Small Water Systems: Surveying State Utility Commission Best Practices

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About the Author

Kathryn Kline joined NRRI in 2015. She has researched and worked in the policy field for the past five years in a variety of positions from public interest grassroots organization to academic research in the science policy field where she is previously published. To date at NRRI, she has published several papers and participated in several conferences, Webinars, and Colloquiums. She earned her M.S. in Public Policy from the Georgia institute of Technology and B.A. in Political Science from Converse College in South Carolina.

Executive Summary

There are over 50,000 community water systems in the United States; of these, just over 82 percent serve fewer than 3,300 customers, which are categorized as small water systems. Therefore, small water systems represent an important segment of the water industry in the United States (EPA, 2016B). While many small water systems are successful, others face challenges in providing clean, reliable water service to customers for a variety of reasons. This document provides an overview of small water and wastewater systems in the United States, and reviews actions being taken by state utility commissions to assist small water systems in effectively managing their work to ensure reliable service and quality.

Section I of this document provides a historical and literature review of small water systems. This section also provides an overview of the challenges unique to small water and wastewater systems. Some of the primary challenges faced by small water systems include, but are not limited to:

- Funding the replacement of aging infrastructure,
- Expanded regulatory requirements under the Safe Drinking Water Act, and,
- Difficulties in achieving economies of scale.

Section II presents the results of NRRI's survey of state utility commissions' use of the ten best practices established in the National Association of Regulatory Utility Commissioners (NARUC) resolution entitled "Supporting the Consideration of Regulatory Mechanisms and Policies Deemed Best Practices for the Regulation of Small Water Systems" (NARUC, 2013). These include:

1. Simplified rate applications for small water systems;
2. Electronic filing procedures;
3. Use of the annual report to provide a significant portion of the rate application;
4. Commission staff assisted rate cases;
5. Simplified rate of return mechanisms;
6. Cost of living adjustments;
7. Rate mechanisms to facilitate emergency infrastructure funds;
8. Operating ratio rate mechanisms where there is very limited rate base;
9. Limiting the use of Contributions In Aid of Construction; and,
10. Combining water and wastewater revenue requirements for purposes of rate cases, as appropriate.

The review of best practices for small water systems, revealed some key insights into how states support small water systems. Forty five states have regulatory authority over water utilities; of these, 41 include at least one best practice for small systems in their water rules. For states that included at least one NARUC best practices in their rules and regulations, the average number of best practices for a state to adopt was three. The majority of states that were responsible for regulating more than 100 small water systems included more than three best practices in their rules and regulations. The most commonly adopted best practices were: E-filing (31), use of annual reports (23), and simplified rate applications (18).

Section III reviews a cross-section of additional policy tools used by state commissions to support small water and wastewater systems, and includes information on how states have adopted policy tools into regulation. This review uncover a variety of different approaches to supporting small water systems, and documents 16 policy mechanisms for supporting small water systems.

Section IV provides an overview of findings from the literature review and survey of best practices for small water and wastewater systems.

Section V presents topics for future consideration and research, including issues such as low-income affordability in the face of likely future increases in customer water rates for aging infrastructure replacement, and possible applications for Nudge Theory (Heiskanen, Lehner & Mont, 2014).

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I. Introduction

Many state commissions face the issue of developing the best possible tools for ensuring that small water and wastewater systems continue to provide their customers with safe drinking water at just and reasonable rates. One of most valuable of these tools for ensuring small systems have the resources necessary to provide high quality water is the rate case. Rate cases help to ensure that small water and wastewater systems have an adequate rate base to maintain quality water delivery. Commissions can take a variety of approaches to making the rate application process easier and more accessible for small systems that may be lacking in expertise or resources. This report reviews specific policy approaches that state utility commissions have adopted to support their small water and wastewater systems. While this report may not document every policy intervention in an ever-evolving field, it is the author's goal to present a variety of different approaches to supporting small water and wastewater systems to serve as a jumping-off point for meaningful discussion at the state commission-level about which suite of policy tools best fit the needs of a state's regulated small water and wastewater systems.

A. History

Public water systems have existed in the United States since 1755 when the first system was built in Bethlehem, Pennsylvania. During the late nineteenth and early twentieth century, scientists and public officials developed a substantially better understanding of how water-borne disease occur (Cutler & Miller, 2006). Also during this period following the Civil War, American scientists began to take a greater interest in water supply engineering, sanitation, and even broader public health initiatives (NH DES, 1999). Some historians posit that this increased awareness of water systems as a public good with the potential to mitigate disease outbreak was a major driver in water system growth (Cutler & Miller, 2006). One landmark during this period was the 1908 disinfection of water in Jersey City, New Jersey, which was the first in the U.S. This led to thousands of cities and towns following suit in the next decade, dramatically decreasing diseases across the country (CDC, 2012). The majority of water pipes in the U.S. have been installed and paid for by past generations as a result of population growth and economic development booms of the 1890s, World War I, the 1920s, and post-World War II (Copeland & Tiemann, 2010). Because of the age of this infrastructure, today's population is faced with maintaining and replacing this aging system.

Copeland and Tiemann (2010) identify 1948 as the year when federal interest in clean water began with the 1948 Water Pollution Control Act (P.L. 80-845); this Act, while establishing no federally required goals or limits, marked the beginning of federal aid to municipal wastewater treatment facilities by establishing a grant program. This program

provided small water companies with planning and design assistance, and authorized loans for treatment plant construction for localities. This was followed by the Federal Water Pollution Control Act Amendments of 1972 in which Congress made substantial revisions to existing clean water laws. Prior to 1972, state and local governments had primary jurisdiction over water quality, and the federal government provided financial assistance and conducted research. The 1972 amendment established national standards for treatment, and included new conditions attached to projects constructed with federal grants while drastically increasing the federal share of support from 55 percent to 75 percent (Copeland & Tiemann, 2010). In this period, annual authorized federal spending increased from five billion dollars in fiscal year 1973 to seven billion dollars in fiscal year 1975.

The Safe Drinking Water Act (SDWA) was passed by Congress in 1974 and amended in 1986 and 1996. The original law required the Environmental Protection Agency (EPA) to establish national health-based standards for drinking water to protect against contaminants; later amendments expanded requirements for the EPA to establish rules for source water protection, operator certification, water system improvement funds, and the provision of public information (Copeland & Tiemann, 2010). The economic and regulatory amendments made to the SDWA in 1986 created the potential for a substantial funding burden, especially for small systems faced with rising costs to adhere to new regulations.

The 1996 amendments to the Safe Drinking Water Act signaled a new approach to managing small water systems. This approach recognized the greater needs of small water systems to achieve compliance with the higher standards for water quality established by the 1996 amendments. This came in the form of the Drinking Water State Revolving Fund (DWSRF) which allocates capitalization grants to states. These grants were the first federal grants available to privately-owned water utilities. The DWSRF was established to "help public water systems obtain financing for improvements necessary to protect public health and comply with drinking water regulations" and provided $21.7 billion from 1997 to 2011 to water systems for 9,188 projects (US EPA, 2013). Projects eligible for DWSRF include installation and replacement of treatment facilities, distribution systems, and certain storage facilities. Projects that address replacement of aging infrastructure are eligible if they are needed to maintain compliance or further public health goals (Copeland & Tiemann, 2010).

Along with the DWSRF came provisions for capacity development which extended the authority of the EPA beyond environmental regulation into a new regulatory framework that included requirements for evaluation of and improvements in technical, financial, and managerial capacities of drinking water utilities which are overseen and enforced by state primacy agencies (Stanford, 2008). The capacity development provisions of the SDWA Amendments link capacity development activities directly to DWSRF funds. If they do not undertake these activities, States failing to implement a capacity development program may lose up to 20 percent of their DWSRF allotment. States must

> ensure that all new community water systems and non-transient, non-community water systems commencing operations after October 1, 1999 demonstrate technical, managerial, and financial capacity with respect to each national primary

drinking water regulation in effect, or likely to be in effect, on the date of commencement of operations (Stanford, 2008; US EPA, 2016A).

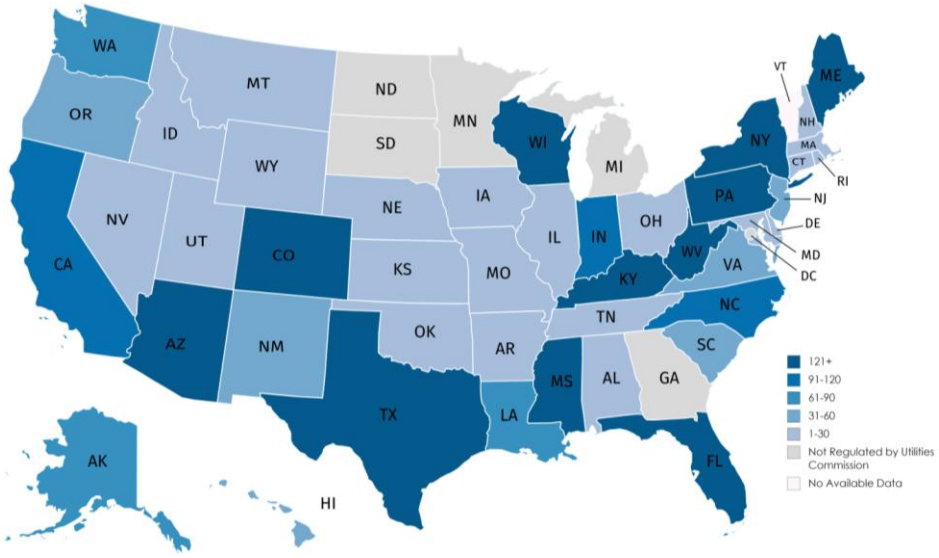
This effectively ensures that new systems are only allowed to operate if they can prove their viability to state utility commissions.

B. Current Overview

1. Small Water Systems

For the purposes of this paper, small water systems are defined as those serving 3,300 or fewer people[1]. The United States Environmental Protection Agency estimates that more than 80 percent of the total water systems in the US serve fewer than 3,300 people per system (NARUC, 2013). These small systems account for more than 90 percent of the systems regulated under the Safe Drinking Water Act, but serve only about 10 percent of the population (Stanford, 2008). Currently, 45 states regulate water or wastewater. Eleven states regulate some or all municipally-owned water systems, and 12 states regulate water systems under other ownership, e.g., cooperatives, water districts, homeowners associations (Denig-Chakroff, 2008). Figure 1 provides information on the number of water and wastewater systems regulated by individual states.

