

The logo for the Metropolitan Planning Council, featuring two orange curved lines that arch over the text.

Metropolitan **Planning** Council

Immeasurable Loss: Modernizing Lake Michigan Water Use

Josh Ellis

MPC Roundtable, May 7, 2013

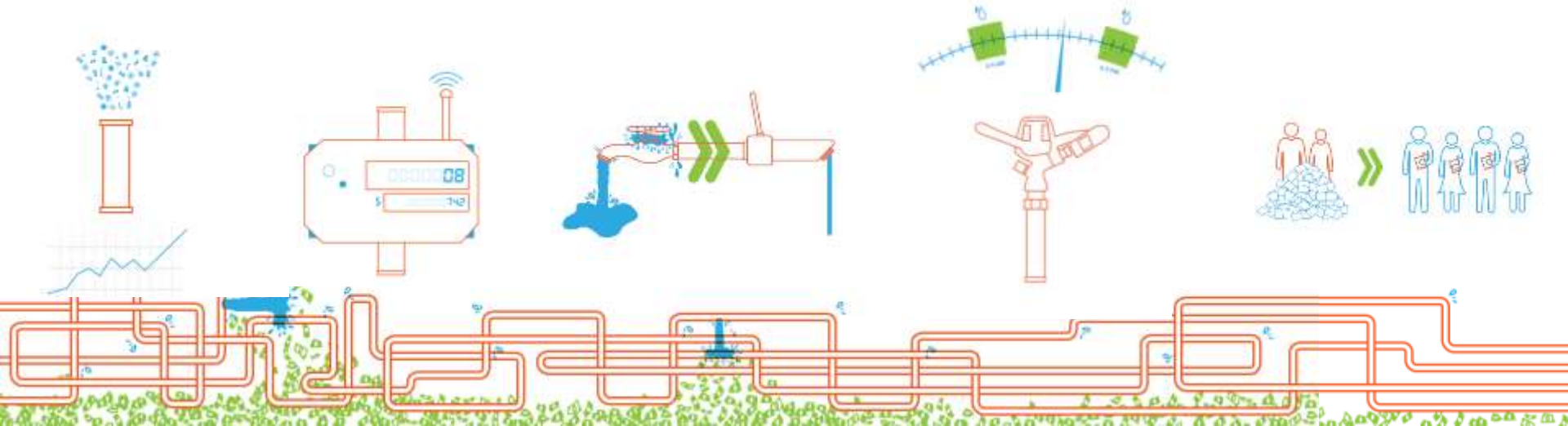


WHY MODERNIZE?



Current opportunity

- IDNR has released proposed rule changes
- MPC supports changes, but recommends further action



Research methods

- LMO-2 data, 1999-2010
- Lawn sprinkling & plumbing ordinances
- National best practices
- Interviews

Professionals consulted for this paper

Bold type indicates Lake Michigan permittee.

Alliance for Water Efficiency

American Water Works Association

Center for Neighborhood Technology

Chicago Metropolitan Agency for Planning

City of Blue Island

City of Chicago

City of Des Plaines

Village of Glenview

Village of Grayslake

Illinois American Water (holds multiple permits for several service areas)

Illinois Dept. of Natural Resources

Illinois-Indiana Sea Grant

Village of LaGrange

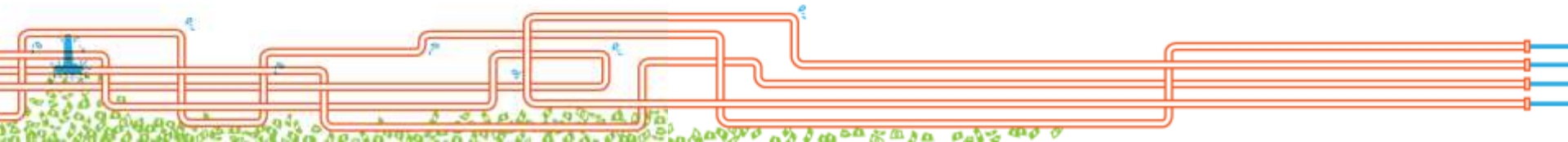
Village of Lake Zurich (has permit, but has not commenced use)

Northwest Water Planning Alliance

Village of Palos Park

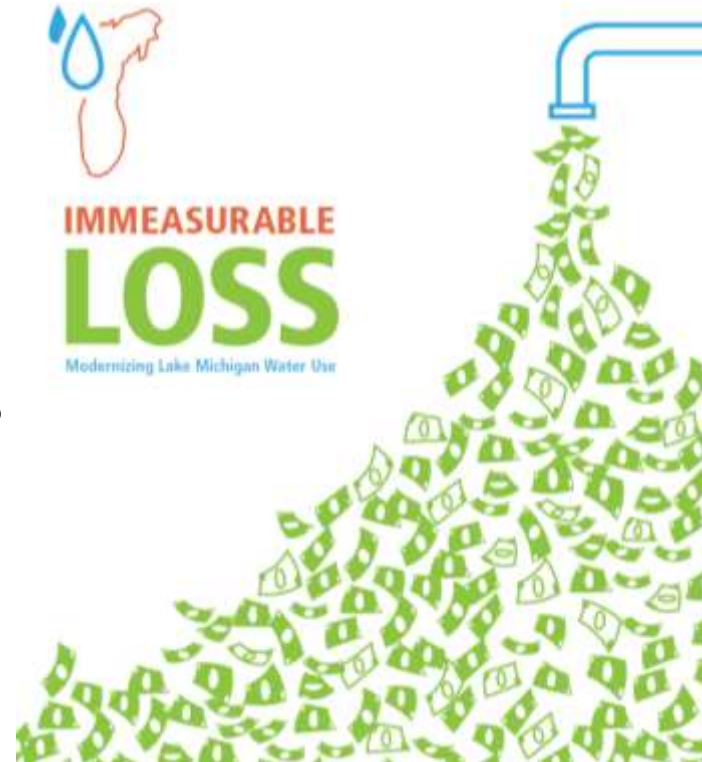
Village of Westmont

Village of Wheeling



Solutions

1. Accounting system
2. Water rates and metering
3. Plumbing standards
4. Outdoor water use standards
5. IDNR capacity



Improve the existing accounting system, while exploring a new approach

SOLUTION #1

Current accounting method: LMO-2

Section II - Water Use Audit

Enter the amount of water pumped and utilized for each item shown below. All amounts entered in this section must be in units of million gallons per day (mgd) rounded off to three decimal places. Conversion calculations are provided for your use in Section IV.

A. Pumpage Data
Water bought or received from the following distribution systems:

- Lake Michigan Pumpage _____ mgd
- Shallow Aquifer Pumpage _____ mgd
- Deep Aquifer Pumpage _____ mgd
- Total Pumpage (add lines 1, 2 & 3) _____ mgd
- Water Treatment Use _____ mgd
- Greens Annual Pumpage (subtract line 5 from line 4) _____ mgd

Water sold or provided to any other distribution systems (enter the name of each system and the amount sold or provided to that system on lines 7 through 12). If additional lines are required, attach an additional sheet listing each system and amount.

- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- _____ mgd
- Total (add lines 7-12 and any additional amounts) _____ mgd
- Net Annual Pumpage (subtract line 13 from line 6) _____ mgd

B. Uses

	Watered	Unwatered	Total	mgd
15. Residential				
16. Commercial and Institutional				
17. Municipal				
18. Construction				
19. Total Uses (add Total lines 15 through 18)				
20. Percentage of Total Use to Net Annual Pumpage (divide line 19 by line 14 and multiply by 100)				%

C. Hydrant Uses

- Firefighting and Training _____ mgd
- Water Main Flooding _____ mgd
- Sewer Cleaning _____ mgd
- Street Cleaning _____ mgd
- Construction _____ mgd
- Other (attach explanation) _____ mgd
- Total Hydrant Use (add lines 21 through 26) _____ mgd

Measuring the quantity of water withdrawn or diverted from Lake Michigan

Last substantial update: Jan 1990

Section II - Water Use Audit (continued)

- Percentage of Hydrant Use to Net Annual Pumpage (divide line 27 by line 14 and multiply by 100) _____ %
- Department allowed maximum for Hydrant Use _____ 1.0 %
- Excessive Hydrant use (subtract line 25 from line 20). If the percentage is greater than 0.5, attach an explanation. (See Rule 730.207 (a)) _____ %

D. Unavoidable Leakage and Unaccounted for Flow

- Maximum Unavoidable Leakage (Do worksheet in Section III; enter amount from line 10 of the worksheet) _____ mgd
- Percentage of Maximum Unavoidable Leakage to Net Annual Pumpage (divide line 31 by line 14 and multiply by 100) _____ %
- Total Accounted for Flow (add lines 19, 27 and 31) _____ mgd
- Percentage of Total Accounted for Flow to Net Annual Pumpage (divide line 33 by line 14 and multiply by 100) _____ %
- Total Unaccounted for Flow (subtract amount on line 33 from line 14) _____ mgd
- Percentage of Total Unaccounted for Flow to Net Annual Pumpage (divide line 35 by line 14 and multiply by 100) _____ %

Please Check Your Calculations
The sum of lines 23 and 35 should equal line 14. If they do not equal, check your calculations. The sum of lines 34 and 36 should equal approximately 100%. If not, check calculations.

Section III - Maximum Unavoidable Leakage Worksheet

Complete the following calculations to determine your maximum unavoidable leakage. Enter the appropriate amounts in the space provided.

A. Cast Iron Pipes With Lead Joints

Age of Pipes	Miles of Pipe	Leakage Rate	Maximum Unavoidable Leakage	gpd
1. 60 yrs. or greater		is 1,000 gpd/mi =		
2. 40-60 yrs.		is 2,500 gpd/mi =		
3. 20-40 yrs.		is 2,000 gpd/mi =		
4. 20 yrs. or less		is 1,500 gpd/mi =		

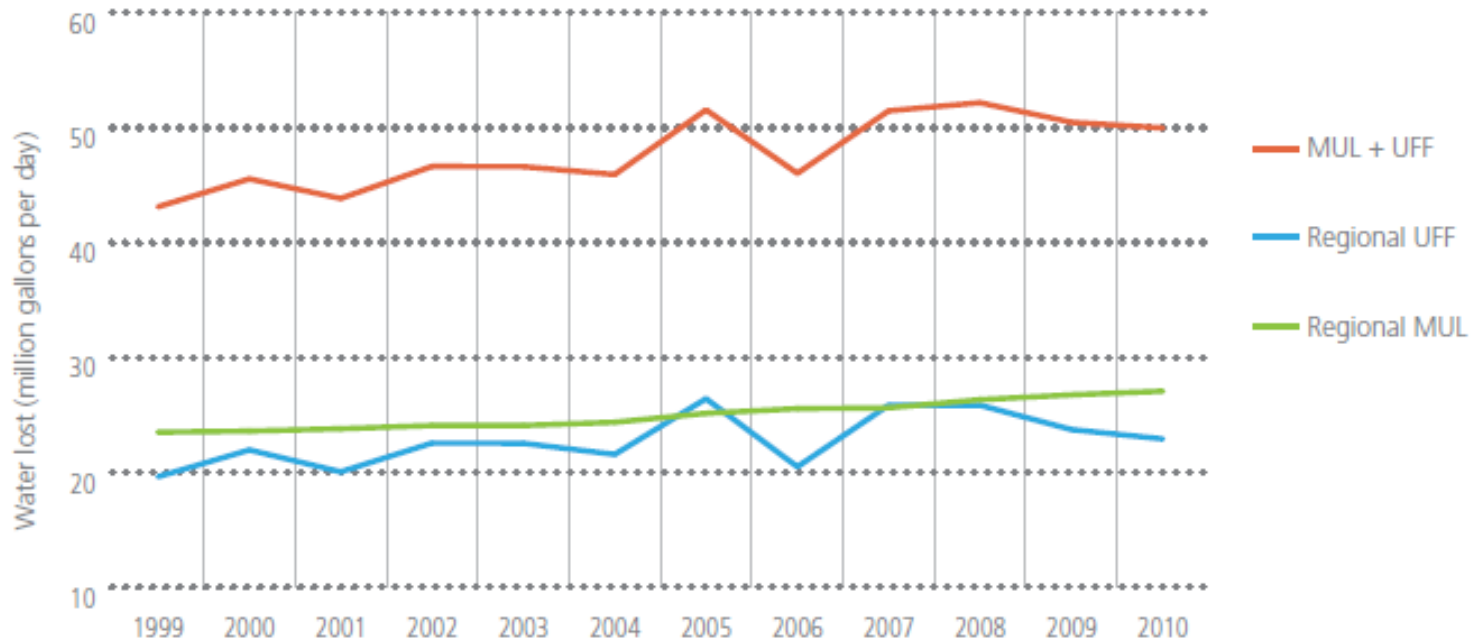
B. All Other Types of Pipes and Joints

Age of Pipes	Miles of Pipe	Leakage Rate	Maximum Unavoidable Leakage	gpd
1. 60 yrs. or greater		is 2,500 gpd/mi =		
2. 40-60 yrs.		is 2,000 gpd/mi =		
3. 20-40 yrs.		is 1,500 gpd/mi =		
4. 20 yrs. or less		is 1,000 gpd/mi =		
5. Total Miles		Total Leakage		gpd

10. Total Maximum Unavoidable Leakage, in mgd (divide total leakage on line 9 by 1,000,000) _____ mgd
(Enter this amount on line 31 of "Section II - Water Use Audit")

“Best information available”

