

IMPROVING SYSTEM EFFICIENCY BEGINNING WITH METERS

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J·U·B ENGINEERS, INC.



**THE
LANGDON
GROUP**



**GATEWAY
MAPPING
INC.**

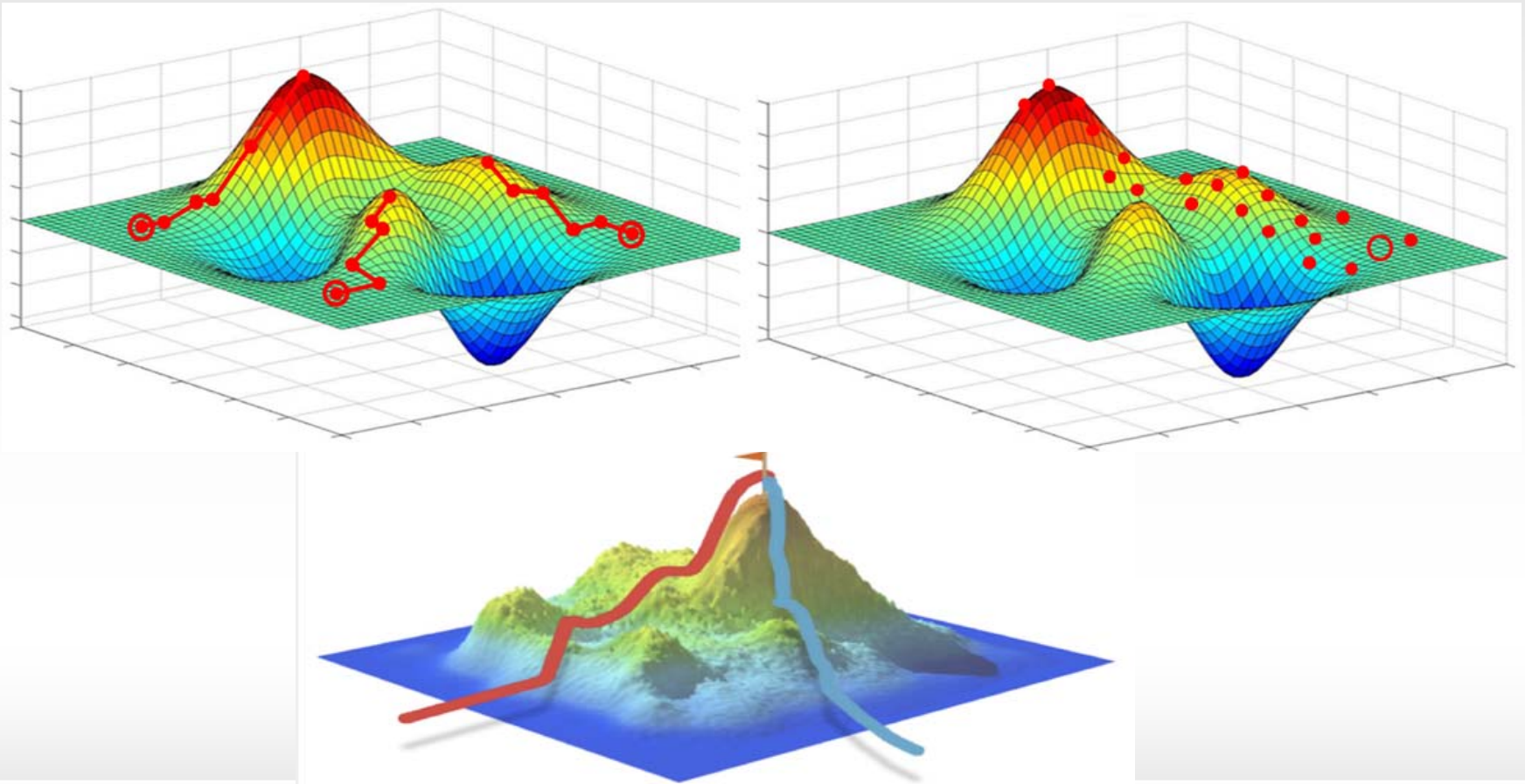
OTHER J-U-B COMPANIES

SCOPE

- System Efficiency Defined
- What Do We Need to be Efficient?
- Metering
- Next Steps
- Cast Studies
- Conclusions & Questions

SYSTEM EFFICIENCY

- Engineer's Definition



SYSTEM EFFICIENCY

- Operator Definition



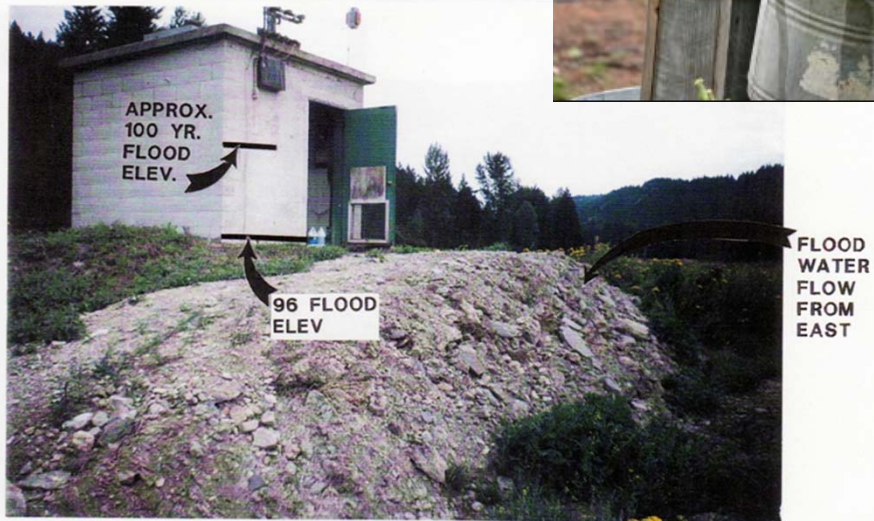
SYSTEM EFFICIENCY

- Customer Definition



SYSTEM EFFICIENCY

- What is NOT System Efficiency?



SYSTEM EFFICIENCY

- What is NOT System Efficiency?



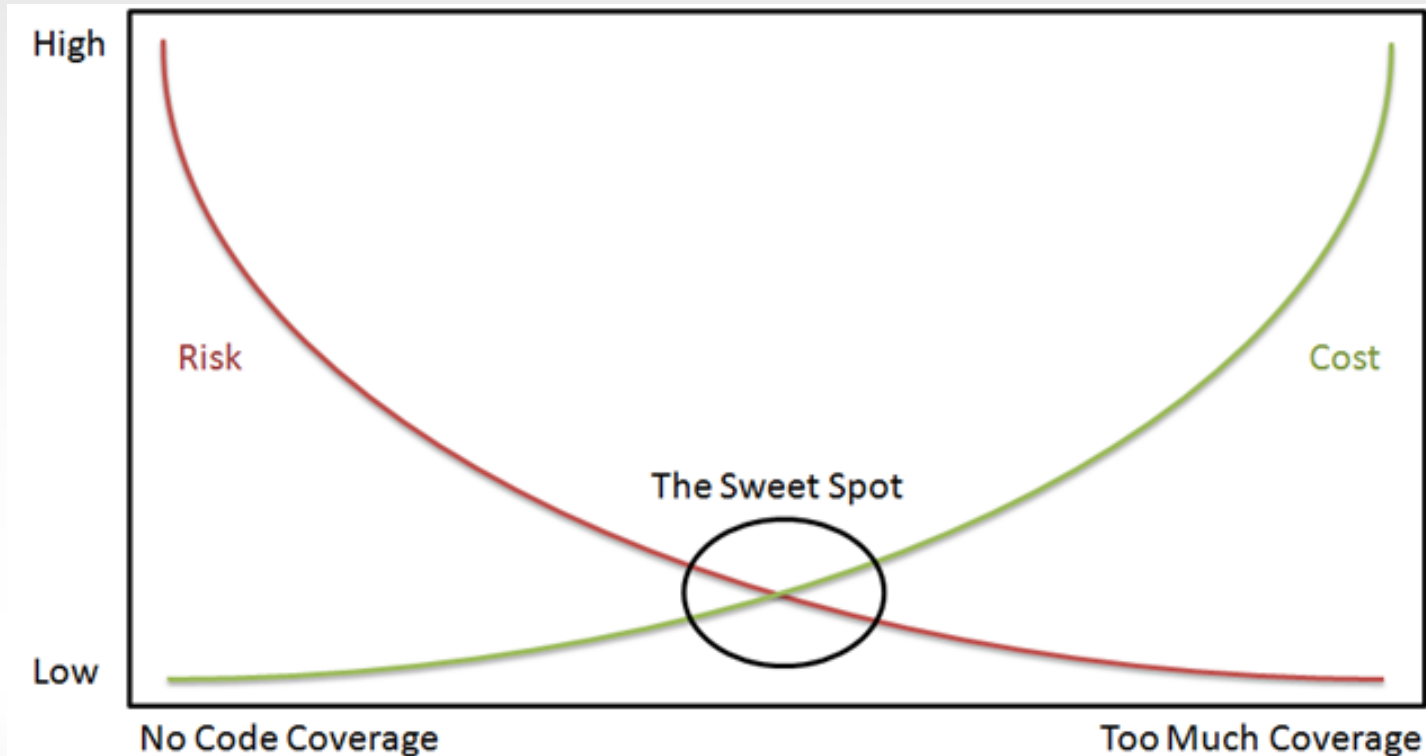
SYSTEM EFFICIENCY

- Reliable, Sustainable & Affordable:
 - Water Supply
 - Water Storage
 - Water Distribution
 - Water Metering



