


This presentation premiered at WaterSmart Innovations

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Water Loss Control as Frontrunner in California Energy Efficiency Programs



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Water Loss Control in CA Energy Efficiency

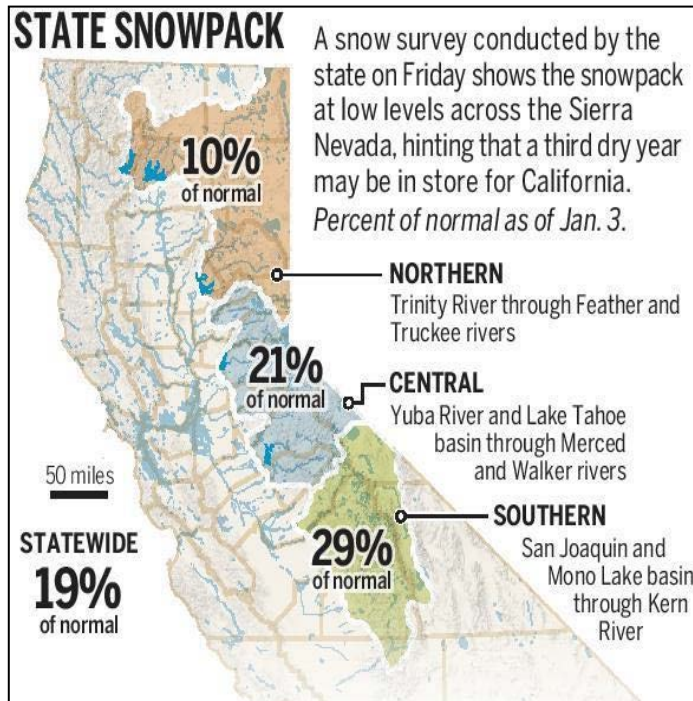


Embedded Energy in Water

CA Energy Efficiency Framework

Case Studies Currently Underway

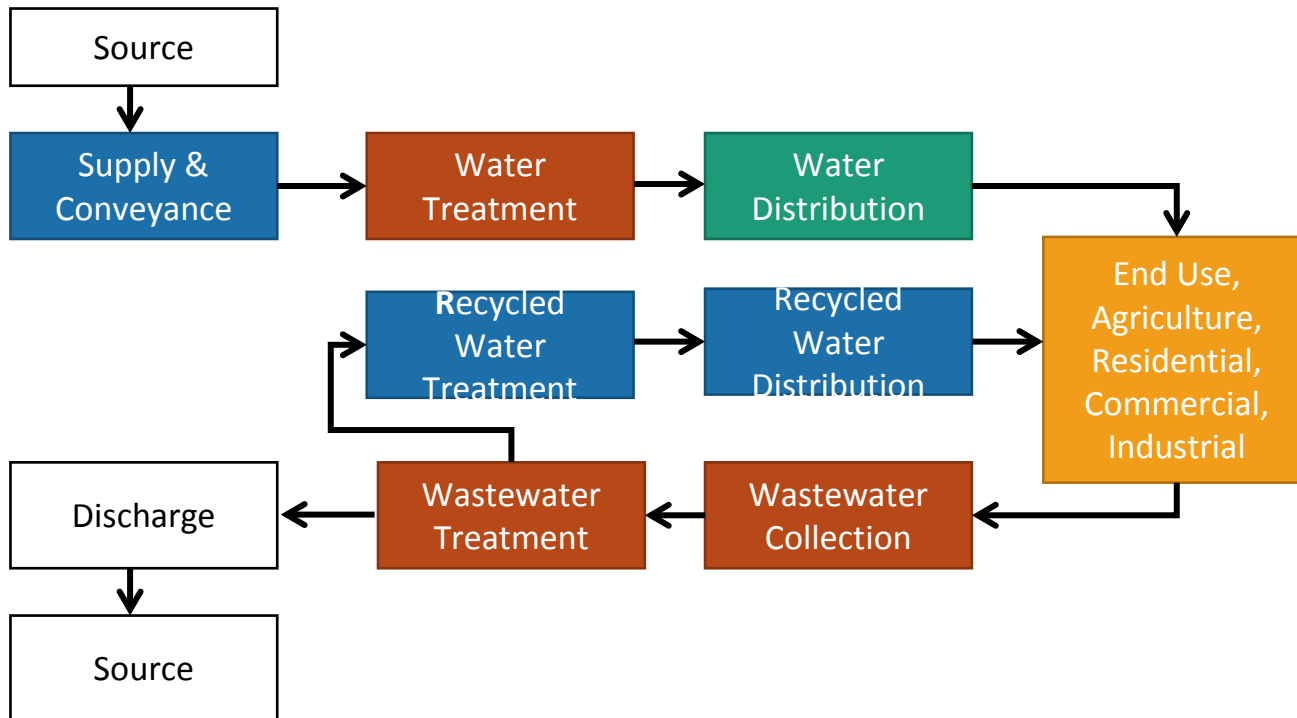
California Background



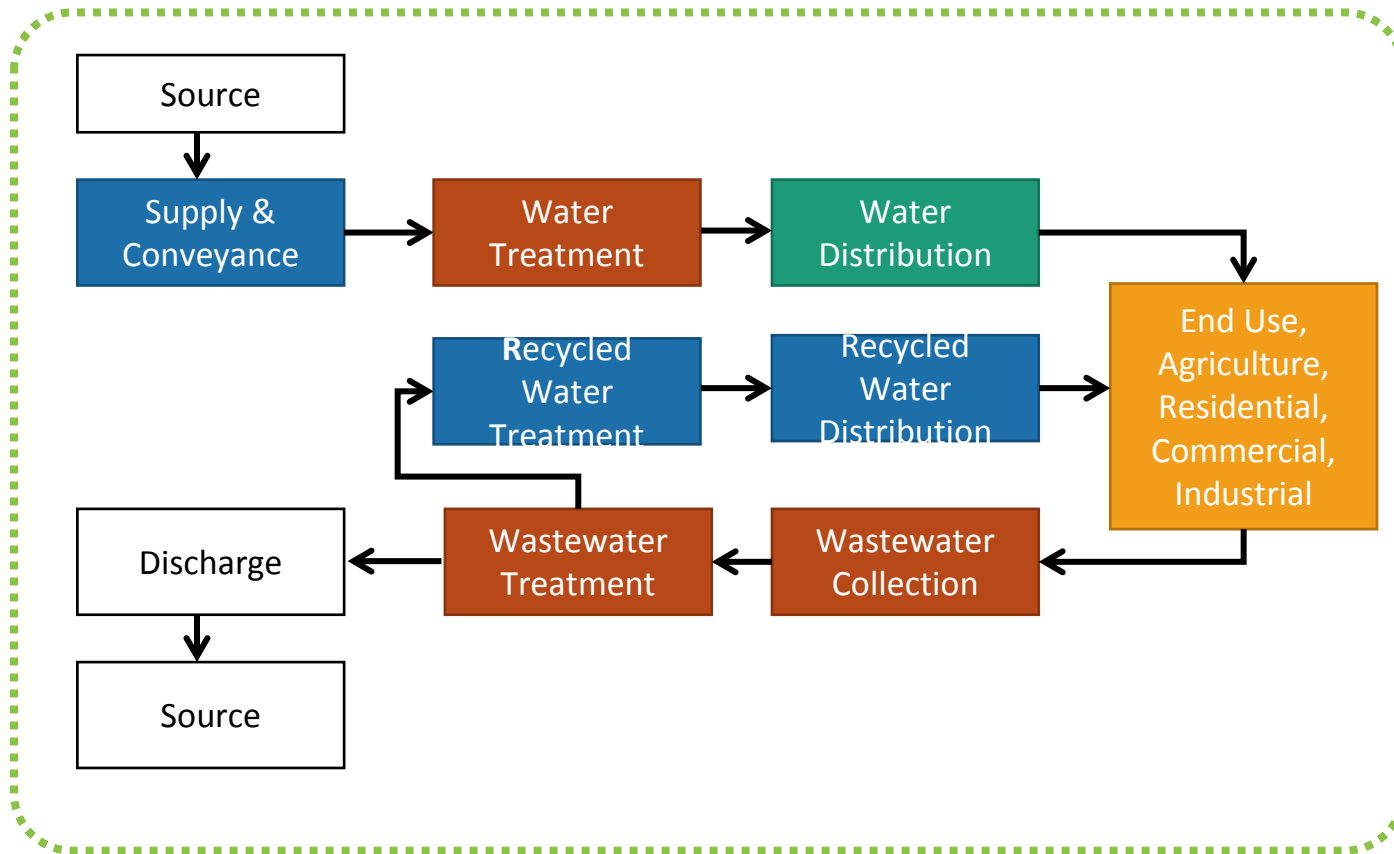
Source: CA Department of Water Resources