Regional water loss data excluding City of Chicago shows increasing loss



Problem #1: Accounting system



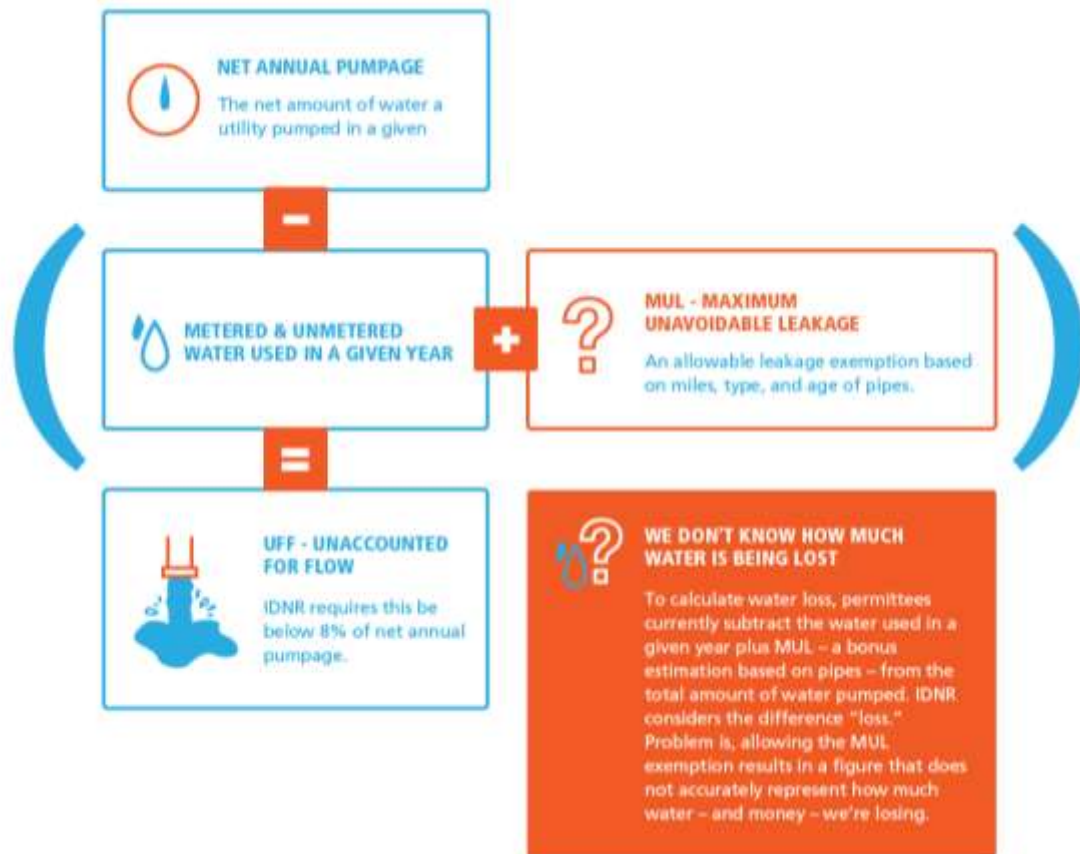
Problem: Lack of useful data

Solution: Eliminate MUL now, but work towards more comprehensive performance metrics

Outcome: Data-driven management



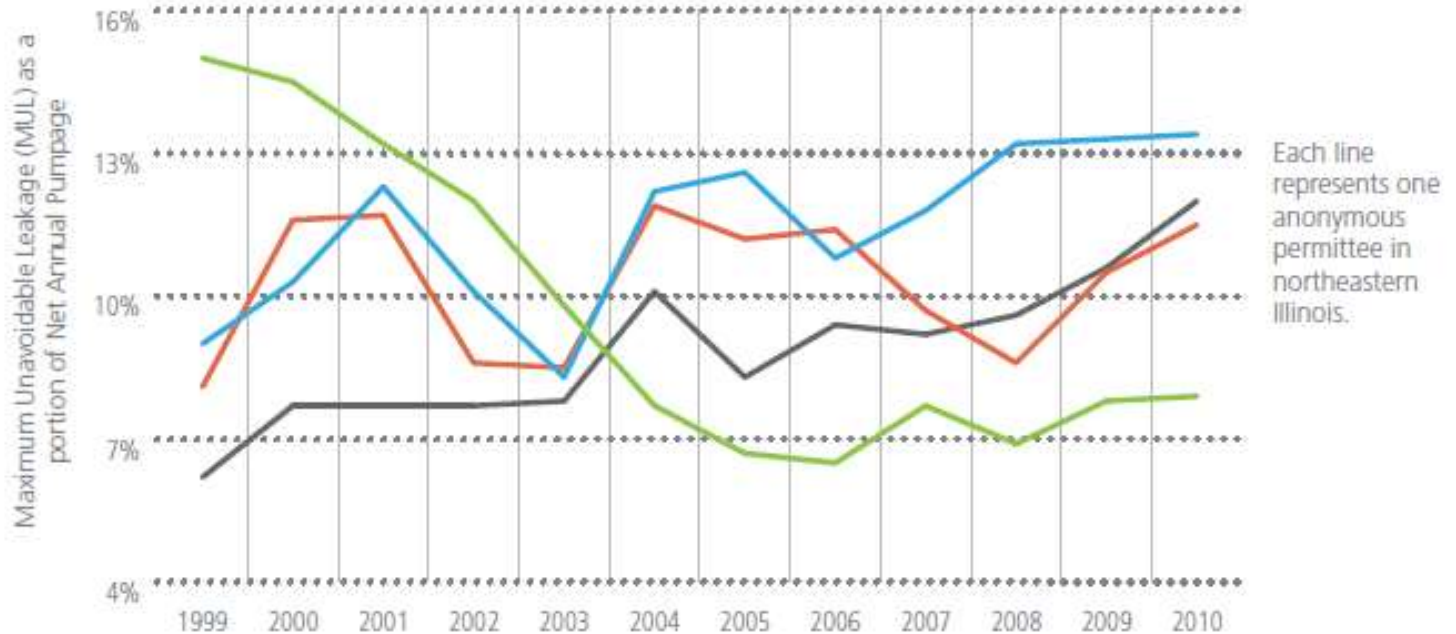
Problem #1: Accounting system



Problem #1: Accounting system



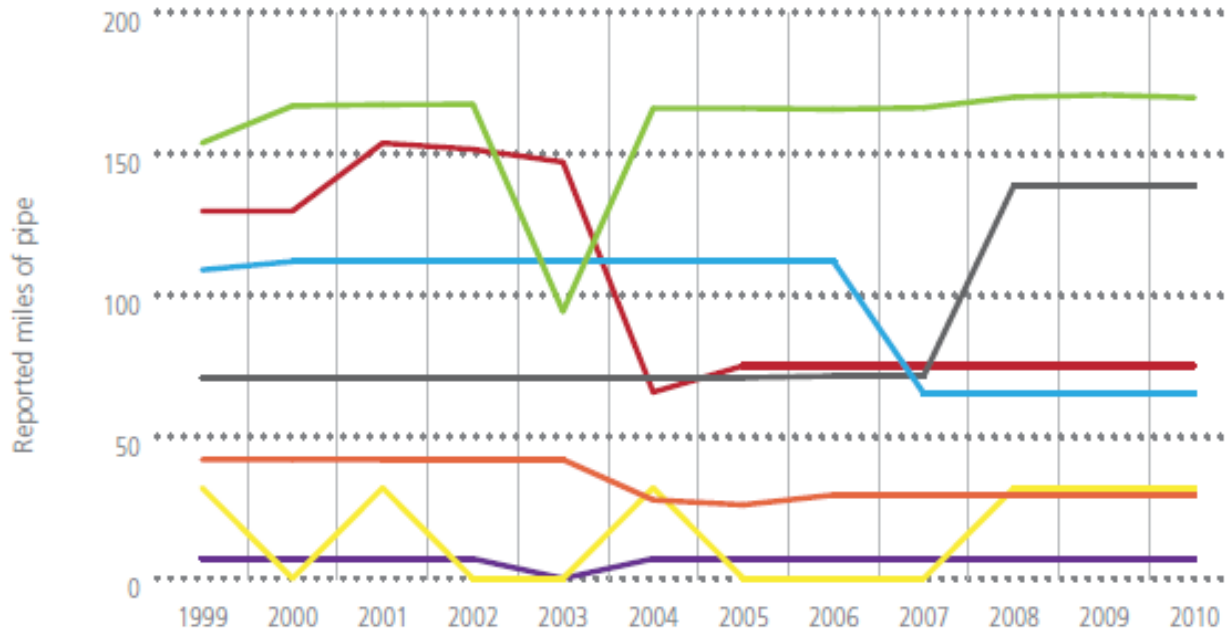
Permittees with extreme year-to-year fluctuations in reported MUL