SYSTEM EFFICIENCY

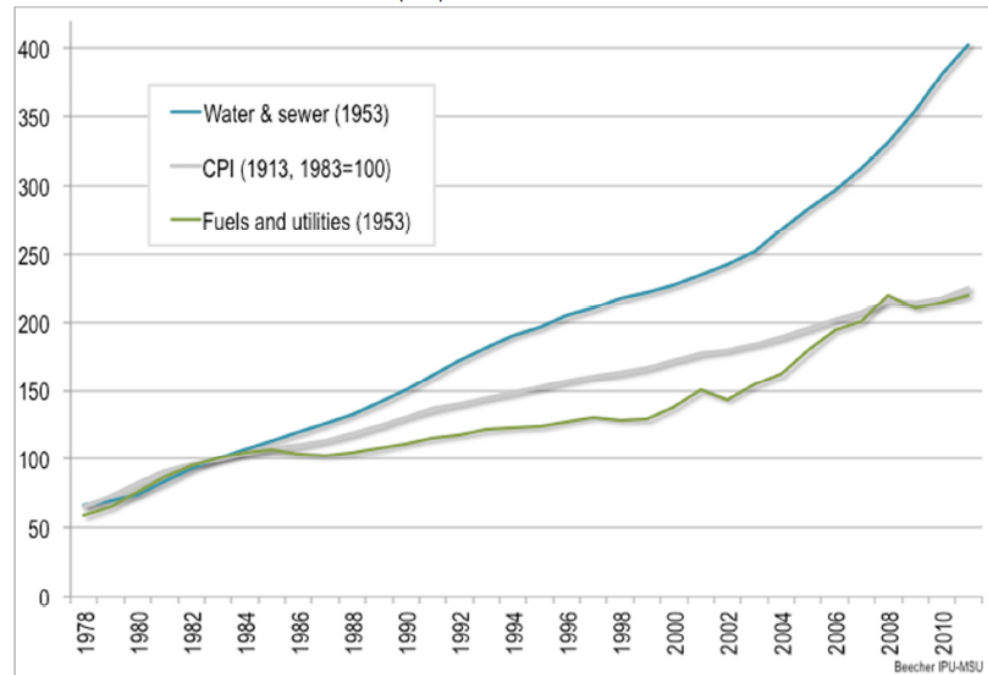
- Ongoing Search for the Sweet Spot



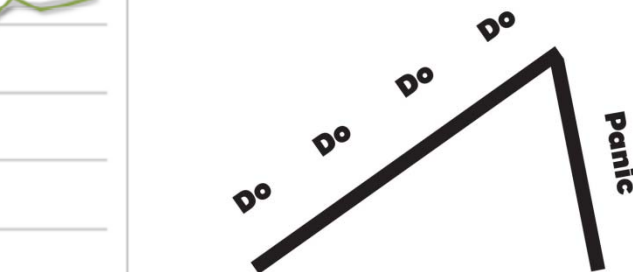
SYSTEM EFFICIENCY

- Why? Because Water Costs Inflation is HIGH

Exhibit 2. Trends in Consumer Prices (CPI) for Water and Sewer Maintenance and Utilities

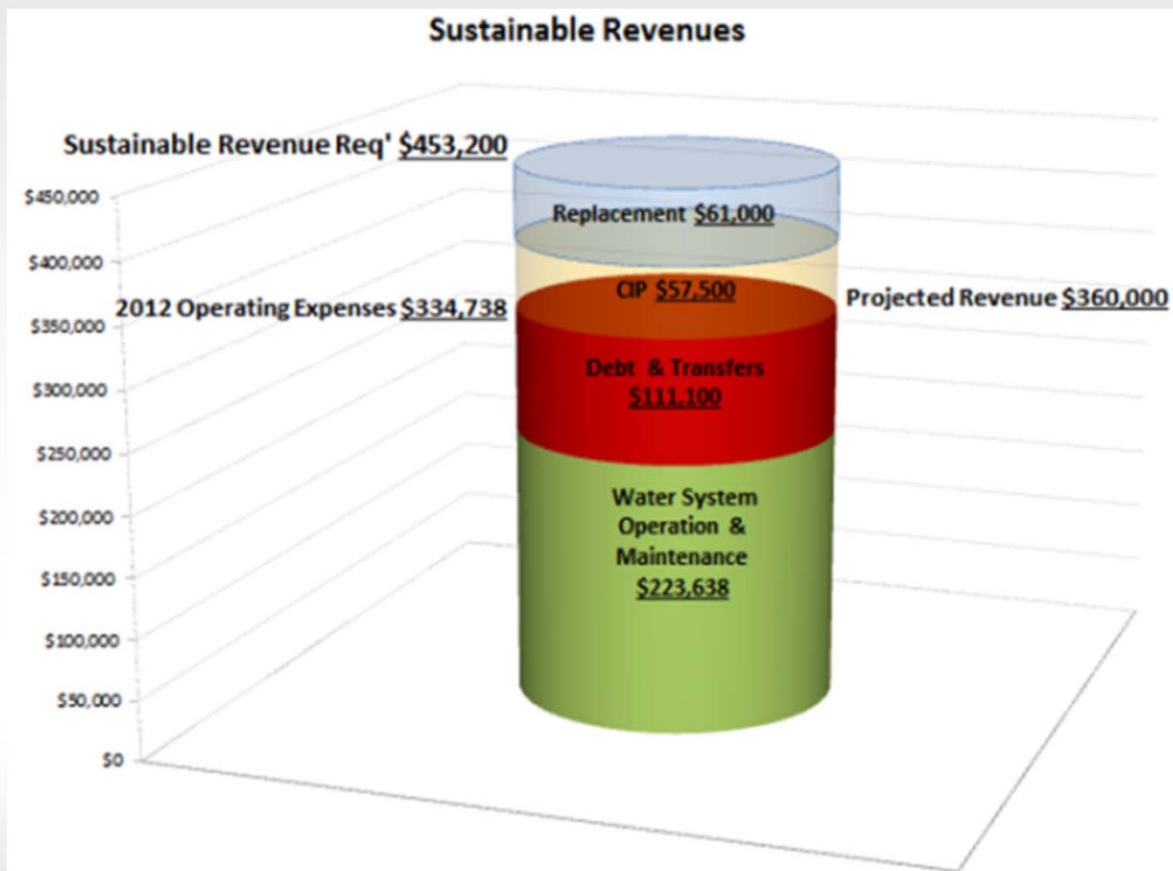


Source of data: Bureau of Labor Statistics.



SYSTEM EFFICIENCY

- Constant Struggle for Low Rates



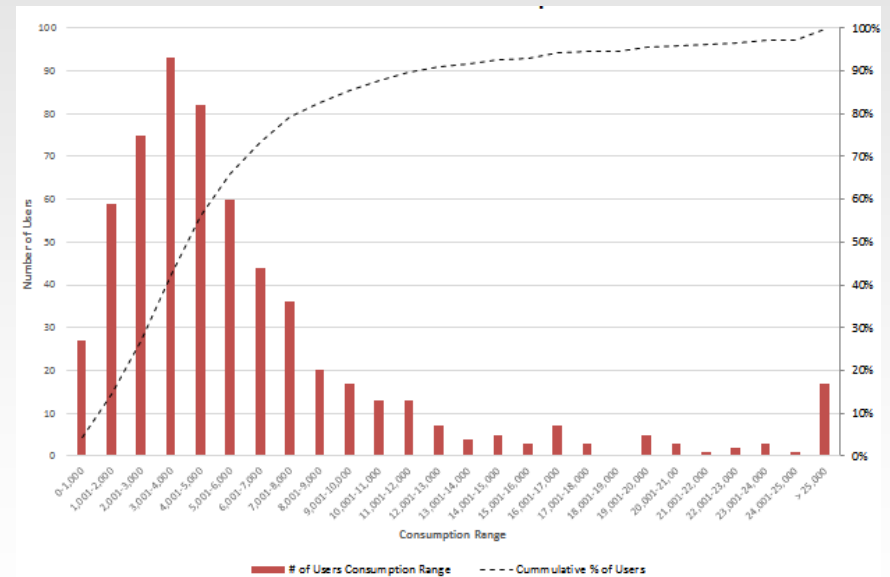
How?

