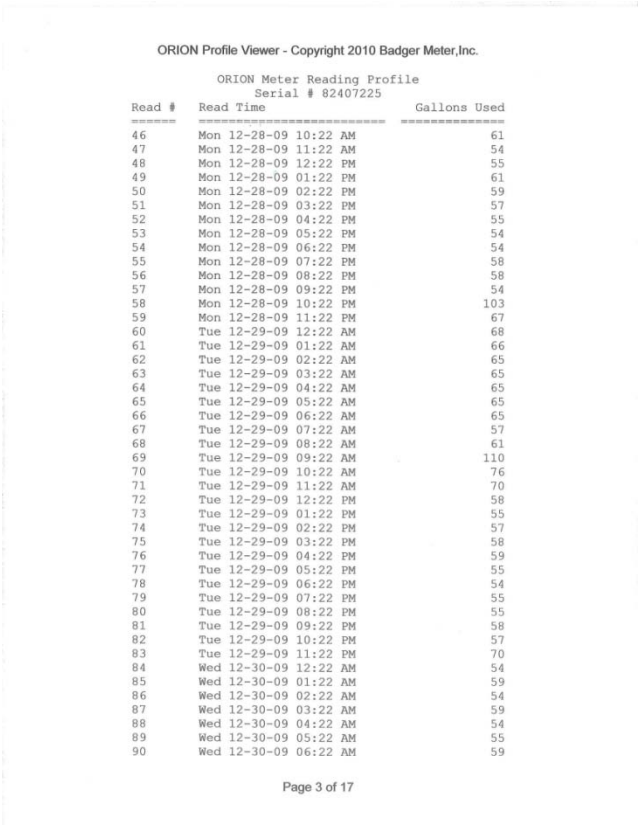
- Minimize labor
- Reduce vehicle runs
- Reduce access to private property
- Improved operator safety
- Troubleshooting bills
- More complete system data
- Profile usage

Data Collection

- Data collection
  - Mobile reads:
    - 1 point per day for 10,000 connections = 300,000 data points per month
  - Fixed Networks:
    - 1 point every hour for 10,000 connections = 7.2 million data points per month

What the Data Set Looks Like

- Needs to be in a useful format
- Needs to be retrievable
- Software to handle the data



ORION Profile Viewer - Copyright 2010 Badger Meter,Inc.

ORION Meter Reading Profile
Serial # 82407225

Read #	Read Time	Gallons Used
46	Mon 12-28-09 10:22 AM	61
47	Mon 12-28-09 11:22 AM	54
48	Mon 12-28-09 12:22 PM	55
49	Mon 12-28-09 01:22 PM	61
50	Mon 12-28-09 02:22 PM	59
51	Mon 12-28-09 03:22 PM	57
52	Mon 12-28-09 04:22 PM	55
53	Mon 12-28-09 05:22 PM	54
54	Mon 12-28-09 06:22 PM	54
55	Mon 12-28-09 07:22 PM	58
56	Mon 12-28-09 08:22 PM	58
57	Mon 12-28-09 09:22 PM	54
58	Mon 12-28-09 10:22 PM	103
59	Mon 12-28-09 11:22 PM	67
60	Tue 12-29-09 12:22 AM	68
61	Tue 12-29-09 01:22 AM	66
62	Tue 12-29-09 02:22 AM	65
63	Tue 12-29-09 03:22 AM	65
64	Tue 12-29-09 04:22 AM	65
65	Tue 12-29-09 05:22 AM	65
66	Tue 12-29-09 06:22 AM	65
67	Tue 12-29-09 07:22 AM	57
68	Tue 12-29-09 08:22 AM	61
69	Tue 12-29-09 09:22 AM	110
70	Tue 12-29-09 10:22 AM	76
71	Tue 12-29-09 11:22 AM	70
72	Tue 12-29-09 12:22 PM	58
73	Tue 12-29-09 01:22 PM	55
74	Tue 12-29-09 02:22 PM	57
75	Tue 12-29-09 03:22 PM	58
76	Tue 12-29-09 04:22 PM	59
77	Tue 12-29-09 05:22 PM	55
78	Tue 12-29-09 06:22 PM	54
79	Tue 12-29-09 07:22 PM	55
80	Tue 12-29-09 08:22 PM	55
81	Tue 12-29-09 09:22 PM	58
82	Tue 12-29-09 10:22 PM	57
83	Tue 12-29-09 11:22 PM	70
84	Wed 12-30-09 12:22 AM	54
85	Wed 12-30-09 01:22 AM	59
86	Wed 12-30-09 02:22 AM	54
87	Wed 12-30-09 03:22 AM	59
88	Wed 12-30-09 04:22 AM	54
89	Wed 12-30-09 05:22 AM	55
90	Wed 12-30-09 06:22 AM	59

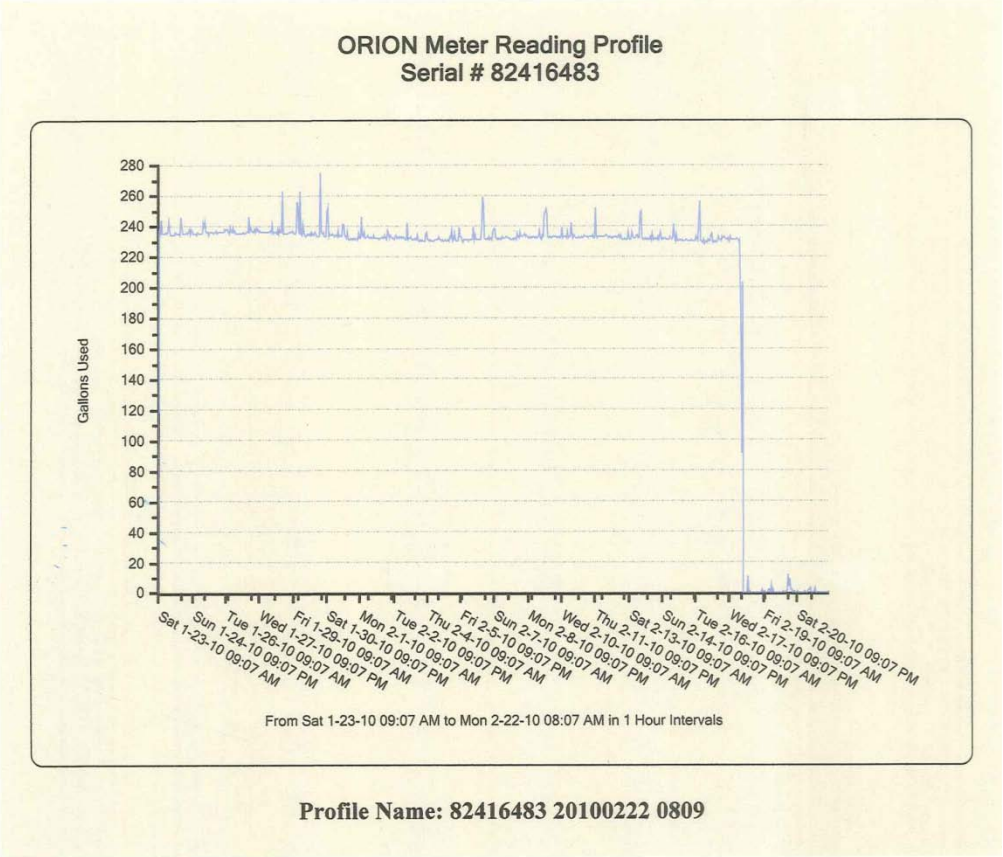
Page 3 of 17

Software Capabilities

- Hourly and daily consumption
- Indicate leaks or backflow
- Identify inactive accounts
- Schedule maintenance
- Status of network endpoints and collectors
- Provide notifications

How to Use Data

- Financial analysis
- Water quality impacts
- Improving custom service
- System master planning
- Promote conservation



J·U·B ENGINEERS, INC.

Water Conservation

- Efficiency of water use
- Managing the demand
- Managing production

- Meeting goals with less water

Methods for Conservation

- Education
- Indoor retrofit programs
- Water restrictions
- Outdoor retrofit programs
- Landscaping/plant selection
- Rainwater collectors
- Incentives
- Ordinances and resolutions
- Leak detection
- Water rates

Impacts of Meters on Conservation

Kingston Water District, Kingston, ID

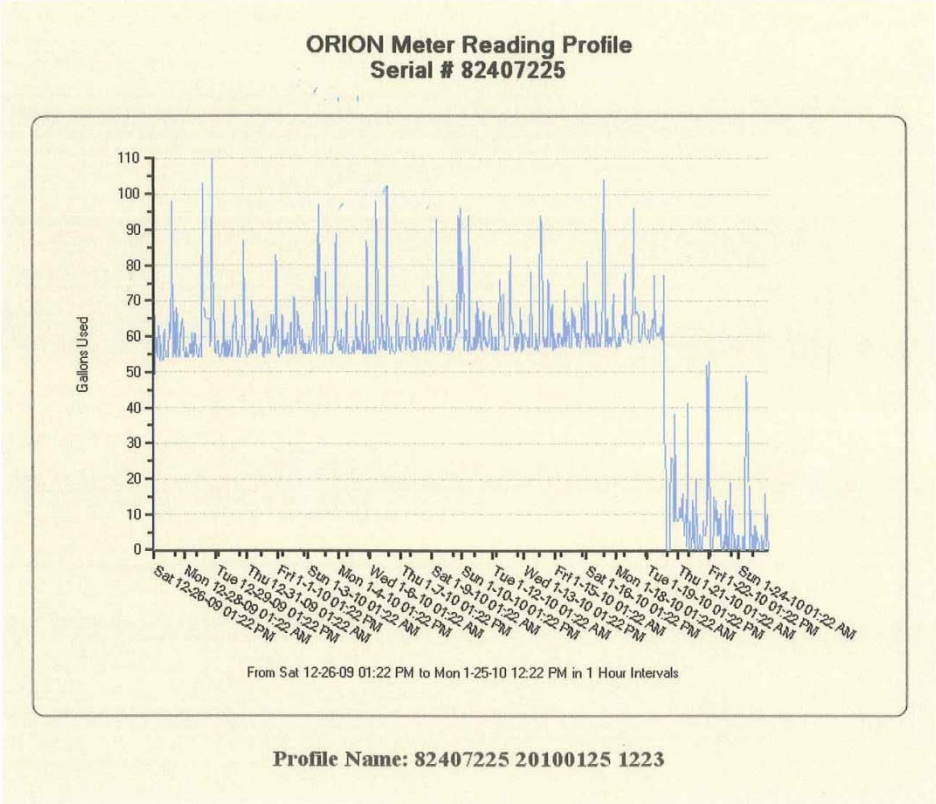
January Use

2010 – 2,856,552

2009 - 3,853,056

2008 - 3,632,772

2007 - 3,573,078



J-U-B ENGINEERS, INC.

AMR & Conservation Benefits

- What you get is:
  - Remote utility management
  - Define leakage
  - Efficiency
  - Time-of-use and rate-of-use data
  - Water usage profiling
  - Identify long term trends

AMR & Conservation Benefits

- Which can lead to:
  - Operational cost savings
  - Support for dynamic rate structures
  - Reduced water use
  - Reduced water production

Future of AMI Networks

- Interface with other utilities
- Provide real-time data to rate-payers
- GIS Coordination
  - Utilizing GIS to track and schedule maintenance and analytics
  - Target specific areas to track trends in water use
  - Identify areas of high flow – leaks

Summary

- Why Meter?
- Meter reading options
- Why AMR
- Data handling and conservation benefits
- Where systems are going

Thank you!

Lori Bryson – General Pacific

Jon Groth - Kingston Water District

Questions?

Michelle L. Johnson

mjohnson@jub.com

Integrating Conservation into Water Supply Planning

Rachel Lanigan, P.E., Carollo Engineers

Integrating Conservation into Water Supply Planning - Agenda

- Brief Review of Typical Approaches
- Top 3 Suggested Improvements
  - City of Ashland
  - California Water Agency
- Other Suggestions

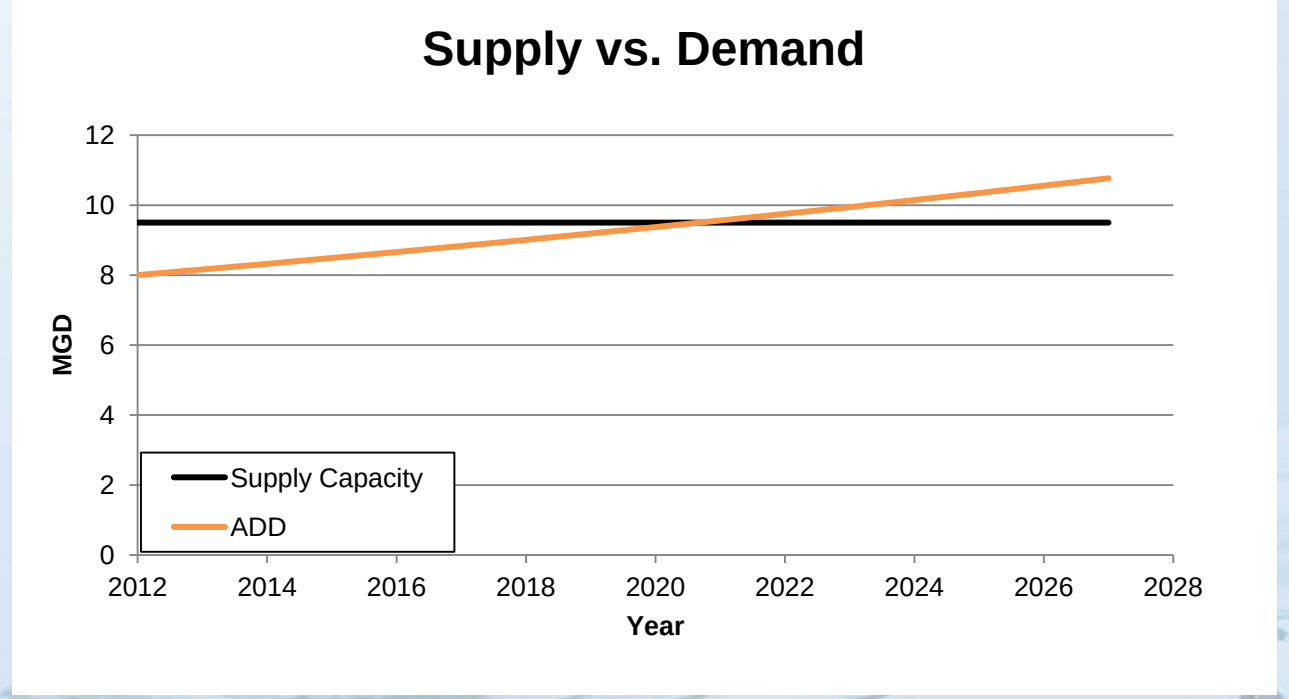
Goal

- Share some cool tips for integrating conservation and supply planning

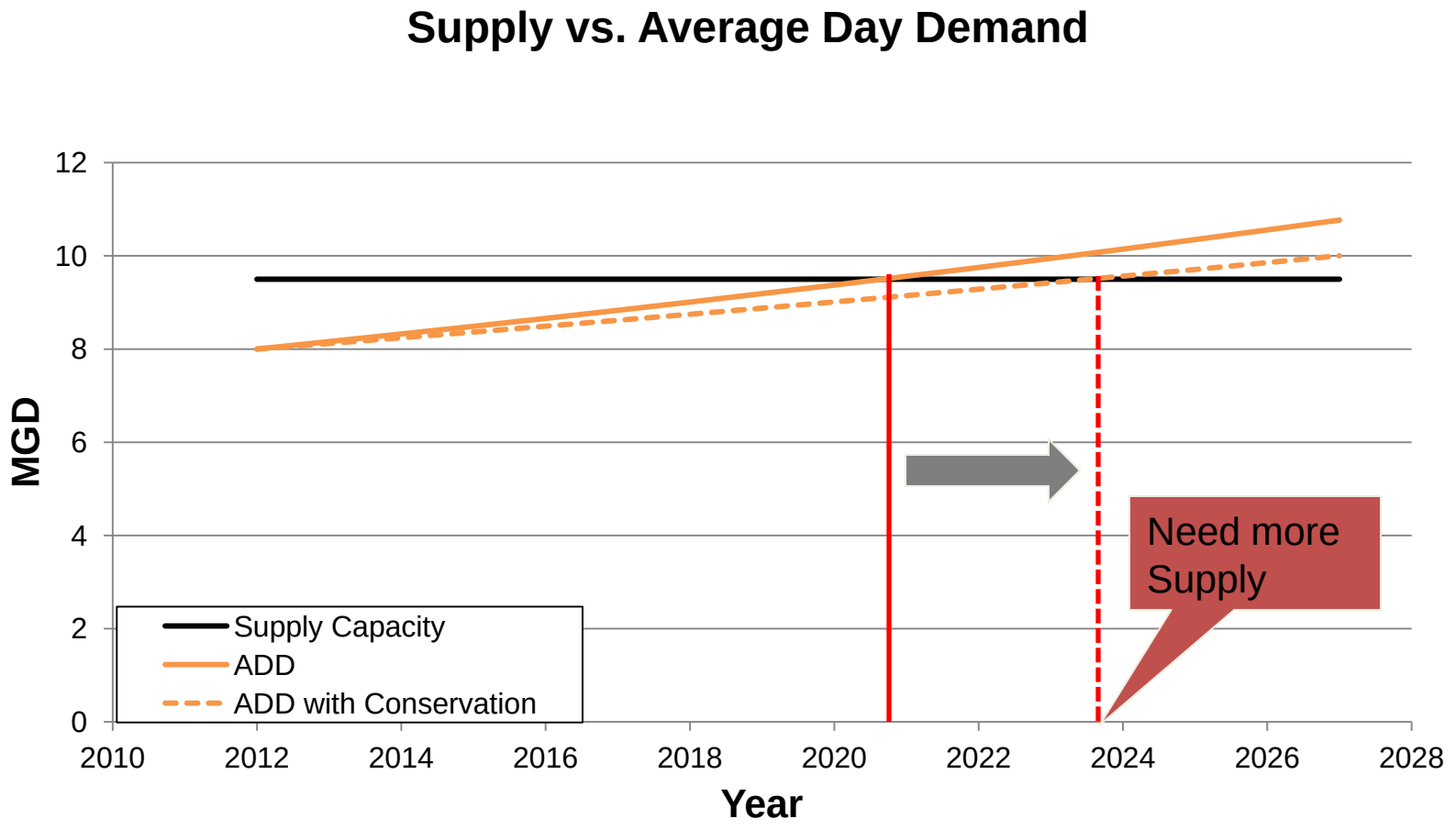
Two typical approaches are used for incorporating conservation into planning

Approach #1: Conservation as a Demand Reduction

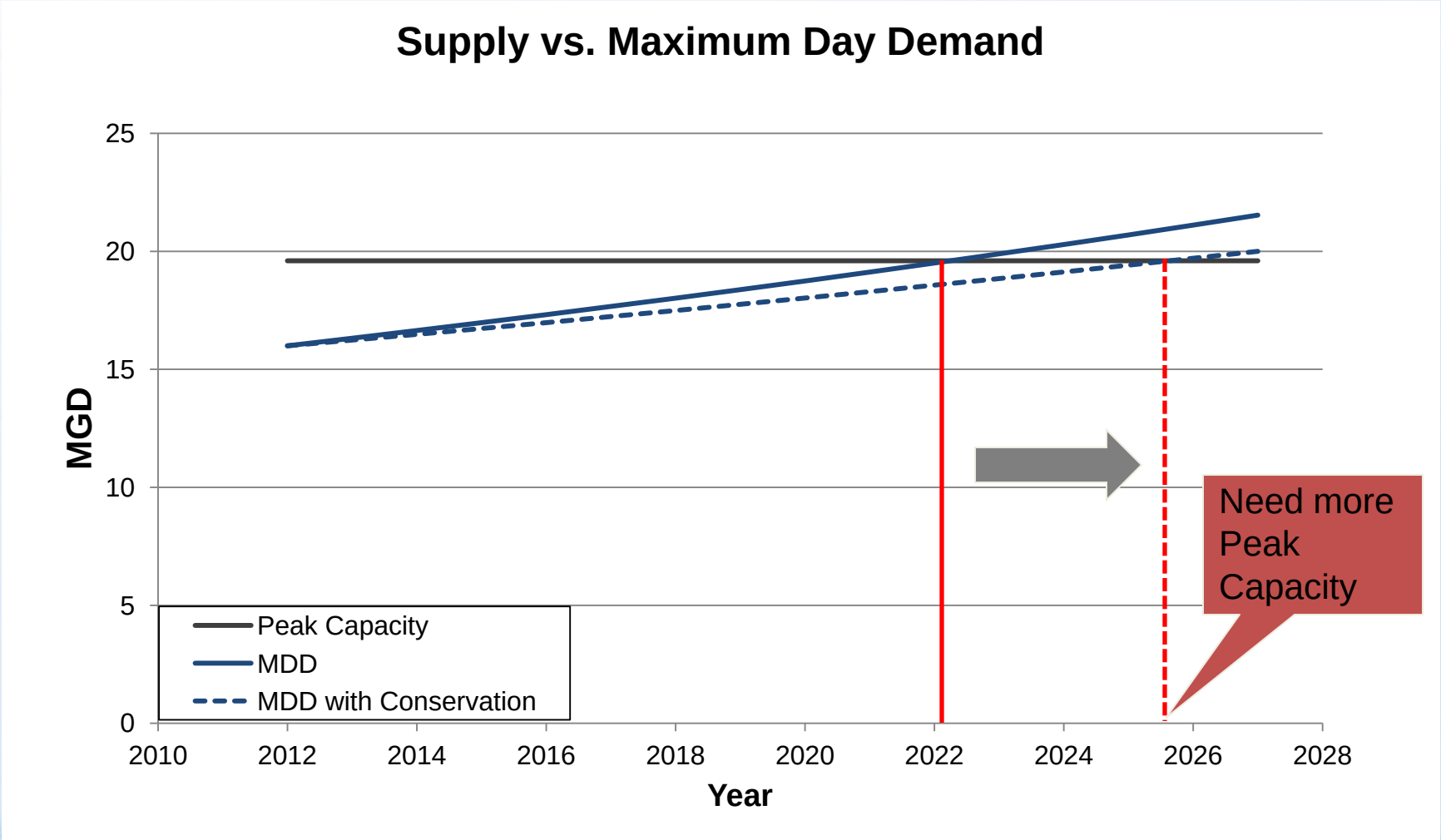
Approach #2: Conservation as a Supply Source