Problem #1: Accounting system



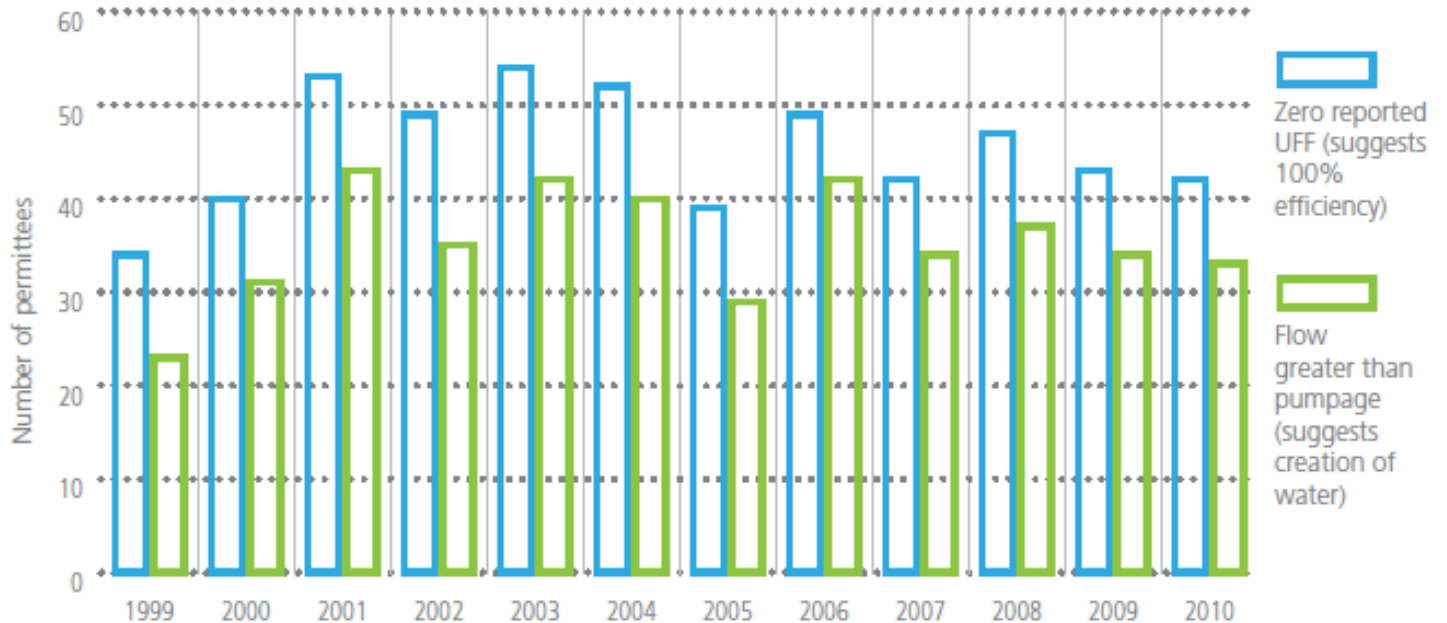
Permittees with unusual year-to-year variations in reported pipe miles



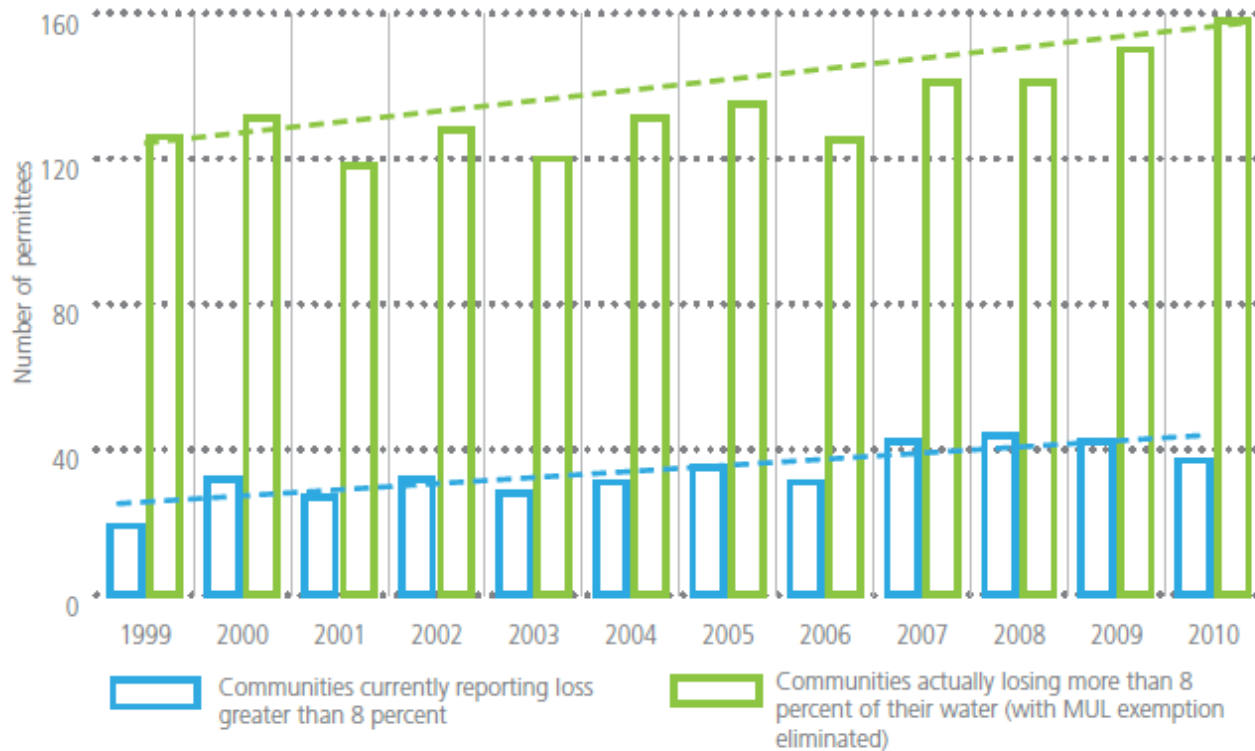
Each line represents one anonymous permittee in northeastern Illinois.