- Revenue and funding
- Data collection
- Planning
- Implementation



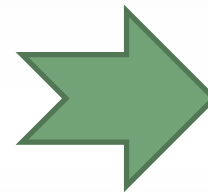
REVENUE METHODS

■ Required Rates



$\$401,338 / 800 \text{ meters} / 12 =$

\$47 per Month

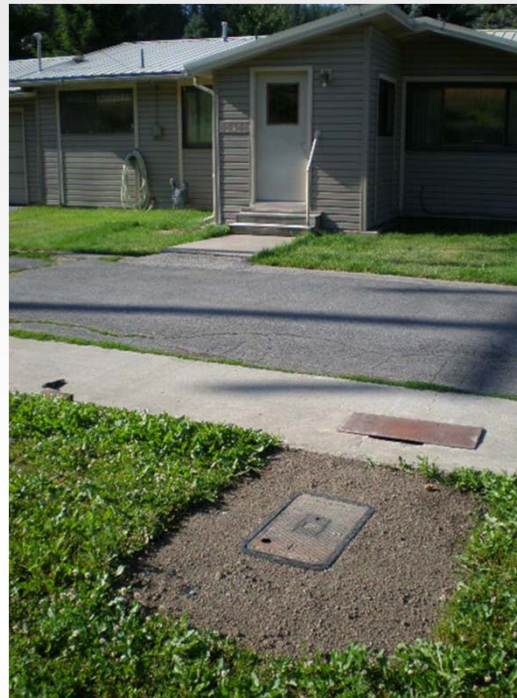


Base Rate = \$40 / Mo

Overage = \$/ gallon over
8,000 gallons

DATA COLLECTION

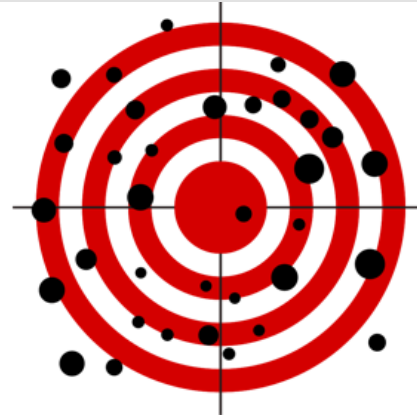
- DATA COLLECTION: METERS



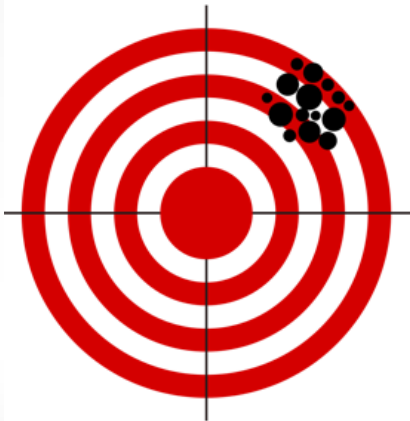
ACCURATE & RELIABLE DATA



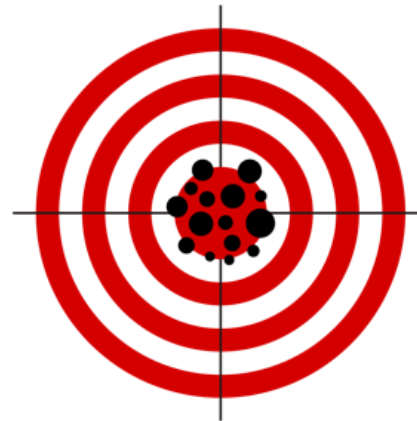
Unreliable & Unvalid



Unreliable, But Valid

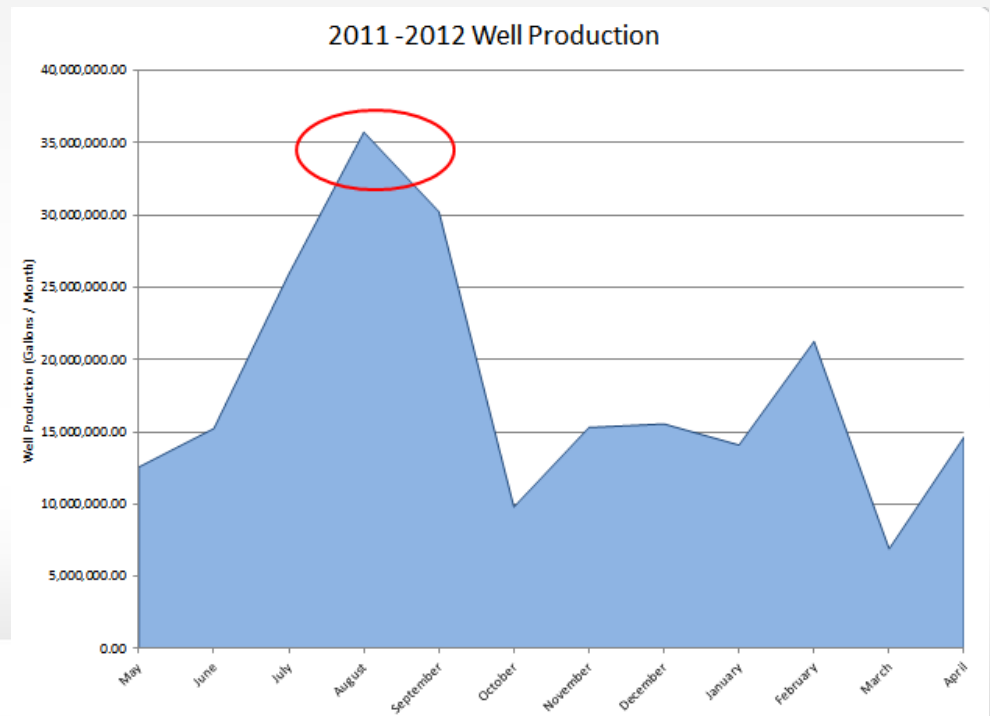
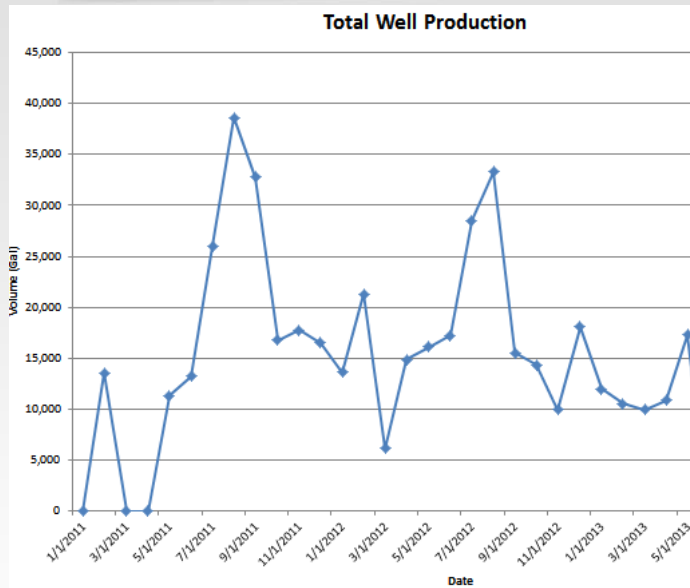


Reliable, Not Valid



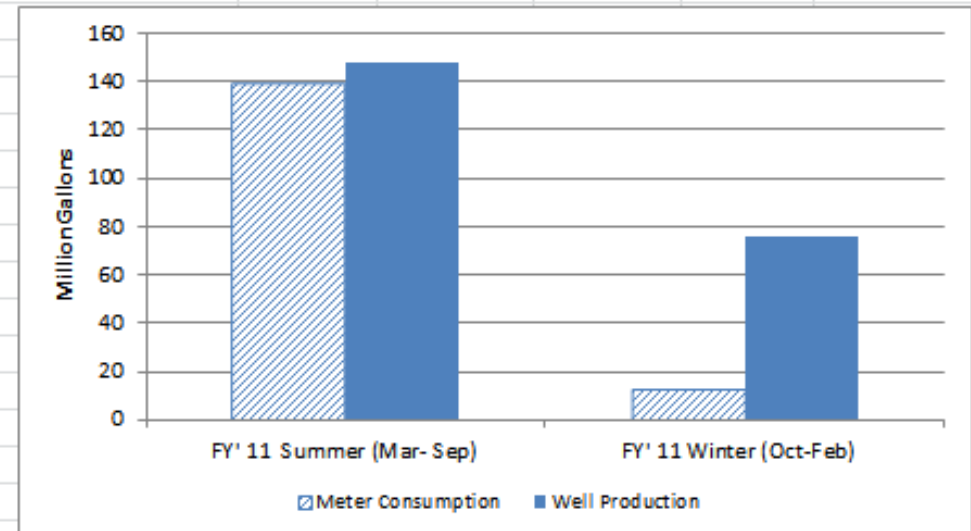
Both Reliable & Valid

WELL PRODUCTION DATA



METER DATA

FY' 2011	Meter Consumption (Gallons) ^{A,B}	Well Production (Gallons) ^C
July	25,275,877	25,919,000
August	0	35,736,000
September	48,240,614	30,227,000
October	0	9809760
November	4946292.12	15307000
December	0	15552000
January	8104258.36	14090000
February	0	21257000
March	34,822,317	6,908,000
April	0	14,653,000
May	12,742,419	16,151,000
June	17,754,304	18,750,000



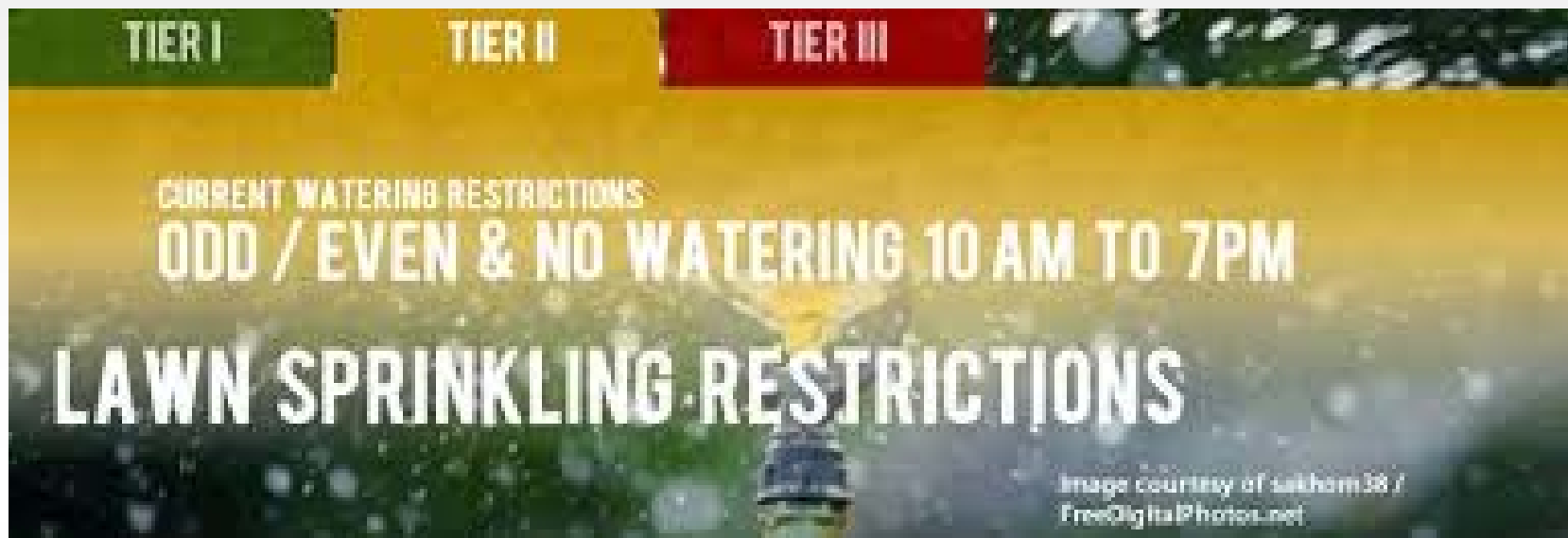
A Residential meter reading is not included during winter (from Oct - Feb), only commercial meters are read during this time

B Note there is a timing issue of when meters are read and when well production is recorded meters are typically recorded 3rd week of the month and billed for previous time span at the beginnir

C From City Records

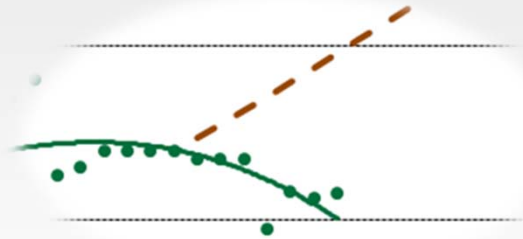
IMPACTS OF METER DATA

- Optimize Peak Day Demands by Conservation Methods *BEFORE* Projects or System Upgrades



