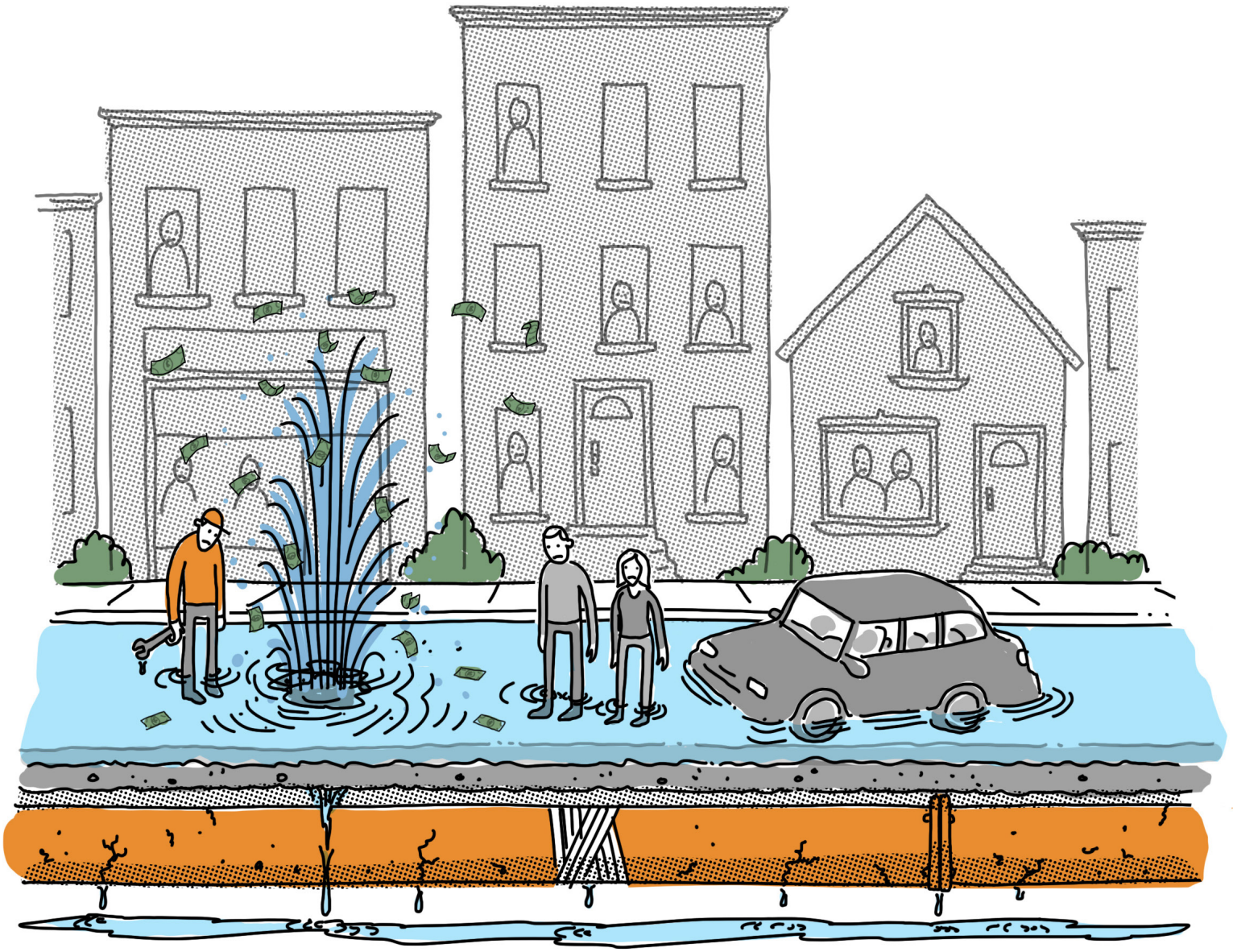


# The Case for Fixing the Leaks

*Protecting people and saving water while supporting economic growth in the Great Lakes region*

CNT

# Foreword

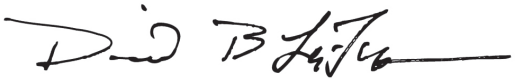
When I first had the opportunity to read *The Case for Fixing the Leaks*, I was impressed by how well it explains the important issue of water loss control in simple-to-understand terms. With this in mind, I was flattered when CNT asked me to write a foreword for it.

As executive director of the American Water Works Association, the world's largest organization of water professionals, I share CNT's concern about leaking pipes and its interest in finding collaborative solutions. In 2012, AWWA published *Buried No Longer: Confronting America's Water Infrastructure Challenge*, a report that documents the enormous repair and replacement needs facing US water systems. Leaking pipes are an obvious symptom of this trillion-dollar challenge.