Problem #1: Accounting system

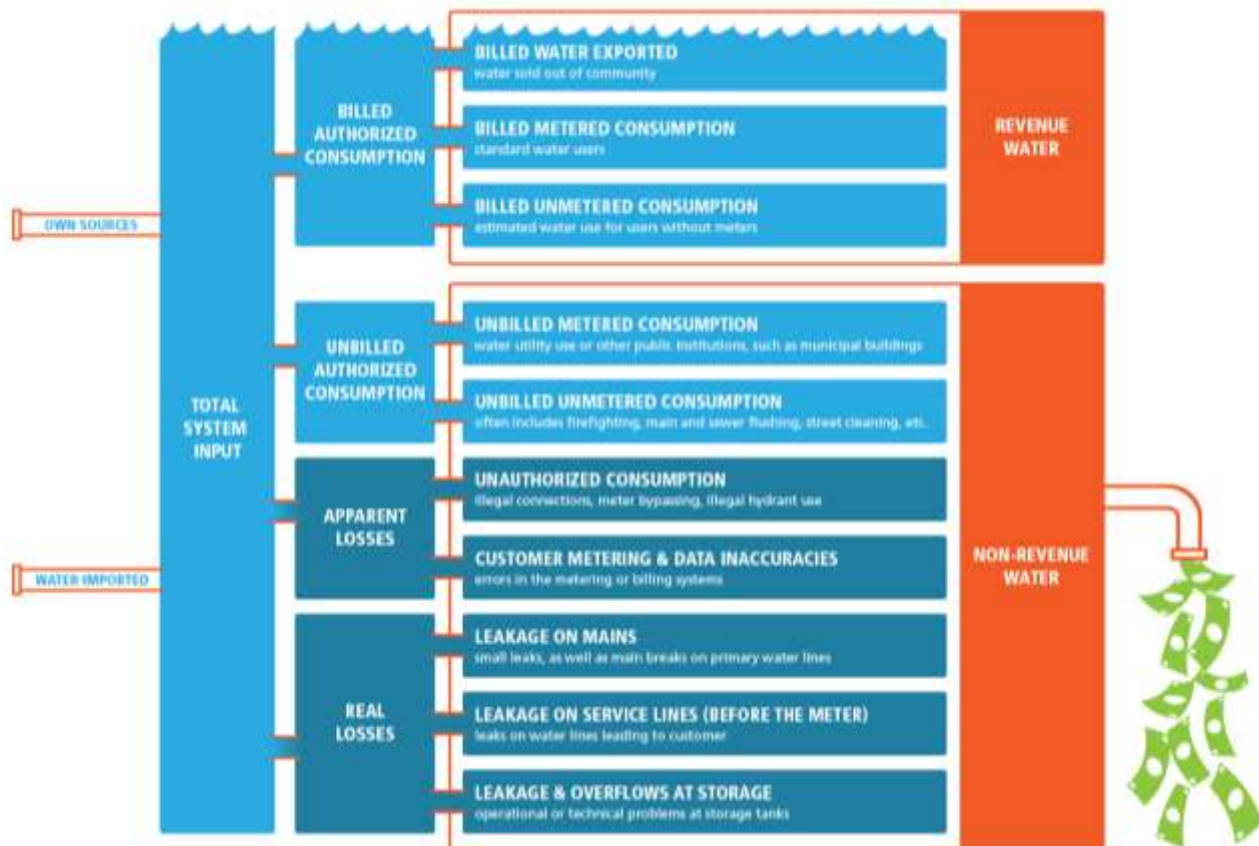
Current formula leads to impossible scenarios of zero water loss, created water



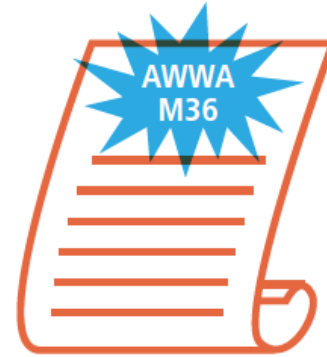
Life without MUL



Solution #1: Non-revenue water



Solution #1: Rethink performance metrics

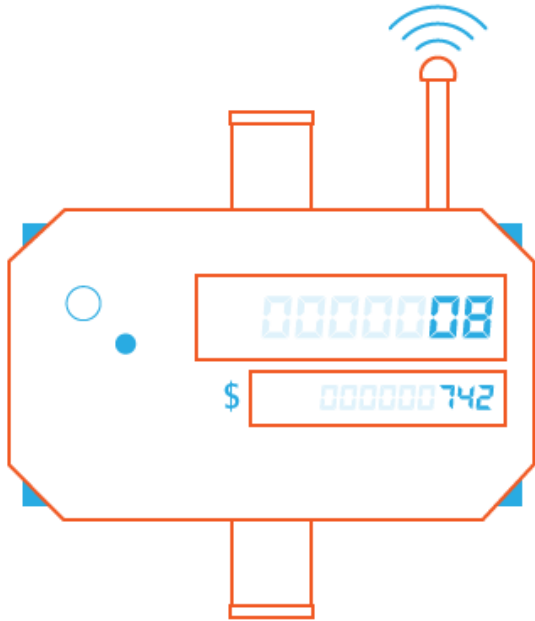


American Water Works
Association

Encourage communities to set water rates based on cost and use comprehensive metering