Figure 1: States Regulating Water& WW Utilities By Number of Systems Regulated



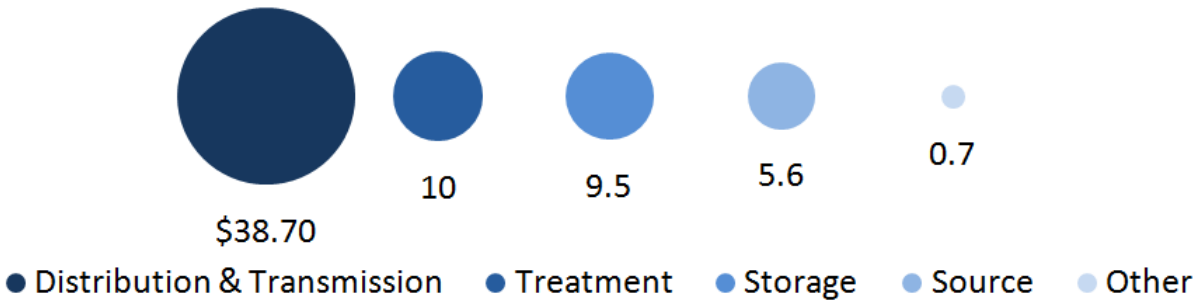
Source: Author's construct based on data gathered from state regulatory commission websites and personal interviews with states.

[1] The EPA classifies very small systems as serving between 25 to 500, and small systems as serving between 501 to 3,300 people. In this report, both small systems and very small systems are referred to under the heading of "small" systems unless otherwise specified.

2. Future Infrastructure Needs of Small Systems

The water industry is one of the most capital intensive industries in the United States. One challenge facing many small systems is replacing or repairing aging infrastructure. This becomes even more challenging because many small systems have trouble gaining access to adequate grant funds or low interest loans (Stanford, 2006). In the EPA's Fifth Report to Congress on *Drinking Water Infrastructure Needs Survey and Assessment*, the EPA estimated that small water systems will require 64 billion dollars over the next 20 years to address system needs (US EPA, 2013). The majority of these needs fall into the distribution and transmission category. Although the distribution and transmission component of water systems is one of the least visible parts, the buried pipes of this network generally account for most of the system's capital value (US EPA, 2013). Figure 2 presents EPA estimates for small water system infrastructure needs by categories for the next 20 years. Federal funding assistance from the EPA poses a challenge for small systems faced with the issue of infrastructure replacement because the largest sources of federal assistance focus on upgrades and new construction necessary to meet wastewater and drinking water standards, and does not support major repair and replacement efforts (Copeland & Tiemann, 2010).

Figure 2: 20-Year Need for Small Water Systems by Project Type (in billions of 2017 $)



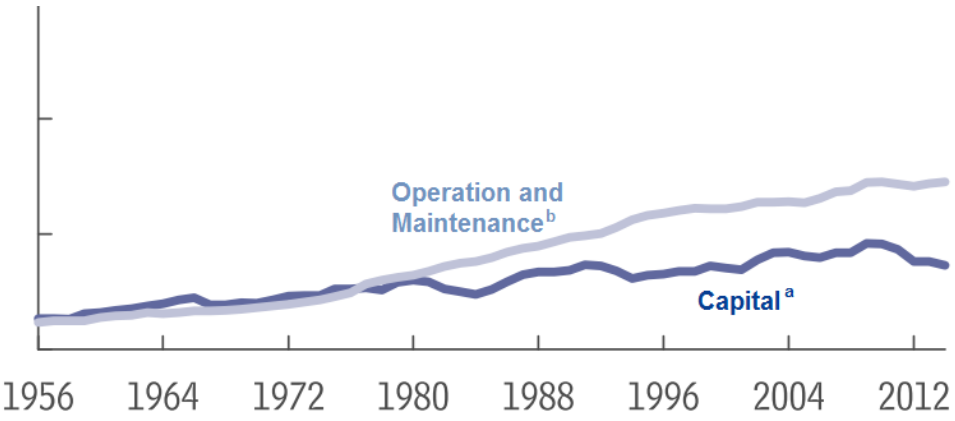
Source: Author's construct based on data from US EPA's *2011 Drinking Water Infrastructure Needs Survey and Assessment* and the CPI from the U.S. Bureau of Labor Statistics.

The Congressional Budget Office (CBO) reports that "returns from additional spending on a mature infrastructure network are typically smaller than those derived from the initial investment" (2015). And this issue is at the heart of the current water system infrastructure investment challenge: while infrastructure replacement is necessary, the returns on investment are not as compelling.

While many water systems will require considerable investments in infrastructure in the next twenty years, funding remains a challenge. Aging infrastructure requires additional funding to repair or replace, and at the same time, a rapid increase in the average price of materials used to build, operate and maintain water infrastructure has created a scenario where nominal spending has increased by 44 percent from 2003 to 2014, but because material prices have

increased more quickly than nominal spending, real (inflation-adjusted) public purchases have decreased by nine percent during this period (CBO, 2015). Examining trends in the water industry more closely, public spending for operation and maintenance (O&M) has continued to show steady growth from the 1950s, while public spending for capital expenses shows more variability and less steady growth over the same time period. Figure 3 presents public spending on O&M versus capital for water utilities from 1956-2014.

Figure 3: Public Spending for Capital and for the Operation and Maintenance of Water Utilities Infrastructure, 1956-2014



a. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of materials and other inputs used to build transportation and water infrastructure.

b. Dollar amounts are adjusted to remove the effects of inflation using price indexes for government spending that measure the prices of goods and services consumed by governments, including materials and other inputs used to operate and

Source: Congressional Budget Office. (2015). Public Spending on Transportation and Water Infrastructure, 1956 to2014. (Publication No. 49910, p. 27.) https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/49910-Infrastructure.pdf

An important concern for small companies managing their infrastructure is the cost of rebuilding systems. Increases in the prices of construction material have come at a time when utilities are beginning to work on the challenges of addressing infrastructure replacement needs. The oldest cast iron pipes from the late 1890s have an average used and useful life of approximately 120 years, while newer pipes installed after WWII have an average life of 75 years (Copeland & Tiemann, 2010). However, these estimates on used and useful life can vary considerably based on factors such as the soil condition, materials used, pipe installation practices, and the character of the water flowing through pipes (Copeland & Tiemann, 2010). Pipes also deteriorate more rapidly later in the life cycle than they do in the early years, which can increase the costs associated with pipes later in life (Copeland & Tiemann, 2010). Table 1 includes information on the estimated pipe lifetime of different common pipe materials. As of

2012, over eight percent of installed water mains surveyed were beyond their useful life, and required immediate replacement (Folkman, 2012). In addition, treatment plants have typical service lives of 15 to 50 years, meaning that plants built in response to the environmental standards of the 1970s and 1980s are becoming ripe for replacement in the next couple decades.

Table 1: Estimated Pipe Lifetime by Material

Pipe Material	Claimed Lifetime (in years)
Cast Iron	120
Concrete	100
Polyvinyl chloride (PVC)	100
Metal Pipe (CPM)	30-80
Vitrified Clay	100
High Density Polyethylene (DPE)	70+

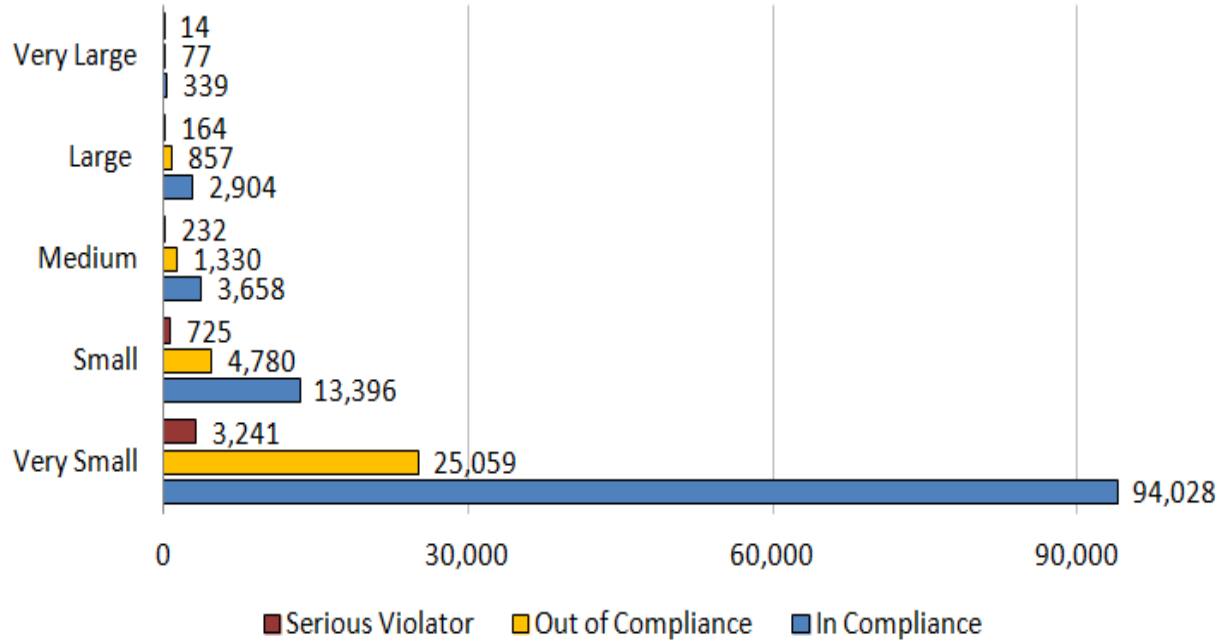
Adapted from City of Olympia, WA. Appendix J: Pipe Evaluation and Replacement Options and Costs--Stormwater System Inventory. (n.d.). p. J-3. Retrieved from http://olympiawa.gov/city-utilities/storm-and-surface-water/policies-and-regulations/~/media/Files/PublicWorks/Water-Resources/SSWPAppendix%20J.ashx

Finally, smaller water systems working on water infrastructure replacement face an additional challenge: communities served by small water and wastewater systems are generally less densely populated, and, therefore, require more pipe miles per customers than larger systems; this adds additional costs to infrastructure replacement (AWWA, 2011).

3. EPA Designations and Serious Violators

Small systems make up more than 90 percent of all systems that the EPA labels as "serious violators," meaning the system has unresolved serious, multiple, and/or continuing violations of EPA's Drinking Water Enforcement Response Policy (US EPA, 2016B), although , this number is decreasing. Between fiscal year 2011 and 2014, the number of small systems designated as serious violators has dropped from 3,908 to 2,512 (Butler, Dutton, Engelberg & Light, 2016). This is due to considerable focus on capacity development efforts by both federal and state agencies in combination with a push by some states to encourage acquisitions and consolidation of small struggling systems into larger systems in the area. Figure 4 illustrates EPA compliance by system size for fiscal year 2016.