It's my experience that water utility managers and other water professionals care deeply about reducing water waste, and there is considerable progress being made on this front. Innovative companies are developing improved leak detection technologies, and more utilities are adopting forward-looking asset management strategies that proactively identify sections of pipe at risk for leaks and breaks. *The Case for Fixing the Leaks* also notes that AWWA and the International Water Association have made available free audit software that allows utilities to account for water loss using a consistent approach and to strive for measurable improvement.

As the report demonstrates, there are many good reasons for communities to actively seek out and fix leaking water mains. Left unaddressed, leaking pipes can lead to serious property damage, public safety concerns and ultimately higher consumer water bills. Perhaps one of the greatest unintended consequences of failing to address leaky pipes is that it can undermine a utility's credibility with its customers. We all recognize that it makes little sense to invest in treating water to the highest standards, only to lose it on the way to the tap.

I believe CNT has done us a great service by amplifying the issue of water loss and infrastructure needs in the Great Lakes region. AWWA looks forward to continued collaboration with CNT and other partners with an interest in smart, efficient management of our most valuable natural resource.



David B. LaFrance
Executive Director, American Water Works Association

**Project Team:** Harriet Festing, Director • Danielle Gallet, Project Manager • Haisi Liu, Ben Shorofsky, Research • Sofia Becker, Ryan Kilpatrick, Kathrine Nichols, Report Editing + Layout

*Cover illustration by Craighton Berman*

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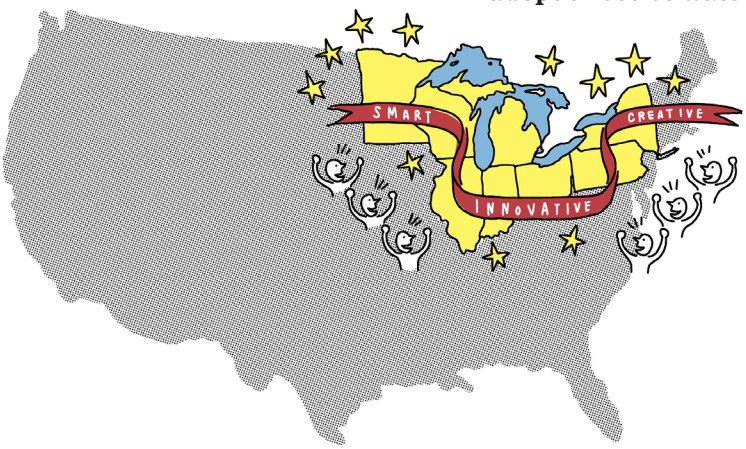
# Preface

## Money Down the Drain

Across America, water utilities and water consumers – basically, all of us – are watching money go down the drain. **Every single day, nearly six billion gallons of expensive, treated water is simply lost.** Why? Crumbling infrastructure. Leaky, aging pipes and outdated systems are wasting an estimated 14 to 18 percent of our nation's daily water use.

Water loss from failing infrastructure, faulty metering, and flat-out theft costs money, and can mean lost revenue for utilities and higher rates for water users. With increasing demand, maintenance and energy costs within the water industry, rates are already rising. Between 1996 and 2010, the cost of water services in the US rose by nearly 90 percent. Given this increase **it is essential that we quickly adopt effective water loss control practices.**




The Great Lakes region is a perfect place to start. The Great Lakes states are stewards of the world's largest available source of fresh water, and represent nearly 30 percent of our nation's gross domestic product and 60 percent of manufacturing. **Controlling water loss is a smart investment** that will ease burdens on utilities and consumers, drive innovation and economic development, protect human health, preserve water resources, and set a national standard for responsible governance and resource protection.

*"IBM supports the efforts of organizations like CNT to increase awareness on the critical issue of US water supplies and how to improve them."*

*Peter Williams, Chief Technology Officer, Big Green Innovations, IBM*[1]

The Center for Neighborhood Technology (CNT) is initiating a collaborative campaign to "Fix the Leaks" in the Great Lakes states. We are calling on state and municipal leaders, water service utilities, industry-related agencies, and Great Lakes institutions to work together on:

- New research regarding water loss and related issues
- Education and technical support opportunities to encourage industry best practices
- Investigating and shaping supportive policies that encourage best practices, public reporting, and improved planning