SOLUTION #2

Problem #2: Water rates & metering



Problem: Water rates that don't meet costs & lack of meters to track use

Solution: Full-cost pricing & universal metering

Outcome: Sufficient revenue for system maintenance

Problem #2: Water rates

ILLINOIS DEPARTMENT OF NATURAL RESOURCES LAKE MICHIGAN WATER RATE SURVEY 2005

Thursday, July 28, 2005

Page 1

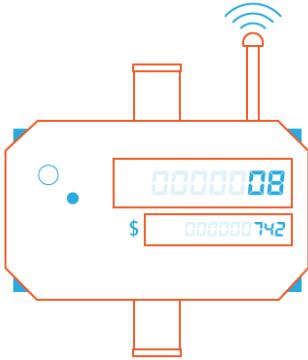
Current Rates in \$/1,000 gallons

Rate Structure

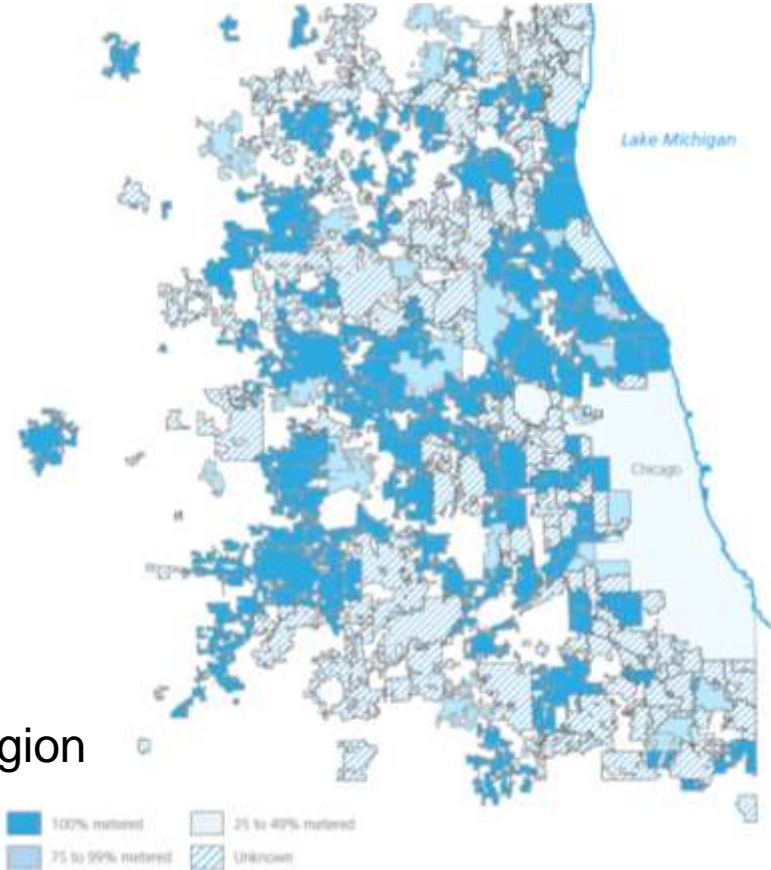
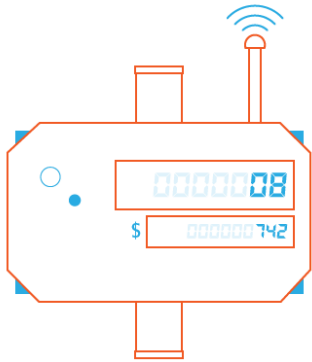
Permittee	Residential	Commercial	Minimum Rate	Minimum Rate Description	Flat Rate	Declining Rate	Increasing Rate	Bill Frequency
Addison	\$3.71	\$3.71	\$14.60	for 2,000 gallons sewer included	X			Bi-Monthly
Alton	\$2.45	\$2.45	\$8.94	res / \$18.49 commercial		X		Bi-Mo/Quart
Arlington Heights	\$3.68	\$3.68	\$15.00	Usage less than 5000 gallons	X			Bi-Monthly
Bannockburn	\$4.88	\$4.88	\$148.00	minimum bill per quarter	X			Quarterly
Beach Park	\$5.40	\$5.40	\$5.40		X			Bi-Monthly
Bedford Park	\$0.00	\$2.32	\$85.75	minimum 35,000 gallons		X		Monthly
Belwood	\$4.74	\$4.74	\$4.74	minimum bill	X			Monthly
Bensenville	\$4.10	\$4.10	\$10.65	minimum bill	X			Monthly
Berkeley	\$5.60	\$5.60	\$27.05	2,000 gallons	X			Monthly
Berwyn	\$2.82	\$1.34	21.11	minimum bill			X	Quarterly/Mo
Bloomington	\$3.36	\$3.96	\$8.40	res / \$19.80 comm - 5K gals	X			Bi-Monthly
Blue Island	\$3.04	\$3.04	\$6.08	maximum 2,000 gallons	X			Monthly
Bridgeview	\$4.24	\$4.24	\$4.24				\$1.87>2K	Monthly
Broadview	\$3.28	\$3.28	\$3.28		X			Monthly
Brockfield	\$4.92	\$4.92	\$36.80	res /\$12.27per month commercial	X			Quarterly/Mo
Buffalo Grove	\$1.80	\$1.80	\$11.00	\$5.50 per month commercial	X			Bi-Month/Mo
Burnham	\$2.25	\$2.25	\$22.50	minimum 10,000 gallons	X			Quarterly
Burr Ridge	\$2.50	\$3.95	\$4.65	fixed charge			\$5.60> 80K	Bi-Monthly
Calumet City	\$2.79	\$2.79			X			Quarterly
Calumet Park	\$2.77	\$2.77	\$25.35	res 9K / \$11.58 comm. 3K			\$2.46>54K	Quarterly/Mo
Carol Stream	\$3.25	\$3.25			X			Monthly
Central Stickney Sanitary District	\$2.93	\$2.93	\$4.50	service fee	X			Monthly
Chicago	\$1.33	\$1.33			X			Bi-Monthly
Chicago Heights	\$3.30	\$3.30	\$8.00	service charge	X			Bi-Month/Mo
Chicago Ridge	\$3.13	\$3.13	\$37.56	res/\$12.52 per month commercial	X			Quarterly/Mo
Cicero	\$3.42	\$3.42	\$25.65	first 7,500 gallons	X			Bi-Month/Mo

NOTE: The purpose of this Lake Michigan Water Rate Survey is to provide the reader with a summary of the current water rates of all Lake Michigan domestic permittees. The reader is cautioned that comparing water rates can be very misleading due to the multitude of factors that influence the determination of a water rate.

*Permittee is not currently using Lake Michigan Water



Problem #2: Metering



Inconsistent data on metering across the region

Solution #2: Guidelines for full-cost accounting

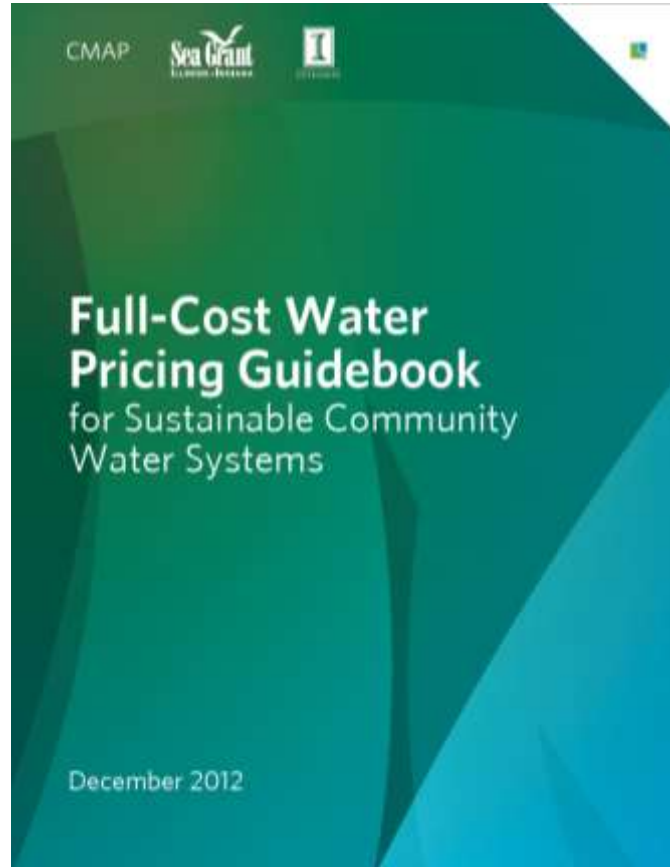
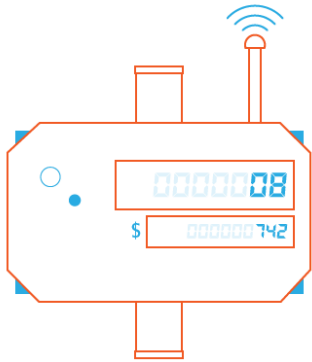
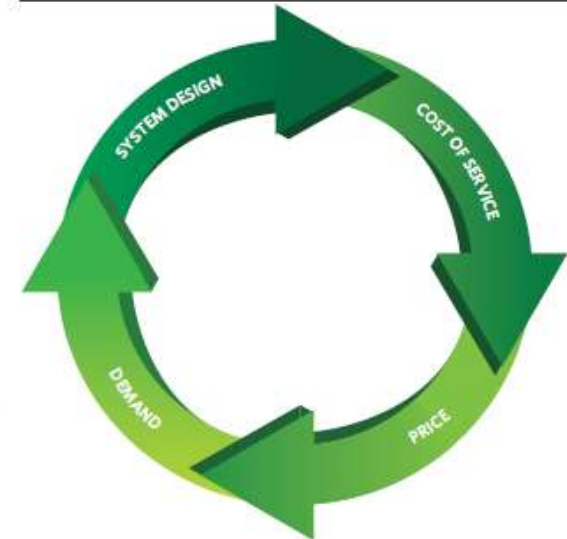
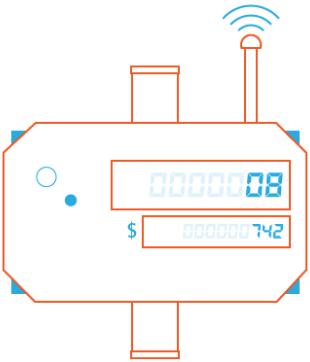