Figure 4: Water Systems -- EPA Compliance by System Size (FY 2016)



Source: U.S. Environmental Protection Agency. (2016). Analyze Trends: Drinking Water Dashboard. *Enforcement and Compliance History Online*. [Data set]. https://echo.epa.gov/trends/comparative-maps-dashboards/drinking-water-dashboard

Consolidating small systems to create the scale necessary for better management and utilization is a goal of some states. California has led the push for small system consolidation, with Senate Bill 88 which authorized California EPA's State Water Board to require consistently failing systems either to meet standards, or to consolidate with, or obtain service from, a public water system (CA EPA, 2016). These consolidation efforts are discussed in greater detail in Section IV of this paper.

4. What Qualifies as a Small Water System?

States take different approaches to defining small water systems, and determining which systems are eligible for assistance. The two most common metrics used to define utility size are the number of customers and annual gross revenue. Some states use a combination of both, or determine class using number of customers, but use annual gross revenue to determine if the utility is eligible for small utility filing assistance options. In states that use different standards to determine utility class and utilities eligible for commission staff assistance, there is the possibility that a small utility may be allowed to file a simplified annual report, but not have access to staff assistance. Few states adopt the EPA's definition of a small water system which is

a utility serving 3,300 or fewer customers; the reason for this is unclear. Table 2 provides examples of states' varying standards for the threshold at which utilities are considered small utility systems for different states.

Table 2: State Definition of Small Water Systems

State	Definition
California	Class C: if it serves 501 through 2,000 service connections, Class D if it serves no more than 500 service connections.
Connecticut	Class C water companies are small water systems, defined as having gross revenue of under $100,000 annually
Florida	Total gross annual operating revenues are $275,000 or less for either water or wastewater service or $550,000 or less on a combined basis
Idaho	Have not more than $50,000 annual gross revenues from water operations, and provide service to fewer than three hundred customers or propose initially to provide service to fewer than three hundred customers
Indiana	The utility serves fewer than 3,000 customers
Kentucky	Had gross annual revenue in the immediate past calendar year of $5,000,000 or less
Maine	Utility with total annual revenues of less than $250,000 during the most recent fiscal year
Nevada	Any water distribution system serving fewer than 600 customers
New Mexico	Have less than an aggregate of five thousand (5,000) service connections in any utility operating district or division in New Mexico averaged over the previous three (3) consecutive years.
New York	Class C have annual water operating revenues between $400,000- $699,999 Class D have annual water operating revenues between $100,000- $399,999
Texas	retail water or wastewater utility service to fewer than 500 taps or active connections.
West Virginia	Class C: less than $200,000 in annual revenue. Utilities are eligible for small utility rate proceedings if they make ≤ $1,000,000 in gross revenues annually

Source: Author's construct based on relevant state rules and statutes

C. Challenges Faced by Small Systems

While there are examples of small water systems that do an excellent job at providing safe and reliable water service to customers at just and reasonable rates, many small systems struggle to do so. Many authors have described the problems faced by these systems.

Compared to larger systems, small water systems are less likely to have the technical capacity necessary to monitor water for contaminants, make timely repairs, or replace deteriorating infrastructure (Butler, Dutton, Engelberg & Light, 2016). Due to limited resources, small systems may not have the managerial expertise to ensure safe and reliable delivery of drinking water, and these shortcomings are exacerbate by financial limitations faced by many small systems.

In *Viability Policies and Assessment Methods for Small Water Utilities*, Beecher, Dreese, and Landers (1992) break down the challenges faced by small water systems into four distinct stages: Demand for Creation of Small Water Utilities, Establishment of Small Water Utilities, Utility Operation, and Application for Rate Relief, and identify specific problems and solutions relevant to each phase. Table 3 provides details on the four stages of development experienced by small water utilities.

Table 3: Problems and Solutions in Small Water System Regulation

Stage	Problems	Solutions
I.	**Demand for Creation of Small Water Utilities**	
	● Reliance on small Water supply ● Distance from large water supply system ● Adjuncts of land development	● Certificates of convenience and necessity ● Regionalization ● Land-use controls
II.	**Establishment of Small Water Utilities**	
	● Little capital ● Weak management experience & structure	● Cooperative ownership ● Capital Subsidies ● Education and training ● Setting initial rates
III.	**Utility Operations**	
	● Low revenues ● Poor recordkeeping ● Inadequate service quality ● Deteriorating plant ● Low capital reserves	● Consolidation ● Centralized assistance ● In-service education and training ● Annual Reports ● Receivership
IV.	**Application for Rate Relief**	
	● Unfamiliar procedures ● Disproportionately expensive to utility ● Poor quality submission to commission	● Case consolidation ● Routinized timing ● Deregulation ● Safe harbors ● Automatic adjustments

Stage	Problems	Solutions
V.	**Processing Application for Rate Relief**	
	● Expensive for company ● Time consuming for commission	● Stipulated proceedings ● Short forms ● Complaint-triggered rate case ● Staff-assisted rate case
Source: Adapted from Beecher, J. A., Dreese, G. R., & Landers, J. R. (1992). Viability Policies and Assessment Methods for Small Water Utilities. *National Regulatory Research Institute.* Table 1-1		

The Beecher, Dreese and Landers (1992) framework is helpful, because it identifies specific pressure points in the small system lifecycle and provides clear solutions. In Stage I, when there is demand for the creation of small water utilities, the authors recommend requiring certificates of convenience and necessity, adopting a focus on regionalization, and land-use controls. When small water utilities are being established, solutions can focus on: cooperative ownership options, capital subsidies, education and training for utility staff members, and setting reasonable initial rates. During Stage III, utility operations, authors point to: consolidation, centralized assistance, in-service education and training, annual reports, and the appointment of a receivership as possible solutions. During applications for rate relief, the authors recommend: case consolidation, routine timing of rate cases, deregulation, safe harbors, or automatic adjustments. And when processing applications for rate relief, stipulated proceedings, short forms, complaint-triggered rate cases, and staff-assisted rate cases are all possible venues for providing small system relief.

In her 2008 report Small *Water Systems: Challenges and Recommendations*, Melissa Stanford lists six challenges common to many small water utilities. These are:

- Aging infrastructure,
- Expanded requirements under the federal Safe Drinking Water Act,
- Difficulty educating management on operational and capital planning issues,
- Insufficient resources to develop and administer low-income programs,
- Insufficient resources at state commissions to assist small utilities, and
- Difficulties in achieving economies of scale.

Teumim and Radigan explain in *The Small Water Company Dilemma: Processes and Techniques for Effective Regulation* that the challenge of small water systems frequently begins when real estate developers create stand-alone systems instead of connecting new developments to pre-existing systems, as in the norm with telecommunications and electricity (2011). Sometimes, costs for adopting a regionalized approach (by connecting new systems to existing water infrastructure is too expensive), and no rules or laws exist requiring these interconnected systems. In these cases, developers frequently create stand alone systems, which, depending on the rules and laws, may be subject to regulation by the state utility commission (Teumim & Radigan, 2011). This creates a challenge because these systems are regulated, but serve smaller

populations, meaning fewer rate payers bear the costs of system operations, maintenance, upgrades, and compliance. This disparity creates relatively high per-capita costs in order for small systems to meet regulatory requirements as the result of the smaller cost-sharing pool (Butler, Dutton, Engelberg & Light, 2016). This problem is not unique to small water systems, but can occur with other types of small utilities as well.

In its report *Buried No Longer: Confronting America's Water Infrastructure Challenge,* the American Water Works Association presents another key challenge faced by water systems: financing necessary infrastructure improvement. In this report, AWWA finds that household water bills will need to increase to fund necessary infrastructure repair. In the most affected communities, this could triple household water bills (2011). These costs are higher for many small systems, where the pipe miles per customer are greater in rural areas. While utilities may need rate increases to maintain the safety and reliability of the system, rate increases are no help if customers cannot afford to pay higher rates. Ensuring affordability and mitigating rate shock are areas where utility commissions must work with small systems to ensure solutions. Encouraging regular rate increases instead of a large, one-time rate increase is an important first step. Future efforts to develop low-income programs, similar to those available for electric, gas, and telecommunications customers, is also an important consideration in future policy conversations on this topic.

From a review of the literature on this topic, we can make six basic observations about small water and wastewater systems, and the challenges they face when trying to provide safe and reliable water to customers.

1. Small water systems face different challenges, which may require different types of policy interventions or support at different stages of the small system's development.
2. Many small systems lack managerial expertise which can make applying for rate cases and maintaining infrastructure and water quality more challenging.
3. Many challenges faced by small systems are exacerbated because the systems are not optimizing their operations by taking advantage of economies of scale.
4. Early challenges with adopting a regionalized approach for developing new systems impacts small systems throughout the life of the system.
5. Small systems are faced with rising costs of infrastructure repair and replacement as their original plant reaches the end of its useful life.
6. As small systems increase rates to make necessary improvements on systems to ensure safe drinking water, utilities and policy makers are going to work towards addressing ways to adopt policies that ensure low and moderate income (LMI) customers are still capable of paying their bills.

These observations are helpful to keep in mind when considering the policy approaches discussed in sections II and III, as the best policy interventions address the specific challenges being faced by the impacted systems.

II. Survey of Best Practices for Regulation of Small Water Systems

A. Survey Methodology

The findings documented below are based upon a thorough review by NRRI of state utility commissions' rules on water and wastewater available through state commission websites. This review documents the NARUC best practices included in state utility commission rules.

B. Best Practices

In its 2013 *Resolution Supporting the Consideration of Regulatory Mechanisms and Policies Deemed "Best Practices" for the Regulation of Small Water Systems* the NARUC Committee on Water identified ten best practices for the regulation of small water systems. This resolution recognized that the cost-of-service regulatory model (wherein rates are determined based on the costs of providing service, including an opportunity for utilities to earn a return on investment) when applied to small water systems, has the potential to result in disproportionately high per-customer rates (NARUC, 2013). To address these issues, the 2013 resolution recognizes that rate application processes and mechanisms that reduced the need for outside counsel or consulting services, and therefore reduced rate application duration and costs should be encouraged (NARUC, 2013). With these goals in mind, NARUC recommended that regulators "consider and adopt as many as appropriate of the regulatory mechanisms identified" (NARUC, 2013).