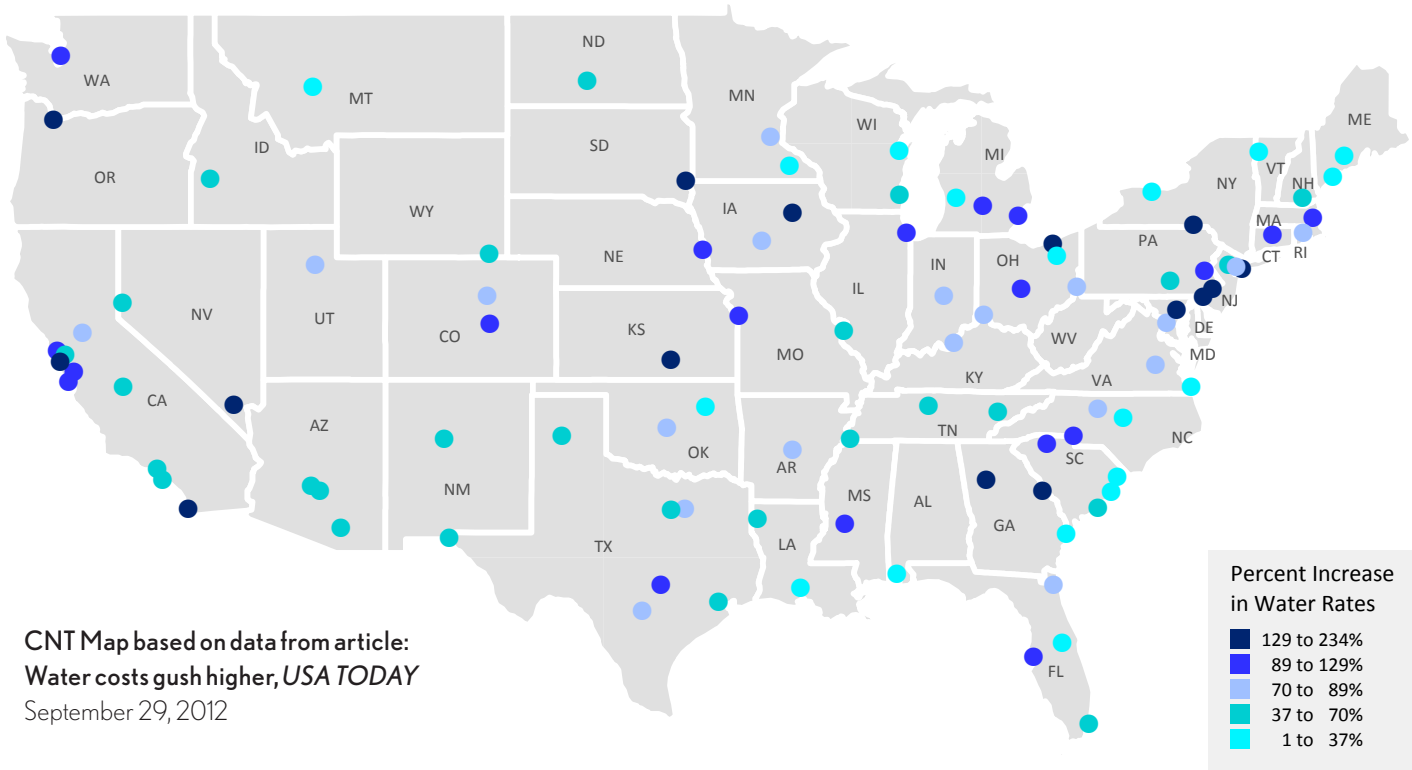
In the following pages we make the **Case for Fixing the Leaks**.

# Consumer Rates are Rising

Across the Great Lakes states and nationally, communities are facing rising water rates as the costs of producing, supplying, and maintaining water services increase. The cost of water service in 2010 was approximately 90 percent more than in 1996.[2] Though still cheaper than average costs for energy, cable, cell phone, and soft drinks, water rates have more than doubled in a quarter of localities since 2000,[3] and are rising faster than other utility rates.[4]

Given that the water industry as a whole is a rising cost sector,[5] responsible water loss control practices and planning can minimize the extent by which water waste contributes to rate escalation. This is increasingly important to consumers and communities.