Approach #1: Conservation as Demand Reduction



Approach #1: Conservation as Demand Reduction



Approach #1: Typical Method

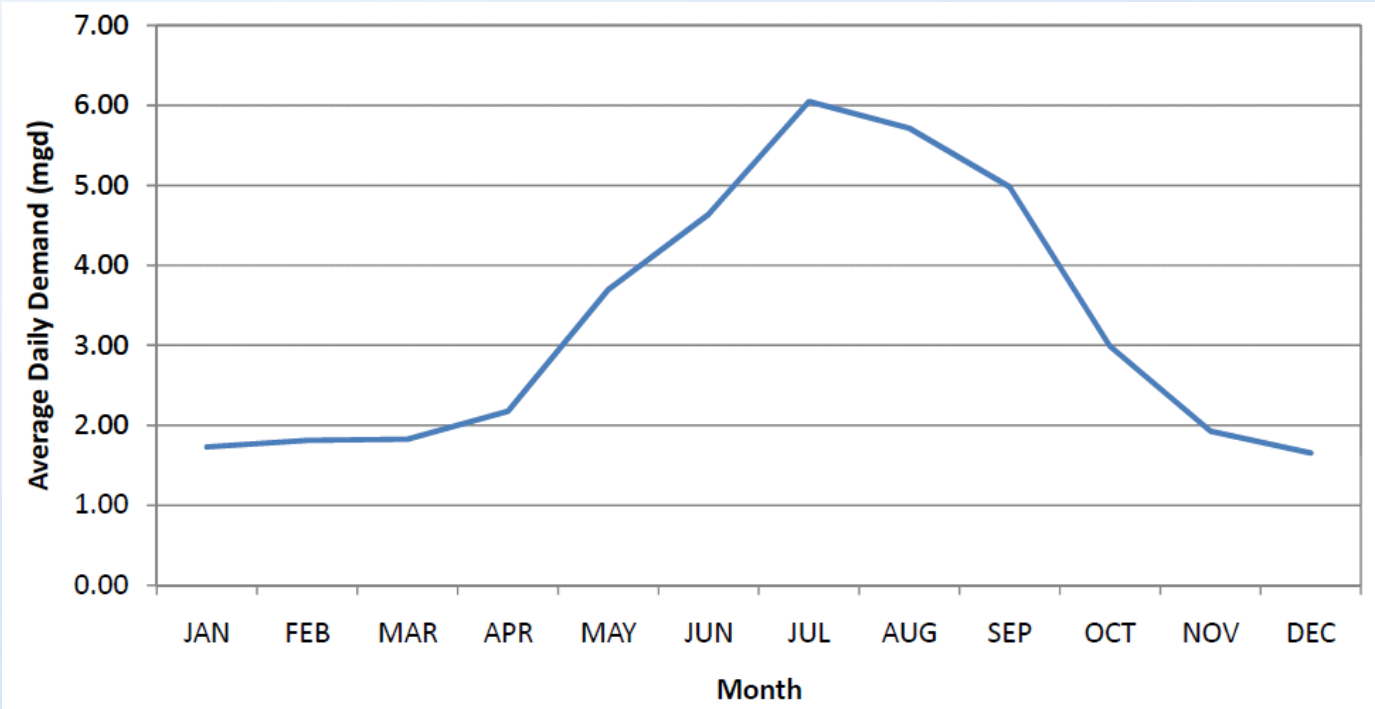
1. Establish conservation goal

Parameter	Goal
ERU Water Use	Reduce to 199 gpd per ERU by 2014
Leakage	Reduce by 1% per year to 10%

2. Apply goal to Average Day Demands (ADD)
3. Calculate Maximum Day Demand (MDD) = ADD x the historical peaking factor

Common problems with Approach #1

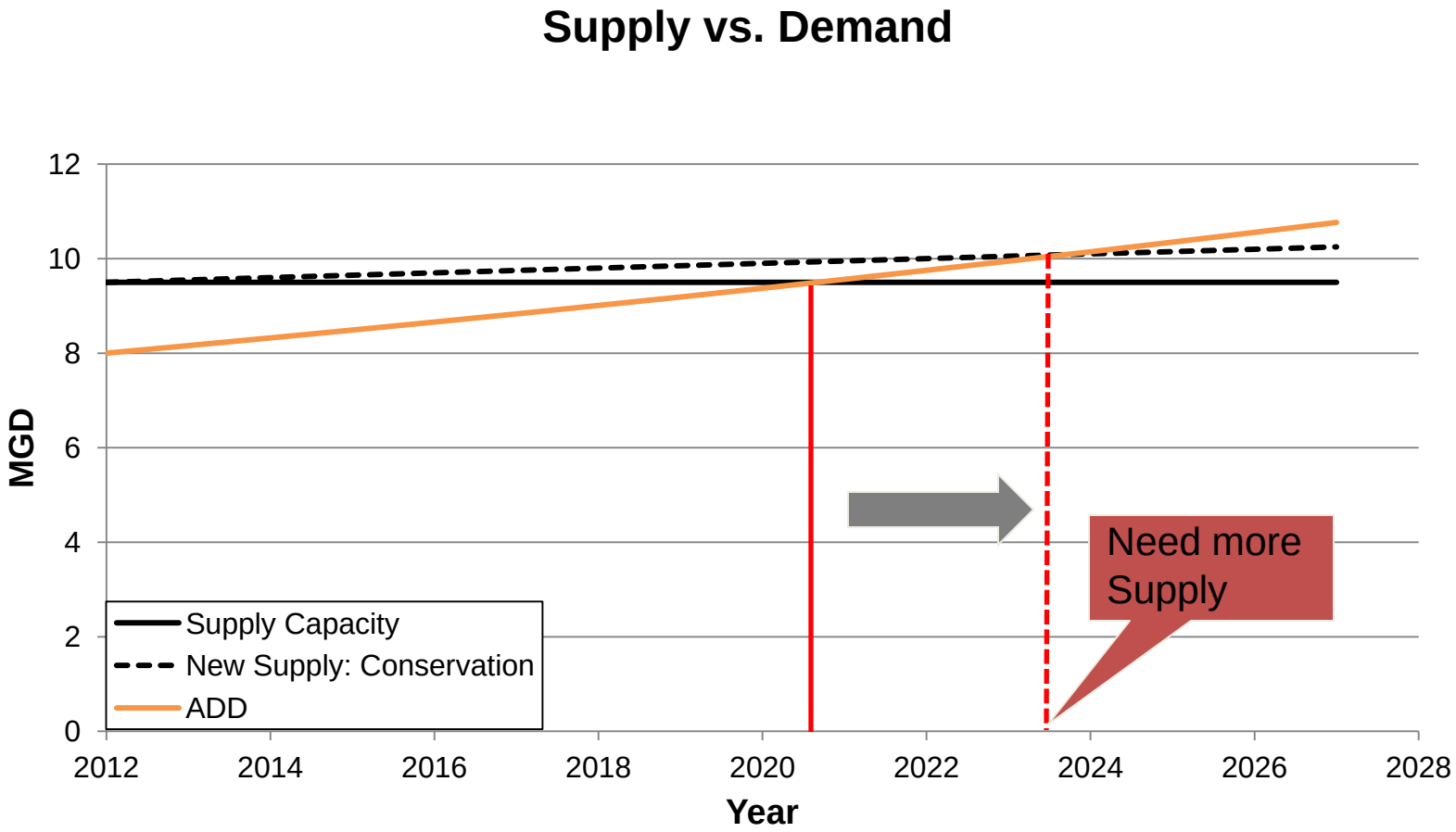
1. Forgets BMPs to support the goal
2. Ignores *peak* demand reduction related to BMPs



Common problem #1 is not the case for Washington plans

- Department of Health (DOH) requires Comprehensive Water Master Plan every 6 years
- Water Use Efficiency (WUE) Program
  - Establish Conservation Goal
  - Requires demand projections with and without conservation goal
  - ***Identify WUE Measures to support the goal***
    - Evaluate cost-effectiveness
    - Estimate water savings
  - Schedule for Implementation

Approach #2: Conservation as a Supply Source



Approach #2: Typical Method

1. Estimate the Cost of Conserved Water
   - $/AF of water saved over the lifetime of each measure
   - Estimate all BMP costs and anticipated water savings

Conservation Measures Cost-Benefit Analysis		
Best Management Practice	**Estimated Savings (ccf)**	**Cost per ccf**
Public Education	686	$0.11
Rain Sensor Program	176	$0.81
Commercial Landscape Rebate Program	2,235	$0.45
Residential Indoor Water Savings Kit	5,387	$0.04
HET Rebate	1,815	$0.2

Approach #2: Typical Method

2. Compare to other supply sources
   - Consider triple-bottom line of economics, environment, and social impacts

Supply Alternatives Cost-Benefit Analysis			
	Conservation	**Drill & Equip New Wells**	**Desalination**
Net Present Worth Cost per 1,000 gal	$15	$31	$100
Environmental Impacts	+	0	-
Public Acceptance	0	+	-

Oregon & California water plans evaluate conservation as a supply source

- Oregon Water Resources Department
  - ***Conservation Plans are required for water rights permits***
    - Evaluate conservation as a source of supply
- California Urban Water Management Plans & Urban Water Conservation Council (CUWCC)
  - ***Compares BMPs to least cost option of alternative supply sources***

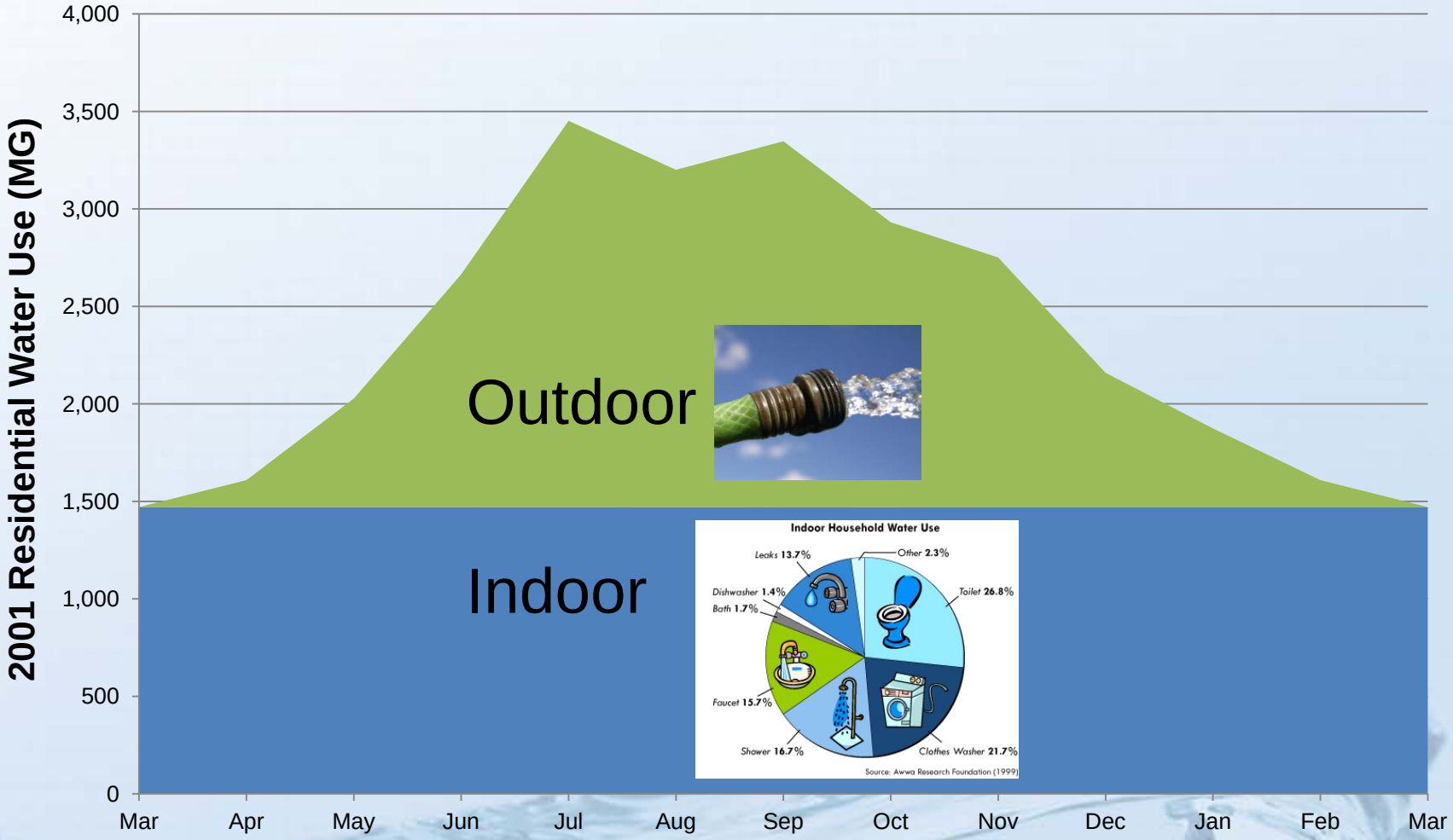
Common problem with supply-side analyses

- Omits the **ultimate quantity of water available** through conservation
  - Not an indefinite supply

Suggested improvements to our typical approaches…

1. Estimate Indoor vs. Outdoor water use

Indoor water use can be defined as the minimum monthly water use



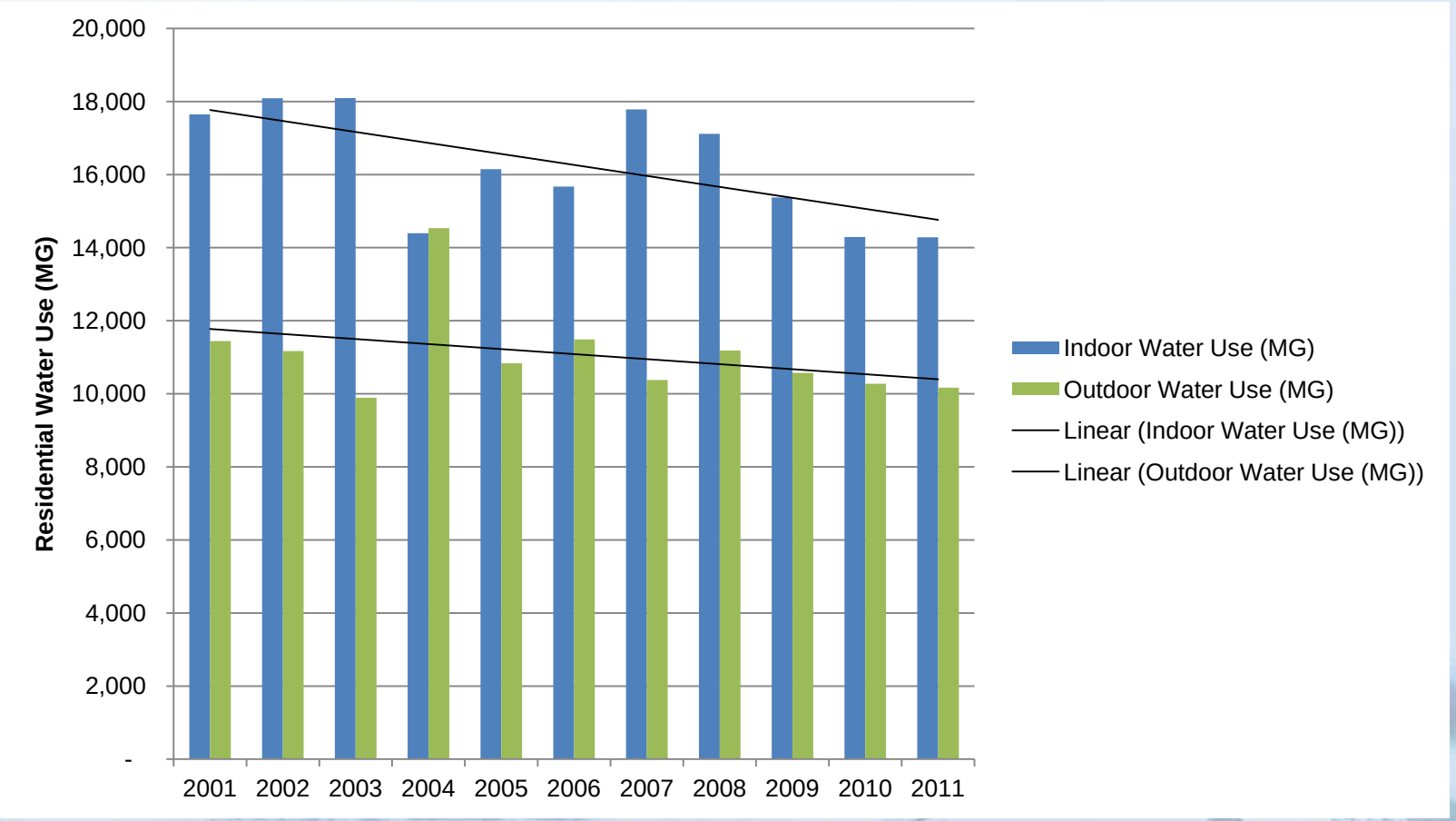
Several good reasons to look at Indoor versus Outdoor water use