IMPACTS OF METER DATA

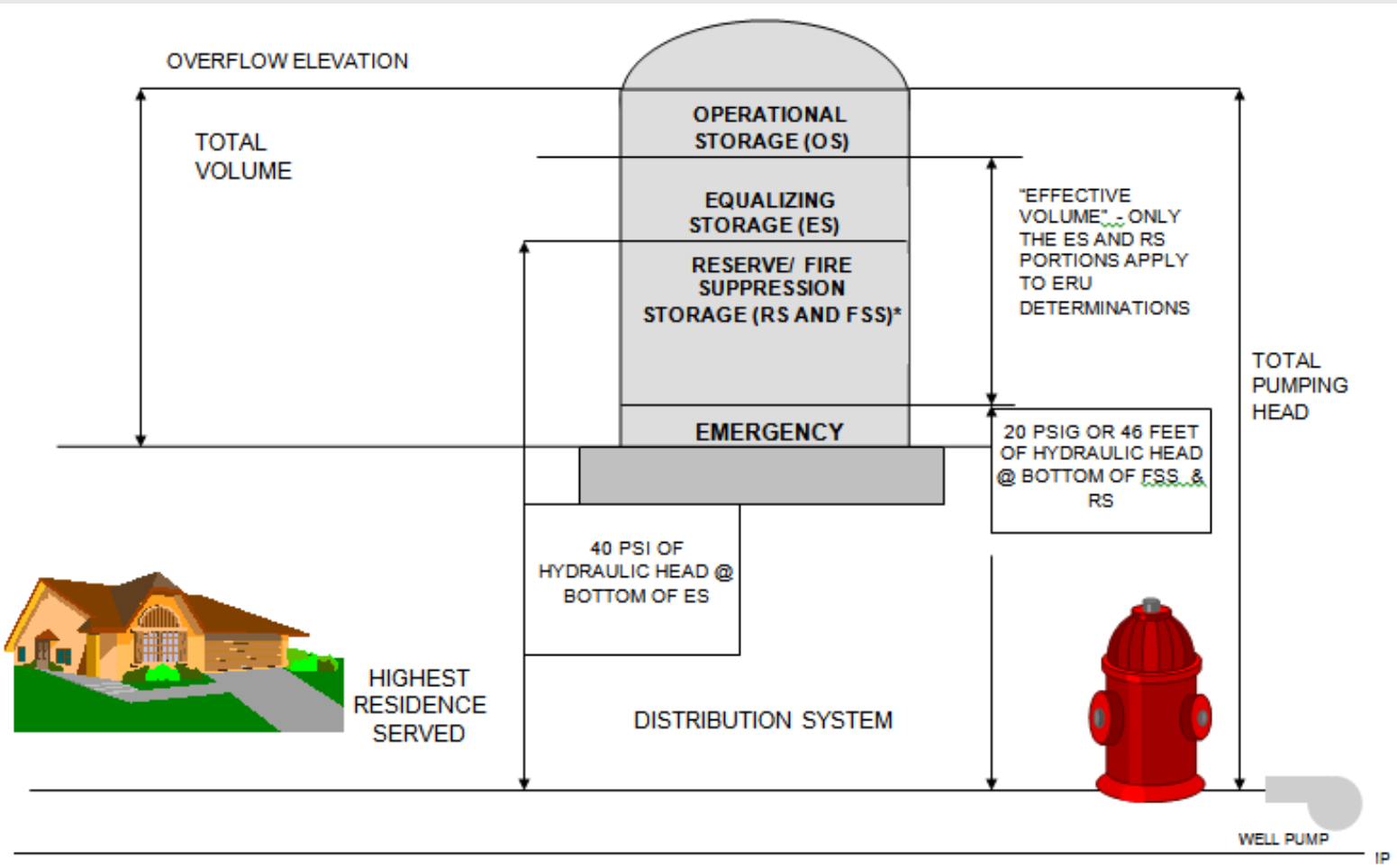
- **Improve Planning Accuracy!**



- 5 Years of Accurate Data to Determine Peak Demands to Size & Time Improvements

SIZING SYSTEM COMPONENTS

- Peak Day & Peak Hour Demands



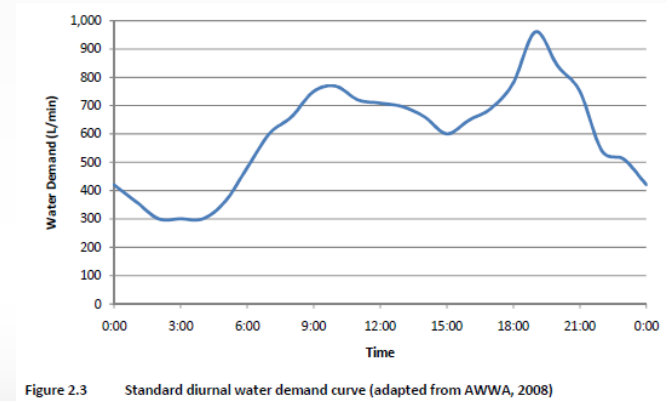
ENGINEERS CALCULATE!



Table 2.6 Summary of peaking factor calculation methods

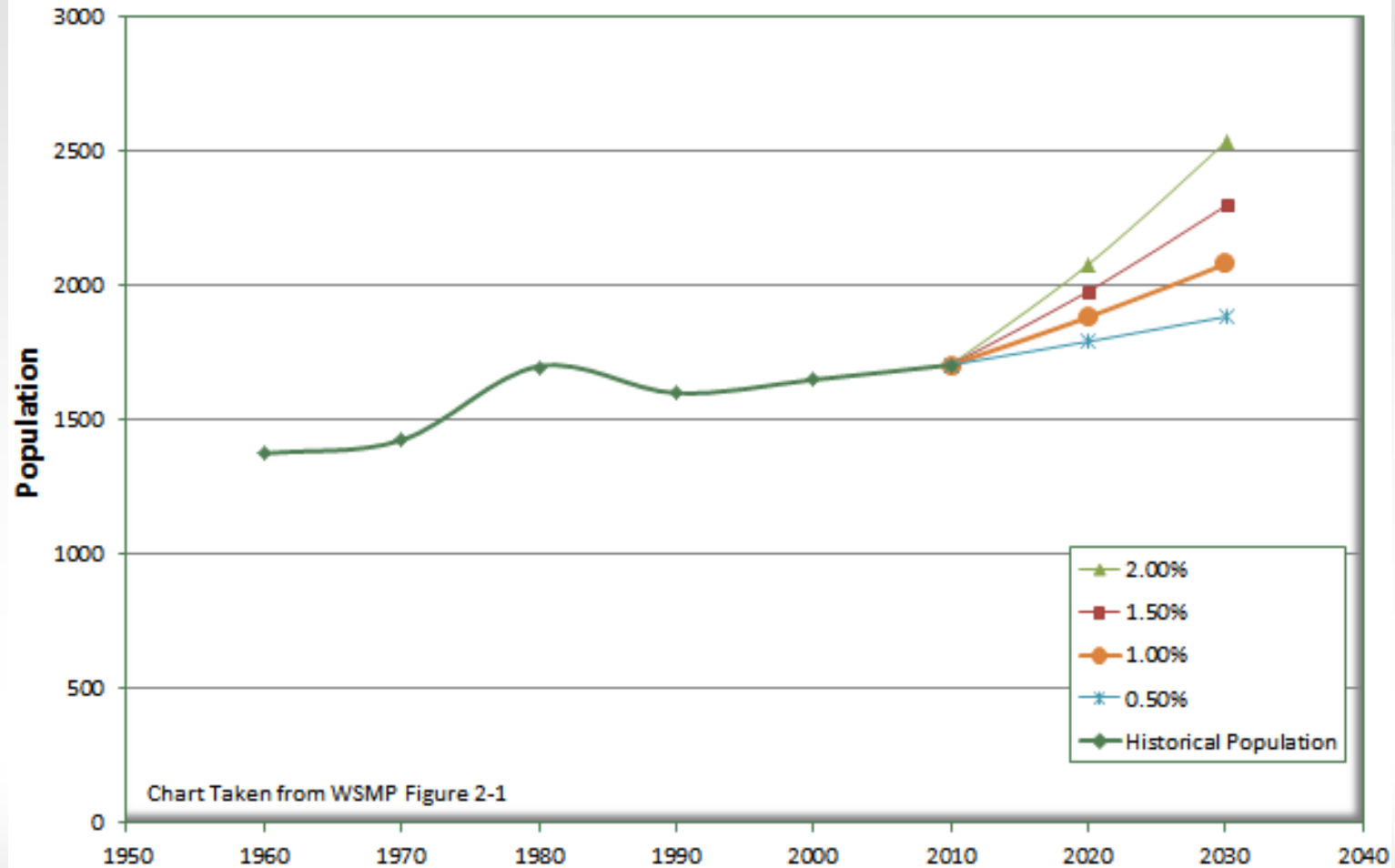
Method	Equation	Population Limits
MOE Guidelines (2008)	Empirical	None
Harmon Formula (1918)	$f_h = \frac{18 + \sqrt{P/1000}}{4 + \sqrt{P/1000}}$	$1,000 \leq P \leq 1,000,000$
PRP-Gumbel (2005) (indoor use only)	$f_h = 2.5 + \frac{2.18}{\sqrt{P/1000}}$	$1,000 \leq P \leq 25,000$
AWWA (2004)	$f_h = \left(\frac{1095.31}{q}\right) p^{0.4}$	$650 \leq P \leq 1,675$
DVGW (2007)	$f_h = 18.1(p^{-0.1682})$	Unknown

*P = population; q = water demand per 1,000 people



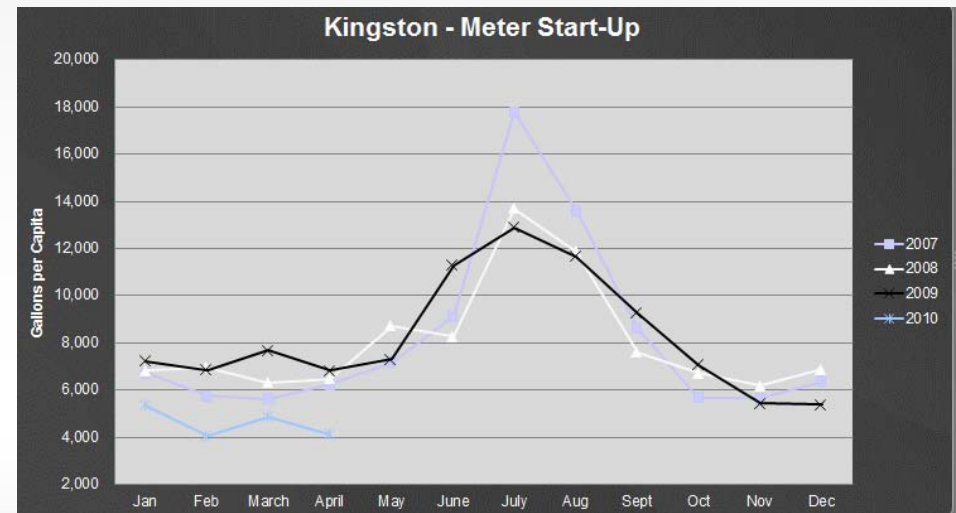
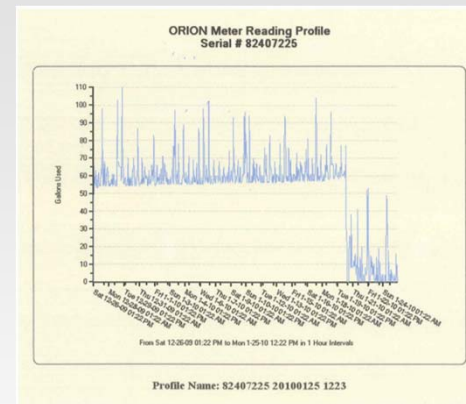
ENGINEERS PREDICT!