Figure 4. Role of price in system sustainability



Source: Beecher, Janice, Patrick Mann and James R. Landers. Cost Allocation and Rate Design for Water Utilities. The National Regulatory Research Institute, 1991.

Solution #2: Universal metering

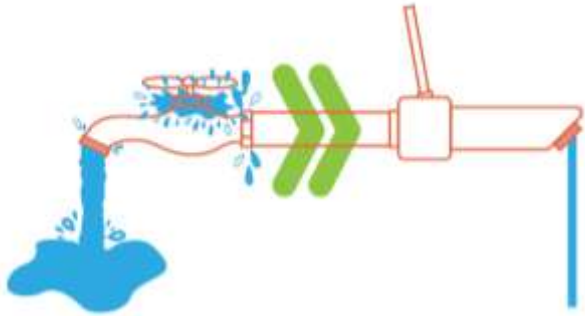


Require permittees to adopt modern plumbing standards

SOLUTION #3

Problem #3: Plumbing standards

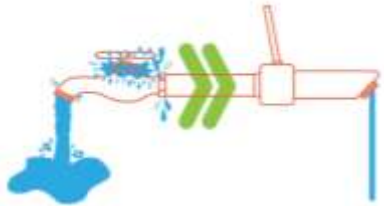
Problem: Inefficient plumbing & waste of potable water



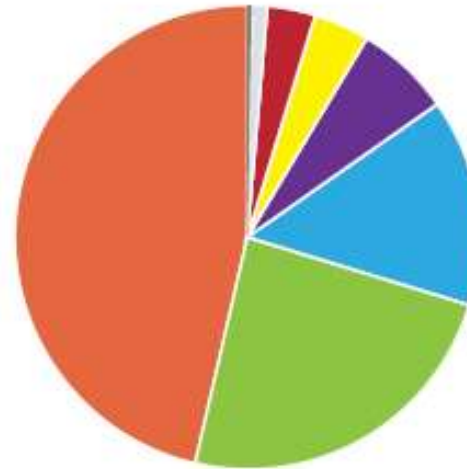
Solution: Modern plumbing standards & non-potable water reuse

Outcome: More efficient use of water

Problem #3: Plumbing standards

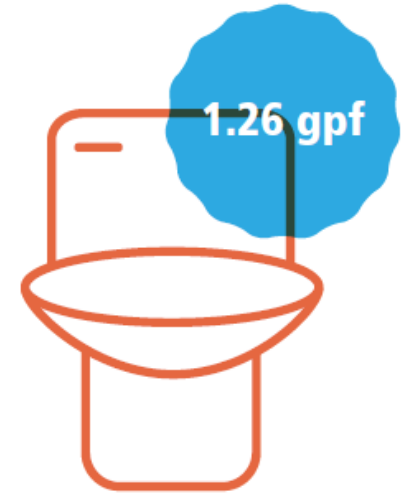
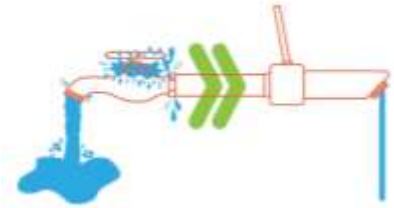


Municipalities often adopt an existing plumbing code rather than writing their own. This sample of 208 northeastern Illinois municipalities reveals a wide variety of codes in place.



- Illinois Plumbing Code 2004
- Illinois Plumbing Code (current or no year)
- International Plumbing Code (any year)
- Chicago Plumbing Code (any year)
- Illinois Plumbing Code 1993
- Illinois Plumbing Code 1998
- BOCA National Plumbing Code 1993
- IAPMO Uniform Plumbing Code

Solution #3: Modern plumbing standards



EPA
WaterSense

Solution #3: Non-potable water reuse

POTENTIAL SOURCES

- Rooftop rainwater
- Surface stormwater
- Graywater from showers, sinks, washers
- Cooling condensate
- Steam condensate
- Groundwater ejectors
- Cooling tower "blow down"
- Process wastewater



POTENTIAL USES

- Landscape irrigation
- Green roof irrigation
- Toilet flushing
- Washing machines
- Car/truck washing
- Cooling tower "make-up"
- Boiler "make-up"