1. Understand where water savings have been achieved
2. Establish useful metrics

3. Target new programs appropriately
4. Estimate ultimate baseline water use

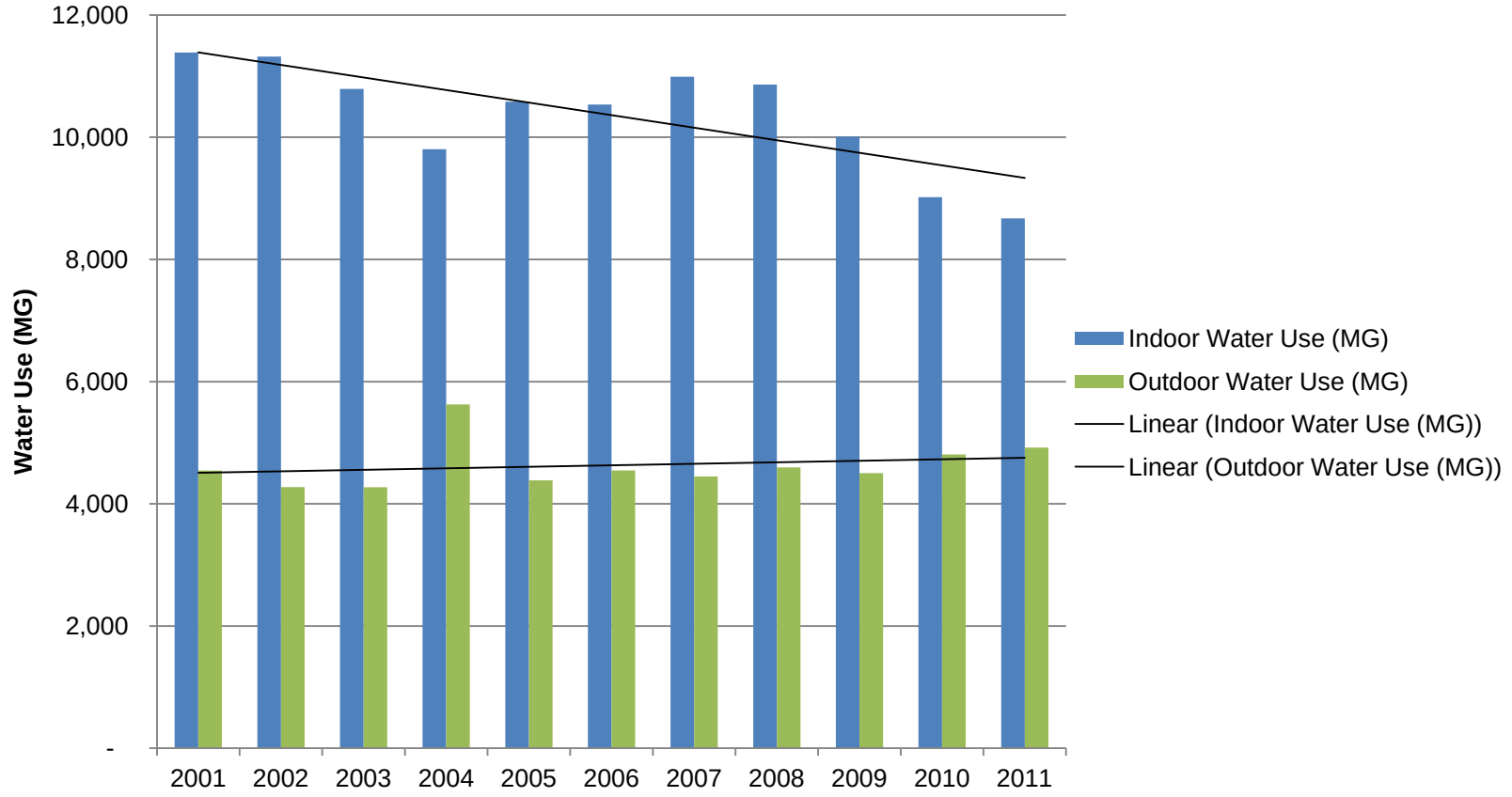
Case Study: California

- Residential trends



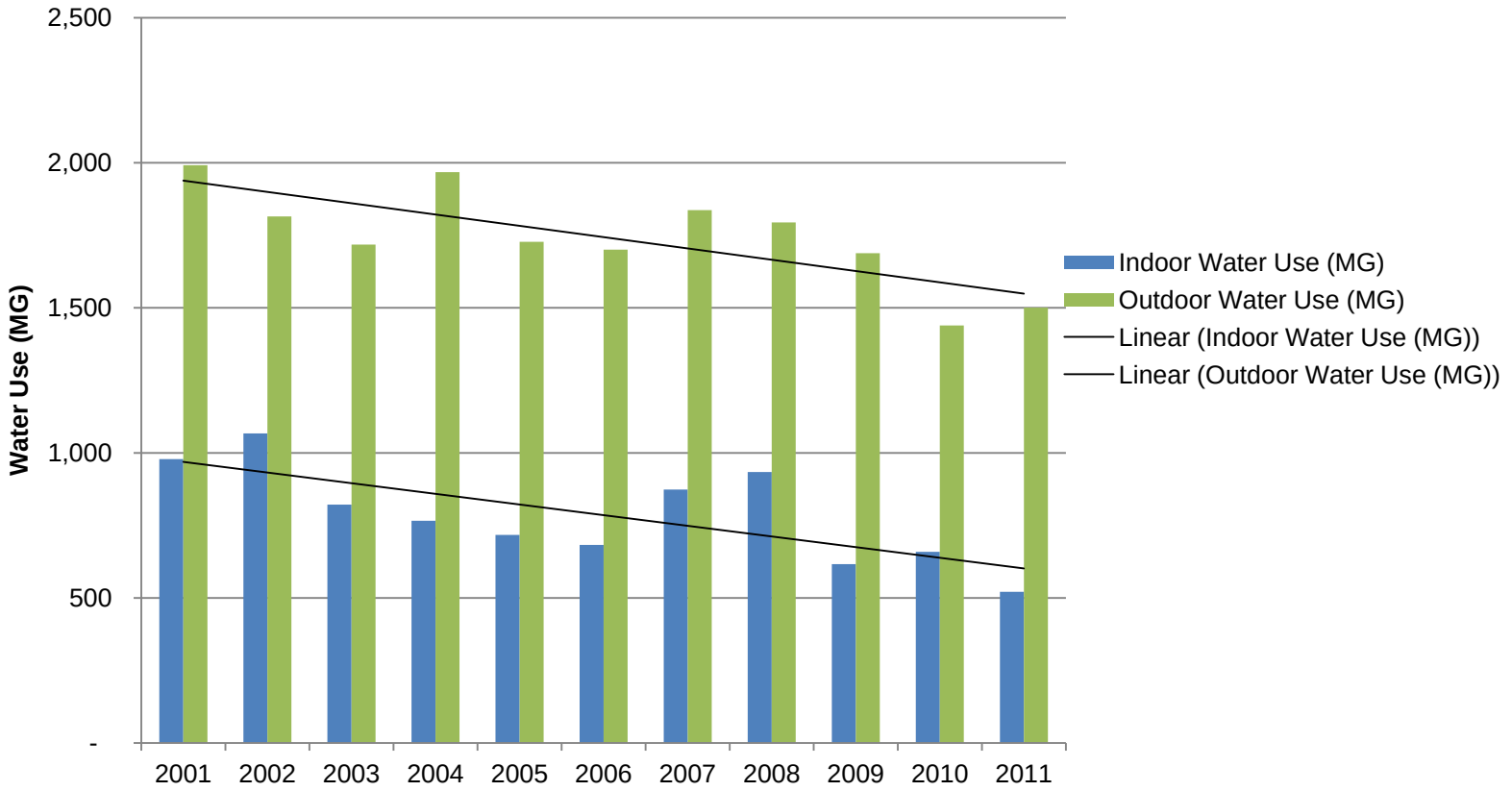
Case Study: California

- Commercial trends

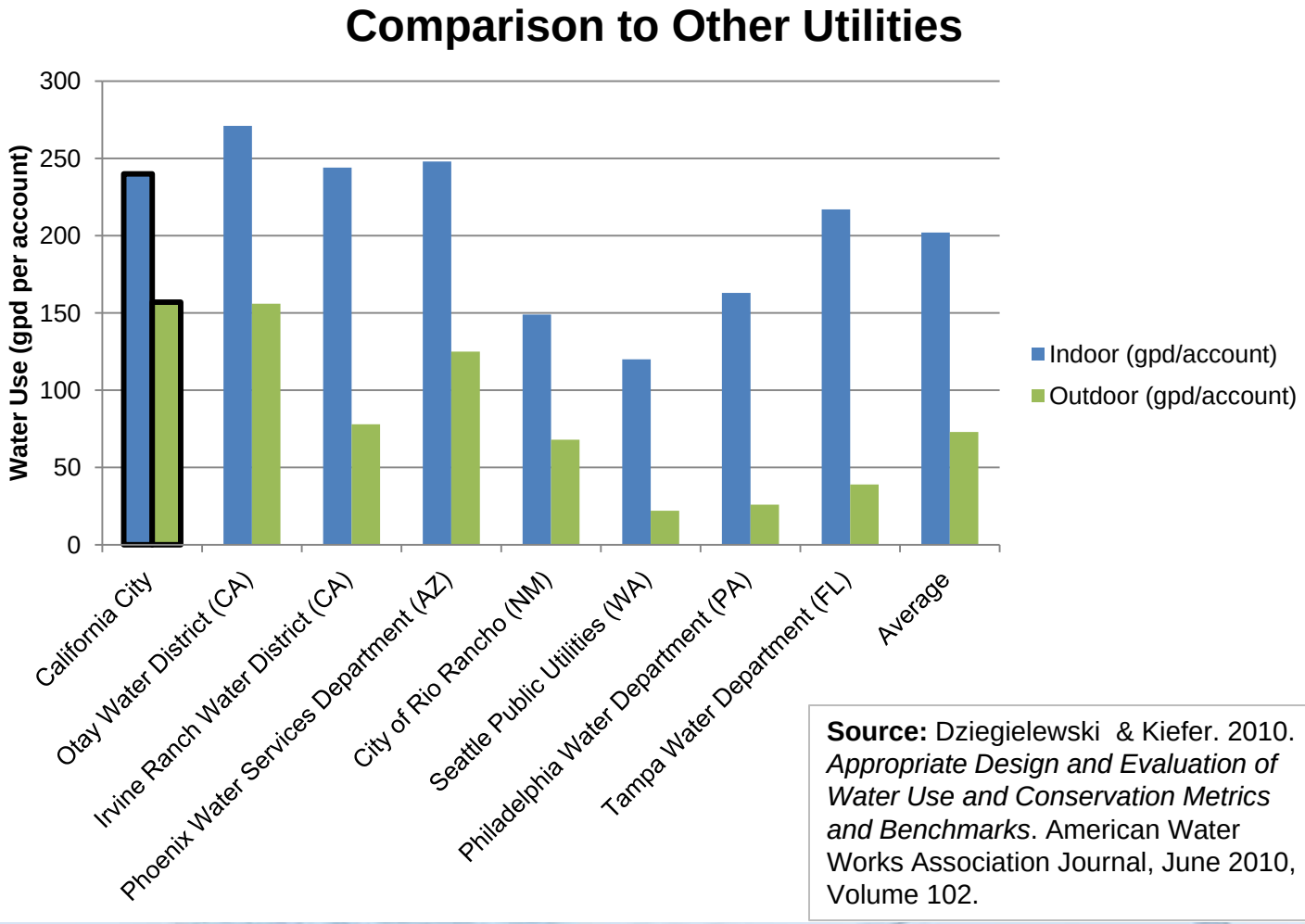


Case Study: California

- Institutional trends

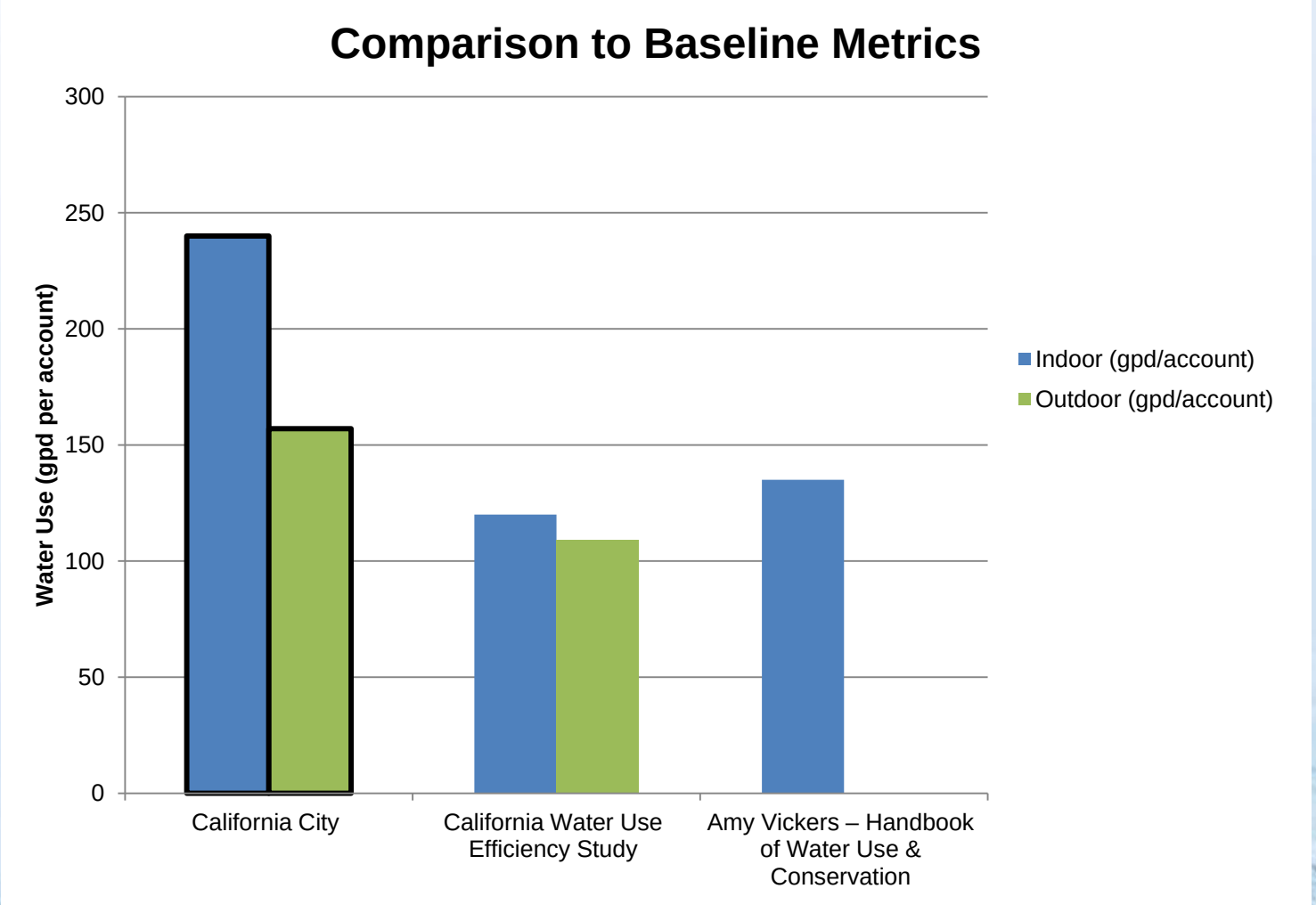


Metrics are becoming available to compare indoor/outdoor water use



Source: Dziegielewski & Kiefer. 2010. *Appropriate Design and Evaluation of Water Use and Conservation Metrics and Benchmarks*. American Water Works Association Journal, June 2010, Volume 102.

Metrics are becoming available to compare indoor/outdoor water use



Indoor vs. Outdoor water use should not be hard to estimate

- Required Data:
  - Historical Monthly Water Use by Customer Type
  - Historical Number of Accounts by Customer Type
- Useful Data:
  - Comparison to other typical water use metrics:
    - Dziegielewski & Kiefer. 2010. ***Appropriate Design and Evaluation of Water Use and Conservation Metrics and Benchmarks***. American Water Works Association Journal, June 2010, Volume 102, Number 6, p. 75
    - DeOreo, William B. 2011. ***California Single-Family Water Use Efficiency Study.*** Prepared by Aquacraft, Inc. Water Engineering and Management. July.

Suggested improvements to our typical approaches…

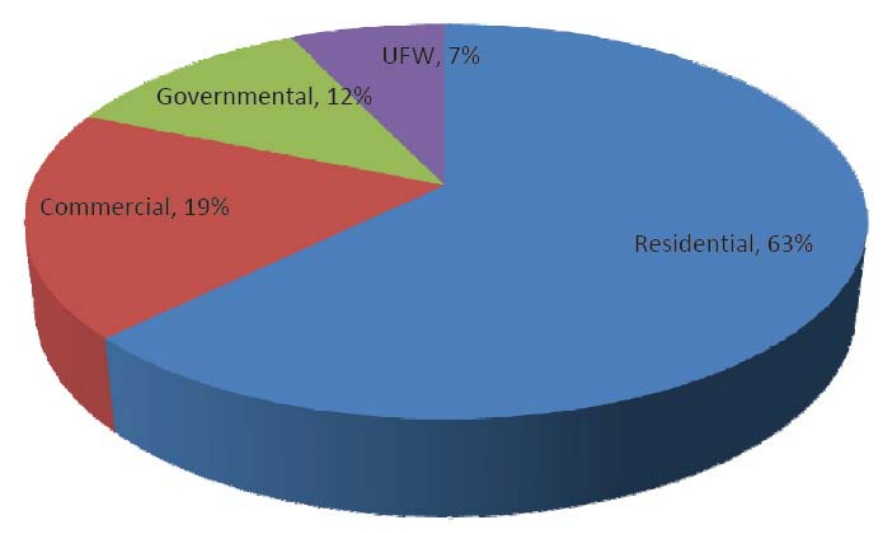
1. Estimate Indoor vs. Outdoor water use
2. Apply conservation goals to average ***and peak*** demands, appropriately

Case Study: City of Ashland
Water Conservation & Reuse Study

Known for the Oregon Shakespeare Festival

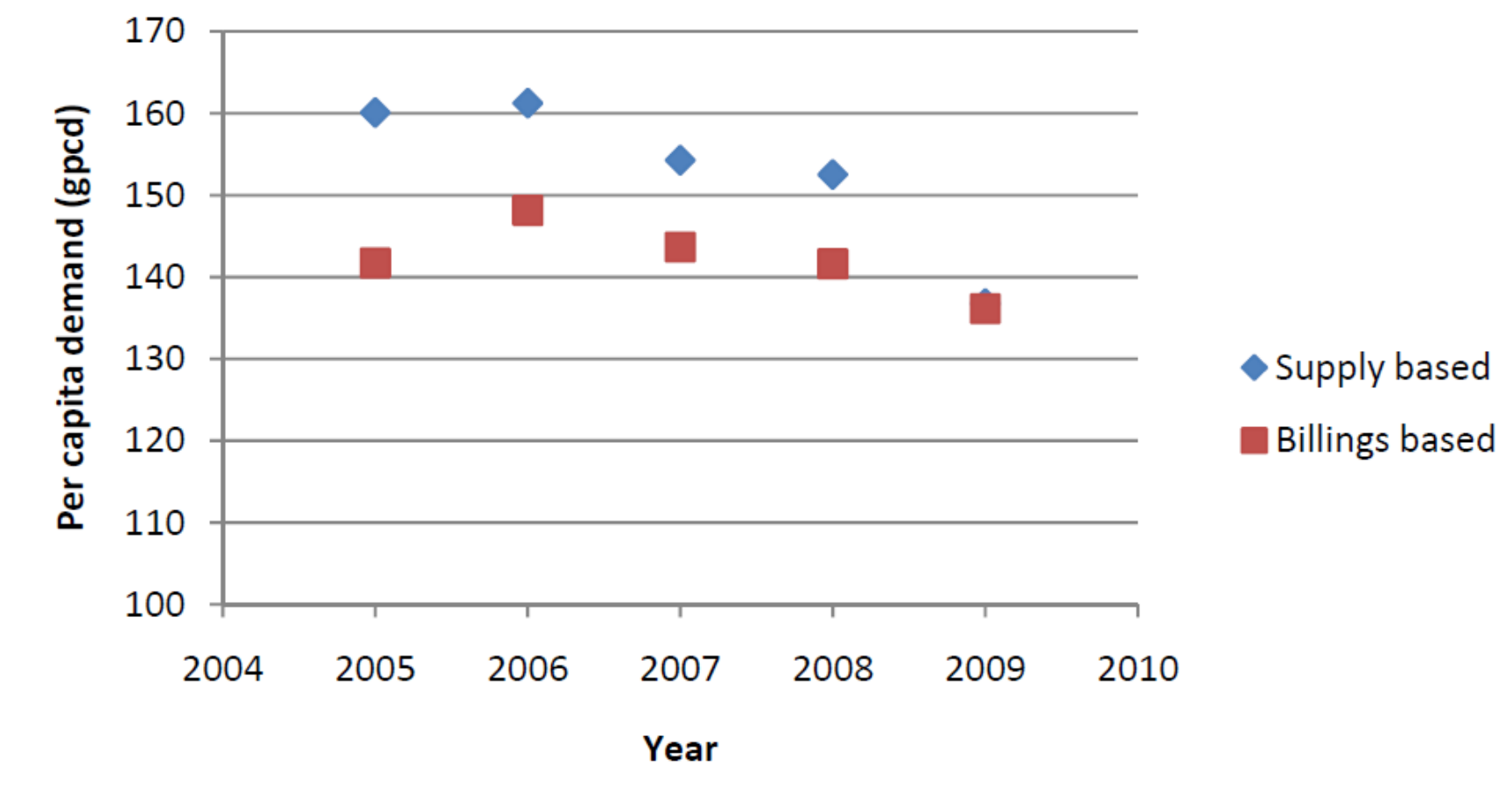
Goals were to identify long-term water supply strategy

Water System Background



- **Population**: 21,500
- **Growth**: < 1% per year
- **ADD**: 3.4 mgd
- **MDD**: 6.9 mgd
- **Avg MDD/ADD Peaking Factor**: 2.1
- **Avg Per Capita Demand**: 144 gpcd
- **Avg Residential Per Capita Demand**: 96 gpcd
- **Leakage**: 8.4%

Per Capita Water Use has been decreasing since 2006

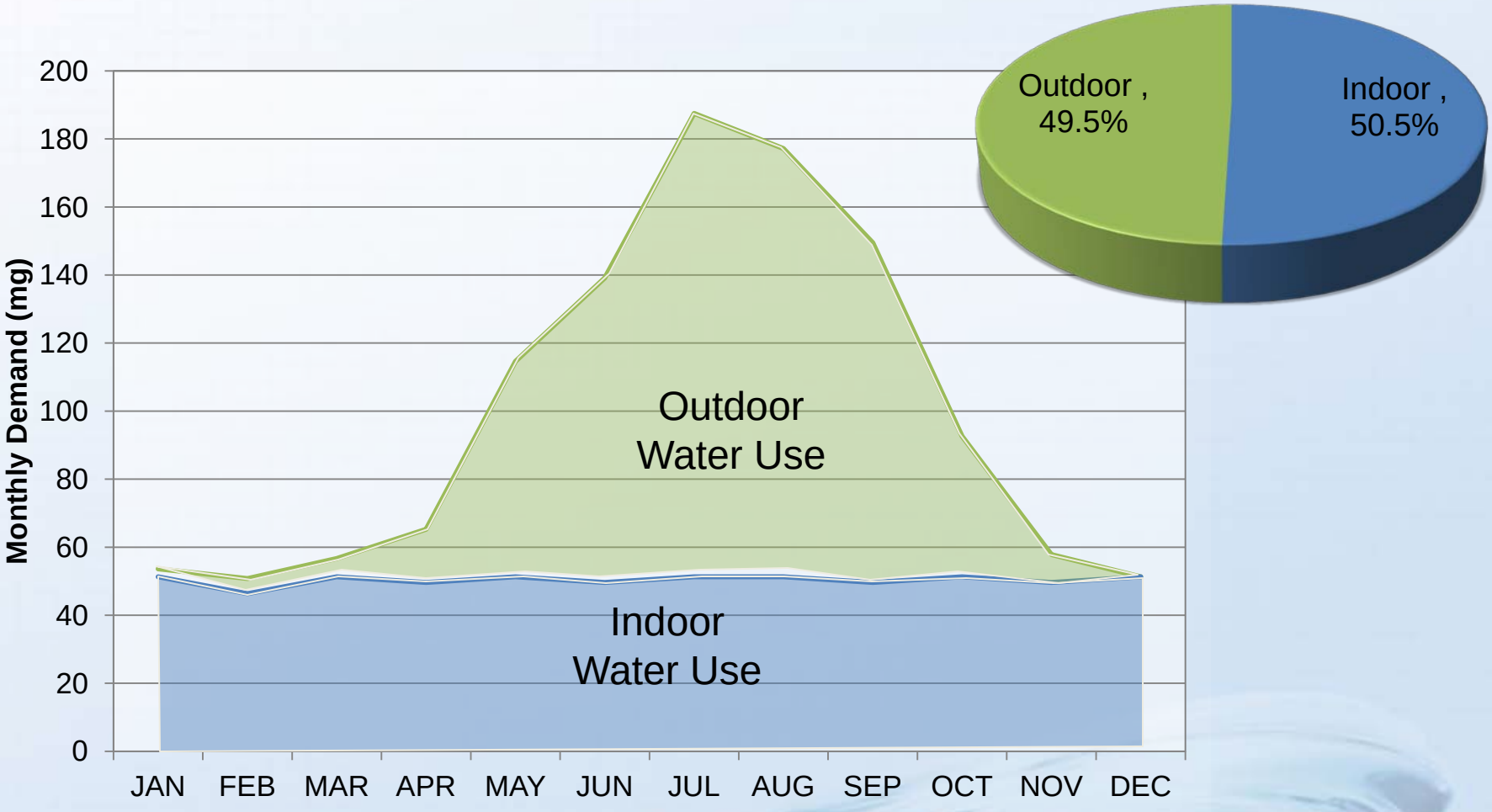


Current Conservation Program has helped reduced demands

Measure	Cumulative Water Savings in 2007[1] (gpd)
Toilet rebates	57,200
Showerhead rebates	41,070
Washing machine rebates	33,600
Dishwasher rebates	6,000
Irrigation audit	15,600
Leak detection	125,000
Rates	135,000
Codes	25,000
New technology[2]	15,000
Total water savings (gpd)	**453,470**

Notes:
(1) Information from City staff.
(2) Park's irrigation system.