## Increasing Water Rates in the United States




CNT Map based on data from article:
Water costs gush higher, *USA TODAY*
September 29, 2012

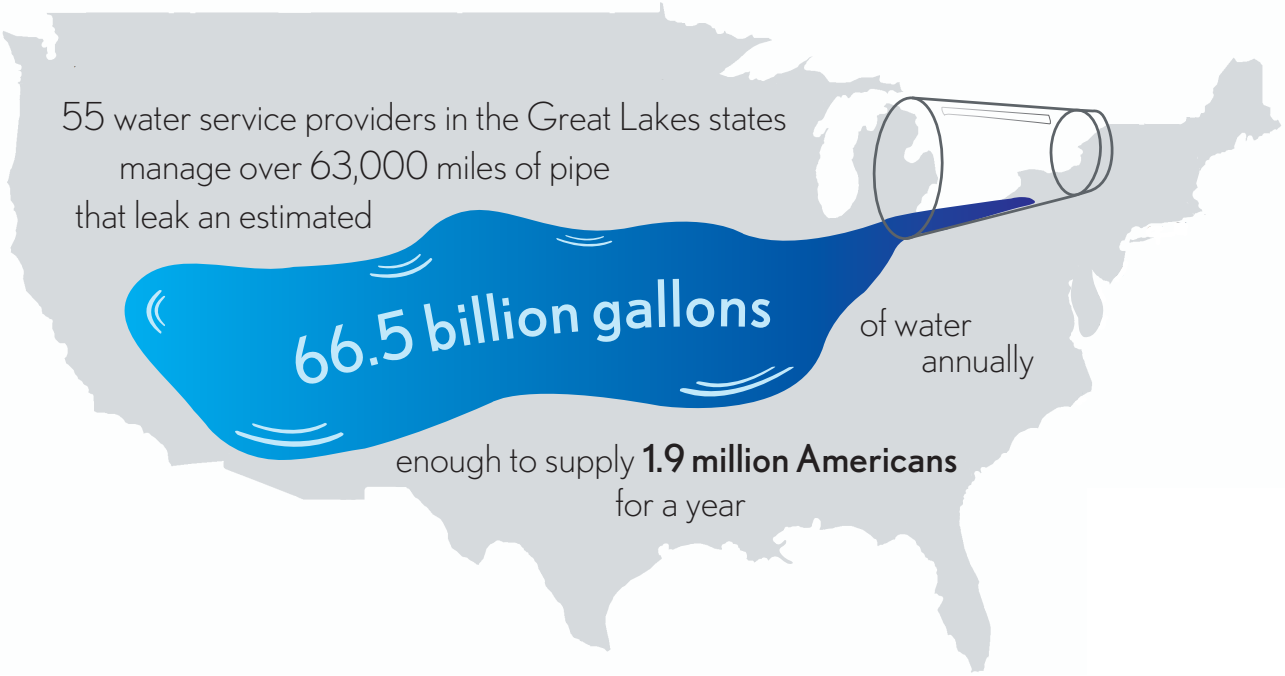
*"With water rates increasing at a much faster pace than inflation, finding ways to ensure that the necessary infrastructure repairs take place while supporting affordable water rates for consumers should be an important concern for policy makers."*

*AARP*[6]

*"In an era of rising costs, water systems that control water loss can reduce their operating expenses, thereby saving ratepayers money."*

*Jeffrey J. Ripp, Assistant Administrator, Water, Division of Water, Compliance & Consumer Affairs, Public Service Commission of Wisconsin*[7]

# Infrastructure Requires Attention




While many factors lead to increased rates, one cause that requires immediate attention is crumbling infrastructure.[8] In 2012, CNT conducted a survey of water service providers in the Great Lakes states. The 55 respondents manage over 63,000 miles of pipe that **leak an estimated 66.5 billion gallons of water annually—that's enough to fill Chicago's Willis Tower sixteen times, submerge the whole of Manhattan by 9.4 feet, or meet the water needs of 1.9 million Americans for a year.**[9]

**This picture is reflected nationally.** With no universal auditing practices in the water sector, it is difficult to calculate the extent of water loss. However, some estimate that as much as 14 to 18 percent of water might be lost each year due to leakage, metering inaccuracies, data handling errors, and unauthorized consumption.[10, 11] That is approximately 5.9 billion gallons of expensive, treated water each day, or 2.1 trillion gallons lost annually in the US. Ten years ago, USEPA estimated that by 2020 the age and condition of nearly half the water and sewer pipes in the US would be considered "poor," "very poor," or "life elapsed."[12] The American Society of Civil Engineers (ASCE) 2013 Report Card for America's Infrastructure confirmed the situation by giving a grade D to the nation's drinking water infrastructure.[13]

In addition to wasting money, leaky infrastructure leads to road collapses, flooded homes, businesses, and vehicles, as well as delayed disaster response, contamination, water born illnesses, and rapidly rising costs.[14]

In 2011, the American Water Works Association (AWWA) conducted research that found the infrastructure situation to be "tenuous" for many utilities, likening the situation to "the archetypal disaster movie in which experts and workers on the front lines warn of an imminent danger but can't convince anyone to take them seriously."[15]

## *Water Main Breaks*

In addition to the unseen leaks occurring in infrastructure buried beneath our feet, which result in billions of gallons of depleted clean water and wasted money, water main breaks also waste water, cause alarm, risk disease, and result in significant economic costs including property damage to communities.