Waster System Master Plan - Figure 2-1

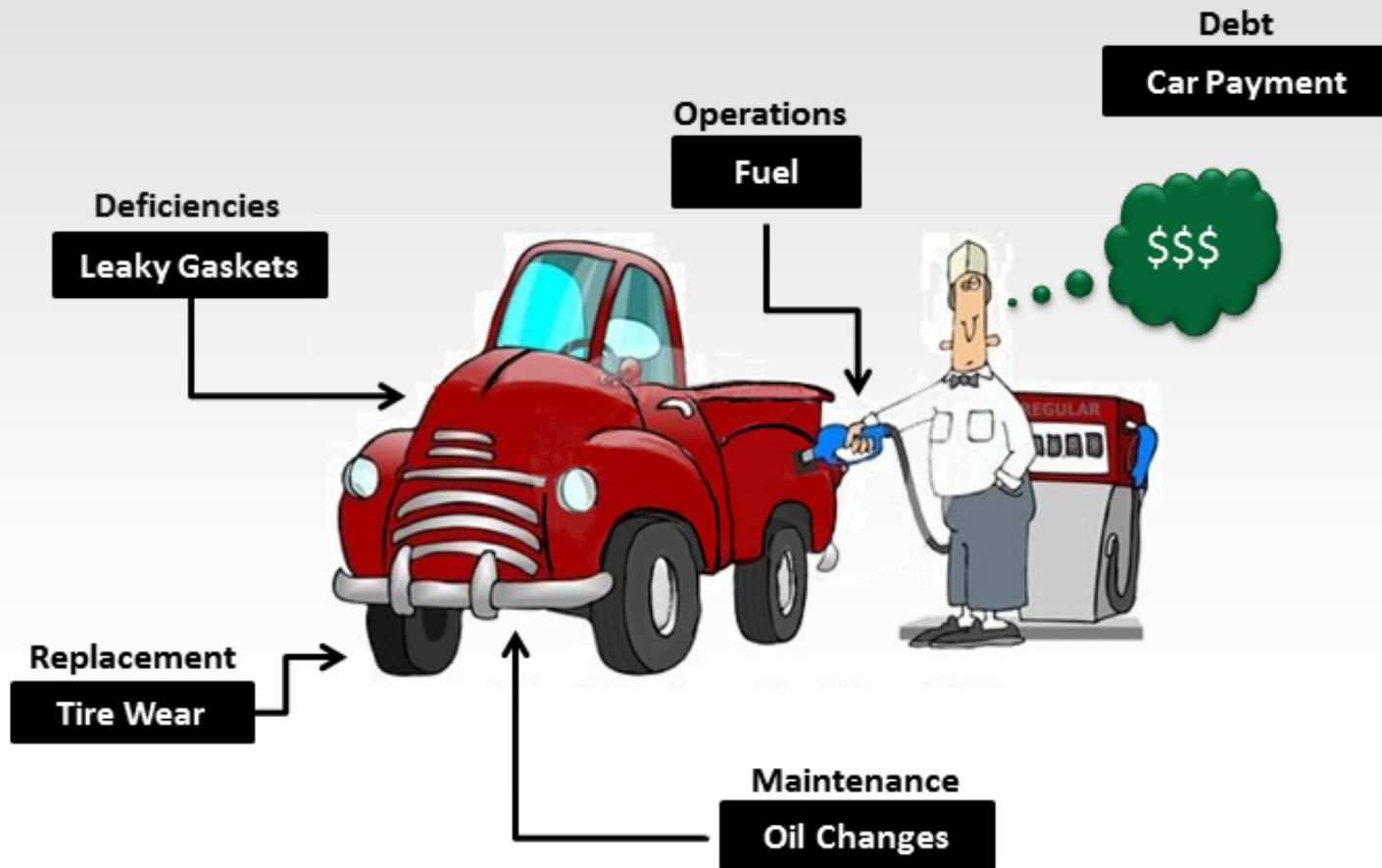


WHAT ENGINEERS MISS

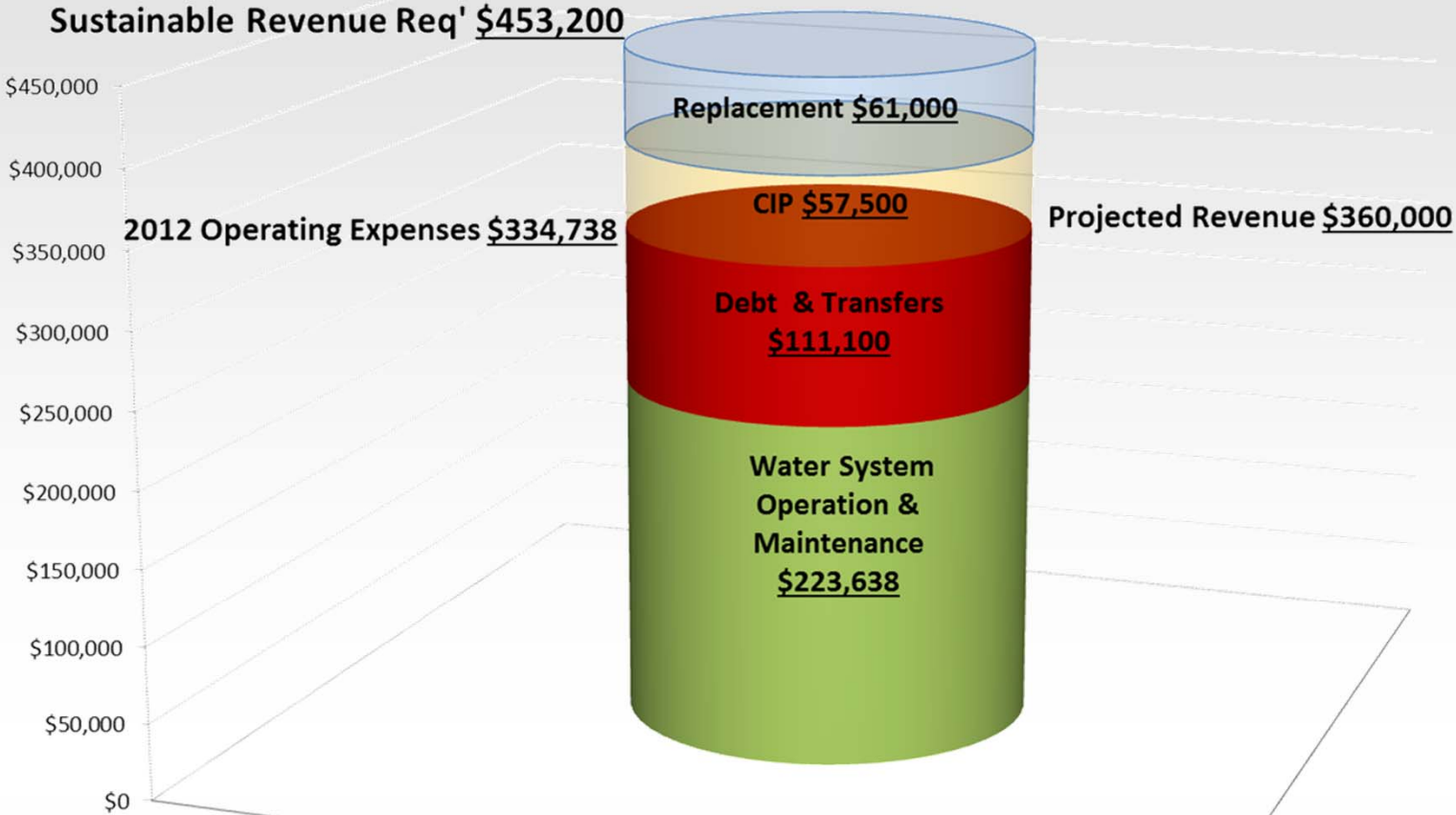
- Conservation
- Reduced Demand / Changing Habits
- Changing Customers



SUSTAINABLE BUDGETING

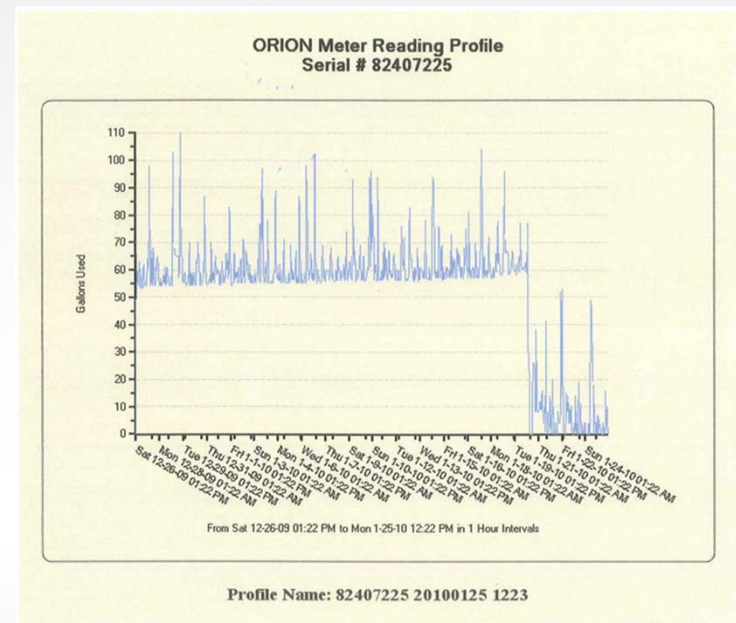


Results of Planning



IMPACTS OF METERING

- Keeps Engineers from Calculating & Predicting



Metering

- Why Meter?
 - Regulatory Requirement

 - Conservation
 - System Capacity
 - Reduce Peak Use

 - Cost Recovery
 - Power
 - Defer Capital Improvements
 - O&M

- Public Education!