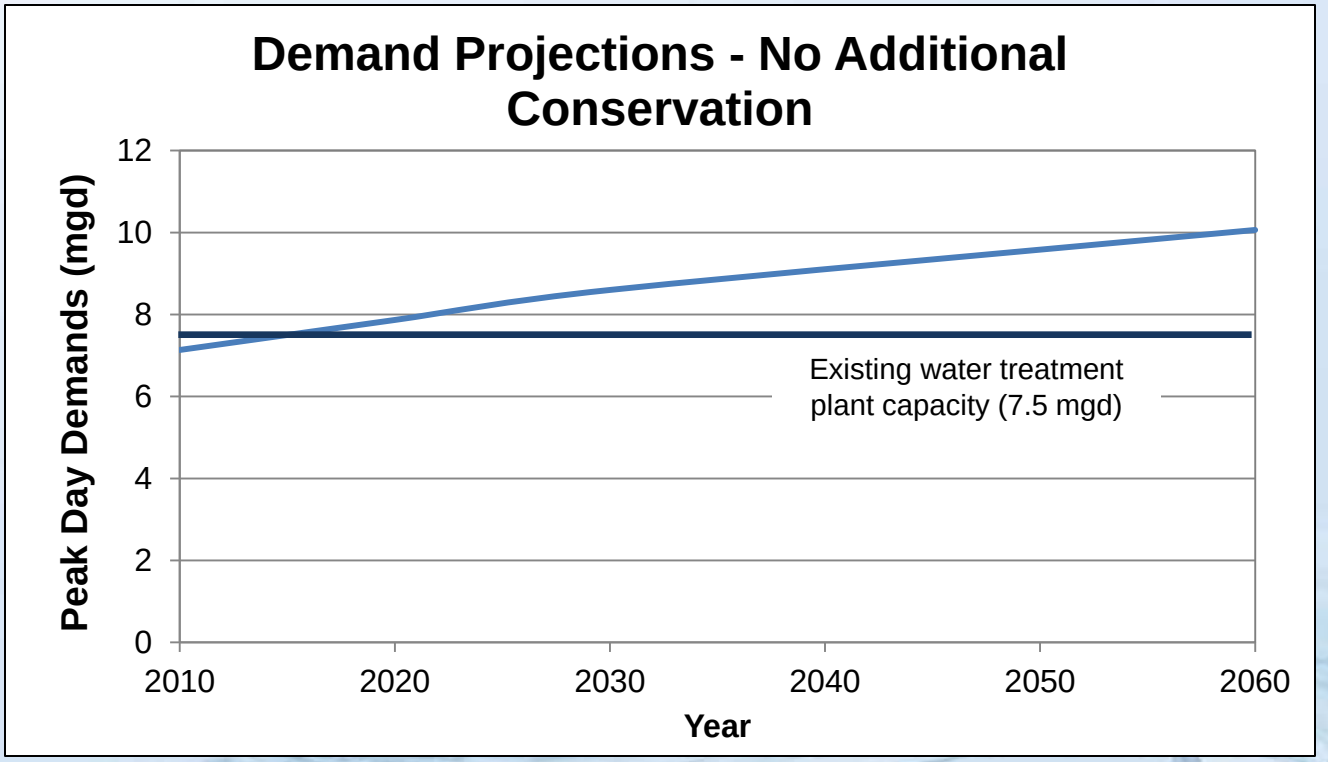
2008 Indoor vs. Outdoor Water Use



Assumption: Indoor demand = lowest monthly use (December)

Critical Supply Issues

- Raw water supply: expected to reach capacity in 2038
- **Peak water supply: already reaching capacity**
  - Curtailments implemented in 2009



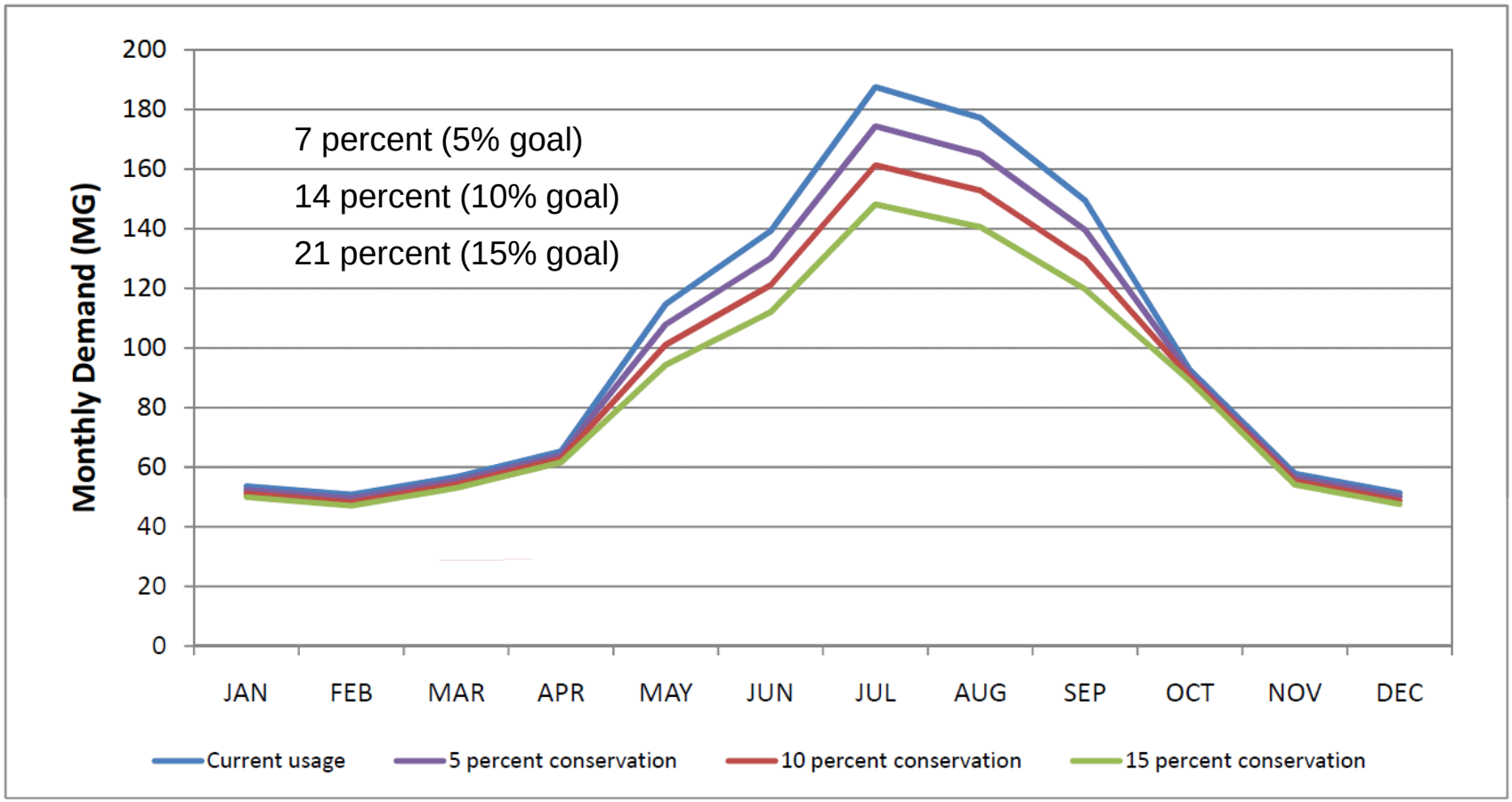
Conservation goals were established

- Over 20 years, reduce per capita demands by:
  1. 5%
  2. 10%
  3. 15%

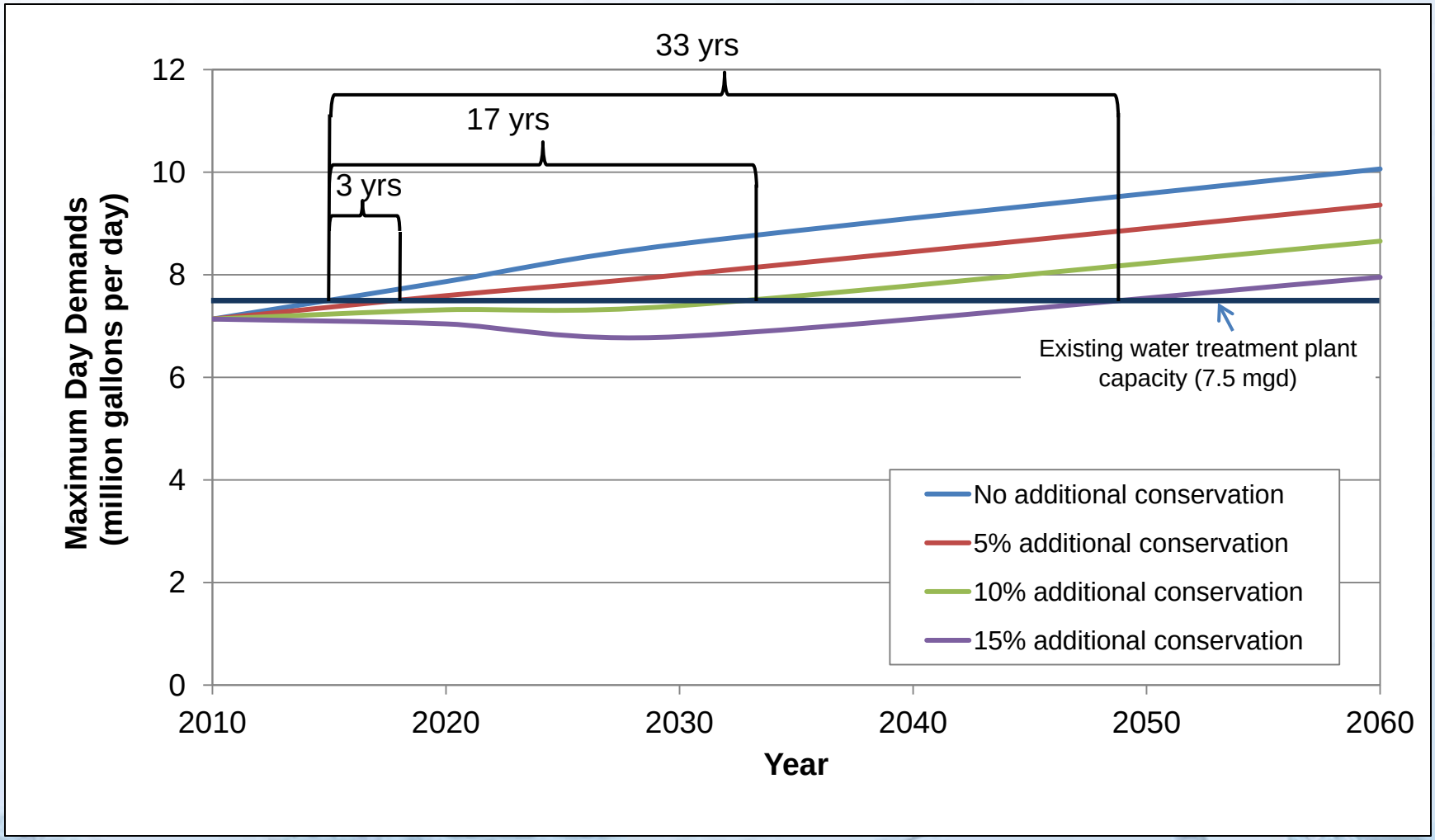
- Planned measures target outdoor water use
  - 75% of reduction targets outdoor water use
  - 25% of reduction targets indoor water use

Applied conservation goals to average and peak demands

20-year Monthly Demand Projections with Varying Conservation



With reduced peak demands, WTP expansion could be delayed



Applying conservation to peak demands should not be difficult

- Required Data:
  - Historical Monthly Water Use
- Required Goals:
  - What conservation measures apply to indoor vs. outdoor water use?
  - What goal should be assumed for planning?

Suggested improvements to our typical approaches…

1. Estimate indoor vs. outdoor water use to target BMPs appropriately
2. Apply conservation goals to average *and peak* demands, appropriately
   a. Plan for the most realistic conservation goal, while targeting more
   b. Peak demands are sensitive to assumptions: Recommend high, low, and average

Suggested improvements to our typical approaches…

1. Estimate indoor vs. outdoor water use to target BMPs appropriately
2. Apply conservation goals to average *and peak* demands, appropriately
    a. Plan for the most realistic conservation goal, while targeting more
    b. Peak demands are sensitive to assumptions: Recommend high, low, and average
3. For Supply-Side evaluations, estimate the quantity of available supply

Estimating how much “supply” is available through conservation

- How much demand hardening has already been achieved?
  - What percent of Residential Customers have HETs?

  - Where is there more potential savings?
- At what point have we reached a baseline water use without asking too much of customers?
  - What are realistic water use efficiency levels?

Combining penetration rates with current water use metrics can help predict future water savings

	% of Customers	% Remaining
HET Rebates Distributed	20	80
Commercial Water Audits Completed	10	90

	Current Water Use Metric (gpd/account)	Baseline Water Use Goal (gpd/account)	Percent Reduction
Residential Indoor Water Use	199	128	**36%**
Residential Outdoor Water Use	147	108	**27%**
CII Indoor Water Use	1,176	917	**22%**
CII Outdoor Water Use	2,059	1,029	**50%**

Estimating supply quantity

Customer Type	2011 Water Use	Indoor Water Use				Outdoor Water Use			
		Percent Indoor	Volume Indoor	Assumed Percent Reduction	Reduced Volume	Percent Outdoor	Volume Outdoor	Assumed Percent Reduction	Reduced Volume
	AF		AF		AF		AF		AF
Residential	75,042	59%	44,611	**36%**	**16,100**	41%	30,431	**27%**	**8,200**
CII Total	48,695	64%	31,234	**22%**	**6,900**	36%	17,461	**50%**	**8,700**
Total Potential					**23,000**				**16,900**

Estimating remaining conservation supply can be challenging

- Required Data:
  - Current water use metrics
  - Conservation program records of data
  - Actual measured demand reductions due to the conservation program
  - Assumptions on baseline water use

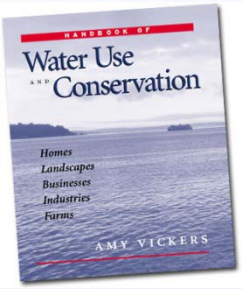
Suggested improvements to our typical approaches…

1. Estimate indoor vs. outdoor water use to target BMPs appropriately
2. Apply conservation goals to average *and peak* demands, appropriately
   a. Plan for the most realistic conservation goal, while targeting more
   b. Peak demands are sensitive to assumptions: Recommend high, low, and average
3. For Supply-Side evaluations, estimate the quantity of available supply

Other Suggestions

- Perform water conservation evaluation and planned program *before* long-term water supply planning
- Ensure conservation goal is realistic
  - Support it with measurable BMPs
- Use the right metrics
  - "Per Capita Demands" can be misleading
  - Use demands per customer type, or Equivalent Residential Units (ERUs)
- Track monthly sales data by customer type
  - Make available to conservation staff

Sources for estimating baseline water use



- Vickers, Amy. 2001. ***Handbook of Water Use and Conservation: Homes, Landscapes, Businesses, Industries, Farms***. May.
- DeOreo, William B. 2011. ***California Single-Family Water Use Efficiency Study.*** Prepared by Aquacraft, Inc. Water Engineering and Management. July.
- CALFED Bay-Delta Program, Water Use Efficiency Element. 2006. ***Water Use Efficiency Comprehensive Evaluation*****.** August.
- Gleick, Peter H. 2003. ***Waste Not, Want Not: The Potential for Urban Water Conservation in California*****.** Prepared by Pacific Institute for Studies in Development, Environment, and Security. November.
- Dziegielewski & Kiefer. 2010. ***Appropriate Design and Evaluation of Water Use and Conservation Metrics and Benchmarks*****.** American Water Works Association Journal, June 2010, Volume 102.

Other good sources

- Western Resource Advocates. 2008. ***Smart Savings, Water Conservation Measures that Make Cents.***
- California Urban Water Conservation Council. 2005. ***BMP Costs and Savings Study*****.** Prepared by A & N Technical Services, Inc. for the CUWCC. March.

QUESTIONS?

CASCADE
WATER ALLIANCE

Designing an Effective Commercial Irrigation Efficiency Program

AWWA PNWS Conference

May 3, 2012

Mike Brent

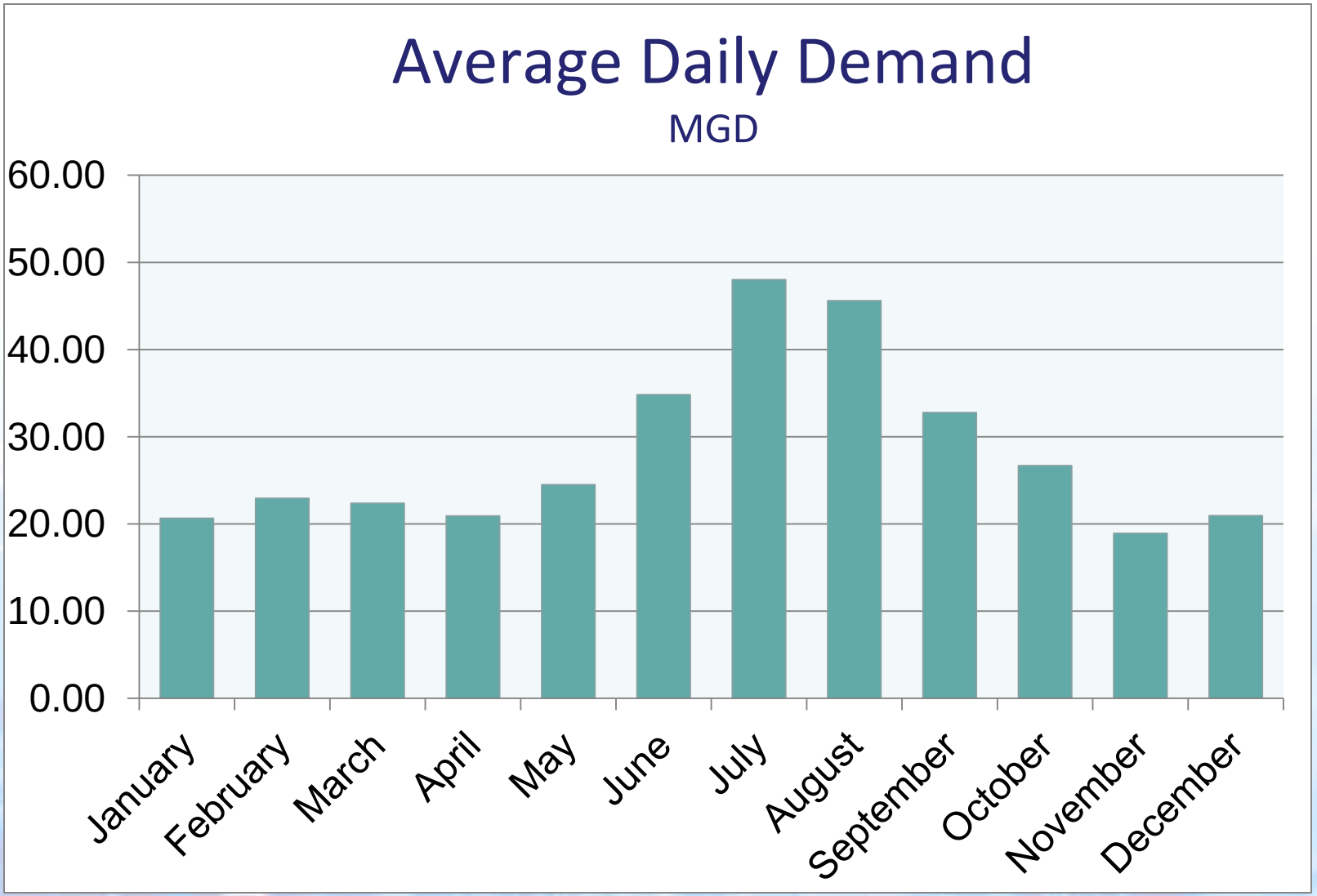
CASCADE WATER ALLIANCE

City of Bellevue
Covington Water District
City of Issaquah
City of Kirkland
City of Redmond
Sammamish Plateau Water & Sewer District
Skyway Water & Sewer District
City of Tukwila

Cascade serves 400,000 residents and 22,000 businesses

Average daily demand is approximately 40 million gallons

Two-thirds of supply comes from Seattle Public Utilities; One-third from groundwater supplies; Own and operate Lake Tapps


Average Daily Demand
MGD
60.00
50.00
40.00
30.00
20.00
10.00
0.00
January
February
March
April
May
June
July
August
September
October
November
December

The Problem

1. Peak season demand drives the need for new supply.
2. Up to 50% of peak season demand through irrigation is wasted.

Targeting Peak Season Demand

Direct installation of rain sensors

Irrigation audits / evaluations

Workshops and classes

Public education

Commercial irrigation upgrades

Process


Project Proposal / Administrative Review
Initial Site Visit
Project Authorization
Project Initiated / Completed
Final Inspection
Rebate Issued

Purpose of Specifications

1. Define the hardware
2. Establish the technical requirements
3. Determine acceptable installation
4. Rebate amount

Irrigation Hardware Specifications

High Distribution Uniformity Nozzles
Sprinkler Bodies with Check / PRV
Master Valves
Pressure Reduction Valves
Smart Controllers
Sensors (Drip and Soil Moisture)
Drip Irrigation
Decommissioned Spray Heads

Development of Specifications

Water Utility	Irrigation Rebate	Inspection or Authorization	Written Specifications
Albuquerque	√	√	
Austin	√	√	
Colorado Springs	√	√	
Contra Costa	√	√	
Denver	√		
EBMUD	√	√	
Irvine Ranch	√	√	
LAMWD	√	√	
San Antonio	√	√	
San Diego	√	√	
Santa Clara Valley	√	√	
Santa Barbara	√	√	
SPU	√	√	
Valley of the Moon	√	√	

Process


Project Proposal / Administrative Review
Initial Site Visit
Project Authorization
Project Initiated / Completed
Final Inspection
Rebate Issued

Results

Eliminated “bad actors”

Better use of funds

More reliable water savings

Developed better relationships with Green Industry

Leveraged educational opportunities

The “Cascade” Effect

Next Steps

Continue refining specifications / program

Offer limited consultant assistance

Explore additional training opportunities

Questions / Comments?

CASCADE
WATER ALLIANCE

Thank You!

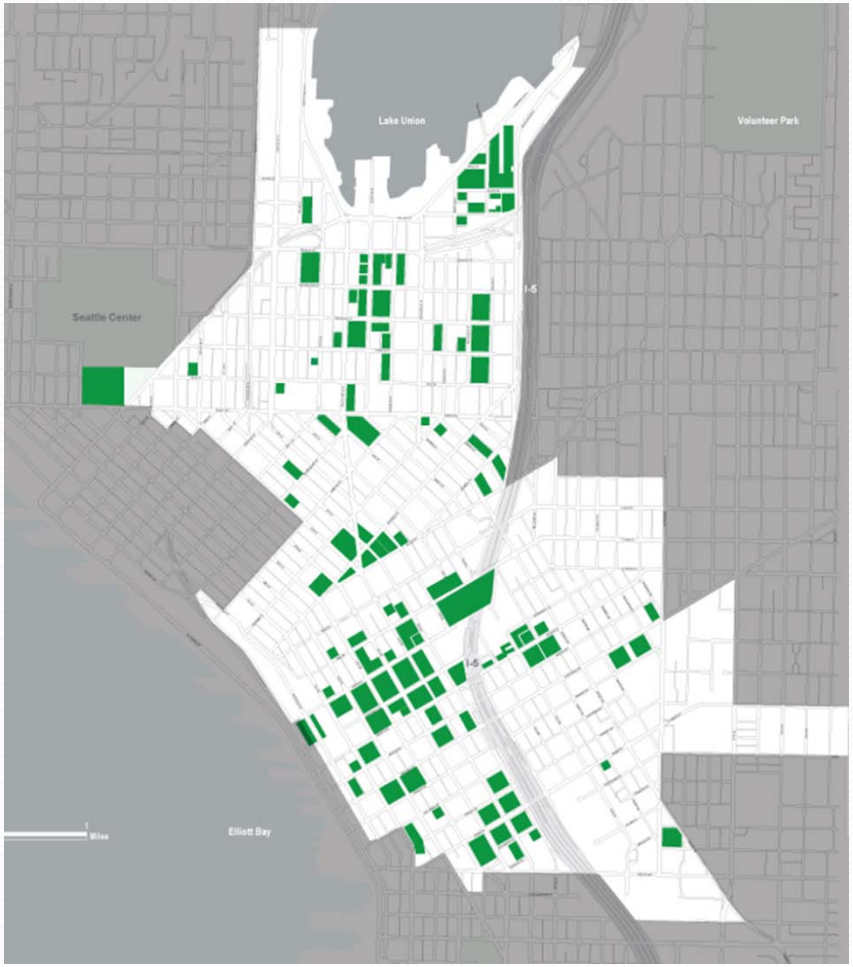
www.cascadewater.org
mbrent@cascadewater.org