Photo: starr61 via Flickr, CC


Photo: Robyn Jay via Flickr, CC

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*"The dangers of the nation's aging plumbing are everywhere. Water main breaks stranded drivers on washed-out roads around the nation, caused a mudslide in California, and flooded school libraries in Minnesota and Texas…Many municipalities spend their scant resources on more visible needs, like street work. Unfortunately, what lies beneath is as dangerous as what is above."*

*Michael Cooper, New York Times*[16]

# Fixing Leaks Benefits the Economy

**The logical response to our infrastructure woes is to fix the leaks.** Fortunately, a suite of cost-effective approaches to reducing water loss and providing smart, responsible water service to customers is now available. Best practices include state-of-the-art auditing methods, leak detection monitoring, targeted repairs or upgrades, pressure management, and better metering technologies. By adopting such practices, water service providers can save themselves and their communities money in the long run, while protecting water resources and generating economic growth.

*"Direct investment on the order of $10 billion in water/energy efficiency programs can boost U.S. GDP by $13 to $15 billion and employment by 150,000 to 220,000 jobs and could save between 6.5 and 10 trillion gallons of water, with resulting energy reductions as well."*

*Alliance for Water Efficiency*[20]

**Investments in water and other infrastructure are one of the best ways to create jobs.** Dollar for dollar, infrastructure investments create 40 percent more jobs than across-the-board tax cuts, and over five times more jobs than temporary business tax cuts.[17] The US Department of Commerce Bureau of Economic Analysis (BEA) estimates that for every job added in the water workforce, 3.68 jobs are added to the national economy.[18]

*"Upgrading and improving our water system makes our city more appealing for businesses and improves the quality of life for our residents, both for the thousands who directly benefit from the jobs created by these construction projects and the millions who rely on our water system every day... By investing in our infrastructure we are investing in our future."*

*Mayor Rahm Emanuel, City of Chicago*[21]

### *Water Use = Energy Use*

Another good reason to fix our infrastructure leaks is that it will also reduce the amount and cost of energy needed for water production and distribution. Water and energy are interdependent: water is required to generate energy, and energy is required to generate water services. It is estimated that about 75 percent of the cost of municipal water processing and distribution is electricity, by reducing leaks we reduce water production costs (Electric Power Research Institute, Inc. , 2002).[19]

*"No business can be started or maintained without a safe and reliable water supply... By modernizing our national water infrastructure we can improve commercial efficiency, increase US competitiveness in the global economy, and create much-needed jobs in the near term."*

*Janet Kavinoky, US Chamber of Commerce*[22]

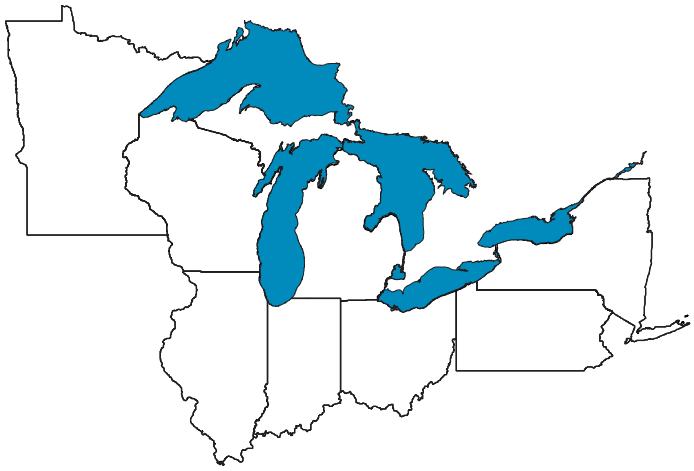
# Focusing on the Great Lakes States

## Stewards of a Great Resource

Communities and their elected leaders within the Great Lakes states share stewardship of the world's largest source of fresh water, and represent an economic region that generates nearly 30 percent of our nation's gross domestic product and about 60 percent of all US manufacturing.[23] Tourism is one of the most important industries in the Great Lakes, with almost one million visitors each year contributing $30 billion to the regional economy.[24]

Businesses are positioning this region as a global leader and "World Water Hub" of "creative talent, innovative ideas."[25] This hub now encompasses 130 water technology companies, a Great Lakes WATER Institute, and over 100 academic scientists and researchers focused on water solutions.[26]