- Drought!
- Hundreds of public water agencies
- Water Loss Control experience varied
 - 30-40% of CA water agencies do not have accurate water balances
- Completely different policies and framework than energy management

Energy in Water



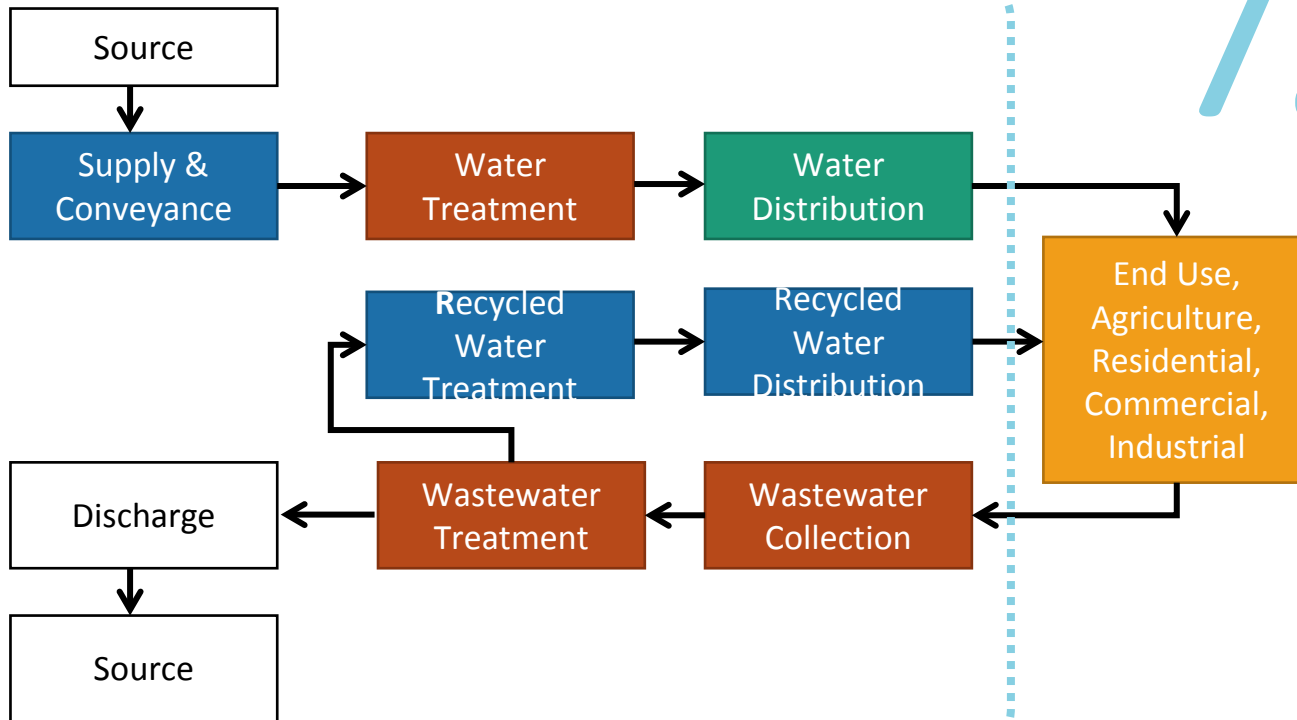
Energy in Water



19.2%

of CA electricity is water related