Strengthen and streamline outdoor water use standards

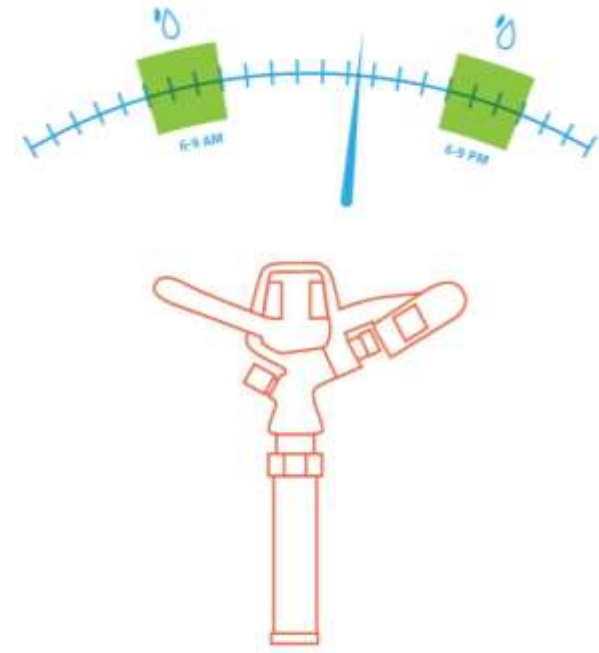
SOLUTION #4

Problem #4: Outdoor water use standards

Problem: Treated water used inefficiently for outdoor use

Solution: Stronger/consistent outdoor watering ordinances

Outcome: Reduce peak demand & potable water waste



Problem #4: Outdoor water use standards

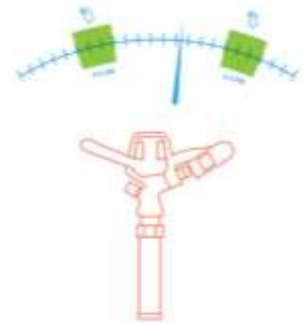
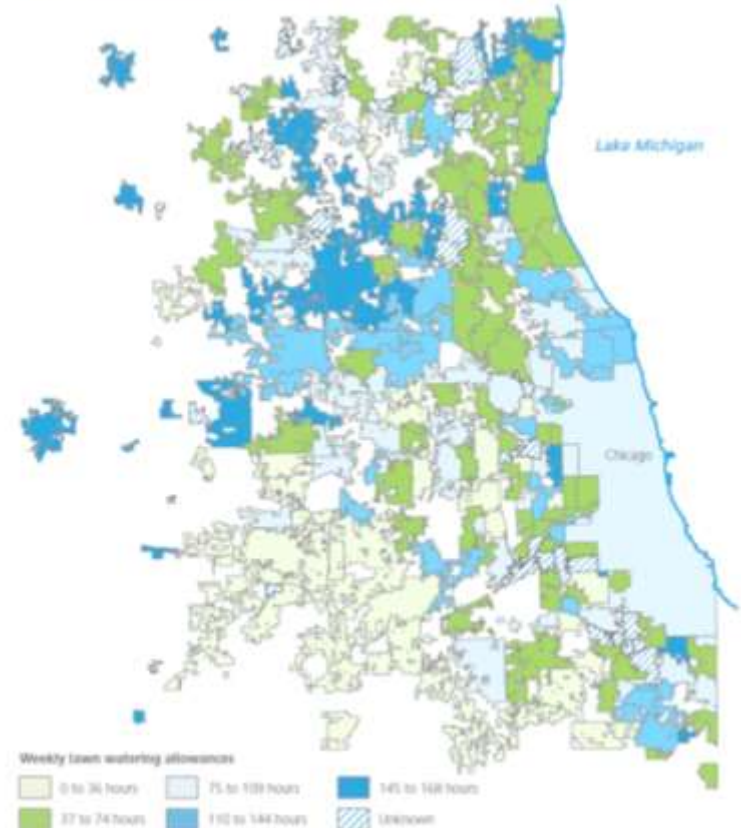


Fig 10. Inconsistent watering allowances among regional municipalities



Solution #4: Better outdoor water use standards

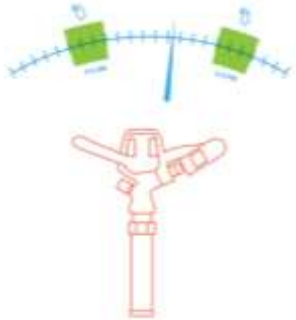
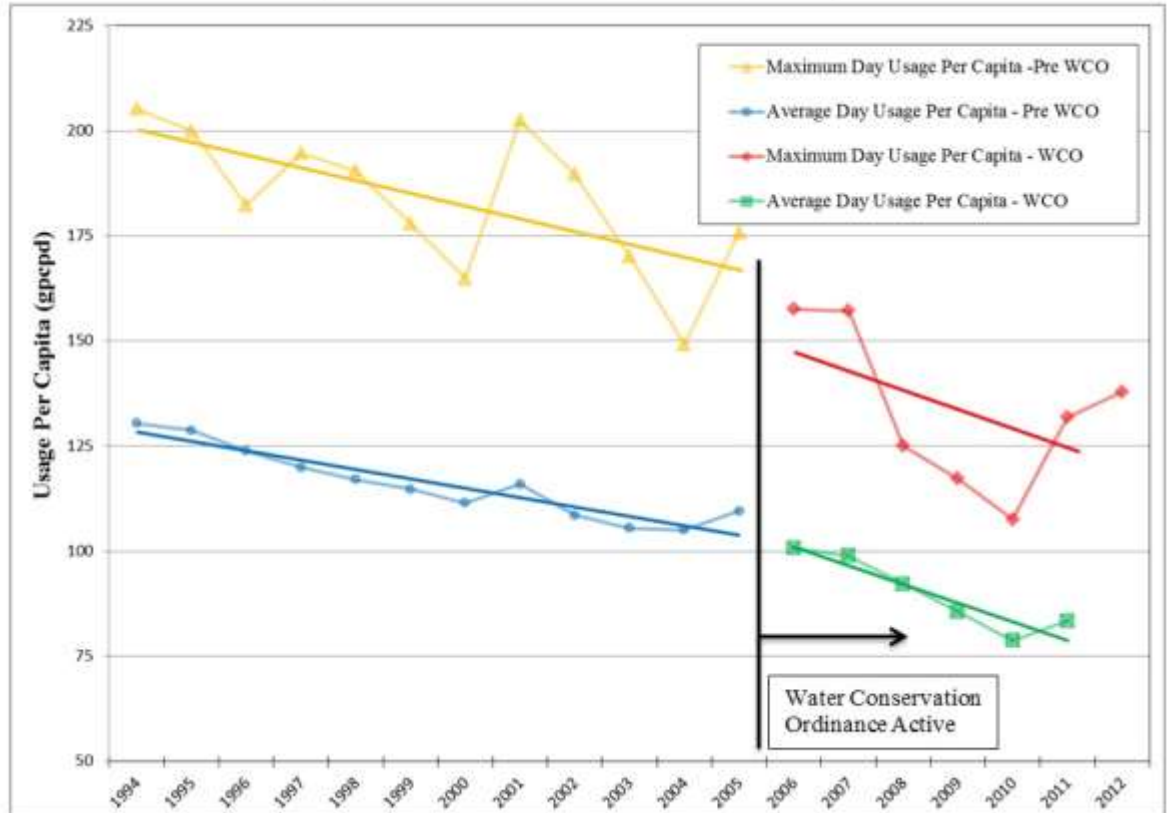


Chart 1 – Per Capita Usage Relating to WCO



Credit: City of Aurora

Increase the capacity of IDNR's Office of Water Resources to provide greater support to permittees

SOLUTION #5

Problem #5: IDNR capacity

Problem: Lack of IDNR staff capacity for proactive measures & collaboration



Solution: Increase capacity for data analysis & working with permittees

Outcome: Improved regional water management

Solution #5: Increase IDNR capacity



Proposed source for revenue to increase IDNR's capacity

Part 1: Base data processing fee of \$1,000 = **\$202,000**

Part 2: Fee based on net pumpage (<1MGD, 1-3.9, 4-20, >20) = **\$89,750**

Part 3: Net loss as percentage of net pumpage = **\$148,250**

Part 4: Fee for >1mil gal unmetered use per day = **\$1,000**

Total: \$441,100



Contact us:

MPC PROJECT TEAM

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Download this report and its infographics at
metroplanning.org/waterwise

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