Water within the Great Lakes basin is protected for future generations by the Great Lakes-St. Lawrence River Basin Water Resources Compact, an agreement between the eight Great Lakes states and two Canadian provinces. As required by the Compact, water conservation and efficiency programs are being developed by each state in order to reduce waste by all users.[27]



*"The Great Lakes region has a unique opportunity to demonstrate best practices in water efficiency as we understand the value of our abundance of the world's most precious resource and collaborate to reduce loss in our drinking water systems through better measurement and innovative technologies."*

*Erik Hromadka, CEO, Global Water Technologies*[30]

*"The Compact's regional goals and objectives recognize that, even in a region of relative water abundance, the management of water to maximize efficiency and minimize waste is critical. Common sense policies can help contain the rising cost to consumers of water and wastewater service and maintain the reliability of fresh water supply that gives the Great Lakes states a globally competitive advantage."*

*Natural Resources Defense Council (NRDC)*[29]

## An Opportunity to Lead

The Great Lakes states have the opportunity to take a lead in demonstrating best practices in water resource management. Of the tens of thousands of drinking water systems in the Great Lakes states that are regulated by the EPA, approximately 11,000 are categorized as "community water systems" that serve the same population all year round.[28] Ensuring that best practices are being employed across this large sector is critical to ensuring sustainable water resources and service in the future. Now is the time to make the Great Lakes states a shining example of good governance and national leadership, by protecting both rate payers and water resources.

# Moving Forward

## Adopting Responsible Auditing Practices

One critical first step to reducing water waste is to establish universal auditing and standards across water utilities, and build public understanding and support for improved water resource management and investment.

CNT's survey of Great Lakes utilities revealed the lack of consistent standards among utilities. Almost three-quarters (71 percent) of the utilities surveyed have no policy in place to control water loss. Less than half the survey respondents use best practice industry auditing standards, two-thirds do not publicly report on the condition of their infrastructure, and less than four percent of utilities said they received assistance from state or regulatory agencies in managing water loss.[31]

### *Water Loss Control in the Great Lakes States*

The 55 water service providers who responded to CNT's survey serve almost 500 municipalities and a population of 9.8 million.

- Their collective water supply infrastructure system includes over 63,000 miles of pipe.
- The average pipe within these systems is 50-years-old.
- Collectively they estimate leakage at about 66.5 billion gallons of water per year.


In fact, across much of the US, **water utilities are on the receiving end of a confusing mix of regulatory requirements, standards, and even definitions for water loss control.** A survey report to the AWWA about state agency water loss reporting practices found a lack of consistency over definitions, standards, benchmarks, targets, and auditing methods, stating:

> *"...the prevailing policies are not entirely clear, consistent, or operational."*
>
> *Janice Beecher, Institute of Public Utilities, Michigan State University*[32]

The inconsistency is bad for consumer confidence. As rates continue to rise, the public expects their money to be invested responsibly. **Uniform water loss auditing is a good start, and an industry-backed method already exists.**

The International Water Association (IWA) and AWWA developed a best management practice tool to help water utilities better manage assets through improved water loss auditing and control. The AWWA Free Water Audit Software©, together with the *Water Audits and Loss Control Programs: Manual of Water Supply Practices M36* provide water utilities with guidance and tools to improve their accountability, efficiency, and decision-making process regarding water loss control issues. The method features universal definitions for all major forms of water consumption and water loss, performance indicators that allow water utilities to assess their water loss, and performance targets. The water audit reveals how much of each type of loss (real or apparent) is occurring and how much it is costing the water utility.

CNT's research indicates that **many utilities within the Great Lakes states are not taking advantage of the free auditing software**, pointing to the need for outreach, education, and training on this best practice tool.

## Auditing Success Stories

Following are testimonies from some utilities within the country that are already practicing robust water loss auditing using the AWWA Free Water Audit Software© method who have seen positive results that have saved communities money:

### Philadelphia Water Department
*Philadelphia, PA*[33]

The Philadelphia Water Department (PWD) has operated a water loss control program for over twenty years and in 2000 became the first water utility in the United States to employ the best practice IWA/AWWA M36 water audit method. Since the beginning of this program, PWD has realized significant savings: both in terms of lost water—by reducing leakage by over 30 million gallons per day (mgd)—and by controlling customer metering and billing errors, resulting in an additional revenue capture of over $15 million since 2000.