Energy in Water



7.7%

of CA
electricity is
related to
the water
sector

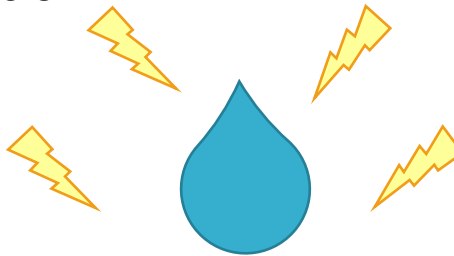
Energy in Water: Research

California Energy Commission

World Policy Institute

California Public Utilities
Commission

The Pacific Institute



5 min

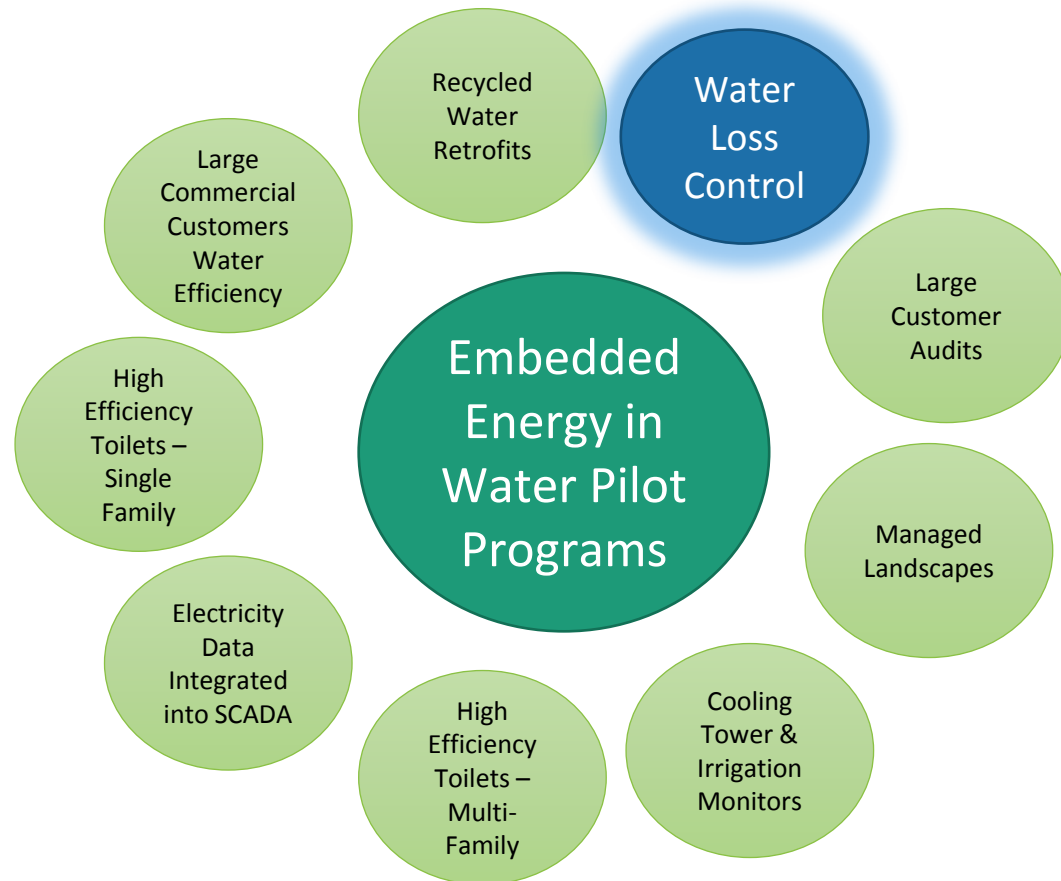