The ten Best Practices outlined in the Water Committee's Resolution include:

a) Simplified rate applications for small water systems;
b) Electronic filing procedures;
c) Use of the annual report provided by the utility to the public utility commission to provide a significant portion of the rate application;
d) Commission staff assisted rate cases including both direct commission staff involvement in the rate application process and site visits to reduce the need for formal discovery;
e) Simplified rate of return mechanisms that may include formulaic rate of return calculations or percentage increases in authorized returns indexed to recent water cases in the same jurisdiction;
f) Cost of living adjustments;
g) Rate mechanisms to facilitate emergency infrastructure funds;
h) Operating ratio rate mechanisms where there is very limited rate base;
i) Limiting the use of Contributions In Aid of Construction in situations where unsustainably low rates may be instituted as a result; and

j) Combining water and wastewater revenue requirements for purposes of rate cases, as appropriate, if the water and wastewater utilities are under the same ownership, which will reduce rate case expense and offer rate increase mitigation options driven by economies of scale that would be unavailable otherwise.

It is worth recognizing the considerable variation between states. While the section below survey different types of state support for small water systems, this topic is most relevant for states with a large number of small systems. States with a small number of regulated systems may have the capacity to allocate more attention to struggling water systems regardless of size.

Table 4 provides additional details on which best practices each state has implemented, and these best practices are explained in greater detail after Table 4.

Table 4: NARUC Best Practices for Water and Wastewater Utilities by State

States	Simplified Rate Application	Electronic Filing	Use of Annual Report	Commission Staff Assistance		Simplified RoR Mechanism	Cost of Living Adjustment	Rate Mechanisms for Emergencies	Operating Ratio Rate Mechanisms	Limited use of CIAC	Combining W & WW for rate case
				Direct staff help	Engineer						
AL											
AK											
AZ			●	●	●						
AR			●	●				●			
CA	●	●	●	●		●	●				
CO	●	●	●	●			●		●		●
CT	●	●	●								
DE		●		●							
FL	●	●	●	●	●		●				●
HI		●						●			
ID		●		●				●			

States	Simplified Rate Application	Electronic Filing	Use of Annual Report	Commission Staff Assistance		Simplified RoR Mechanism	Cost of Living Adjustment	Rate Mechanisms for Emergencies	Operating Ratio Rate Mechanisms	Limited use of CIAC	Combining W & WW for rate case
				Direct staff help	Engineer						
IL	●	●	●					●			
IN	●	●					●				
KY	●	●	●	●					●		
LA	●										
ME	●	●				●		●			
MD		●									
MA		●									
MS		●	●								
MO		●									
MT	●	●	●			●			●		
NC		●	●								
NE									●		
NH	●	●	●	●	●	●					
NJ		●									
NM	●		●			●					
NV	●	●					●				
NY		●									
OH		●									
OK	●		●			●					
OR	●	●	●	●							
PA	●	●						●			●
RI		●						●			
SC		●	●						●		

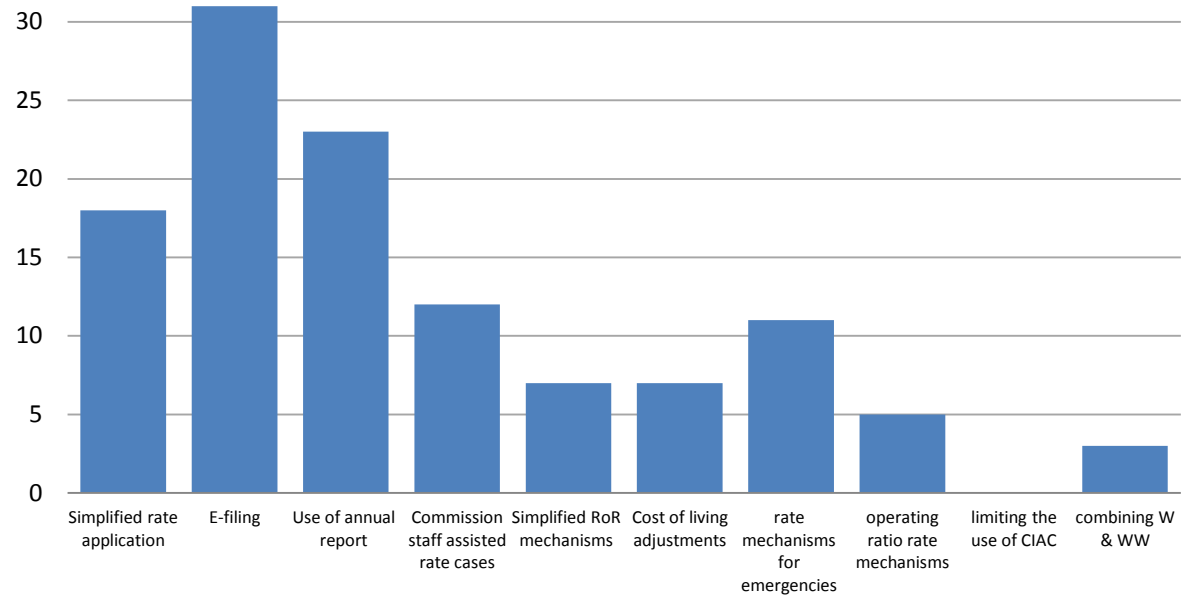
States	Simplified Rate Application	Electronic Filing	Use of Annual Report	Commission Staff Assistance		Simplified RoR Mechanism	Cost of Living Adjustment	Rate Mechanisms for Emergencies	Operating Ratio Rate Mechanisms	Limited use of CIAC	Combining W & WW for rate case
				Direct staff help	Engineer						
TN											
TX	●		●	●		●	●	●			
UT											
VT		●	●								
VA		●	●					●			
WA		●	●					●			
WV	●		●	●	●						
WI		●	●				●				
WY		●	●					●			
Total	**18**	**31**	**23**	**12**	**4**	**7**	**7**	**11**	**5**	**0**	**3**

Author's construct based on states' rules and regulations from individual state websites

C. Survey Findings

E-filing (31) was the most commonly used of the NARUC best practices, followed by use of an annual report (23) and simplified rate applications (18). Best practices such as commission staff assisted rate cases (12) and rate mechanisms for emergencies (11) were less common, but still used by a considerable number of utility commissions.

Figure 5: NARUC Best Practices for Water &Wastewater by State Usage



Source: Author's construct based on data gathered from Table 4

For states that included at least one NARUC best practices in the rules and regulations, the average number of best practices included is three. The majority of states that were responsible for regulating more than 100 small water systems included more than three best practices in their rules and regulations. Only four of the 45 states surveyed that regulate water and wastewater utilities did not include any best practices in the state's rules or regulations. This could result from a state only regulating a small number of utilities. In this circumstance, state commission staff may implicitly implement these best practices because they have the bandwidth to maintain closer relationships with the small number of small water systems regulated in the state without providing rules on the books, or the state may not regulate any small water systems at all, only medium and large water systems.

Simplified rate applications for small water systems

Simplified rate applications for small water systems allow these companies to apply for a rate increase using an application that requires less time and effort to complete. Simplified rate

applications may require fewer steps. One often-cited challenge of small systems is the minimal staff retained onsite. This may create a scenario where small water systems have the capacity to complete day-to-day operations, but not have the capacity to mount a full rate case. Other concerns expressed by small water systems include the need to hire expert help (such as legal representation) to apply for a rate increase. This may discourage these systems from applying for a higher rate. A simplified system may appear less formidable for a small provider, require less expert assistance, and encourage systems to apply for regular rate increases. As we noted earlier, regular small rate increases are more palatable to customers than one-time large increases. Simplified rate forms vary significantly from state to state. Many simplified forms work in tandem with the company's annual report to reuse information that utilities should already have on hand to apply for rate increases. Other states simplify the process even more. Montana, for example, allows small water or wastewater utilities to apply for a pre-determined standard rate tariffs where the filing requires only a copy of the written customer notification of intent to adopt the Standard Rate Tariff, a statement verifying that the notification was mailed to customers, a list of names and billing addresses of all customers, and a copy of the standard rates in tariff form (MT PSC, 2016).

Some type of a simplified rate application was utilized by eighteen of the states reviewed for this survey. The most common method for providing a simplified rate application was to provide a separate, simplified rate request form for qualifying small water or wastewater systems. These forms generally required less detailed accounting information from small systems. Simplified rate case procedures also frequently included provisions for a shortened time period, instead of the regular timeline for a full, general rate case proceeding.

Electronic filing (e-filing) procedures

Electronic filing (e-filing) procedures allow utilities to submit applications for rate increases online instead of filing physical paperwork with the state commission. E-filing has several advantages, including: savings from avoided printing/ postage/ fax/ courier delivery costs; increased filing speed; the ability to file twenty-four hours a day, seven days a week; and more efficient review of applications. E-filing was the most commonly used best practice, currently used by thirty-one state commissions. E-Filing has allowed for more streamlined communications between utilities, commissions, and other interested parties.

Use of the annual report

Use of the utility's annual report to provide a significant portion of the rate application is another best practice implemented by a significant number of states. Many states require utilities to provide an annual report to utility commissions which provide basic information about utilities' current financial state. By allowing small water and wastewater systems to re-use

information already gathered for the annual report as a part of the rate application, utility commissions can decrease the difficulties of applying for rate cases, because small systems have already collected much of the needed information.

At least twenty-three states currently require utilities to complete an annual report, and a substantial amount of the accounting information required for an annual report is necessary to file a rate case. Requiring small water and wastewater systems to file annual utility reports does more than just ensure that utilities have prepared a significant amount of the information required to file a general rate case, it also ensures that small systems are regularly reporting on the current state of their utility operations to state utility commissions. This is valuable for ensuring that small utilities have an understanding about the state of their company's business, and also allows commission staff to monitor small systems and provide timely support if necessary.

Commission staff assisted rate cases

Commission staff assisted rate cases can take two forms: direct commission staff involvement in the rate application process or site visits to reduce the need for formal discovery. In either case, Commission staff provide expertise not otherwise available to small water systems. Twelve states provide commission staff assistance in rate cases. Four of these states provide engineering assistance in addition to filing assistance. A few of the state commissions reviewed specifically disallow commission water staff from assisting small systems while filing rate cases because of "ex parte" communication rules.

Connecticut takes this approach to ex parte communications, but has also created a simplified application process stating: "it is envisioned that small water companies can file this simplified fill-in-the-blank application using the Company's Annual Reports with little or no involvement of outside consultants" (CT DPUC).

Simplified Rate of Return (RoR) mechanisms

Simplified Rate of Return mechanisms may include formulaic rate of return calculations or percentage increases in authorized returns indexed to recent water cases in the same jurisdiction, or allow for an automatic rate increase without a full rate case if the rate increase requested is below a certain threshold. These can allow small water systems to increase their Rate of Return by a percentage less than or equal to a number specified by the commission. This mechanism can be beneficial for allowing small systems to increase their rates without a costly, formal process and has the potential to help mitigate rate shock which may occur if a small system files for a long-overdue rate case.