*"Water utilities that carefully audit the water that they supply are better positioned to control excessive losses and provide reliable service to their customers. PWD is proud to be both pioneer of, and a strong advocate for, progressive water loss control methods."*

*George Kunkel, Water Efficiency Program Manager, Philadelphia Water Department*

### Birmingham Water Works Board
*Birmingham, AL*[34]

The IWA/AWWA water audit method helped the Birmingham Water Works Board—the largest water utility in Alabama — identify more than 2.8 billion gallons of unrecovered real water loss resulting in a cost of $962,914 in 2011. The leak survey team surveyed over 3,800 miles of main and detected 241 non-showing leaks which helped identify almost 14 miles of pipe that required immediate replacement in 2011.

*"Since using the AWWA methodology we have a better sense of what we are losing and what we should be doing to prevent it... We're focusing our attention on the low-hanging fruit and have already seen a pretty significant decrease in losses."*

*Ray Sloan, Water Auditor, Birmingham Water Works Board*

### Water and Wastewater Authority
*Wilson County, TN*[35]

Use of the free IWA/AWWA water audit method in 2011 helped this small utility (323 miles of main and 7,000 connections) identify three leaks losing 7 gallons per minute, collectively, in a 9-mile district-metered area. Although not detectable by acoustic sound techniques, analysis by the utility suggests the leaks had started in 2002, and that over the years 35 million gallons of drinking water, valued at about $70,000, had been lost.

*"For a small utility, this is a lot of money. That could have bought us a couple trucks...If you are a utility that hasn't been active in leak detection, rates go up and customers could be paying for losses as much as 50 percent, which is what triggered the legislation in Tennessee. For customers, they may not know it but they pay for it."*

*Chris Leauber, Executive Director, Water and Wastewater Authority, Wilson County, TN*

## A National Trend Toward Auditing Adoption

An increasing number of water utilities are voluntarily incorporating the IWA/AWWA M36 water loss control methodology into their operations in an effort to improve water efficiency and management. The benefits of these practices are also recognized by a growing number of states, many of which have water loss control policies in place. In fact, about half the states in the US have related water loss policies that require auditing at some level.

Both the states of Georgia and Tennessee require water loss audits using IWA/AWWA methodology. Other states have water loss auditing requirements that incorporate a modified IWA/AWWA methodology. This is part of a growing trend to encourage water audits and information sharing as a smart step toward defining universal benchmarks and improving water loss control.

*"When you are talking about water, it's one of the most important resources you can have. Without water, your economy will be nothing."*

*Senator Ross Tolleson, State of Georgia*[36]

*"Water loss means lost utility revenues and added expenses. The IWA/AWWA water audit procedure can provide a good benchmark for the integrity and financial health of a water system."*

*Jeffrey J. Ripp, Assistant Administrator*
*Water, Division of Water, Compliance & Consumer Affairs,*
*Public Service Commission of Wisconsin*[37]

*"Water lost from our aging systems is a financial drain on ratepayers, who pay for the energy and chemical costs to treat water they never use. It's also an indicator of the water system's financial health, which is why investors with $40 billion in assets under management have endorsed increased disclosure of system water loss. 'Fixing the Leaks' proposes actions to enhance reporting of water loss, which is an important step toward action to protect water systems' ratepayers and the investors who help water systems provide this critical service."*

*Sharlene Leurig, Senior Manager, Water Program, Ceres*[38]

# It's Time to Fix the Leaks

We can no longer afford to lose billions of gallons of treated water to crumbling infrastructure. The costs are too high.

Through new research, education and awareness, technical assistance, and supportive policies, CNT is working to help utilities across the Great Lakes states adopt responsible water management practices. We welcome your collaboration.

**To learn more about our work and the Fixing the Leaks campaign, please contact Danielle Gallet, Water Supply Program Manager, at danielleg@cnt.org.**