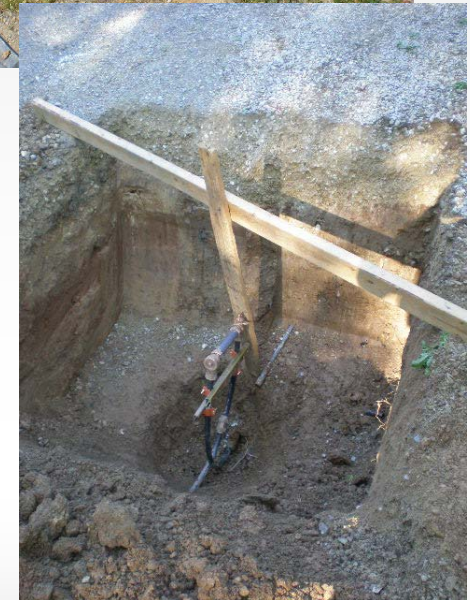
Meter Installation Projects

- Challenges
 - Public Relations
 - Lots of mini projects
 - Complete work in house or with a contractor?



Meter Installation Projects


- What do you need to complete the work?
 - You need a champion!
 - Detailed project tracking
 - Decision making in the field
 - Property owner coordination
 - Take advantage of mapping updates
 - Have plan for line replacements



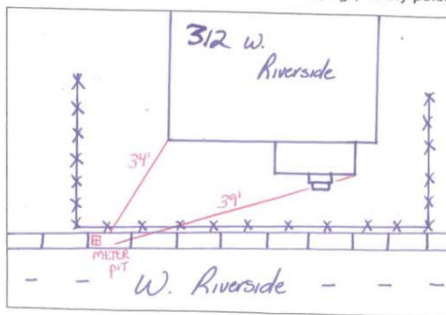
Sample Tracking Sheet

Central Shoshone County Water District Detailed Meter Pit Installation

Please provide information given:

Install Date:	5-3-10	Service Line Material and Size Between Main and Meter:	
Start Time:	7am	Service Line Material and Size Between Meter and Service:	
Finish Time:		Completed Meter Pit Installation (CSCWD):	
Account Number:		Completed, Tested Meter Installation (CSCWD):	C
Customer Name:		Final ICP Review (PHD):	sh
Service Address:	312 W. Riverside		
Meter Reading:	0		
Module ID:	 82304389		
Meter ID:	36075012		
Meter Mfg. & Model:	RCBL 25 5/8"		

Sketch of Meter Pit Location
(Swing ties to permanent features - buildings, utility poles)



F:\Projects\30-08-007 Enaville Water Treatment Plant\DOCUMENTS\METER PIT\Spec\Memo_Installation.docx

Pay Items	Quantity
3/4" Meter Service <u>concrete</u> Box Type and Lid	Ea 1
Additional Depth of Excavation for Meter Pit	FT
Meter Pit Concrete Surface Repair	SY
Meter Pit Gravel Surface Repair	SY
Meter Pit Asphalt Surface Repair	SY
Additional ____" Service Line (Pipe Only)	LF
Service Line Installation in Asphalt	LF
Service Line Installation in Concrete	LF
Service Line Installation in Sod/Dirt	LF
____" Service Connection Replacement	Ea
____" Curb Stop	Ea
Curb and Gutter	LF
Concrete Sidewalk	SY 4'x4'x4"
Exploratory Excavation	HR

Notes

- INSTALLED NEW 3/4" METER, TIED INTO EXISTING

- CUT OUT 4'x4'x4" OF SIDEWALK

Post Installation

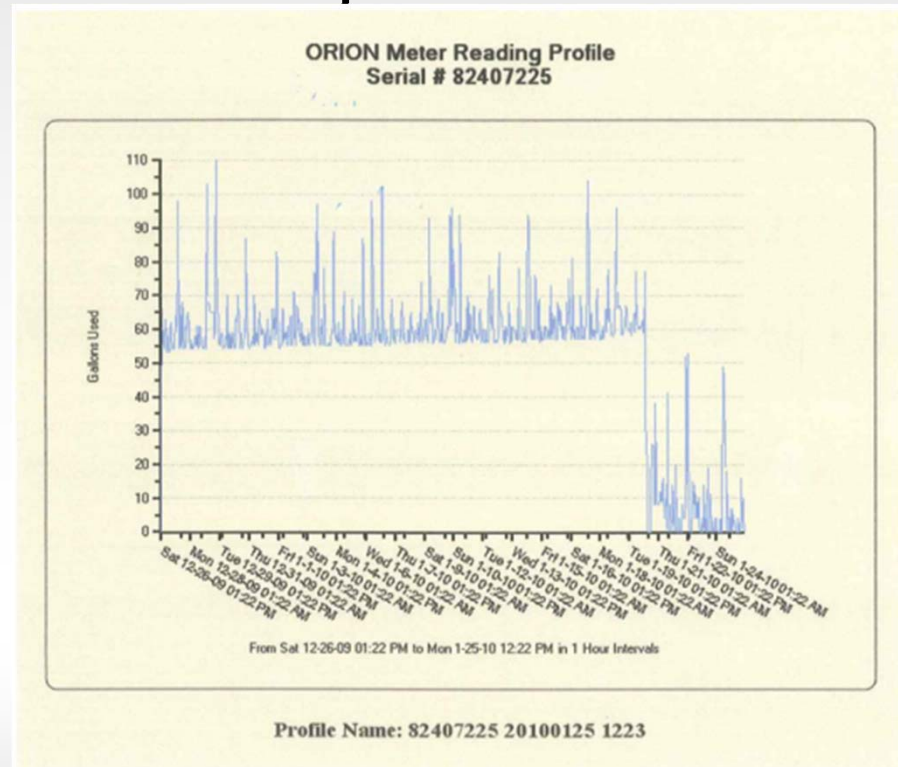
- Meter are installed, and now we read!?
- Allow for time to start up system and troubleshooting

Post Installation

- Example Bills – When to send them?
- Bill without collections for a period of time
- Bill based on use

ORION Profile Viewer - Copyright 2010 Badger Meter, Inc.

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



Leaks

- How to address these?



Develop a Pipeline Replacement Plan

- Break your system into bite size pieces
- Develop a prioritization plan
 - Pipe Age
 - Pipe Material
 - Known problem areas
 - System pressures
- Estimate costs
- Budget accordingly
- Work your plan!

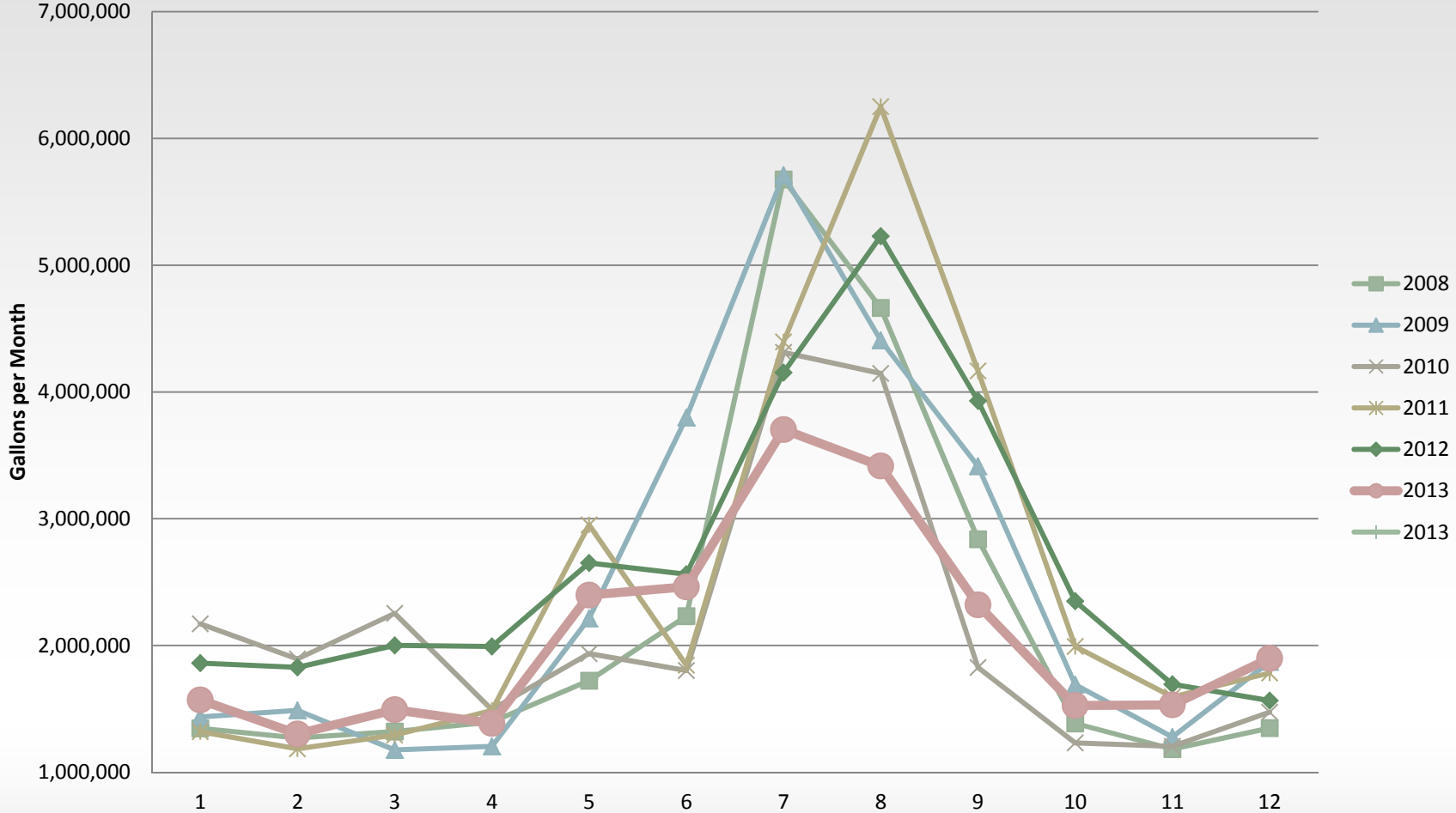
Case Studies

- East Hope
 - Meters installed 2013
- Central Shoshone County Water District
 - Meters installed 2010
 - Waterline Replacement start 2014
- Kingston Water District
 - Meters installed 2008
 - Waterline Replacement Project 2010