Seattle 2030 District

Partnering for Water Conservation

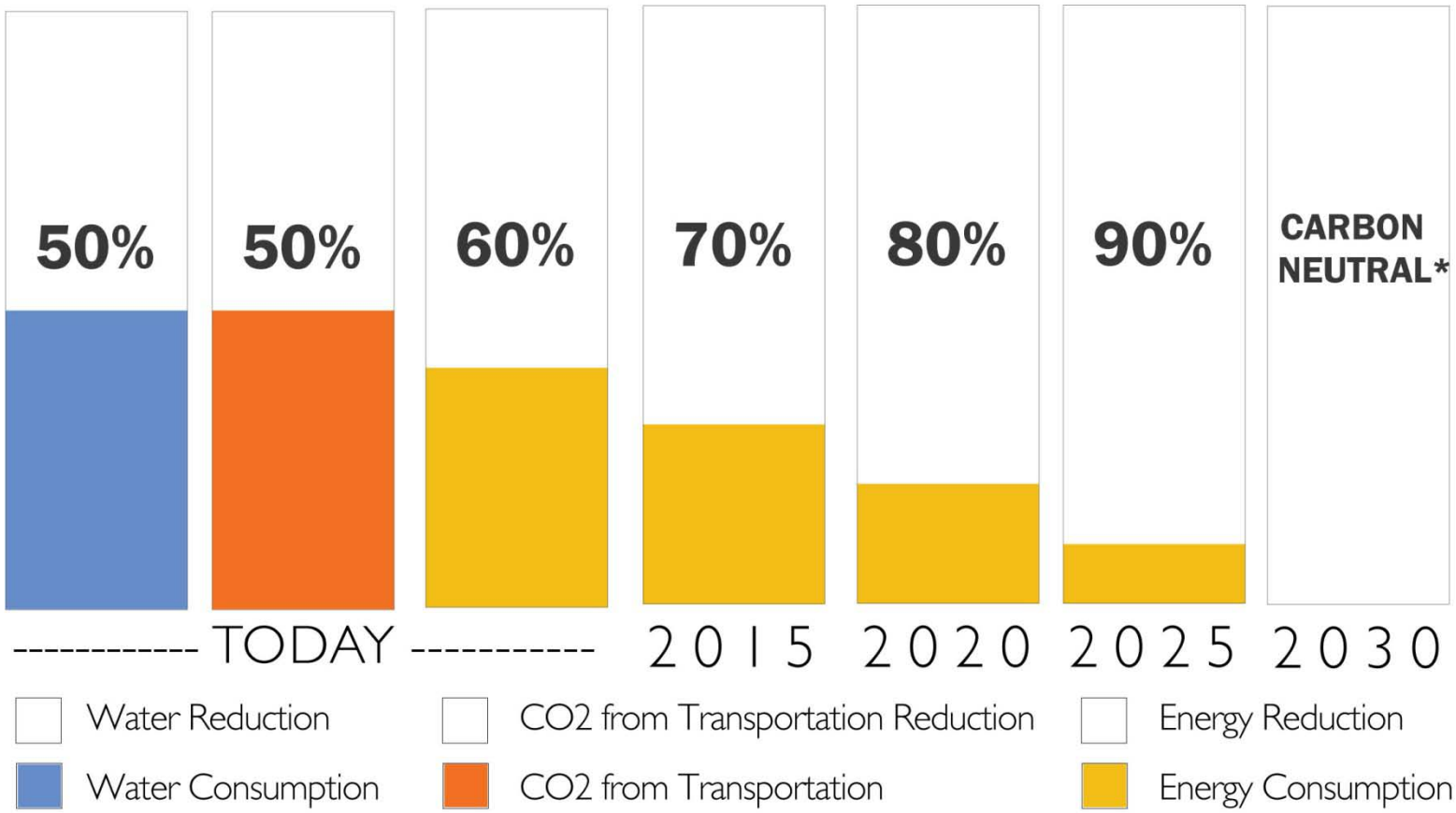
Beau Schilz, PACE Engineers and Michael Laurie, Watershed LLC

Seattle 2030 District Overview



- Public/Private Partnership
- 2030 Energy Use
  - ⇩ 50% for existing building
    (Carbon neutral for new)
- 2030 Water Use
  - ⇩ 50% for new and existing
- 2030 Transportation
  - ⇩ 50% for auto and freight

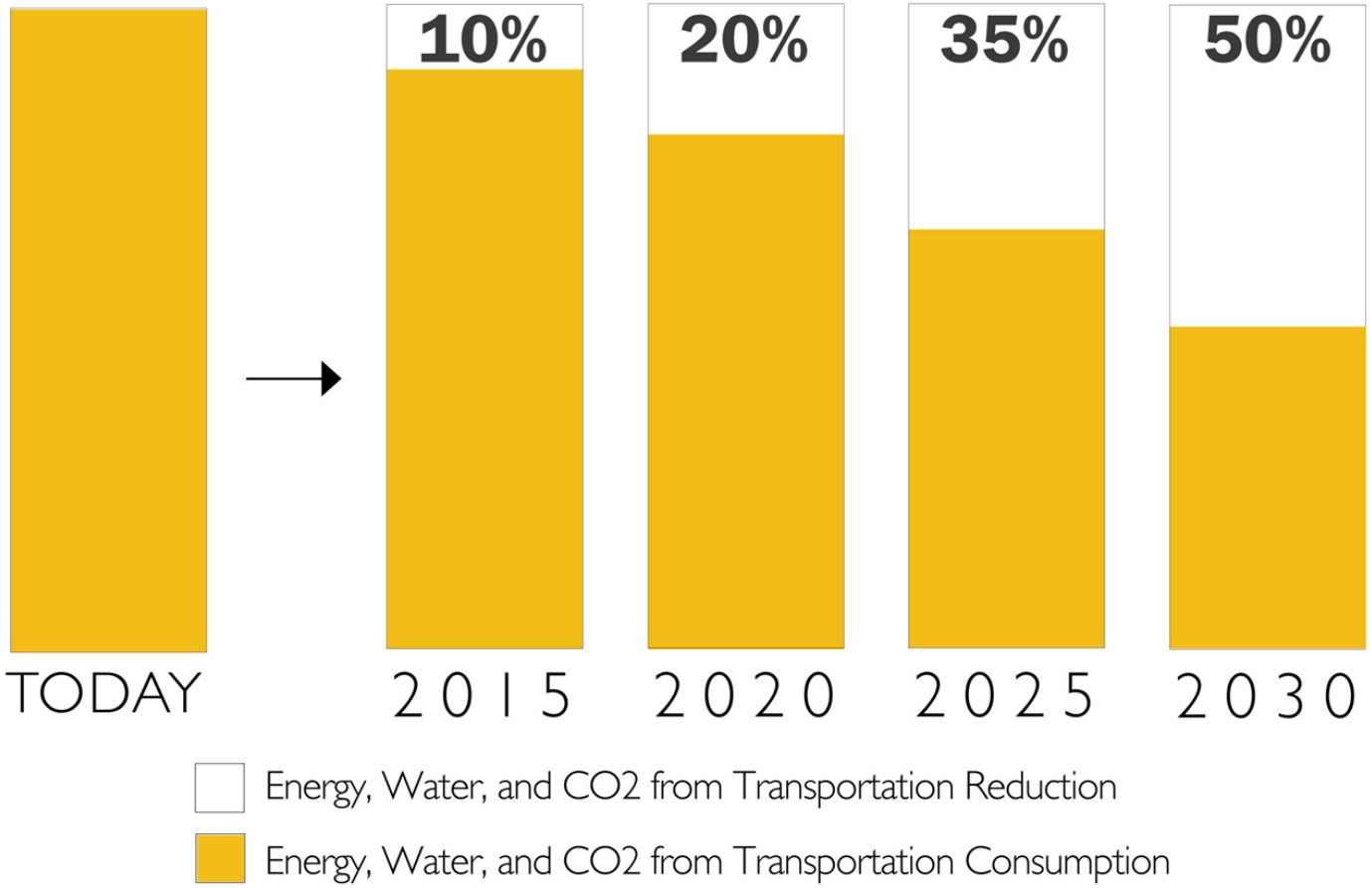
2030 Performance Targets – New Buildings



The 2030 Challenge for Planning: New Buildings & Major Renovations

**Using no fossil fuel GHG-emitting energy to operate.*

2030 Targets – Existing Buildings

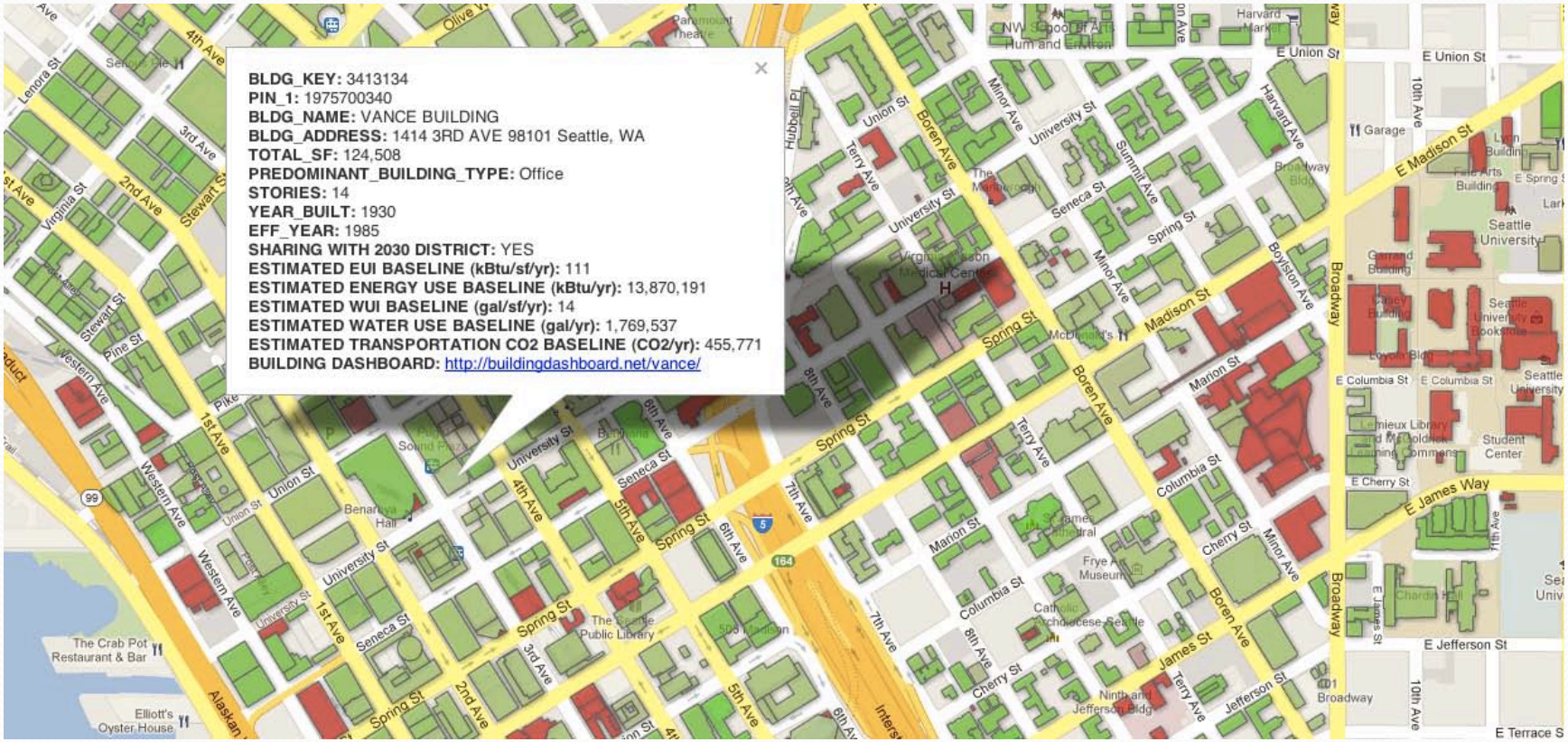


The 2030 Challenge for Planning: Existing Buildings

2030 District Goals

- 1st High Performance Building District in Country
- Opportunity to Showcase Existing / Previous Achievements
- Connect businesses to create economically viable management solutions
- Utilizes ENERGY Star Portfolio Manager to track progress in meeting goals
- Transform downtown Seattle into an attractive place to locate homes and businesses

Building Dashboard

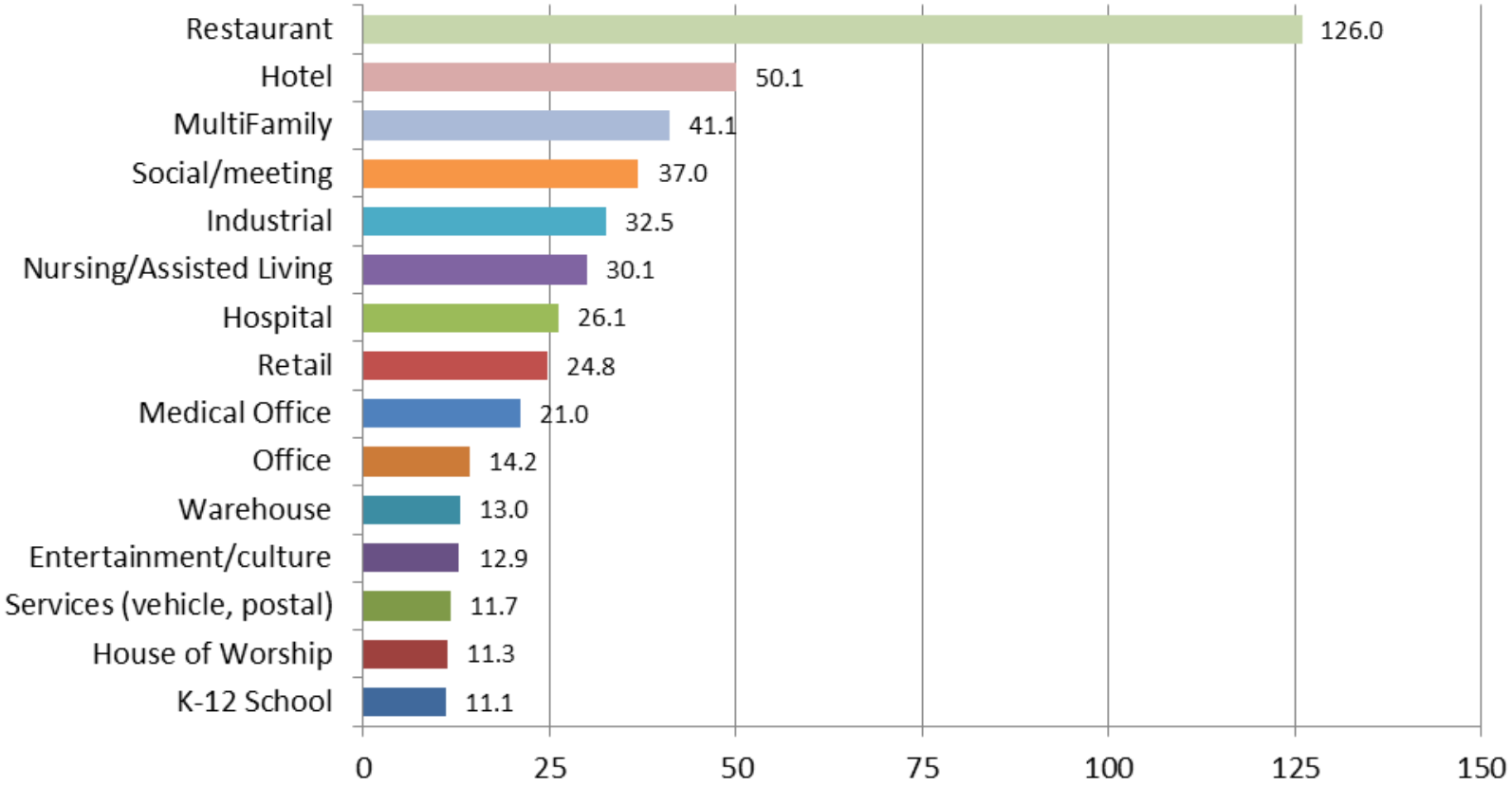


The PWC Working Group

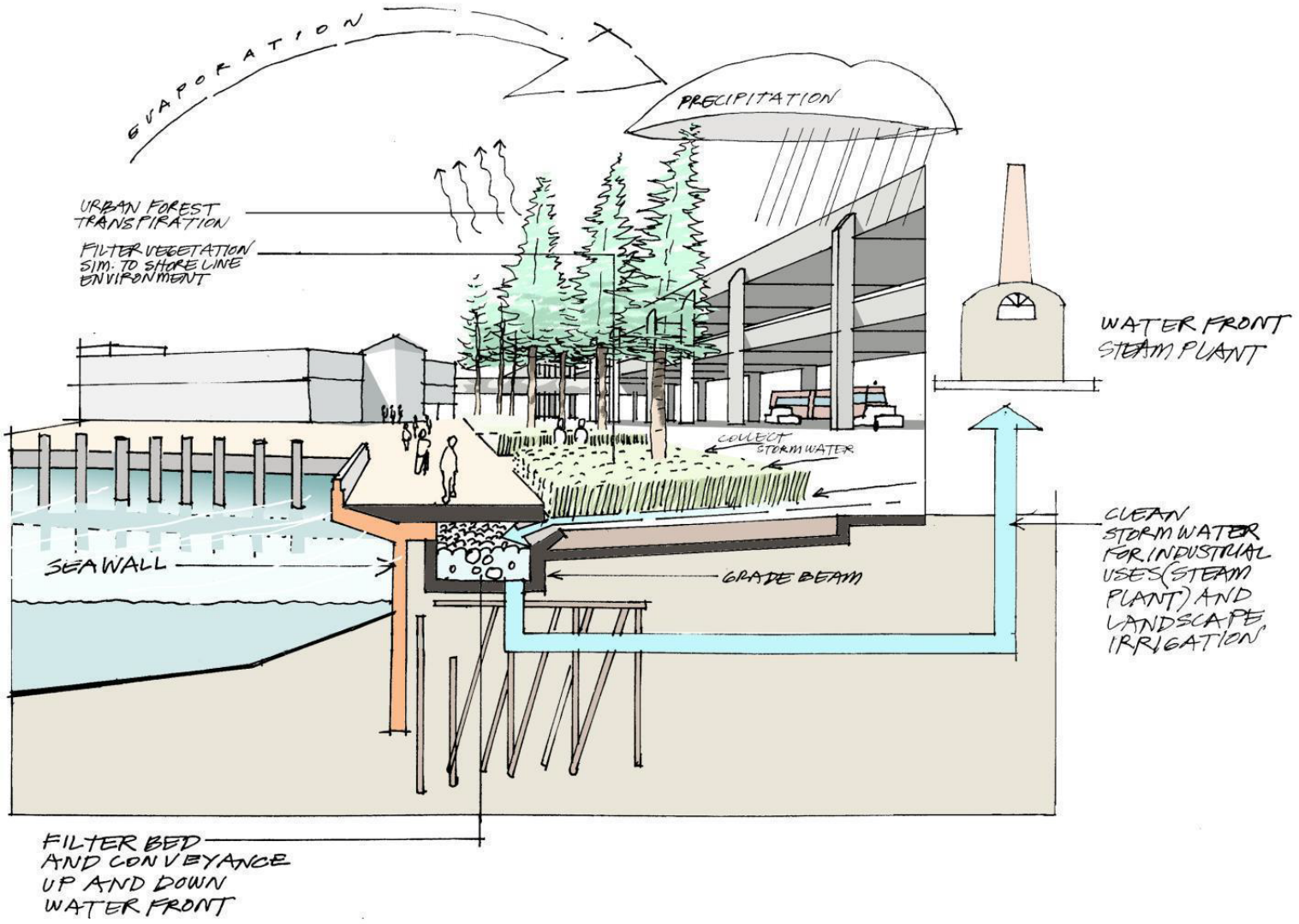
- Seattle Public Utilities
- Building Operations Auditing Consultants
- Water Utility Engineers
- Utility Planners
- Architects
- 2030 District Staff and Representatives

Water Use Intensity

(gallons/ft^2/year)



Stormwater to Steam



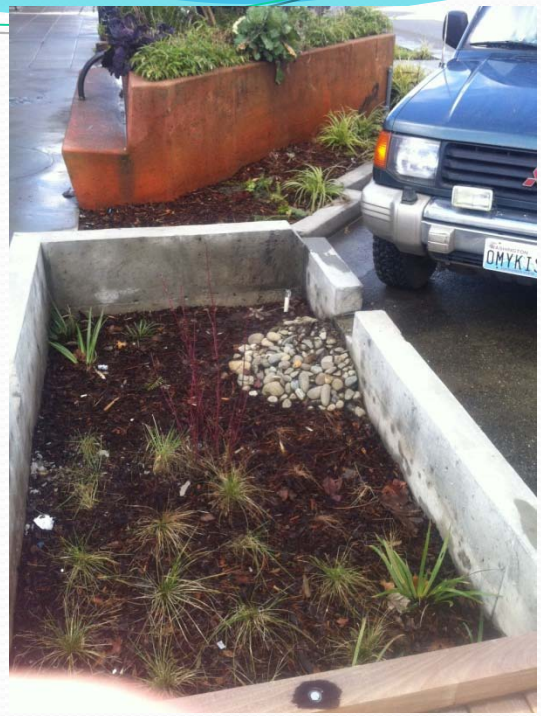
Phase 1 Water Audit Form

WATER USE EQUIPMENT INVENTORY				
Item No.	**Description**	**Total Number**	**Average Rated Gallons (Per Use)**	**Unit/Metric**
1	Restroom Faucets			Avg GPM
2	Toilets			Avg GPF
3	Urinals			Avg GPF
4	Showerheads			Avg GPM
5	Washing Machines			Commercial or Residential?
6	Dishwashers			Commercial or Residential?
7	Pre-Rinse Spray Valves			Avg GPM
8	Steamers			
9	Garbage Disposals			
10	Sterlizers			
		Total Number	**Air or Water Cooled?**	
11	Ice Machines			
		Size in Tons		
12	Cooling Tower			
		Water Reuse On-Site?	**Use Per Vehicle**	**Avg Vehicles / Day**
13	Car Wash			
		Steam or Hot Water?	**Est. Daily Volume**	**Unit/Metric**
14	Boilers			gallons
		Equipment Type?		
15	Process Equipment that uses water			
16	Single Pass Cooling Equipment			

- Compiled in Excel™
- Simple
- Can be used by variety of Building Types

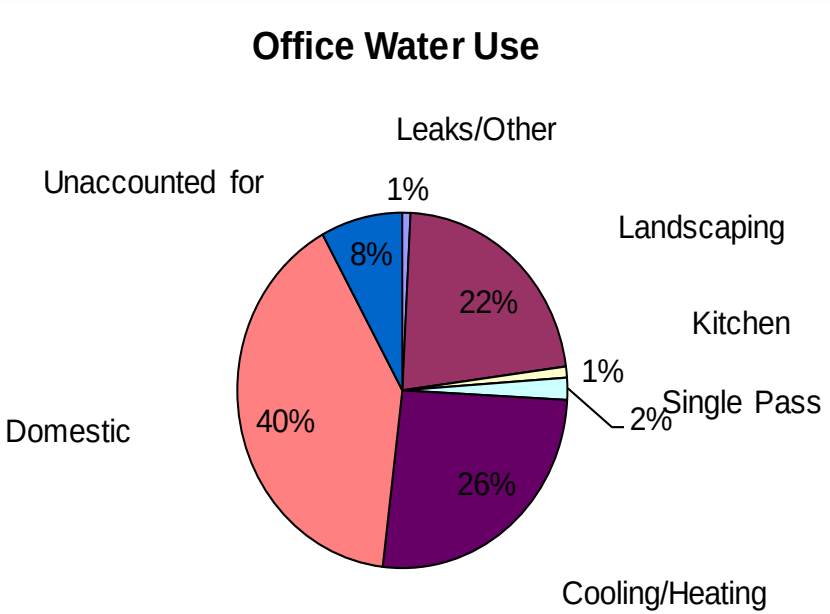
Water / Energy Nexus

- 13% of the country's energy consumption is used in collecting, treating, and distributing water.
- Onsite stormwater control, wastewater treatment, water reuse, rainwater collection can save energy
- Determining Greenhouse Gas reductions associated with water conservation.
- Energy efficiency projects that reduce waste heat can save water.