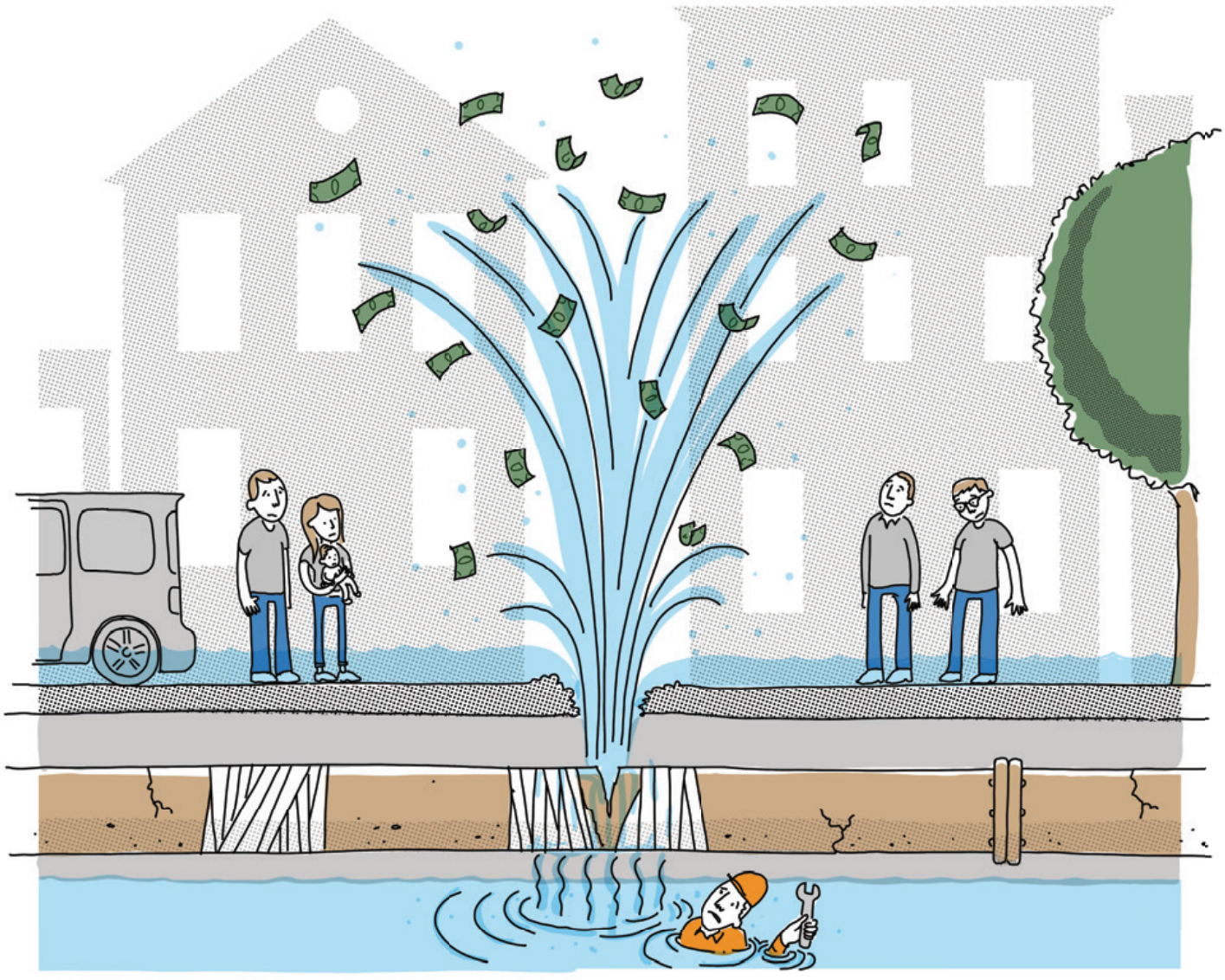


*Illustration by Craighton Berman*

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## ABOUT THE CENTER FOR NEIGHBORHOOD TECHNOLOGY

The Center for Neighborhood Technology (CNT) is an award-winning innovations laboratory for urban sustainability. Since 1978, CNT has shown urban communities in Chicago and across the country how to develop more sustainably. CNT promotes the better and more efficient use of the undervalued resources and inherent advantages of the built and natural systems that comprise the urban environment.

As a creative think-and-do tank, CNT researches, promotes, and implements innovative solutions to improve the economy and the environment, make good use of existing resources and community assets, restore the health of natural systems, and increase the wealth and well-being of people—now and in the future. CNT's unique approach combines cutting edge research and analysis, public policy advocacy, the creation of web-based information tools for transparency and accountability, and the advancement of economic development social ventures to address those problems in innovative ways.

CNT works in four areas: transportation and community development, water, energy and climate. CNT has two affiliates, CNT Energy and Alternative Transportation for Chicagoland.

CNT is a recipient of the 2009 MacArthur Award for Creative and Effective Institutions.

More information about CNT is available at **www.cnt.org**

**This project is part of SMART WATER FOR SMART REGIONS led by the Center for Neighborhood Technology (CNT), which is an initiative that seeks to help communities within the Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin) deliver water services to homes and businesses more efficiently while sustaining water resources. The report is part of a series published over the next two years that addresses the challenges, and potential solutions, associated with water loss.**

**To get involved, please contact Harriet Festing, Director of the CNT Water Program at hfesting@cnt.org or (773) 269-4042.**

**For more information about this report, contact Danielle Gallet, Water Supply Program Manager, at *danielleg@cnt.org***