Seven states include provisions for allowing simplified Rate of Return mechanisms. Many states with this type of provision specify that the purpose of such rules is to reduce the

administrative burden placed on small systems by requiring a full general rate case. One example of a simplified RoR mechanism is Oklahoma, where the commission allows a fifteen percent annual increase in revenue based on the previous twelve months (OKCC, 2014).

Cost of living adjustments

Cost of Living Adjustments (COLAs) are generally equal to the percentage increase in some standardized price index such as the consumer price index. COLAs allow small water systems to receive an automatic rate increase that is less than or equal to a pre-established index rate without applying for a rate increase and participating in a full rate case proceeding. For example, the Nevada Public Utilities Commission uses the most recent gross domestic product deflator (GDP Deflator), which is published by the commission at the beginning of each year (NV PUC, 2017). Seven states allow cost of living adjustments.

Rate mechanisms to facilitate emergency infrastructure funds

Rate mechanisms to facilitate emergency infrastructure funds are made available to water and wastewater systems in many states. This differs from a utility commission maintaining available funds in case of emergency because in one case money is collected ahead of time and made available, while in the other, there is a rule on the book that allows for an expedited rate case to increase rates in case of emergency. Eleven states have emergency rate mechanisms in place including Wyoming and Rhode Island. These mechanisms generally provide utilities with the option of filing an expedited rate change application in case of an emergency to ensure the maintenance of a minimum cash flow requirement. Many of the rules reviewed on emergency rate mechanisms were not limited to small systems, but were generally allowed for water systems of all sizes in case of emergency.

Operating ratio rate mechanisms

Operating ratio rate mechanisms differ from a traditional rate base methodology, and may be an acceptable tool for evaluating rates when little or no rate base exists. An operating ratio rate mechanism is a ratio of annual operating revenues to annual operating expenses. Operating revenues include money received for services including income from rates, connection fees, penalties, and other sources. Operating expenses include salary, benefits and employee taxes, supplies, treatment chemicals, filters, insurance, lab and testing fees, minor repairs, regular maintenance, and, if applicable, purchased water costs. Including depreciation costs in an operating ratio allows system owners and commissions to see whether or not a system is charging customers enough to cover the replacement of assets. It is recommended that an operating ratio (which includes depreciation) of approximately 1.2 would have enough funds to

cover daily expenses, debt service, capital replacement costs, emergencies, and unexpected shortfalls in revenue although this depends upon the specific circumstances of each water system (Barnes, 2015). Colorado, Kentucky, Nebraska, Montana and South Carolina all allow for some type of operating ratio rate mechanisms.

Limited use of Contributions In Aid of Construction

Limited use of Contribution In Aid of Construction (CIAC) focuses specifically on situations where the rates that would be instituted would be insufficient to cover ongoing costs for maintaining the plant created. This policy tool is focused on creating sustainable new development. There was a noticeable lack of official policies limiting the use of Contribution in Aid of Construction. It is possible that the SDWA discourages the establishment of non-viable new systems, and this may have limited the number of systems that meet the circumstances established for this best practice.

Combining water and wastewater revenue requirements

Combining water and wastewater revenue requirements for purposes of rate cases, as appropriate, if the water and wastewater utilities are under the same ownership, which will reduce rate case expenses is the final best practice identified by the NARUC Water Committee. Three states allow utilities to combine water and wastewater revenue requirements for rate cases.

III. Additional Practices

States have developed a variety of additional approaches to support small water systems. David Denig-Chakroff (2008) identifies six effective practices, policies and procedures associated with regulating small utilities and their customers in *The Water Industry at a Glance.* These include:

1. Providing technical assistance and advice;
2. Simplifying rate procedures;
3. Modifying Rate designs and structures;
4. Establishing policies to advance consolidation and regionalization;
5. Strengthening certification requirements for new small systems; and
6. Working closely with primacy agencies and other stakeholders to improve small system conditions.

The section below outlines approaches adopted by different states to provide support to small systems. While some tools may be similar to the NARUC Water Committee's Best Practices, they have been included below to provide additional insight into the variety of tools that states have developed to support small systems. All policy tools discussed in this section may not be appropriate to every state, but they have been included in this review to present a variety of approaches to small water and wastewater system support.

A. Reserve Accounts

Reserve accounts allow small systems to put aside funds for future expenditures. In Colorado, reserve accounts focus on "future major capital expenditures and [are used] to implement a monthly surcharge to fund a reserve account for future capital improvement expenditures" (CCR 5112(e)(IV)). Colorado's reserve account option requires small water companies to identify the proposed method for fund collection, and the expected use of such funds. The state Commission retains the right to approve proposals. If a reserve account for major capital improvements is approved, the small water system is required to report all disbursements from the reserve by written notice to the Commission. Additionally, any plant that is capitalized by means of the reserve account shall be accounted for as a CIAC.

Montana also allows reserve accounts to be utilized by small water and wastewater utilities for either capital improvements or as required to assure compliance with state or federal safe drinking water statutes or regulations (MT PSC, 2014). This differs from Colorado's rules by expanding the acceptable uses for a reserve account to cover safe drinking water rule compliance, in addition to capital expenditure, and provides a unique approach to addressing the regulatory burden placed on existing small water systems of complying with safe drinking water rules. This has the potential to provide a substantial impact, considering that small and very

small water systems account for approximately ninety percent of very serious violators of the EPA's Safe Drinking Water Act (US EPA, 2016).

B. Proposed Agency Action Process

The Florida Public Service Commission provides small utilities with the option of choosing to file a rate case under the PSC's Proposed Agency Action (PAA) process, which does not require utilities to undergo a formal hearing. As a part of the discovery processes, which occurs in the first few months after filing a PAA case, the PSC staff schedules a customer meeting in the utility's service area to hear customer comments on the quality of service being provided by the utility and the proposed rates under consideration. Suspension of the utility's proposed rates and the determination of interim rates reflect the standard rate case process. After the customer meeting and completion of staff investigations, the staff prepares a recommendation for consideration by the full Commission at a Commission Conference in Tallahassee. Because the case has not been to hearing, affected parties are allowed to address the Commission at the Conference when the case is being considered.

The Commission will then vote to adopt, reject, or modify the staff's recommendation. Then, a PAA order is prepared and issued. The order becomes final if a substantially affected person does not protest it within 21 days. The PAA process takes approximately five months. If the case is protested, it will be scheduled for a hearing, and a final decision will be made within eight months of the protest date (FL PSC, n.d., A).

C. Distribution System Investment Charge

Distribution System Investment Charges (DSIC) address the issue of historical under-investment in water systems by allowing water utilities to add a surcharge to customers' bills to accelerate the replacement of existing aging facilities. DSIC was first implemented in Pennsylvania in the 1990s to allow for non-revenue producing investments to replace aging infrastructure. Benefits of implementing these charges include: enhanced quality of service, fewer leaks, avoidance of rate shock, and significant progress in replacing aging infrastructure. Currently over seventeen states allow for some form of a DSIC for water, wastewater, and even sometimes natural gas or electric utilities (NAWC, n.d., C).

Opponents of DSIC voice concerns that this mechanism provides a way for utilities to sidestep the type of detailed review that would occur during a full rate proceeding. Additionally, some say that allowing utilities to implement an investment charge decreases the risks to the utility without a commensurate reduction in rate of return allowed to utilities (AARP, 2012).

To address consumer concerns, a combination of the following policies have been implemented by state commissions to ensure protection for consumers in states allowing DSIC:

- Placing limits on eligible plant,
- Annual audits,
- Annual true-ups,
- Surcharge reset to zero in next rate case or in case of overearnings,
- Surcharge reset if utility exceeds allowed rate of return, and
- Implementation subject to hearing (FL PSC, 2001).

D. Multiple Simplified Regulatory Treatment Options

Several states provide small water and wastewater systems with a variety of simplified regulatory treatment options that allow small operators to determine the best fit for their system, and petition to use that treatment option. Colorado and Montana are among the states that provide multiple options. Regulatory treatment options allowed under this approach include:

1. Adopting the commission-approved standard rate tariff (MT);
2. Filing a rate application in accordance with the operating ratio methodology (MT and CO);
3. Annual rate adjustment option (CO);
4. Resource Cost Pass-Through option (CO);
5. Major Capital improvements reserve option (CO); or
6. A company specific, customized option (CO)
   (MT PSC, 2014; CO DRA, 2015).

While these policy tools are extensions of other policies and does not describe a specific option but a procedural method for providing greater choice, these are helpful to include as possible approaches to supporting small water systems. Providing multiple simplified regulatory treatment options allows small systems to determine which option best suits the specific challenges they face.

E. Company Specific, Customized Option

The Code of Colorado Regulations provides (in section 5112(e)(V)) an option for small, privately owned water companies to file "an application for authorization to implement a company specific, customized regulatory plan". This option specifies that the applying small, privately owned water company shall bear the burden of proof that:

1. The provision appropriately balances reasonable regulatory oversight with the costs and benefits of regulation;
2. The proposal is not discriminatory; and improves the quality of service to customers;

3. It is financially compensatory; and,
4. Promotes the development and maintenance of just and reasonable rates (CCR 5112(e)(V)).

The New Hampshire Public Utilities Commission also provides utilities with the option to file a request for alternative regulation (NH PUC, 2013). Unlike the Colorado version of this process, which provides different regulatory options in addition to a customizable plan, New Hampshire leaves the options open for the petitioning utility. It simply requires the applying utility to describe the alternative regulation method in detail within the application, and describe the effects of the proposed alternative ratemaking method on the following issues:

1. Competition;
2. The safety, adequacy and reliability of public utility service;
3. The traditional regulatory balance which does not unfairly benefit or disadvantage utility consumers, utility investors and other stakeholders;
4. Administrative efficiency in the regulatory process;
5. Economic development in New Hampshire;
6. Access to basic utility service to residents throughout the state, also known as universal service;
7. Innovation of services;
8. Infrastructure improvements; and,
9. Environmental and conservation safeguards and incentives (NH PUC, 2013).

After consideration of the materials by all parties, the commission may approve the alternative form of regulation if it meets clear criteria.

F. Review of Investor-Owned Water and Wastewater Utility Systems within the State

Because no two states regulate in identical environments, reviewing the current state of regulated water and wastewater systems in individual states is a smart first step. Florida started this process in 2012 as the result of a commission suggestion that resulted in a formal legislative mandate (Chapter 2012-187) to create a study committee for the purpose of studying issues and challenges facing investor owned water and wastewater utilities, and develop recommendations on five issues required by the legislation, and a series of other issues proposed by the study committee members.