East Hope

- 2009
 - Connections - 190
 - Aging Distribution
 - Surface Water Supply
 - Maximum Month: 5,700,000 Gallons
- 2013
 - System Fully metered
 - Billing fully implemented in July 2013
 - Maximum Month: 3,700,000 Gallons
 - 35% reduction in max month use

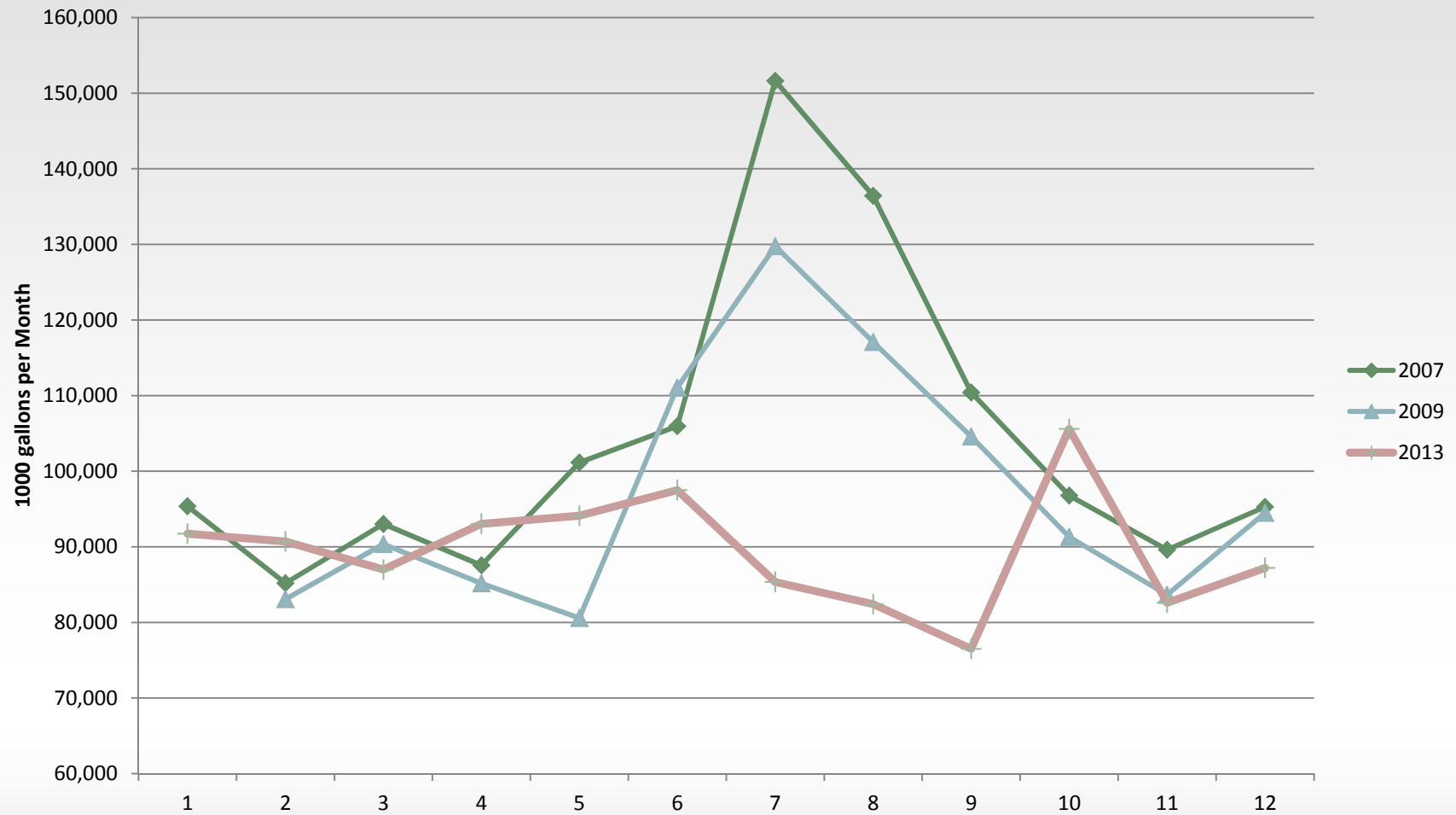
East Hope



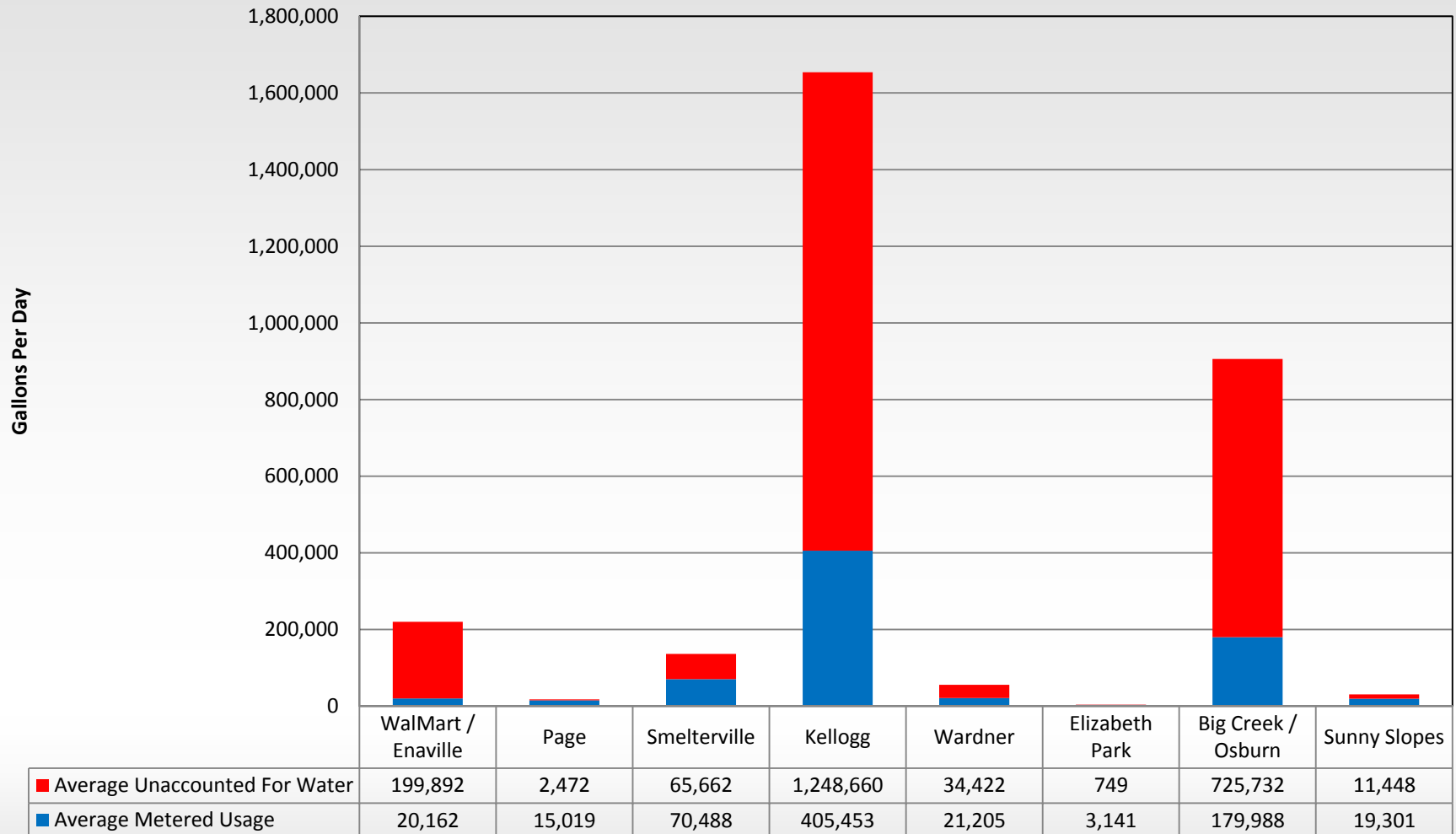
CSCWD

- 2007
 - Connections ~ 3000
 - Large percentage of aging mains
 - GWIDI Well Supply
 - Max Month: 152,000,000 Gallons
- 2013
 - System Fully metered
 - Billing implemented in 2010
 - Max Month: 97,000,000 Gallons
 - 36% reduction in use