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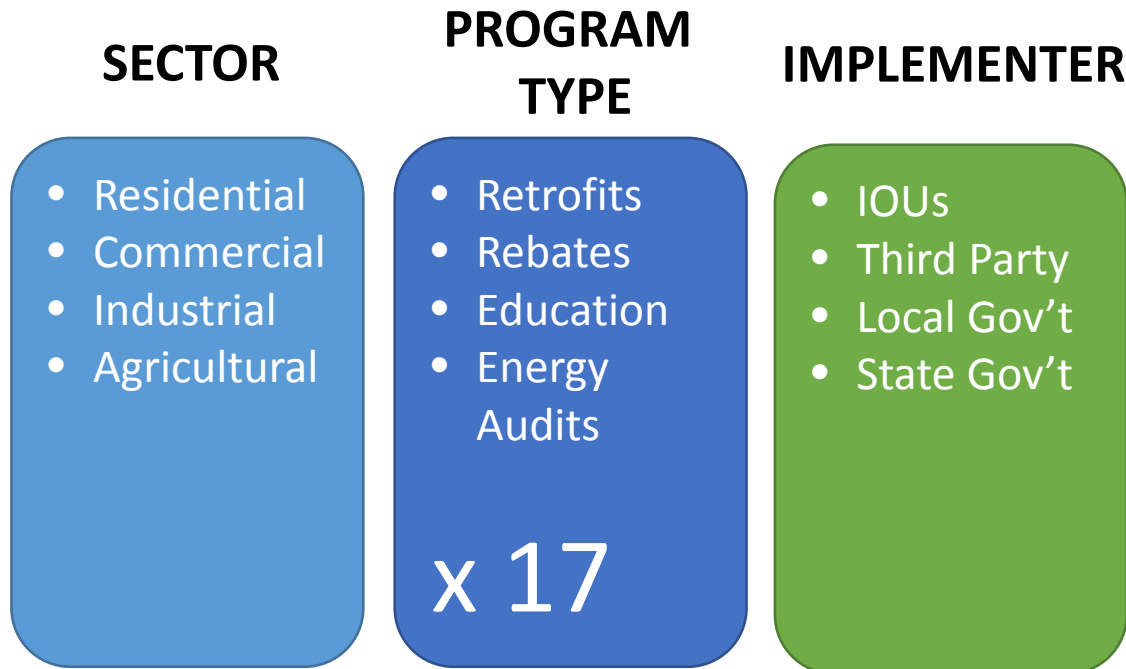


14 hrs

CPUC: Pilot Studies 2008- 2009



Energy Efficiency Framework in CA

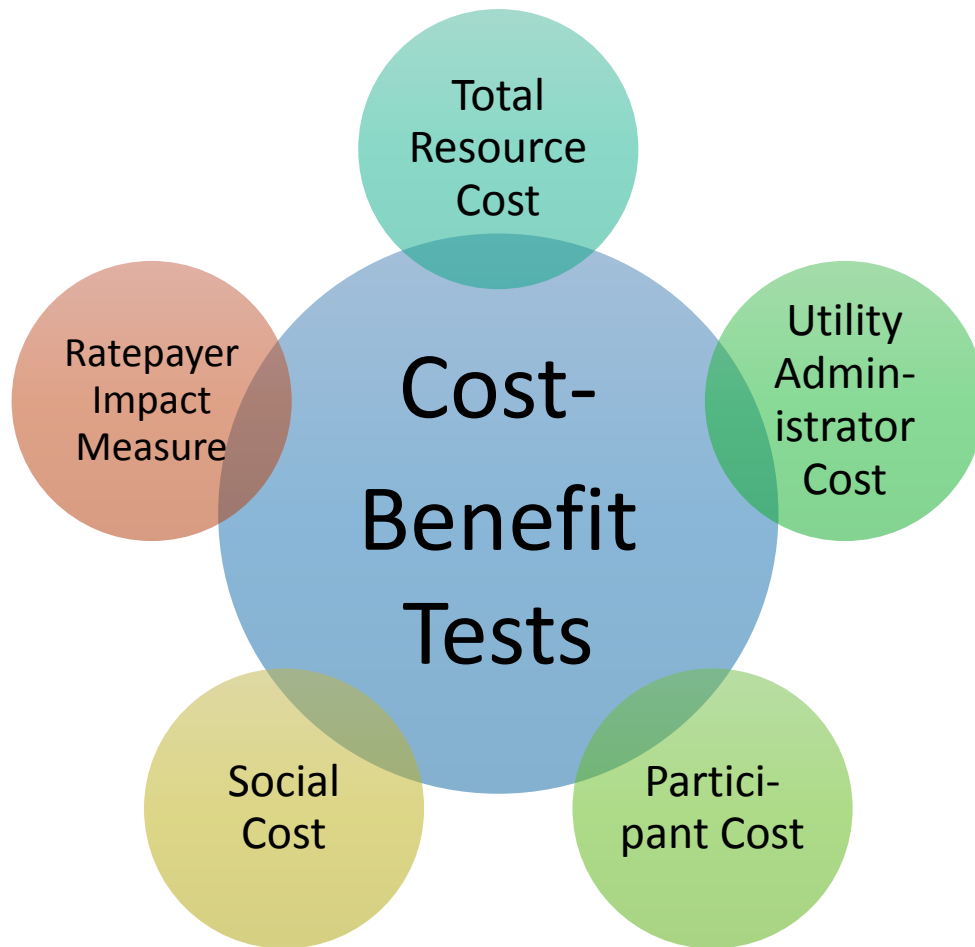


\$3.1B

(USD)

2010-2012 program cycle

Cost Effectiveness Standard



- apply this framework to water loss control programs?
- on what scale? based on what timeframe?