The study committee consisted of eighteen members representing different stakeholder groups, and was required to meet at least two times in areas centrally located to utility customers who were recently affected by significant rate increases. To facilitate and promote public comment and participation, transparency, and accessibility the Committee created a website

which provided information to the public about the meetings, and included links to audio and video recordings. This work resulted in a report presented to the legislature which included suggested legislative and agency rule changes (FL PSC, 2013).

Embarking on a review of issues and challenges facing small water and wastewater systems creates a formal process of review and consideration of the issues facing these systems, and allows input from different affected stakeholders which encourages more varied input than could be expected from a single-stakeholder process alone. It ensures that actions being taken in the form of legislation and rule changes address the most pressing issues facing small systems. Finally, it is important that serious review of stakeholder positions is a part of the policy development process to ensure that proposed solutions target the most pressing problems.

G. Pass Through Adjustments

A pass through rate adjustment enables a utility to adjust its rates to reflect an increase or decrease in the rates or fees that it is charged for certain expenses. At least thirty-five states allow some form of pass-through adjustment for regulated water and/or wastewater utilities (NAWC, n.d., A).

Texas and Florida allow pass through adjustments in certain circumstances to ensure utilities recover costs associated with providing services, although eligible costs differ between these two states.

Texas allows utilities to implement a pass-through provision as a minor tariff change, even if a utility has not approved a pass-through provision in its tariff in the past. The Texas Public Utility Commission allows pass-through provisions in the following situations:

- Changes in purchased water or sewage treatment costs,
- Temporary water rate provisions implemented due to mandatory reductions,
- The costs associated with changing source water if the change is required by a governmental entity, or
- A production fee charged by a groundwater conservation district (TX PUC, n.d.).

The Florida Public Service Commission allows a broader range of items to be included in these expenses such as:

- electric power;
- ad valorem taxes; and,
- water or wastewater testing required by the Florida Department of Environmental Protection (FL PSC, n.d., B).

Including water and wastewater testing as an eligible pass-through adjustment can help to address increases in regulatory burden.

Nevada and Pennsylvania both provide special, small water company provisions for the use of pass through adjustments. Nevada allows small water companies to utilize pass through costs for increases in the costs of fuel or power, and to finance large additions or improvements to plant (NV PUC, n.d.). Pennsylvania allows small water utilities to establish pass through adjustments for purchased water cost recovery (PA PUC, 1996).

While many states have adopted some type of pass through adjustment mechanisms for water utilities, critics point to these provisions as reducing the utility's incentive to control costs. These provisions also shift the risk away from investors and onto customers. Traditionally, pass through costs were approved only in circumstances where there was the potential for a volatile and uncontrollable cost that could impact a utility's financial health, such as a drastic increase in fuel costs. Trackers allowing this sort of cost increase have become commonplace, and address many different needs. However, trackers can require substantial investments of commission staff time. For these reasons, pass through costs should be closely evaluated by regulators before adoption (AARP, 2012).

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H. Allowing Qualified Small Water Systems to Increase Rates a Specified Number of Times between General Rate Cases

Similar to a simplified Rate of Return mechanism, rate increases between general rate cases allows qualifying small systems to make small rate increases between general rate cases. This decreases the costs associated with filing general rate cases (e.g. costs of lawyers, accountants, engineers, etc.) and encourages small systems to increase rates regularly which helps to avoid rate shock. The Indiana Regulatory Utility Commission utilizes this policy tool; allowing for small water or wastewater utilities to increase base rates up to five times between general rate orders, as long as it occurs no later than six years from the date of the utility's most recent rate case (IN AC, Article 14). Critics of this approach cite concerns about the risk of establishing a precedent for increasing rates without clearly establishing a need for such increases.

The Texas Public Utility Commission also allows Class C utilities (utilities serving 500 customers or fewer) to adjust their rates once each calendar year, but no more than four times between rate proceedings using a price index equal to the Gross Domestic Product Implicit Price Deflator index (TX, PUC, n.d.).

The New Mexico Public Regulation Commission allows for up to a two percent adjustment in a small water utilities' commodity and customer service charge in a calendar year without a formal filing, provided that the utility is in good standing with commission rules and orders, has not changed its rates in the past twelve months, has given notice of the change to its

customers at least thirty days prior to the change taking effect, and filed the required documents with the commission at least thirty days prior to going into effect (NM PRC, n.d.).

I. Standard Rate Tariff

Some states allow small systems to adopt a small system standard rate tariff which does not require a general rate case for approval. The standard rate is pre-determined by the state utility commission staff and updated regularly. Generally, these types of tariffs require utilities to inform customers and state commissions in advance. In some cases, commissions reserve the right to deny the adoption of a standard rate tariff by a small water utility if the commission determines that it would be unjust.

Montana rules allow small utilities to adopt the Commission's standard rate tariff. A standard rate tariff form is submitted to the commission for approval. Small water or wastewater utilities can choose one of several options:

1. A flat charge of $50 per connection per month for a water utility that provides water to its customers on an unmetered basis;
2. A monthly service charge of $40 per connection, plus a usage rate of $2.00 per 1,000 gallons for customer usage in excess of 10,000 gallons, for a small water utility that provides water to its customers on a metered basis; or
3. A flat charge of $30 per connection per month for a small wastewater utility (MT PSC, 2014).

Standard rate tariffs expire three years after the effective date, but may be extended with commission approval.

Oregon allows small water utilities serving less than 500 customers to establish standard rate tariffs that are not subject to Commission regulation if the water utility charges less than a specified amount determined based upon the pipe diameter (OR PUC, 2017). If utilities serving less than 500 customers wish to increase rates above the established thresholds, they are required to enter into a formal rate case.

J. Generic Return on Equity Option

New Hampshire allows an alternative to a full rate case proceeding for small water systems where a small water system may "request an increase in revenues to recover the cost of any capital additions, or any operating costs that are the result of any state or federal mandate, that result in annual earnings, based on the small water system's fiscal year, below a generic return on equity" if the following conditions are met:

- The utility files a petition including information on current rate of return; proposed cost of capital and most recent cost of debt; copies of all relevant invoices; a notarized explanation of each capital addition's usefulness, need, and purpose; requested increase in revenues; and an amended tariff page;
- The system make itself available for commission audits;
- the system maintains records in accordance with uniform system of accounts;
- The system provides notice of the change to all customers; and
- A copy of the customer notice and affidavit of the mailing are filed with the commission within 15 days of acceptance of the petition (NH PUC, 2013).

Once every twelve months, the commission is tasked with establishing a generic return to be applied to the equity invested in the small water system using the discounted cash flow methodology (NH PUC, 2013).

K. Single Tariff Pricing

Single Tariff Pricing allows utilities to price rates for customers of the same class similarly, even when regions may not be physically interconnected. Under this system, all customers pay the same rate for service, even though individual systems may vary in terms of costs, operating characteristics, and number of customers served (US EPA, 1999). Currently at least 26 states allow some form of single tariff pricing; Other states may allow single tariff pricing on a case-by-case circumstance (NAWC, n.d., B). Use of single tariff pricing can help water utilities spread the benefits of economies of scale to all customers, and can also help to mitigate rate shock in certain circumstances. Some advocates of small system acquisitions have encouraged single tariff pricing as an important complementary policy that ensures that the acquiring company will have the requisite funds to make necessary updates to newly acquired failing infrastructure in a timely manner.

L. Allowing Recovery of Procedural Expenses in Rate Relief

Some states explicitly provide provisions within their rules allowing small water and wastewater systems to recover administrative and some professional costs within the rate relief petition. New Hampshire is one example, allowing:

"(1) All administrative costs, including, but not limited to:
a. Postage costs;
b. Publication costs;
c. Photocopying expenses; and
d. Transcription costs; and
(2): One of the following 2 expense categories:

a. the fees of one professional, such as, an accountant, economist, engineer or attorney provided they are prudently incurred and just and reasonable; or
b. All mileage and hourly fees of utility employees used to prosecute a rate proceeding (NH PUC, 2013).

By explicitly allowing a mechanism for defraying cost associated with general rate cases, states can address small system concerns relating to high costs which may discourage them from coming in for rate cases.

M. Support of Regionalization for New Proposed Systems

Regionalization is described as "the consolidation of the operations, physical systems, or both of two or more existing or proposed water or domestic wastewater system" (TECQ, 2003). Texas's Commission on Environmental Quality (which has responsibility for both environmental and economic regulation of water and wastewater) has developed policy guidance supporting regionalization efforts, including developing clear requirements for persons seeking to build and operate a water or wastewater system. These requirements include:

1. First requesting service from all existing providers in a two mile radius of proposed facilities, and
2. Evaluating the affordability of rates through a regional approach versus a stand-alone facility (Stanford, 2006).

Additionally, CEQ requires proposed systems to demonstrate: that a stand-alone approach is necessary because of a lack of nearby providers, cost reviews show that a stand-alone system is the most economic option, or the existing system's technical and managerial capabilities are inadequate (Stanford, 2006).

Supporting a regionalization approach for proposed systems has unique challenges. For example, nearby water systems may not have the desire or available capacity to support a large number of new customers, and interconnections to existing systems can be costly. Additionally, there can be tension between the goal of regionalization and the profit motive and economic development benefits with a large, high-density housing developments (Stanford, 2006).

N. Partnerships

Partnerships are an important way for small water utilities to reap the benefits of information and resource sharing. Partnerships can range from informal cooperation between systems to a complete transfer of ownership. Because of the considerable variability of different small water systems, the most helpful option on the partnership spectrum may differ depending on the attributes of individual small systems. Partnerships can help small water systems develop

technical, managerial, and financial capacity, and also may help to reduce the level of oversight and state resources required to keep struggling small systems afloat (US EPA, 2007). Figure 6 provides a visual of the partnership spectrum, which includes different options for developing partnerships which range from the least formal option (on the left) to the most formal option for partnership.

Figure 6: The Partnership Spectrum

The least intrusive option for engaging in partnerships is informal cooperation, where a small water system works with other systems, but without a contractual agreement. Examples of informal cooperation include sharing equipment, sharing bulk supply purchases, and signing mutual aid agreements. Contractual Assistance is the next step; this requires a contract that remains under the system's control. These can take the form of: contracting operation and management, outsourcing engineering services, or purchasing water. A Joint Power Agency creates a new entity by several systems, where the systems continue to exist as independent entities. Examples include sharing system management, sharing operators, or sharing source water. The final restructuring option is ownership transfer, where a system is acquired by an existing or newly created entity. This could take the form of an acquisition with physical interconnection, acquisition and satellite management, or one system transferring ownership to another to become a larger existing system (US EPA, 2007).