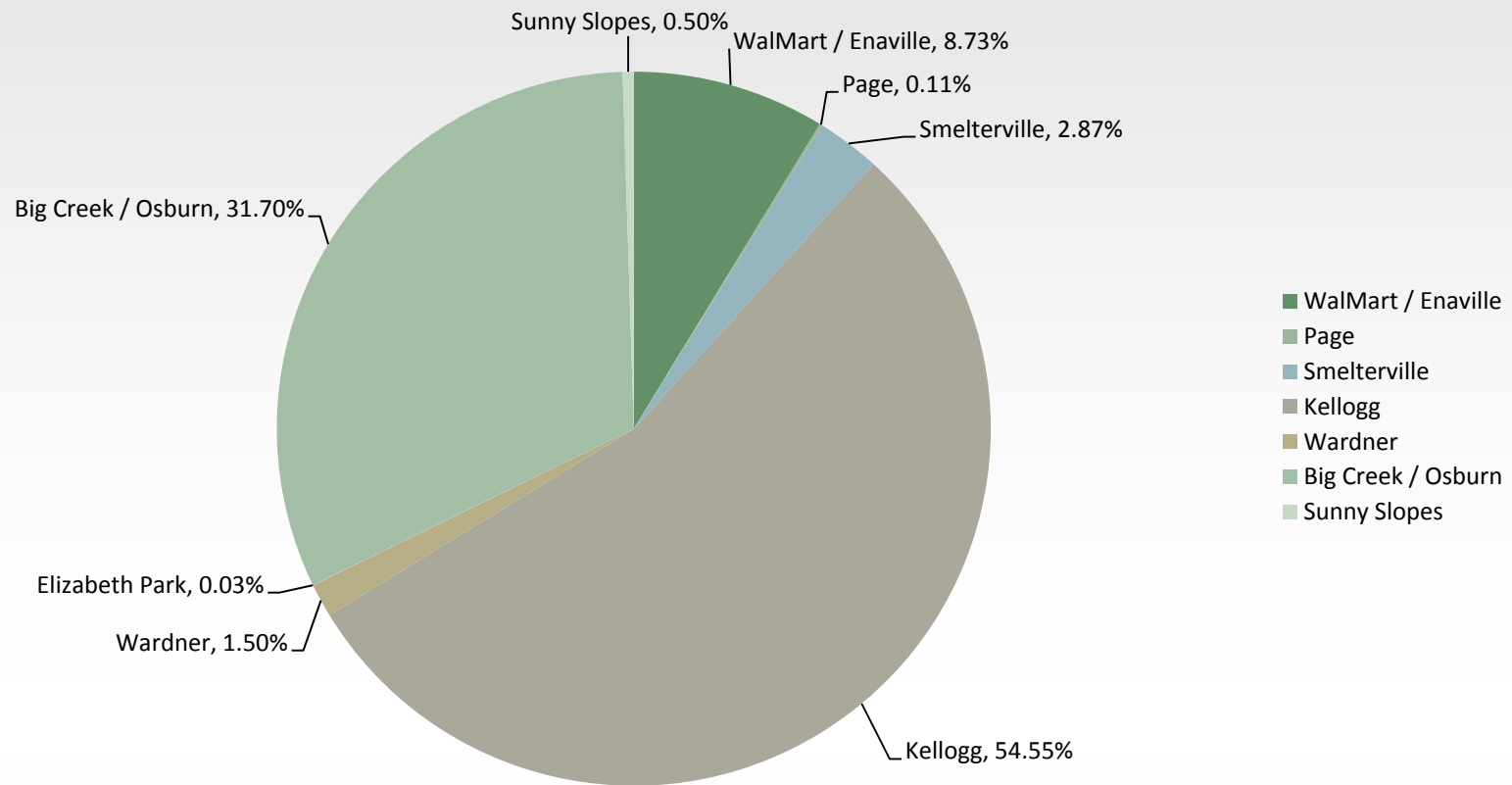
CSCWD



CSCWD



Percentage of Total System Leakage by Zone

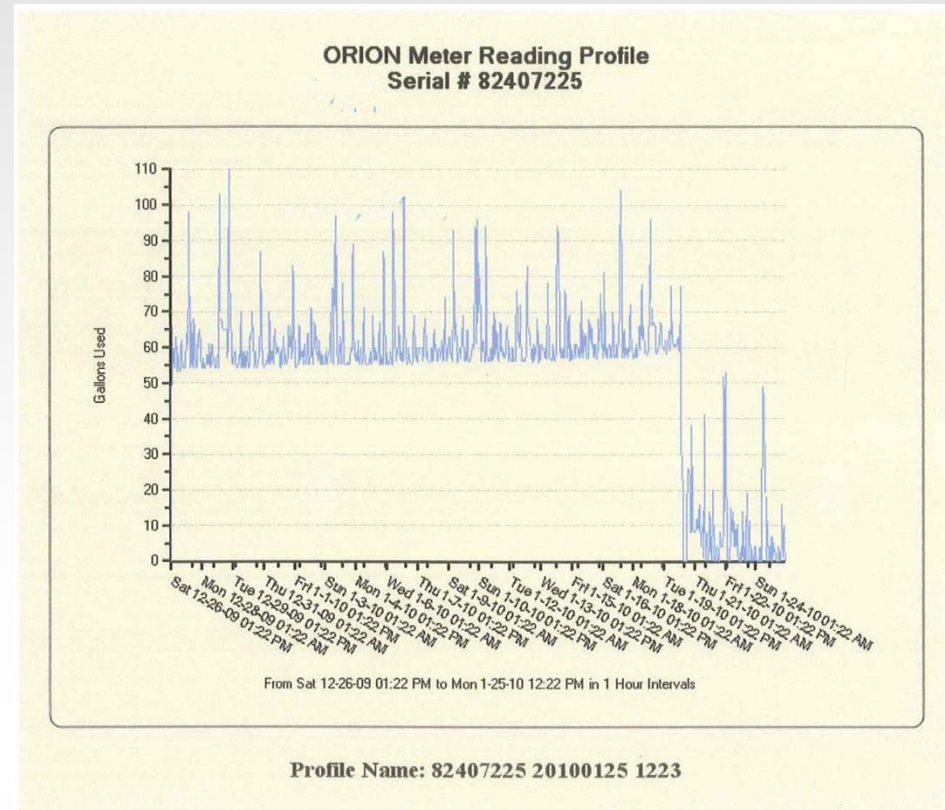


Kingston Water District

- 2007
 - Connections – 242
 - Unmetered
 - Large percentage of aging steel mains
 - GWIDI Well Supply
 - Max Month: 9,500,000 Gallons

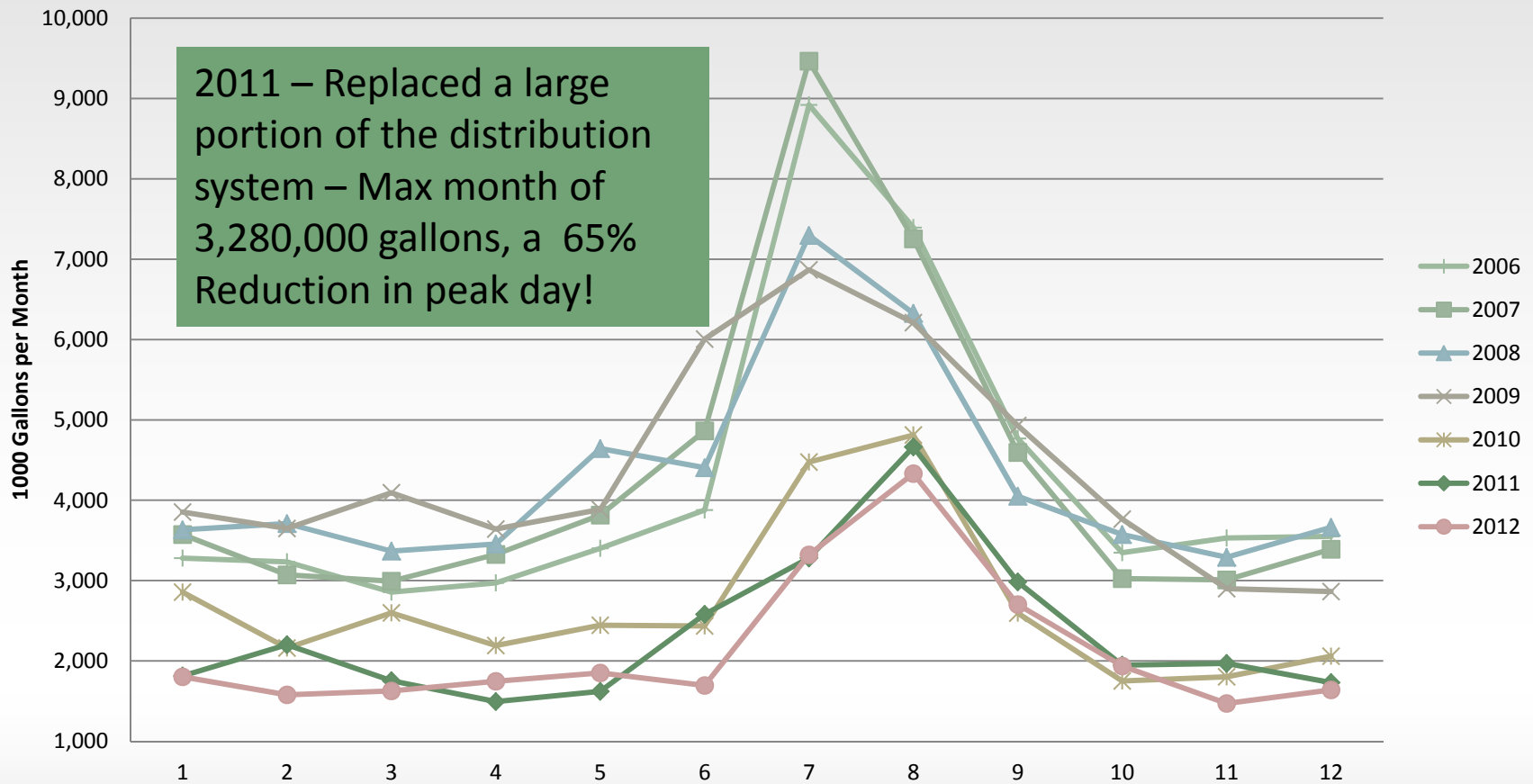
Kingston Water District

- 2008
 - System Fully metered
 - Billing fully implemented in spring
 - Max Month:7,300,00 Gallons
 - 23% reduction in use

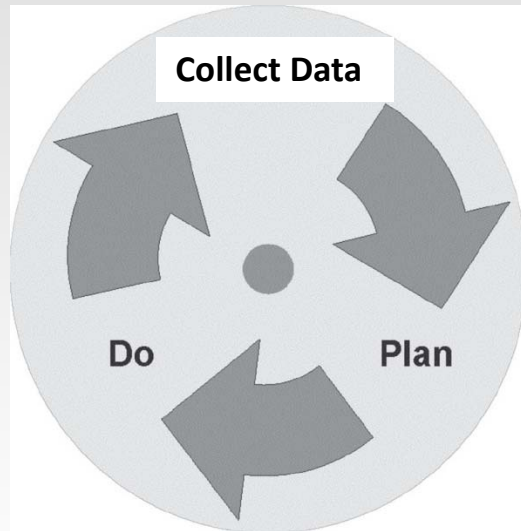


Kingston Water Data

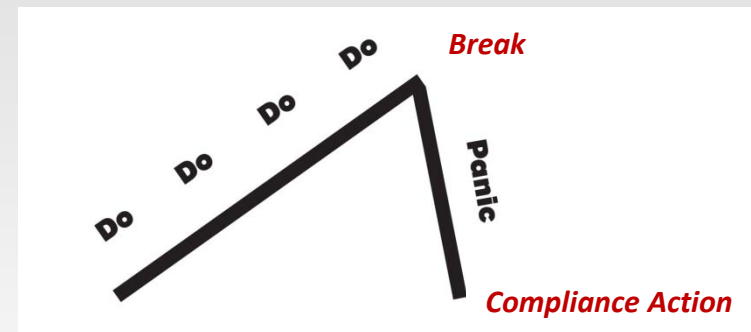
Kingston - Water Use



CONCLUSION



- Sustainable
- Minimizes Long Term Rates
- Minimizes Debt & Financing
- Maximizes Staff Salaries
- Minimizes Engineering Fees



- Unsustainable
- Maximizes Rates
- Maximizes Debt & Financing
- Minimizes Staff Salaries
- Maximizes Engineering Fees
- Eliminates CIP & Replacement Program

QUESTIONS?

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