Energy IOU Funded Water Loss Control – Phase 2 Pilots



Southern California Edison

San Diego Gas & Electric

Southern California Gas

- 7 Water Loss Control Programs Underway
- Water & Energy Savings, Costs Tracked
(realized and potential)
- Cost-Effective Calculations Pending

Introduction to the Water Balance

| | | | | |
|--|--|---|---|---|
| System Input Volume 3,138.67 MG (100%) | Authorized Consumption 2,753.74 MG (88%) | Billed Authorized 2,751.78 MG (88%) | Billed Metered Water Exported - MG (0%) | Revenue Water 2,751.78 MG (88%) |
| | | | Billed Metered Authorized 2,751.78 MG (88%) | |
| | | | Billed Un-metered Authorized - MG (0%) | |
| | | Un-billed Authorized 1.96 MG (0%) | Un-billed Metered Authorized - MG (0%) | |
| | Un-billed Un-metered Authorized 1.96 MG (0%) | | | |
| | Water Losses 384.93 MG (12%) | Apparent Losses 144.66 MG (5%) | Unauthorized Consumption 3.92 MG (0%) | |
| | | | Meter Error 140.74 MG (4%) | |
| | Real Losses 240.26 MG (8%) | | | |

AGENCY A: A Strong Candidate for Real Loss Reduction?

| | | | | |
|--|--|---|---|---|
| System Input Volume 3,138.67 MG (100%) | Authorized Consumption 2,753.74 MG (88%) | Billed Authorized 2,751.78 MG (88%) | Billed Metered Water Exported - MG (0%) | Revenue Water 2,751.78 MG (88%) |
| | | | Billed Metered Authorized 2,751.78 MG (88%) | |
| | | | Billed Un-metered Authorized - MG (0%) | |
| | | Un-billed Authorized 1.96 MG (0%) | Un-billed Metered Authorized - MG (0%) | |
| | Un-billed Un-metered Authorized 1.96 MG (0%) | | | |
| | Water Losses 384.93 MG (12%) | Apparent Losses 144.66 MG (5%) | Unauthorized Consumption 3.92 MG (0%) | |
| | | | Meter Error 140.74 MG (4%) | |
| | Real Losses 240.26 MG (8%) | | ILI=8.2 | |

Dig a little deeper...maybe not so much.



- Issues with input meter



- Surveyed entire system
- 1 confirmed customer-side leak, estimated at 1 GPM

AGENCY A: After 14.5% Input Meter Adjustment

| | | | | |
|--|--|--|---|--|
| System Input Volume 2,944.50 MG (100%) | Authorized Consumption 2,753.62 MG (94%) | Billed Authorized 2,751.78 MG (93%) | Billed Metered Water Exported - MG (0%) | Revenue Water 2,751.78 MG (93%) |
| | | | Billed Metered Authorized 2,751.78 MG (93%) | |
| | | | Billed Un-metered Authorized - MG (0%) | |
| | | Un-billed Authorized 1.84 MG (0%) | Un-billed Metered Authorized - MG (0%) | Non-Revenue Water 192.72 MG (7%) |
| | | Un-billed Un-metered Authorized 1.84 MG (0%) | | |
| | Water Losses 190.88 MG (6%) | Apparent Losses 144.42 MG (5%) | Unauthorized Consumption 3.68 MG (0%) | |
| | | | Meter Error 140.74 MG (5%) | |
| | Real Losses 46.46 MG (2%) | ILI=1.6 | | |