Partnerships have the potential to benefit the water system, state programs, and customers. Small water systems stand to benefit from economies of scale, long-term savings, the potential for improved customer service, improved planning for future operations, and increased capacity. State utility commissions can benefit from increased use of partnerships through improved compliance numbers, the potential to reduce the number of regulated systems, resource savings, and improved customer relations. And customers benefit from improved water quality, reduced long-term costs, and increased reliability of supply (US EPA, 2017). Even where physical connection partnerships are not viable due to geographical limitations, partnerships can benefit small systems in other ways, such as through billing, human resources, or other forms of partnerships.

The US EPA provides a number of suggested steps that have the potential to help foster partnerships. These include:

- Remove obstacles (at the federal, state, and local levels), wherever possible, to make partnerships more routine, rather than an exceptional consideration;
- Clarify federal, state, and local roles in facilitating partnerships;
- Review existing guidance and case studies to fill any gaps, highlight success stories and case studies;
- Address concerns of "parent" systems to take on both past and future challenges of struggling systems (e.g., hold harmless provisions for past violations); and
- Provide financial tools and incentives for partnerships (e.g., priority points on DWSRF; set-aside funding to support partnership planning, and efforts of partnership "brokers") (US EPA, 2017).

Additional EPA resources for supporting water partnerships (such as partnership resources, a state compendium, case studies, and a decision tree) are expected to be made available on the EPA website in summer 2017 (US EPA, 2017).

O. Fair Market Valuation for acquisitions

The Pennsylvania Public Utilities Commission maintains a focus on restructuring physically or administratively nonviable drinking water systems into one single, viable water system or authority (PA PUC, 2006). To support this, the Pennsylvania PUC provides acquisition incentives for cases that demonstrate a series of requirements including serving the public interest (PA PUC, 2006).

In 2013, the Illinois legislature approved Public Act 98-213 and established Section 9-210.5 of the Illinois Public Utilities Act, "Valuations of Water and Sewer Utilities" which incentivizes larger utilities to acquire troubled small systems and to streamline the regulatory approval process. This allows a large public utility, to elect to establish the ratemaking rate base of the acquired small system at the time of the acquisition if desired (Jager, 2016). In this case, the three independent appraisals must be performed by appraisers approved by the Illinois Commerce Commission's water department manager, and the average of the three appraisals will determine the fair market value of the small water or wastewater system being acquired. Supporters of this Act have lauded it for providing regulatory certainty and efficiency for water utilities while streamlining the process for acquisitions of troubled water systems (Jager, 2016). In return, affected utility customers benefit from investments in the water and wastewater infrastructure by an experienced utility with proven access to capital and financial, technical, and managerial resources. Similar rules exist in Missouri, New Jersey, and Indiana.

P. Mandatory Consolidation

The California PUC has also taken an active role in encouraging consolidation, noting that handling regulation and policy issues can be expensive and burdensome to less sophisticated water providers. As early as 2005, California Department of Health Services requests Class A (the largest) utilities to report on an annual basis which smaller utilities they might consider purchasing (CA PUC, 2005). Roughly two percent of public water systems in California do not reliably deliver drinking water that meets all state and federal drinking water standards (CA PUC, 2005). Historically, the Division of Drinking Water asked public water systems to consolidate when appropriate. More recently, Governor Brown signed Senate Bill 88, which authorizes the State Water Board to require systems that consistently fail to meet safe drinking water standards to consolidate with, or obtain service from, a public water system (CA Water Board, 2016). While this action is outside of the jurisdiction of the state utility commission, it has real impacts on the small systems regulated by the California commission.

IV. Conclusion

Small Water Systems make up the majority of community water systems in the United States, and they still face many challenges. These challenges vary during the lifecycle of water systems. Many small systems face challenges related to their inability to obtain adequate capital, insufficient managerial expertise, or difficulty in fully utilizing economies of scale to optimize operations. In the past four decades, water systems have faced increasingly stringent drinking water regulations, which inflate operating costs associated with running small systems. More recently, increased concerns about lead line replacement, and looming aging infrastructure replacement costs have led many water groups to consider the impact that increased water infrastructure costs will have on consumer rates.

Today, supporting small water systems is not about reinventing the small systems wheel, but rather taking stock of the challenges unique to small systems within states and connecting existing needs with appropriate policies, support systems, and information. The stakeholders in this industry -- the regulatory community and the water companies -- can work towards improving outcomes to small system customers through efforts focused on:

1. Finding ways to optimize economies of scale in small systems,
2. Improving communication and information sharing between stakeholders,
3. Establishing enduring working relationships between stakeholders, and
4. Providing continued support in the form of capacity development resources.

The review of best practices for small water systems, revealed some key insights into how states support small water systems. Most of the states that have regulatory authority over water utilities include at least one best practice for small systems in their water rules (41 of 45). For states that included at least one NARUC best practices in the rules and regulations, the average number of best practices for a state to adopt was three. The majority of states that were responsible for regulating more than 100 small water systems included more than three best practices in their rules and regulations. The most commonly adopted best practices were: E-filing (31), use of annual reports (23), and simplified rate applications (18).

In addition to the NARUC best practices for small water systems, a review of state water rules revealed a variety of other public policy mechanisms that had been adopted to support small water systems. Some of these mechanisms included:

1. Allowing small systems to create reserve accounts for future expenditures,
2. A Proposed Agency Action (PAA) process, similar to a simplified rate case,
3. Establishing Distribution System Investment Charges,
4. Allowing small water systems to choose from several simplified regulatory treatment options,
5. Company Specific, Customized Options,

6. Review of Investor-Owned water utility systems,
7. Pass through adjustments,
8. Allowing for a specific number of rate increases between general rate cases,
9. A standard rate tariff,
10. Generic return on equity options,
11. Single tariff pricing,
12. Allowing recovery of procedural expenses in rate relief,
13. Support of regionalization for proposed systems,
14. Encouraging small water system partnerships,
15. Allowing fair market value for acquisitions, and
16. Mandatory consolidation.

While state and federal governments have provided support for small systems in many forms, a significant number of small systems still show signs stress. One indication of this is the large number of small and very small systems that are out of compliance with or serious violators of the EPA's Drinking Water Enforcement Response policy. The viability of struggling small water systems will continue to be a challenge faced by state regulators, as issues such as emerging contaminants, lead line replacement, and infrastructure replacement create additional demands on small water systems. The NARUC Water Committee recognizes the viability challenges facing many of these systems, and has identified the following policy tools and mechanisms for facing these issues:

a. enforcing technical, managerial, and financial requirements as defined by the US EPA;
b. (where applicable and beneficial to the customer) supporting consolidation efforts with nearby systems; and,
c. in cases where a new system proves to be the most beneficial option for consumers, assuring adequate rates for infrastructure sustainability and emergency funding (NARUC, 2013).

The EPA's increased focus on developing strategic partnerships for small systems is a promising option for decreasing small system challenges stemming from economies of scale. For such methods to work, it will be important to minimize costs associated with utilizing these partnerships that may take the form of legal costs, accounting costs, or oversight/managerial costs. Highlighting successful partnerships, and providing a clear toolbox for small water systems considering this model are important to the success of such partnerships. Like other options discussed throughout this paper, strategic partnerships while promising, are unlikely to solve the entirety of small water system problems.

Looking to the Future

While the small system challenge may be as old as utility regulation itself, new technology and policy frameworks have developed and are still developing that provide regulators with new tools for approaching old problems. Theories such as Nudge Theory and its application in commission-utility interactions will provide new approaches for encouraging optimal outcomes. Nudge Theory, a behavior economics approach to implementing public policy

objectives popularized by Richard Thaler and Cass Sunstein in their 2008 book *Nudge--Improving Decisions about Health, Wealth and Happiness*, offers a method for optimizing state utility commissions' interactions with small water and wastewater systems. Thaler and Sunstein describe Nudge Theory as:

> any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not (2008).

The nudging concept, while by no means a silver bullet for small water systems, has broader applicability than consumer behavior, and may very well expand methods for interacting with small water and wastewater system stakeholders, as well as having applications in information sharing, an important element of small system capacity development efforts (Heiskanen, Lehner & Mont, 2014). Future efforts examining how nudge theory could be applied to state utility commission interactions with utilities provides an opportunity for future research.

Additionally, efforts to increase flow of information between parties, and exploring methods for providing this information could prove valuable to the growing body of research on how to support state commission-utility interactions. Strengthening these relationships, and opening lines of communication between the many stakeholders involved in Commission processes is vital to ensuring that small systems are aware of, and take advantage of rate case options developed to get small systems in the door at commissions. This also ensures that small system policies are not only available, but utilized by small systems. Optimizing commission information on websites and through other communication platforms is another area ripe for further exploration, where small systems stand to benefit from improved methods of communication.

Finally, Commissions and other key stakeholders should carefully consider steep potential increases in customer rates that may occur in the next decade as utilities face the challenges of replacing aging water infrastructure. Small water systems could be significantly impacted by nonpayment if consumers cannot afford increases in water rates. While electric and telecommunication utilities frequently provide low and moderate income customers with additional assistance, it is important to consider whether these same solutions can be translated to the water industry, or if it is even appropriate and necessary to provide this support at all. Is there potential to take customer financing models such as Pay As You Save (PAYS) which have helped homeowners finance energy efficiency improvements on their house and apply this model towards water efficiency improvements which could help reduce consumption, and therefore absorb some of the impact of rising infrastructure costs (LIHEAP, 2017)? Perhaps more traditional low-income assistance methods would be more appropriate. Regardless of the conclusion, now is the time for policymakers to begin the discussion before the issue of non-payment becomes a pressing issue.