Cooling Towers

- Lighting efficiency projects can save water in building with cooling tower.
- Cooling towers can be water intensive. Solutions:
  - Conductivity meters
  - Proper water treatment
  - Water softeners, like those installed at the Experience Music Project.



Rainwater Systems serving double duty

- Likely cheaper to subsidize on-site stormwater control than to install separate new stormwater pipes.
- Commercial building cisterns can control stormwater in winter and irrigate in summer.
- Seattle Steam stormwater reuse.

Reduce Peak Demand!

- Reduced peak demand could defer $ millions in water supply expansion.
- Efficient irrigation may reduce transport of pollutants into local bodies of water.

Triple Bottom Line Accounting

- We undervalue the financial benefits of services that nature provides “for free”
  - SPU Cedar River Watershed valued at $2M but replacement value of water filtering closer to $200M.
- Water efficient buildings
  - Worth more than they appear
  - May sell more quickly
- We can argue about the economic value of nature’s benefits, but we can all agree it is more than ZERO

Questions?

Beau Schilz

Project Planner

PACE Engineers, Inc.

beaus@paceengrs.com

(425) 827-2014

Watershed LLC

Michael Laurie

Owner

Watershed, LLC

mlaurie@mindspring.com

(206) 567-5492

Implementing the Water Use Efficiency Regulations in Washington: A 5-Year Update

Mike Dexel

Water Resources Policy Lead

Office of Drinking Water

Office of Drinking Water's Mission

To protect the health of the people of Washington State by ensuring safe and reliable drinking water.

Origin of the Water Use Efficiency (WUE) Rule

- **2003 Municipal Water Law**
  - **Complex water law reform**
  - **Water systems can use "unused" water rights to serve growing communities**
- **In exchange for water right benefits**
  - **Must use water more efficiently**
  - **Required us to adopt WUE rule**

Timeline of Municipal Water Law (MWL)

2003
- Legis-lature passed MWL

2007
- WUE Rule adopted

2008
- MWL Superior Court decision

2010
- MWL Supreme Court decision

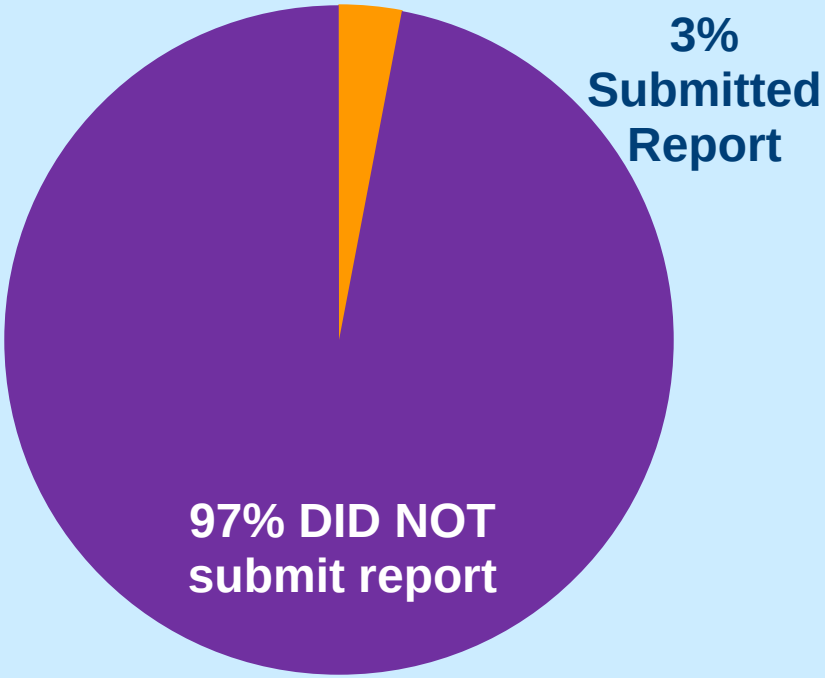
What did 2008 Superior Court decision say?

- **Definition of "municipal water supplier" is unconstitutional**
  - **Private water systems <u>are not</u> considered municipal water suppliers**
  - **WUE requirements don't apply**
  - **Number of municipal systems reduced from 2,100 to 600**

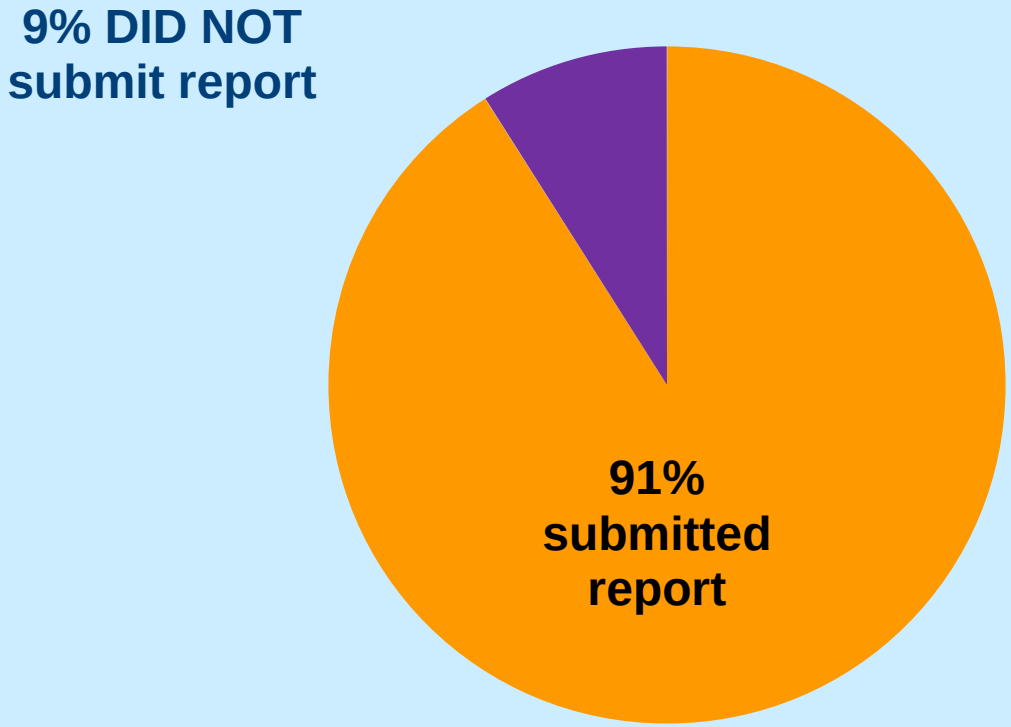
Effect of MWL Litigation

- **Regulated Community (privately owned water systems)**
  - **Confused**
  - **Already purchased expensive equipment to comply with law**
  - **State encouraged participation**
  - **Most water systems postponed efforts**
  - **Voluntary vs. mandatory program**

Private Systems Submitting WUE Annual Report in 2009 (Voluntary)



Private Systems Submitting WUE Report in 2010 (Mandatory)

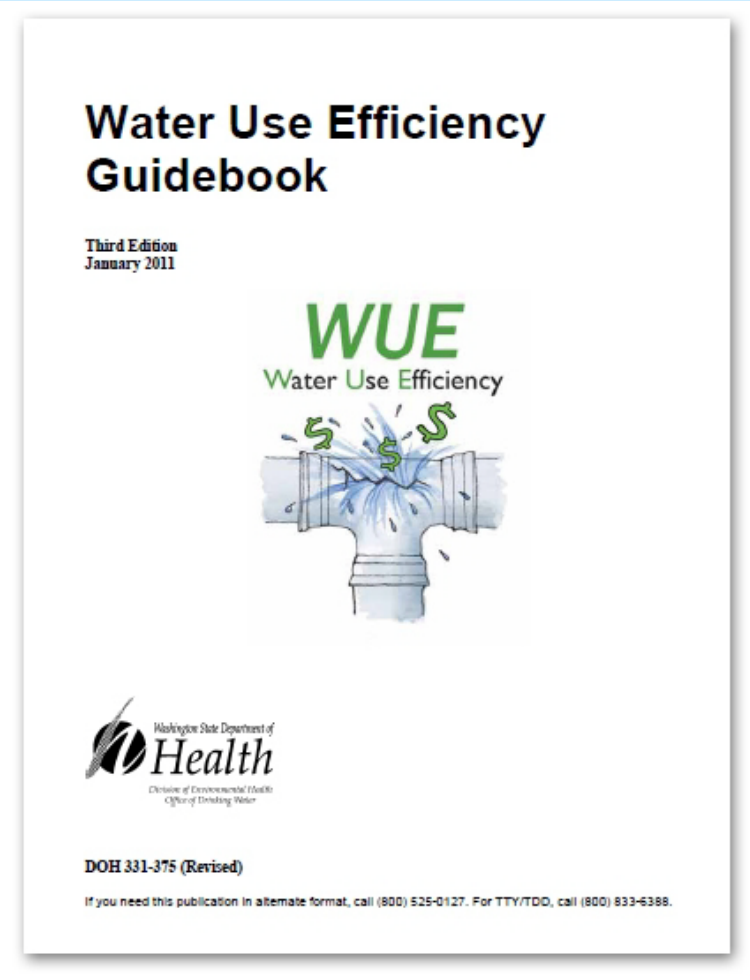


WUE Requirements

- Set WUE goals in a public forum (demand side efficiency)
- Meter installation by 2017
- 10% leakage standard (supply side)
- Establish WUE Program
- Annual reporting (online)

Key Implementation Tools

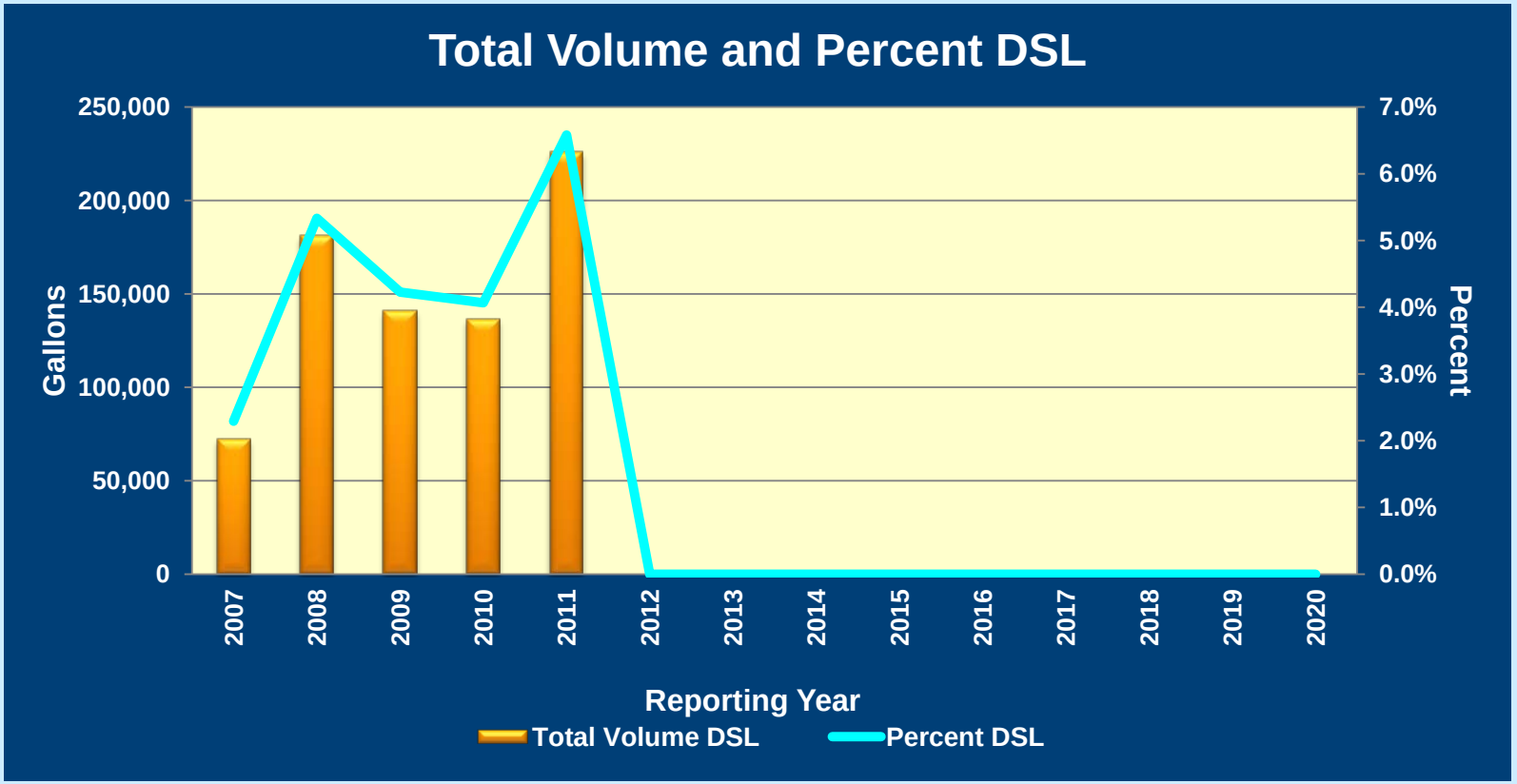
- WUE Guidebook
- Website
- Training
- Publications



Key Implementation Tools (cont.)

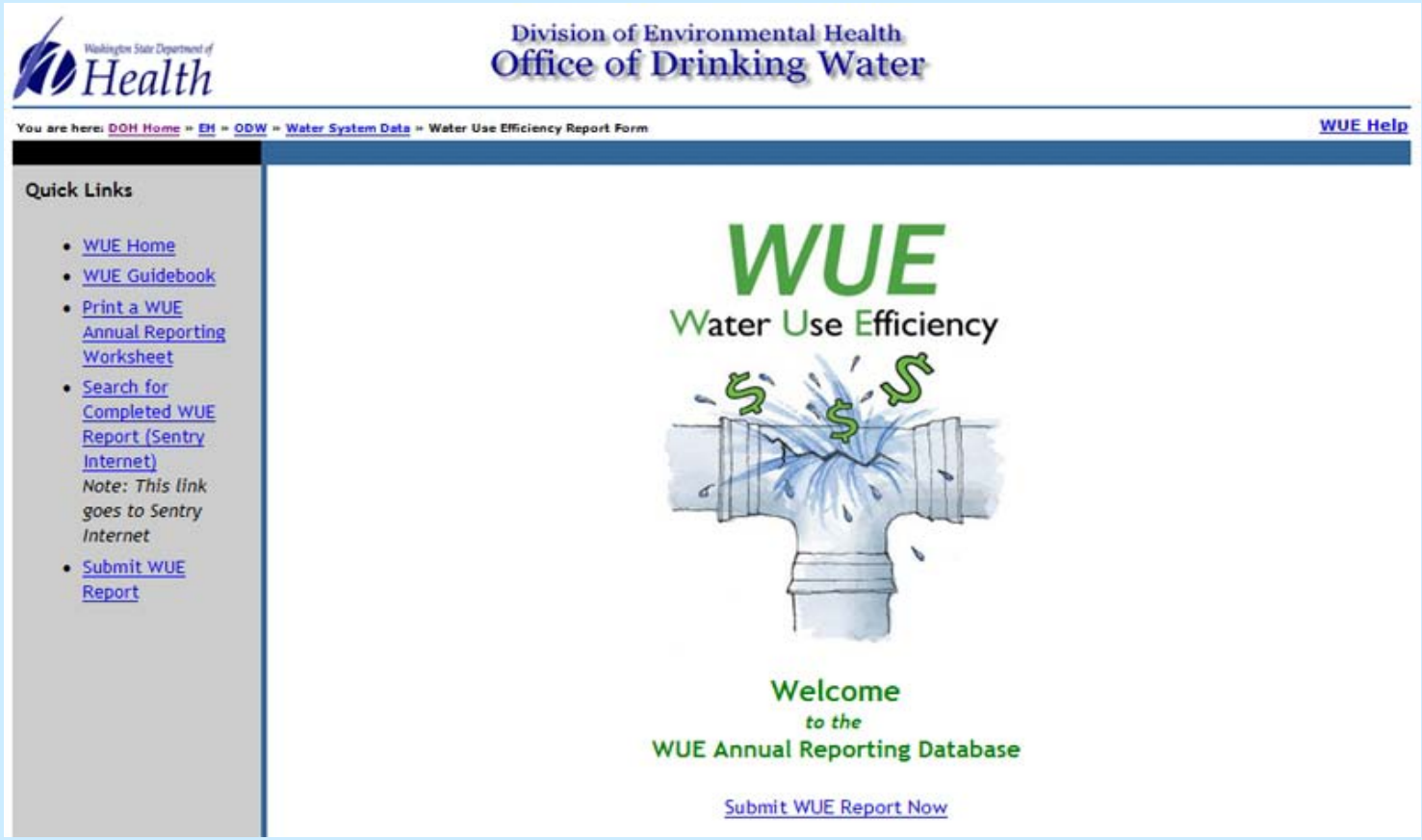
Key Implementation Tools (cont.)

WUE Data Collection Tool



Key Implementation Tools (cont.)

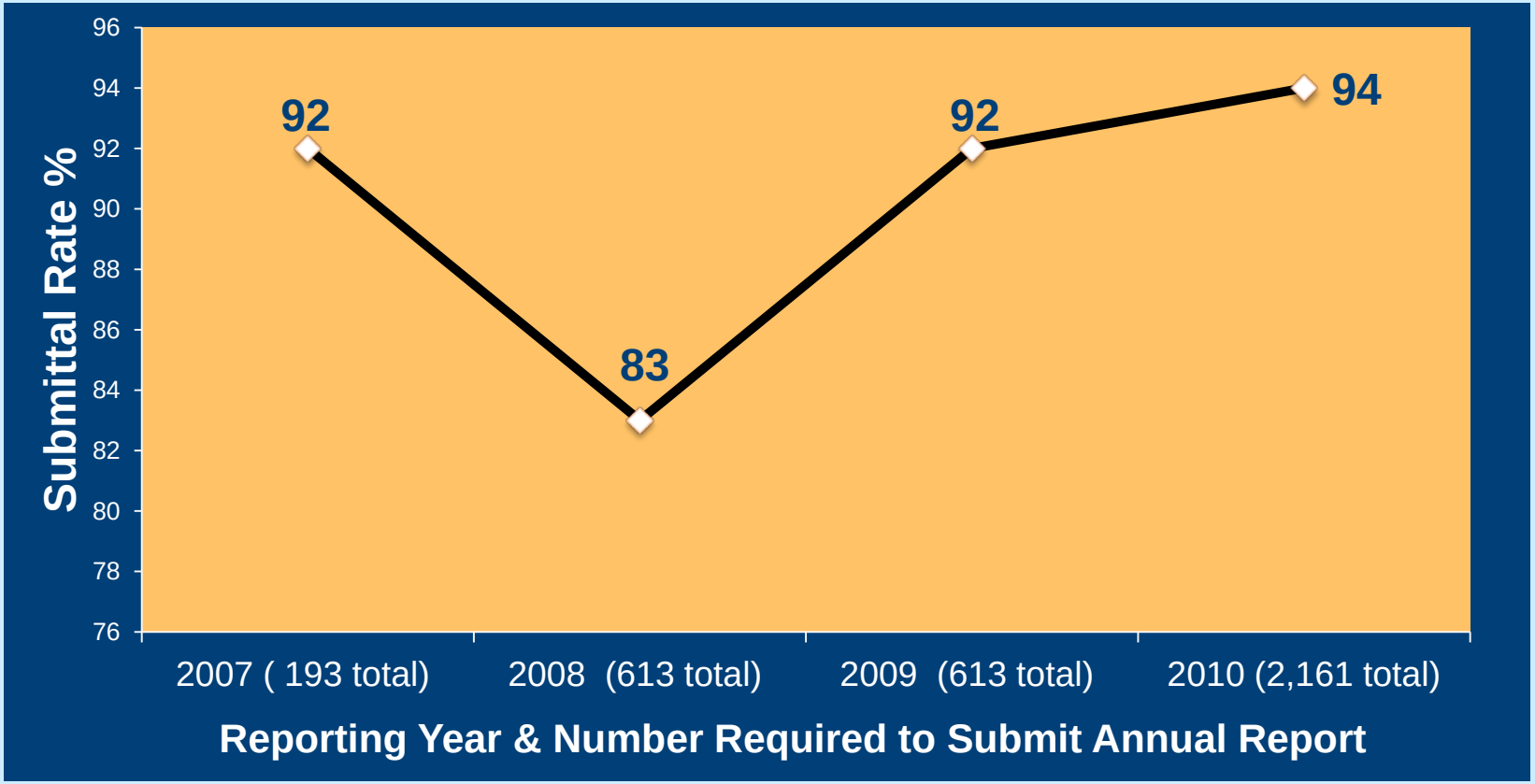
Online Annual WUE Reporting



Annual Reporting

- **Due July 1**
  - **Department of Health and customers**
- **Summary report:**
  - **Water pumped and purchased**
  - **Water consumed by customers**
  - **Meter installation progress**
  - **WUE goals and progress**

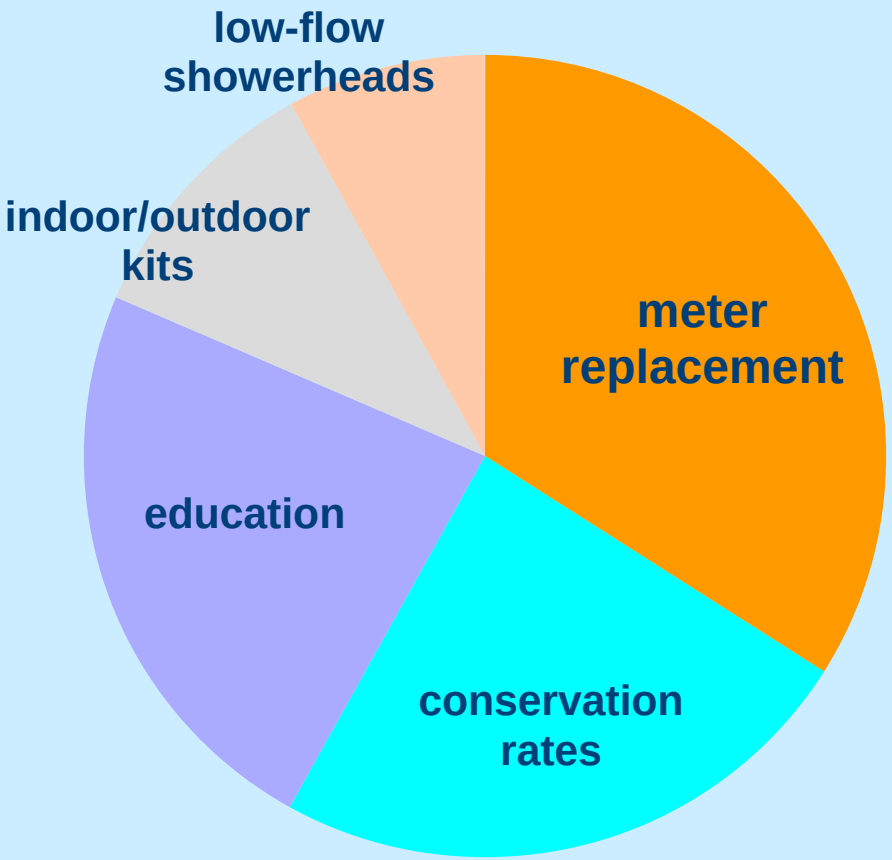
WUE Reporting Submittal Rate



WUE Goals

- **WUE Goals must have water savings and target time**
- **“Reduce average daily per capita use by 5% by 2015”**
- **Adopted through public forum**
  - **Select minimum number of measures to achieve goal**
  - **Link goal to WUE program**