AGENCY B: Little Potential for Real Loss Reductions, but Worth the Data Validation

| | | | | |
|--|--|---|--|---|
| System Input Volume 1,810.37 MG (100%) | Authorized Consumption 1,745.31 MG (96%) | Billed Authorized 1,737.48 MG (96%) | Billed Metered Water Exported - MG (0%) | Revenue Water 1,737.48 MG (96%) |
| | | | Billed Metered Authorized 1,737.48 MG (96%) | |
| | | | Billed Un-metered Authorized - MG (0%) | |
| | | Un-billed Authorized 7.83 MG (0%) | Un-billed Metered Authorized 1.94 MG (0%) | Non-Revenue Water 72.89 MG (4%) |
| | | | Un-billed Un-metered Authorized 5.89 MG (0%) | |
| | Water Losses 65.06 MG (4%) | Apparent Losses 5.49 MG (0%) | Unauthorized Consumption 1.13 MG (0%) | |
| | | | Meter Error 4.35 MG (0%) | |
| | | Real Losses 59.57 MG (3%) | ILI=0.9 | |

AGENCY C: Data Collection & Validation Challenges

- Level of staff engagement and leadership
- Quality of record-keeping
- Level of staff expertise

| | | | | |
|--|--|---|---|--|
| System Input Volume 3,286.19 MG (100%) | Authorized Consumption 3,109.88 MG (95%) | Billed Authorized 3,107.82 MG (95%) | Billed Metered Water Exported - MG (0%) | Revenue Water 3,107.82 MG (95%) |
| | | | Billed Metered Authorized 3,107.82 MG (95%) | |
| | | | Billed Un-metered Authorized - MG (0%) | |
| | Water Losses 176.31 MG (5%) | Un-billed Authorized 2.05 MG (0%) | Un-billed Metered Authorized - MG (0%) | Non-Revenue Water 178.36 MG (5%) |
| | | | | Un-billed Un-metered Authorized 2.05 MG (0%) |
| | Apparent Losses 27.59 MG (1%) | Unauthorized Consumption 4.11 MG (0%) | Meter Error 23.48 MG (1%) | |
| Real Losses 148.72 MG (5%) | | | ILI=1.8 | |

IW

AGENCY D: Need for Data Validation Assistance

| | ILI | Real Losses |
|--------------------|-----|-------------|
| 2011 CUWCC BMP 1.2 | 0.3 | 50 MG |
| 2012 CUWCC BMP 1.2 | 2.3 | 416 MG |
| 2013 WSO | 1.6 | 297 MG |

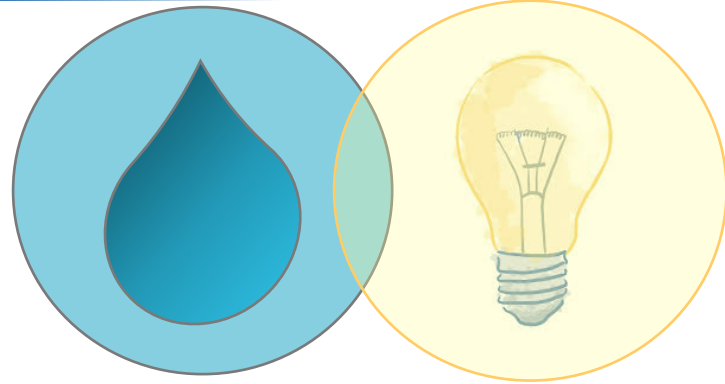
AGENCY E: Promising Opportunities for Real Loss Reductions

| Leak type | Count | Estimated gpm | |
|------------------------------|-------|---------------|-----|
| Main | 4 | 105 | |
| Service | 12 | 100.5 | |
| Meter | 18 | 11 | |
| Blow-Off | 0 | 0 | |
| Valve | 0 | 0 | |
| Hydrant | 1 | 1 | |
| Other | 0 | 0 | MGY |
| Total City of ██████ Leakage | 35 | 217.5 | 114 |
| | | | |
| | | | |
| Leak type | Count | Estimated gpm | MGY |
| Customer | 45 | 74 | 39 |

= 153 MGY

- Leak detection survey covered 2/3 of city distribution network, and uncovered leaks that would equate to 153 MGY if not addressed.
- Extrapolate this finding to approximately 230 MGY for the entire system.
- 230 MGY in leakage translates to approximately 7.5% of total annual production, most of which goes unbilled since it occurs pre-customer meter.

Take-Aways



- Quality of available data
- Need for education of water utility staff in terms of data management practices, reporting procedures
- Strategic targeting: Pre-screen water agencies for water loss reduction potential
- How do water and energy utilities collaborate on terms that make sense for both of them?