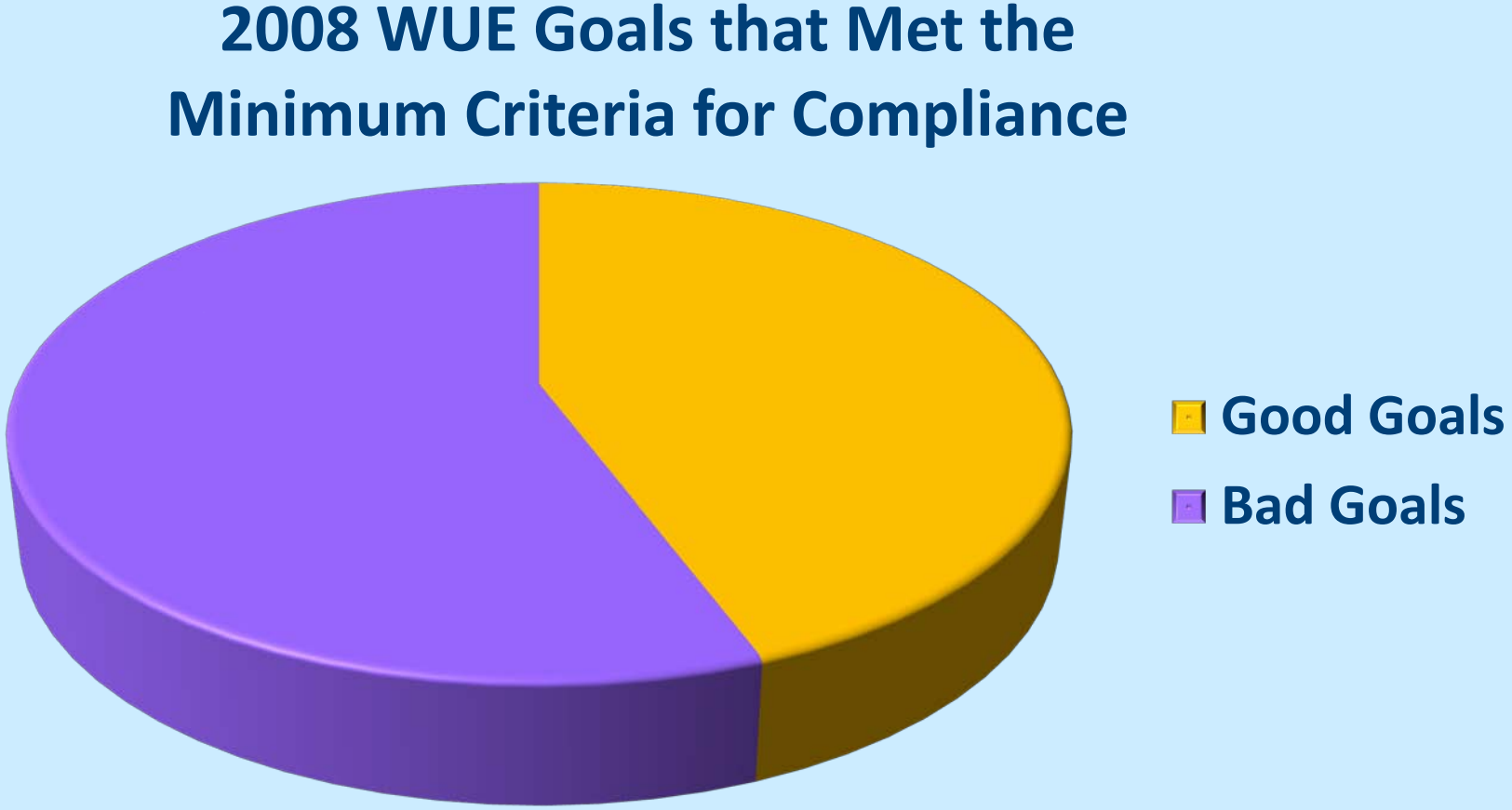
Top Five Measures Implemented



Confusion About Goals and Measures

- Many water systems have not set an acceptable goal
  - "Our goal is to educate our customers" is NOT a goal, it is a measure
- Measures = Actions
  - Education, conservation rates, low-flow showerheads , etc.
- Measures describe <u>how</u> to achieve goal, not what trying to achieve

2008 Goals: Good vs. Bad

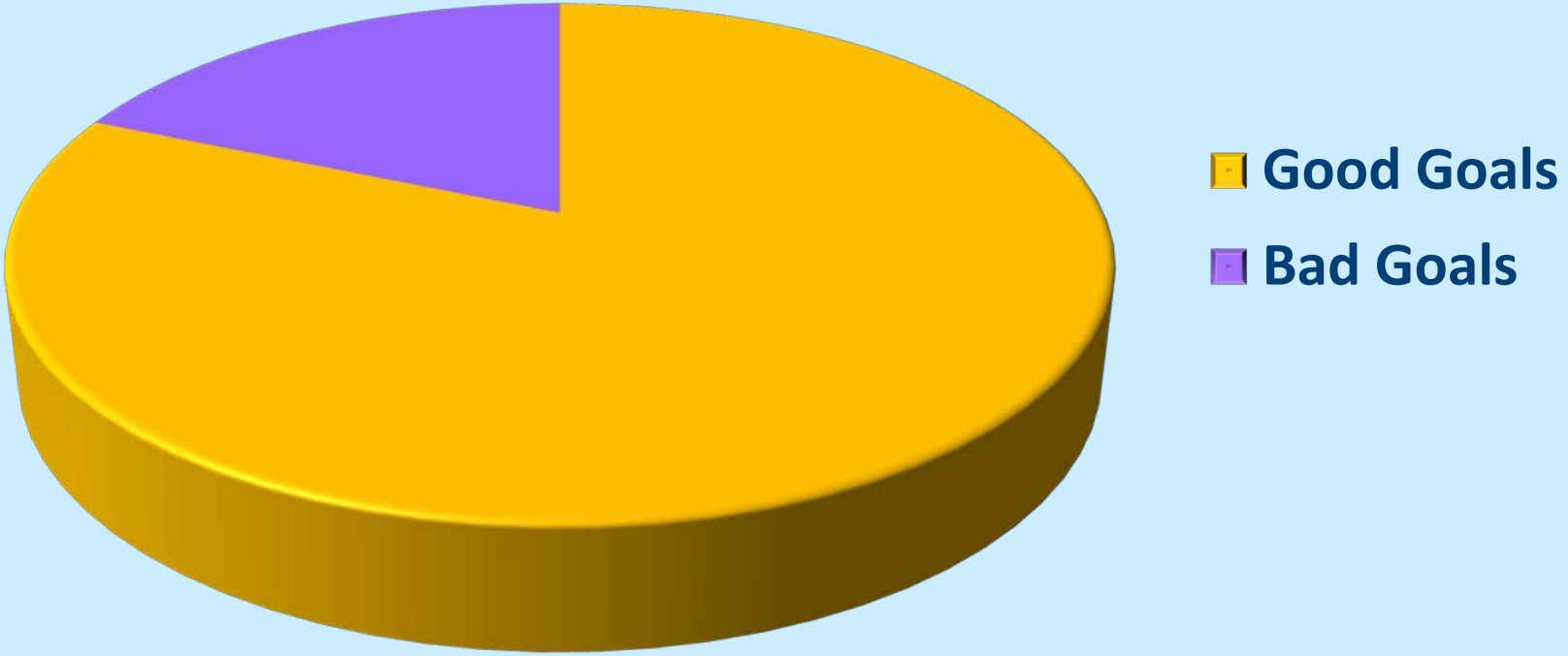


Compliance: Goal Setting

- "Soft" compliance approach—focus on technical assistance
- We review each WUE report to ensure a goal meets minimum criteria—if not, system receives compliance letter
- Very successful

2009 Goals: Good vs. Bad

2009 WUE Goals that Met the Minimum Criteria for Compliance



Common Demand Side Goals

- 1-2% reduction per capita or connection, per year over 6 years
- 5% seasonal reductions
  - Limit outdoor use/peak demand
  - Avoid need for new storage
    - 2003 Pacific Institute report: “Outdoor improvements can significantly reduce demand…up to 25-40% savings”

WUE Budgets Used to Reduce Leaks

- Limited budgets focus on fixing leaks
- Recovers lost revenue:
  - Kathy Small – 2008 WA State Operator of the Year
  - "The quickest way to boost revenue is to fix leaks"
- Have more control over fixing leaks than customer use behavior

Why Less Emphasis on Reducing Customer Use?

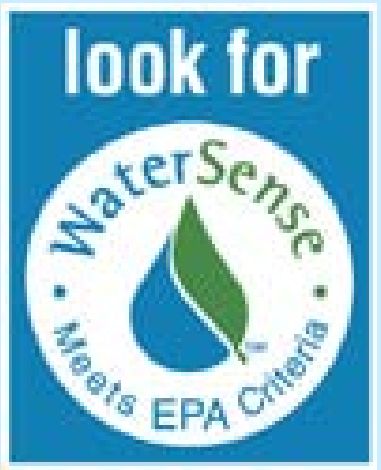
- Lack of good historical data
- Need time to determine if measures support the goal
- Hesitation to set the bar too high for fear of not reaching the goal:
  1. What will the state do?
  2. What will customers think?
  3. How will the boss react?

Water Research Foundation From 2010 Study

- #1 Reason for Consumers to Conserve Water
  a) Right thing to do
  b) Save money
  c) Concerns about environment
- Study also found
  - Customers think they're already doing all they can to conserve
  - Customers prefer bill inserts, TV ads

Education as the Only Measure to Achieve WUE Goal

- **Small systems like education because it's familiar and inexpensive**
  - **If only using education, then educate about hardware savings**
    - **Hardware savings: replace old inefficient devices/ appliances/fixtures with WaterSense labeled products**



WUE Goals—Conclusions

- Taking small steps to achieve demand side efficiency
- Need time to see the effect of customer conservation participation and effectiveness
- Need historical metered info
- Focus on implementing low-cost measures to achieve goals

WUE Public Forum—Goal Setting

- Familiar process for public systems, foreign to private systems
- A good idea, but has had little effect
- Few if any attendees or public comments received at public forums

Case Study: Sammamish Plateau Water and Sewer District

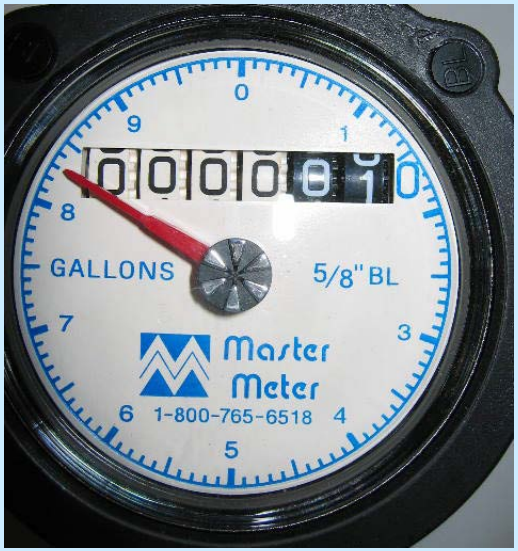
- 16,500 connections, 92% residential
- East King County
- Huge outreach to engage the public
  - Notification signs, informational flyers at City Issaquah and Sammamish, website, press release and advertisements in two local newspapers
  - Extended start time of public meeting and comment period by two weeks

WUE Public Forum—Conclusions

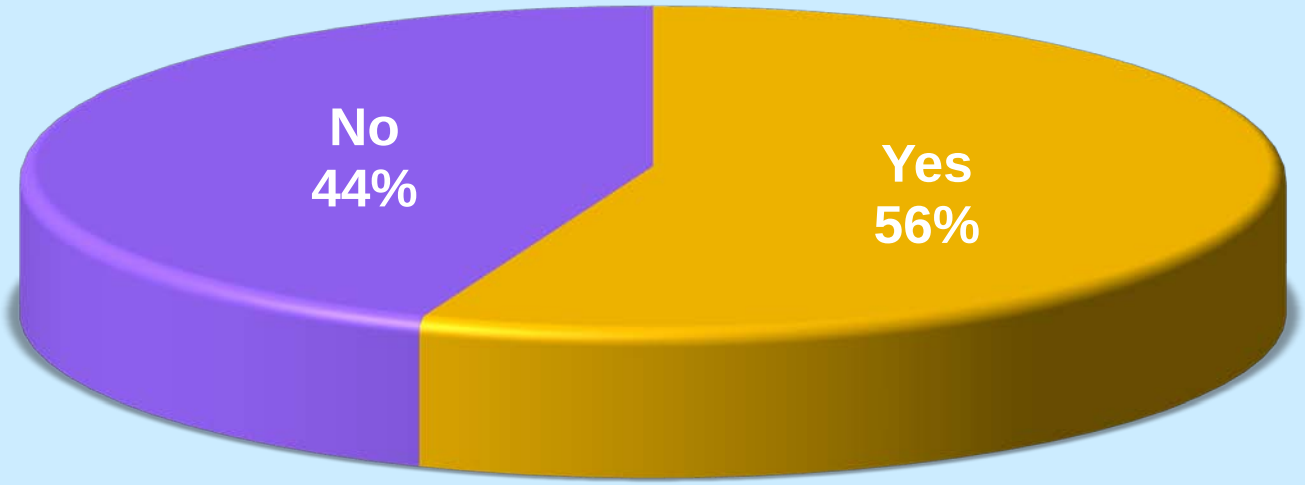
- Public not participating in a dialogue about WUE goals
- Anticipated more involvement by neighboring water users and environmental groups
- More public participation if water shortage, emergency, or drought

Source and Service Meters

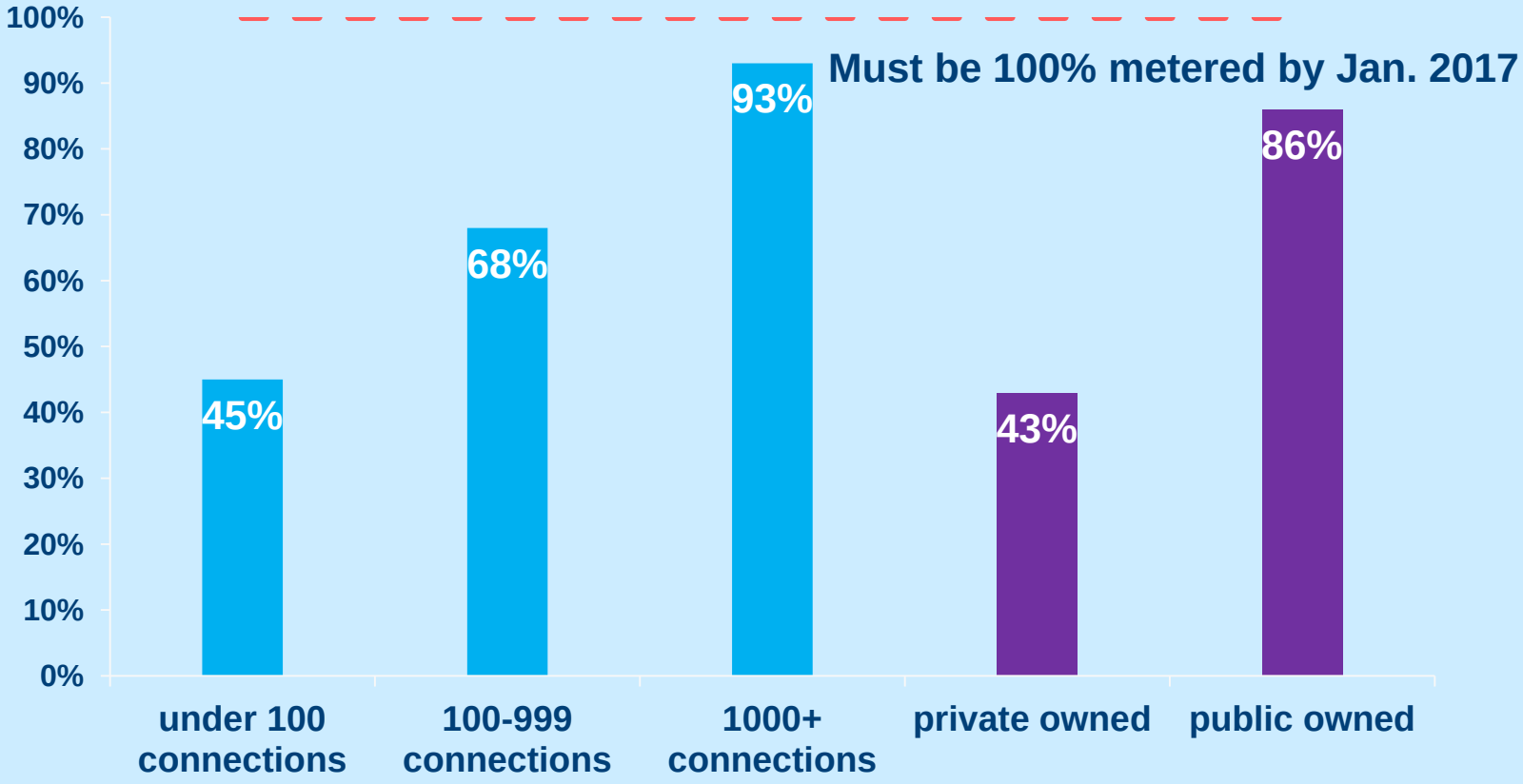
- Source meters required now
- Service meters required by January 2017



Fully Metered Water Systems in 2010



Fully Metered Water Systems by Size/Ownership in 2010

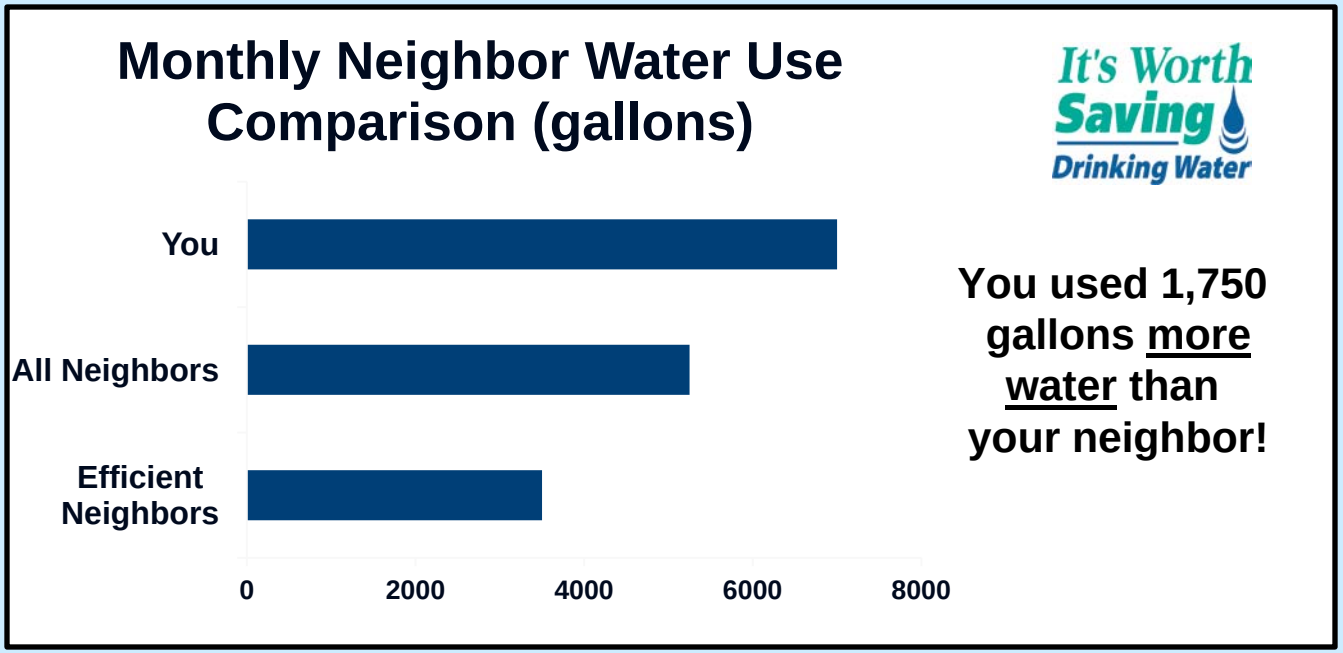


Homeowner's Associations: Using Flat Rates

- Meters will help you understand what's efficient vs. inefficient
- Three things to do if don't change rates:
  1. Read meters monthly to know usage patterns; need that info to set goals
  2. Establish "excess-use" fee for high volume users, fairness issue
     - High-impact rate, low-impact rate

Homeowner's Associations: Using Flat Rates

3. Compare each customer's water usage with neighbors, send them this info in a "consumption report"



Investments in Automatic Meter Reading (AMR)

- **Benefits of AMR/AMI**
  - **Increase revenue without increasing rates**
  - **Reduce apparent—more accurate authorized consumption and reduces annual leakage**
  - **Read meters faster and easier**

Investments in Advanced Metering Infrastructure (AMI)

- **Benefits of AMI**
  - **Hourly readings for all connections**
  - **Identify largest users and customer leaks (real-time)**
  - **Provide usage information to your customer's fingertips**
  - **Use data to predict daily/future demand and set WUE goals**

Meters—Conclusions

- Meters are your friends
- Not embraced by unmetered systems
  - Mainly due to customer's fear of being charged for usage once meter installed
- Meters are one of greatest tools to promote WUE and manage water use

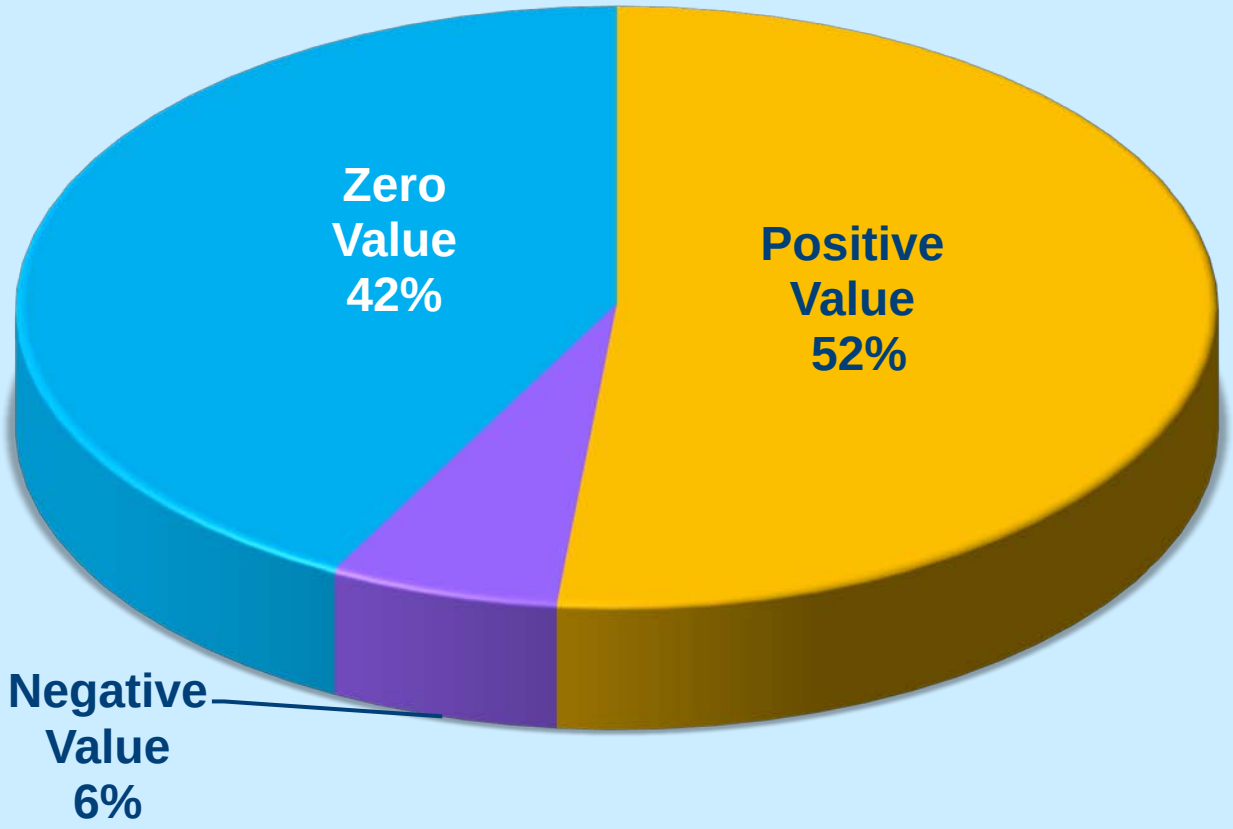
Reducing Leaks

- 10% leakage standard
- 3-year average
- Water loss control action plan if exceed 10%
- Real and apparent losses contribute to total losses

The Story on Leaks: Apparent Losses

- **Poor data collection/equipment skew annual leakage percentage**
- **Apparent losses**
  - **Old inaccurate meters (source, service, intertie)**
  - **Unreliable or lost data (change in personnel)**
  - **Inconsistent data collection or not at all**
  - **Broken meters**
  - **Billing software glitches**

Reported Leakage Values in 2010



Case Study: City of Bingen

- Population = 720 residential
- Klickitat County, shore of Columbia River
- 3-year average water loss = 43.8%
- 39% in 2008, 54% in 2010
  - Two newspaper articles
  - City council: “unacceptable”

Case Study: City of Bingen (cont.)

- Industrial customer oversight
  - Meter multiplier of 1,000 not factored in for almost 7 years
  - Double whammy
    - High leakage percent and lost revenue
- Actions taken
  - Meter accuracy testing, zone meters, new 6” and 8”meters at port, ERWoW leak survey, industrial customer water audits

Case Study: Hangman Creek Watershed, Spokane County

- Watershed Leak Detection survey for seven small towns and districts
  - Spokane Co. Conservation District
  - Dept. of Ecology funds
- Average of 20% water loss
- Survey found very few leaks
- Water loss due to:
  - Broken and unreadable meters
  - Used funds to replace meters

Case Study: City of Mercer Island

- Population = 22,700
- King County, shore of Lake Washington
- Purchase 100% water from Seattle
- 3-year average = 7.9%
  - Down from 10.4 to 3.0% in 2009

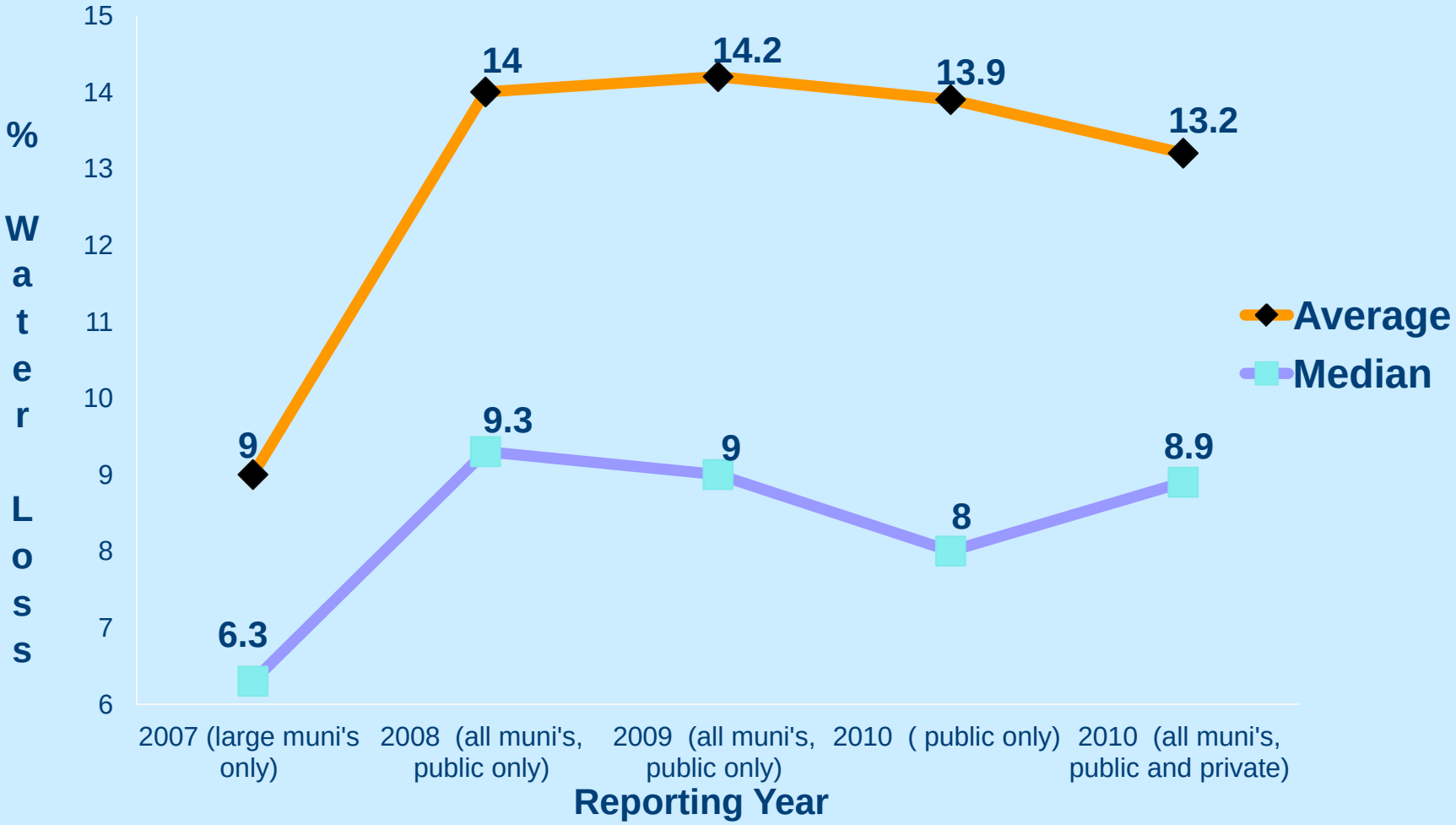
Case Study: City of Mercer Island (cont.)

- **2010, Water Loss = -1.2%**
  - **Possibly due to intertie meter with Seattle, not confirmed**
    - **Who pays for meter calibration?**
    - **How frequent?**
  - **Replaced six (12-16”) meters ingoing/outgoing storage tank, $50K**

Case Study: City of Mercer Island (cont.)

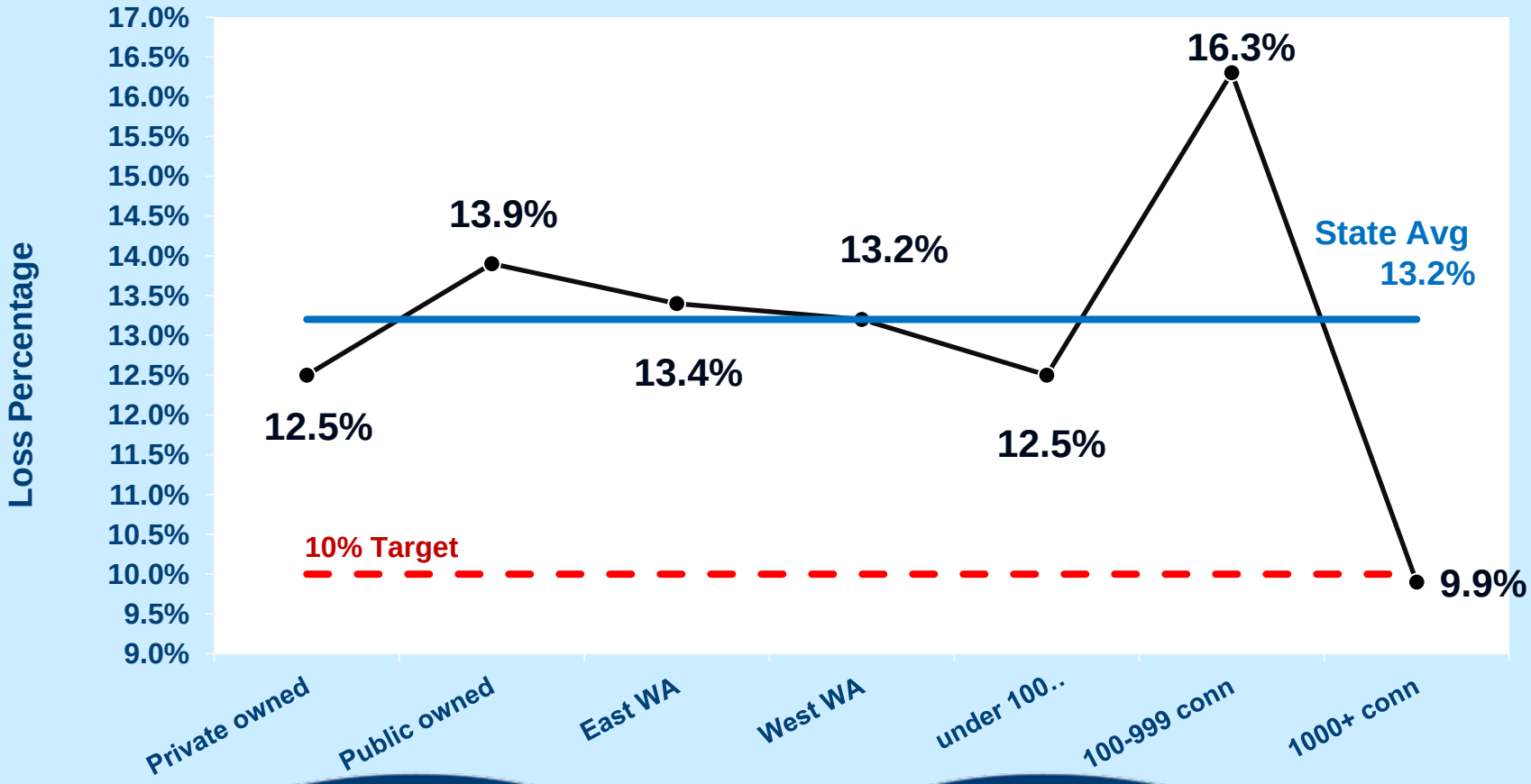
- **Resources, troubleshooting, resulting frustration when looking at annual total**
  - **Time lag to show WUE progress**
  - **Justify cost to decision makers**
    - **What have WUE investments accomplished?**
    - **Are you sure looking in right places?**

Statewide Annual Leakage Performance

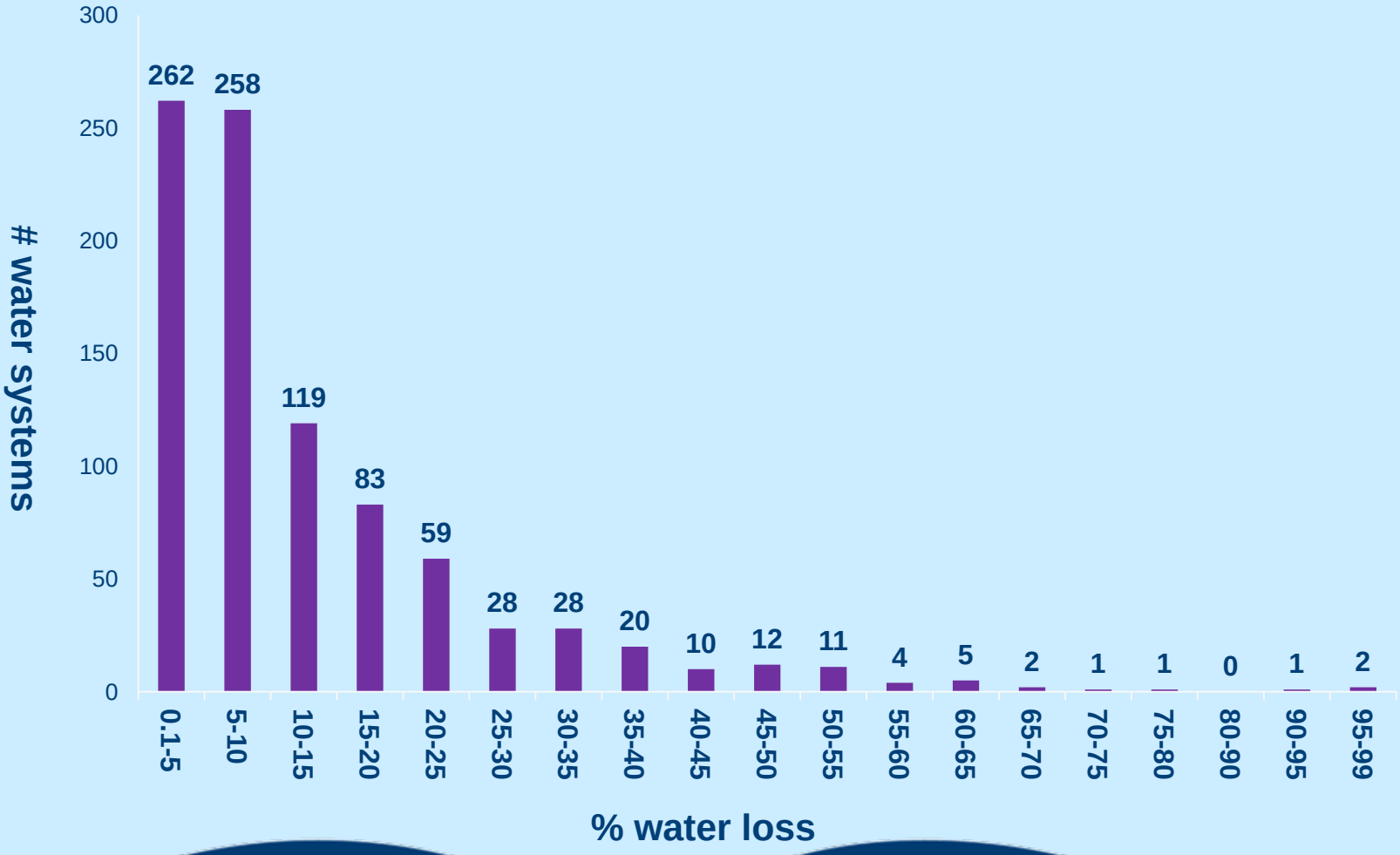


Analysis of Water Loss, 2010

n=906; range 0.1 - 98.7%; represents 45% of reports submitted



Range of Leakage Values



WUE Programs

- **WUE Programs Submitted with Planning Document**
  - **6-year cycle for large and expanding systems**
  - **Since 2007, we have approved about 200 (10%) WUE Programs**
  - ***New this year:*** **DWSRF loans require an approved plan (WUE program) before you can even apply for funding dollars**

WUE Programs: Challenges for Smaller Water Systems

- Conceptual leap
- Little resources devoted to effort
- A lot of unknowns
  - Little historical data make it difficult to predict savings
- Conservation = educating their customers, nothing more

WUE Program: City of Yakima

- Population = 65,000
- Goal: Maintain at 74.9 gal/person/day
- Measures
  - Rates (declining block to uniform)
  - Water use history on bills
  - WaterSense education
  - Soil moisture sensors in public green spaces

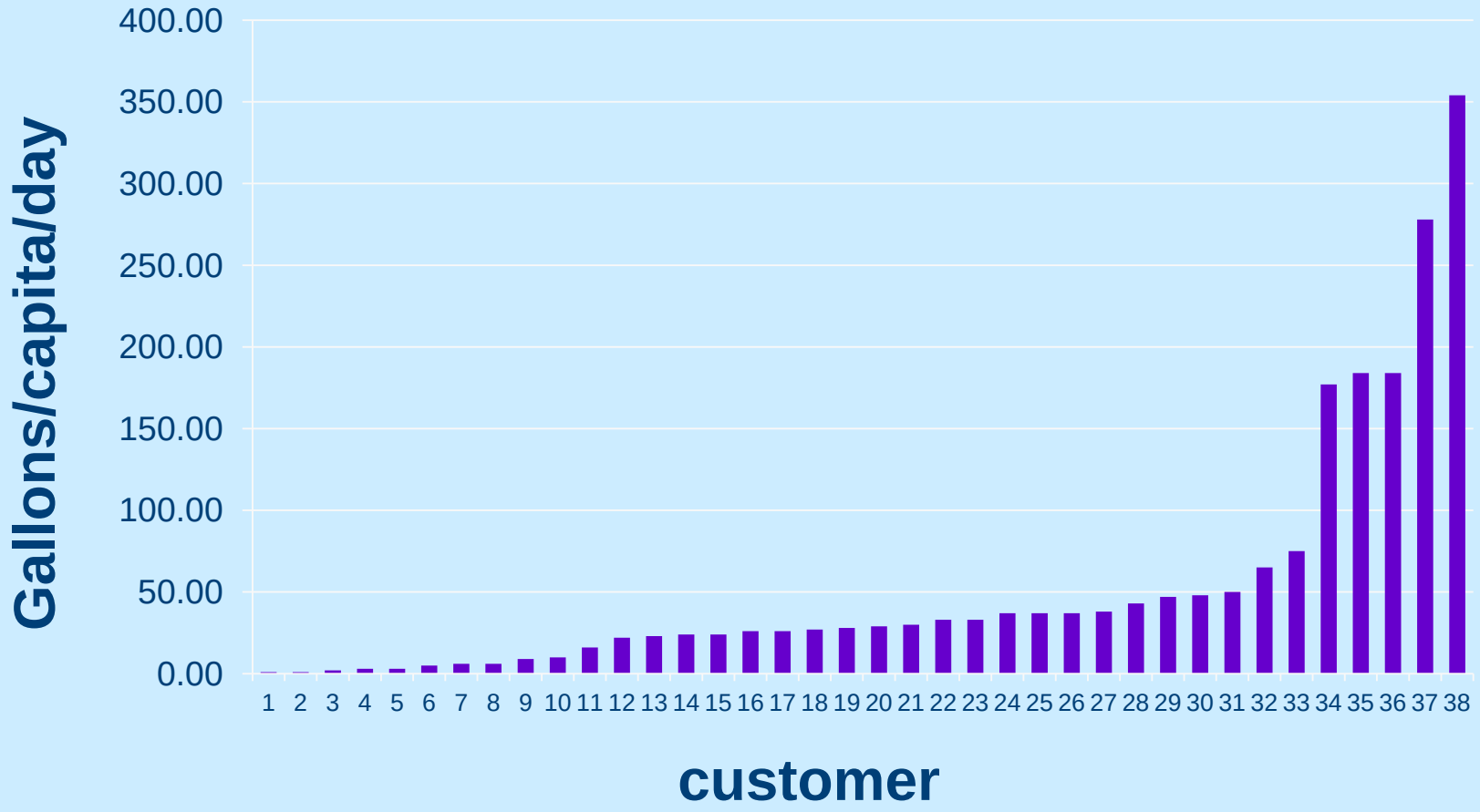
Yakima's Meter Replacement Program

- Installing AMI meters in 2012
- Using AMI technology:
  - Daily monitoring of leaks
  - Online customer access to daily water use
  - Give customers goal setting option, warning when goal exceeded

WUE Program:
Clear Lake Water District

- Pierce County
- Population = 325 summer, 275 winter
- Enlisted help of Partnership for Water Conservation to develop WUE program
- WUE Objective: target customers with very high water use in summer

Clear Lake: Target the High End Users in Summer



Clear Lake WUE Program

- **Two-year Goal: Reduce summer use by 0.5% by 2012**
  - **From 83.3 to 81.7 gal/person/day**
  - **Average 25,000 gal reduction/year**
- **Measures**
  - **Seasonal rates**
  - **Bi-monthly education**
    - **Outdoor tips in summer, Indoor tips in winter**

What Do We Do With WUE Information

- Link it to our Capacity Program
  - Technical, Managerial, Financial capabilities of water systems
  - Determine what type of systems are having trouble
- Link it to our Planning Program
  - Focus WUE planning efforts
    - Likelihood of water shortage
    - Declining water supplies

Ensuring Compliance

- Approve WUE Program in planning document
- Ensuring WUE Reports submitted
- Ensure meters get installed
- Ensure WUE goals meet minimum requirements every 6 years
- Ensure water loss control plans get completed if leaks over 10%

How We Enforce

- **Since 2008:**
  - **Reporting reminder notices to over 3,500 water systems**
  - **766 Fail to Report notices**
  - **423 Fail to Establish Goal notices**
  - **More aggressive for repeat violators**
  - **Resulted in high compliance rates**

Making Sense of Water Loss Volume vs. Percentage

- **Considerations: system size, water supply situation, effect on the water resource, volume of water loss**

	Percent Water Loss	Volume Water Loss	# Homes Served	County
Water System A	41.4%	**166 MG**	1,250	Spokane
Water System B	39.8%	**1 MG**	21	Thurston

5-Year Conclusions

- New accountability for muni's that didn't exist before the law has changed attitudes about conservation
- Sense of responsibility to comply with the law (10% leakage)
- Increased level of awareness about waste and water use in general

5-Year Conclusions (cont.)

- Better data collection will lead to better resource management
  - Initial focus on apparent losses
- Understanding customer use (meters) will lead to more meaningful and effective WUE goals and programs

For More Information

- **Mike Dexel**

  WUE Program Manager
  360-236-3154
  michael.dexel@doh.wa.gov

Questions & Comments