Bibliography

AARP. (2012). Increasing Use of Surcharges on Consumer Utility Bills, p. 9. Retrieved from http://www.aarp.org/content/dam/aarp/aarp_foundation/2012-06/increasing-use-of-surcharges-on-consumer-utility-bills-aarp.pdf

American Water Works Association. (2011). Buried No Longer: Confronting America's Water Infrastructure Challenge, p. 12. Retrieved from http://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf

Barnes, Glenn. (2015). Key Financial Indicators for Water and Wastewater Systems: Operating Ratio. University of North Carolina Environmental Finance Center. [Website]. Retrieved from http://efc.web.unc.edu/2015/02/27/ operating-ratio/

Beecher, J. A., Dreese, G. R., & Landers, J. R. (1992). Viability Policies and Assessment Methods for Small Water Utilities. National Regulatory Research Institute, pp. 18-19. Retrieved from http://nrri.org/download/1991-17-viability-policies-and-assessment-methods-for-small-water-utilities/

Butler, K., Dutton, A., Engelberg, D., & Light, F. (2016). Drinking Water: EPA Needs to Take Additional Steps to Ensure Small Community Water Systems Designated as Serious Violators Achieve Compliance. U.S. Environmental Protection Agency, Office of Inspector General. (Report No. 16-P-0108), pp. 3-4. Retrieved from https://www.epa.gov/sites/production/files/ 2016-03/documents/20160322-16-p-0108.pdf

California Environmental Protection Agency. (2016). Mandatory Consolidation or Extension of Service for Disadvantages Communities. [webpage]. Retrieved from http://www.swrcb.ca.gov/drinking_water/programs/compliance/

California Public Utilities Commission. (2005). Water Action Plan, p. 7. Retrieved from http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Water/water_action_plan_final_12_27_05.pdf

California Water Board. (2016). Frequently Asked Questions on Mandatory Consolidation or Extension of Service for Water Systems. Retrieved from http://www.waterboards.ca.gov/drinking_water/programs/compliance/docs/fs082415_mand_consolid_faq.pdf

Center for Disease Control and Prevention (2012). A Century of U.S. Water Chlorination and Treatment: One of the Ten Greatest Public Health Achievements of the 20th Century. Retrieved from https://www.cdc.gov/healthywater/drinking/history.html

City of Olympia, WA. Appendix J: Pipe Evaluation and Replacement Options and Costs--Stormwater System Inventory, p. J-3. Retrieved from http://olympiawa.gov/city-utilities/storm-and-surface-water/policies-and-regulations/~/media/Files/PublicWorks/Water-Resources/SSWPAppendix%20J.ashx

Colorado Department of Regulatory Agencies. (2015). Code of Colorado Regulations. Retrieved from https://drive.google.com/file/d/0B1oMNUeCI8FYNGF4RDZZSW92OUE/view

Connecticut Department of Public Utility Control (DPUC). Instructions for Small Water Company Rate Case Application. Retrieved from http://www.dpuc.state.ct.us/dpucinfo.nsf/e44d8de5a083c772852574490064928l/6757d589250378fc852575400056cd57?OpenDocument

Congress of the United States Congressional Budget Office. (2015). Public Spending on Transportation and Water Infrastructure, 1956-2014. (Report No. 49910), pp. 1, 5. Retrieved from https://www.cbo.gov/publication/49910

Copeland, C. and Tiemann, M. (2010). Water Infrastructure Needs and Investment: Review and Analysis of Key Issues. Congressional Research Service. [Report No. 7-5700], pp. 3-4, 6, 15-16. Retrieved from https://fas.org/sgp/crs/homesec/RL31116.pdf

Cutler, David, M., and Grant Miller. (2006). Water, Water Everywhere. Municipal Finance and Water Supply in American Cities. In E.L. Glaeser and C. Goldin (Eds.), *Corruption and Reform: Lessons from America's Economic History*. (p. 154). University of Chicago Press. Retrieved from http://www.nber.org/chapters/c9982.pdf

Denig-Chakroff, David. (2008). The Water Industry at a Glance. National Regulatory Research Institute, pp. 13-14. Retrieved from http://nrri.org/download/2008-04-the-water-industry-at-a-glance/

Florida Public Service Commission. (2001). Distribution System Improvement Charges for the Florida Water and Wastewater Industry. p. 17. Retrieved from *http://www.psc.state.fl.us/Files/PDF/Publications/Reports/Waterandwastewater/dsic4ww.pdf*

Florida Public Service Commission. (2013). Report of the Study Committee on Investor-Owned Water and Wastewater Utility Systems, pp. 19-20. Retrieved from http://www.psc.state.fl.us/Files/PDF/Utilities/WaterAndWastewater/Water-Wastewater%20Sub%20Committee%20Report.pdf

Florida Public Service Commission A. *Rate Case Procedures for Water and Wastewater Utilities*. [Webpage]. Retrieved from http://www.psc.state.fl.us/Publications/PSCRateCase

Florida Public Service Commission B. *Frequently Asked Questions: Utility*. [Webpage]. Retrieved from http://www.psc.state.fl.us/WaterWasteWater/UtilityFAQs.

Folkman, Steven. (2012). Water Main Break Rates in the USA and Canada: A Comprehensive Study, p. 6. Retrieved from http://www.watermainbreakclock.com/docs/UtahStateWaterBreakRates_FINAL_TH_Ver5lowrez.pdf

Heiskanen, Eva, Matthias Lehner, and Oksana Mont. (2014). Nudging? A Tool for Sustainable Behavior?. Swedish Environmental Protection Agency. (Report No. 6643), pp. 12-13. Retrieved from https://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6643-7.pdf?pid=14232

Indiana Regulatory Utility Commission. Indiana Administrative Code, Article 14: Small Utilities. Retrieved from: http://www.in.gov/legislative/iac/title170.html

Jager, Maris. (2016). Water Utility Acquisition-- An Illinois Model for Incentivizing Acquisitions. Women's Council on Energy and the Environment [Newsletter]. Retrieved from http://www.wcee.org/default.asp?page=WaterAcquisition

Low-Income Home Energy Assistance Program. (2017). On-Bill Financing Allows You to "Pay As You Save". Retrieved from https://liheapch.acf.hhs.gov/news/may17/PAYS.htm

Montana Public Service Commission. (2014). Public Service Regulation, Utility Division, Privately Owned Water Utilities (38.5.2531). Retrieved from http://www.mtrules.org/gateway/Subchapterhome.asp?scn=38%2E5.25

Montana Public Service Commission. (2016). Small Water Checklist. Retrieved from http://www.psc.mt.gov/watersewer/pdfs/Small%20water%20checklist%20-%20standard%20rates.pdf

National Association of Regulatory Utility Commissioners. (2013). Resolution Supporting the Consideration of Regulatory Mechanisms and Policies Deemed "Best Practices" for the Regulation of Small Water Systems, p. 1. Retrieved from http://pubs.naruc.org/pub/53A0D971-2354-D714-51EB-8A01C0909879

National Association of Water Companies A. (n.d.). Pass-Through Adjustments (Non-DSIC). Retrieved from http://www.nawc.org/uploads/documents-and-publications/documents/document_49c8c56a-1400-492f-91db-88058e8dd0e2.pdf

National Association of Water Companies B. (n.d.). Rate Consolidation. Retrieved from http://www.nawc.org/uploads/documents-and-publications/documents/document_9f8e1d8c-a61b-4e78-9d78-a8c41dc00c28.pdf

National Association of Water Companies C. (n.d.). Distribution System Investment Charge (DSIC) for Water and Wastewater Systems. Retrieved from: http://www.nawc.org/state-utility-regulation/regulatory-practices/distribution-system-investment-charge.aspx

Nevada Public Utilities Commission. (2017). Water/Sewer - Notification of Gross Domestic Product Deflator. Retrieved from http://pucweb1.state.nv.us/puc2/Misc.aspx?Util=Water&Aspx_AutoDetectCookieSupport=1

Nevada Public Utilities Commission. Nevada Administrative Code 704.595. Retrieved from http://www.leg.state.nv.us/NAC/NAC-704.html#NAC704Sec595

New Hampshire Department of Environmental Services. (1999). A partial History of Public Water Systems. Retrieved from https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-16-2.pdf

New Hampshire Public Utilities Commission. (2013). New Hampshire Code of Administrative Rules: (NH CAR 206.06). Retrieved from https://www.puc.nh.gov/Regulatory/Rules.htm

New Mexico Public Regulation Commission (n.d.). New Mexico Administrative Code, Title 17, Chapter 12.770.8. http://164.64.110.239/nmac/_title17/T17C012.htm

Oklahoma Corporation Commission. (2014). Chapter 65 Water Rules: Relief from Rate Increase Requirements(165:65-9-11). Retrieved from http://www.occeweb.com/rules/Ch%2065%20Water%20Rules%20eff%20September%2012,%202014%20searchable.pdf

Oregon Public Utilities Commission. (2017). Oregon Administrative Rules 860-036-1910. Retrieved from http://arcweb.sos.state.or.us/pages/rules/oars_800/oar_860/860_036.html

Pennsylvania Public Utilities Commission. (1996). 66 Pa.C.S. § 1307. Retrieved from http://www.pacode.com/secure/data/052/chapter66

Pennsylvania Public Utility Commission. (2006). PA Public Code § 69.711. Retrieved from http://www.pacode.com/secure/data/052/chapter69/s69.711.html

Stanford, Melissa. (2006). The Texas Model of Regulation of Water and Wastewater Utilities. (Report No. 06-03), pp. 6-7. Retrieved from http://nrri.org/download/2006-03-the-texas-model-of-regulation-of-water-and-wastewater-utilities/

Stanford, Melissa. (2008). Small Water Systems: Challenges and Recommendations. National Regulatory Research Institute. (Report 08-02), pp. 1-2, Retrieved from http://pubs.naruc.org/pub/4AD6368E-2354-D714-5153-649292D1BA6B

Teumim, Phillip & Frank Radigan. (2011). The Small Water Company Dilemma: Processes and Techniques for Effective Regulation. National Regulatory Research Institute. (Report No. 11-18), p. 3. Retrieved from http://nrri.org/download/2011-18-the-small-water-company-dilemma_-action-steps-toward-effective-regulation/

Texas Commission on Environmental Quality. (2003). The Feasibility of Regionalizing Water and Wastewater Utilities: A TECQ Policy Statement. (Report No. RG-357), pp. 1-2. Retrieved from http://interchange.puc.state.tx.us/WebApp/Interchange/Documents/44000_38_830973.PDF

Texas Public Utilities Commission. (n.d.). Rules and Laws, Chapter 24: Water. Retrieved from http://www.puc.texas.gov/agency/rulesnlaws/subrules/water/CH24Complete.pdf

Thaler, R. and Sunstein, C. (2008). *Nudge-- Improving Decisions about Health, Wealth and Happiness*.

U.S. Environmental Protection Agency. (1999). Consolidated Water Rates: Issues and Practices in Single-Tariff Pricing. (Report No. EPA 816-R-99-009), pp. 1-2. Retrieved from https://nepis.epa.gov/

U.S. Environmental Protection Agency, Office of Water. (2007). Restructuring and Consolidation of Small Drinking Water Systems: A Compendium of State Authorities, Statutes, and Regulations. (Report No. EPA 816-B-07-001), pp. ii-iv. Retrieved from http://bit.ly/2nkedbJ

U.S. Environmental Protection Agency. (2013). Drinking Water Infrastructure Needs Survey and Assessment: Fifth Report to Congress. (Report No. EPA 816-R-13-006), pp. i, 5-6. Retrieved from https://www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf

U.S. Environmental Protection Agency. (2016B). GPRA Inventory Report: Q3, 2016. [website]. https://obipublic11.epa.gov/analytics/saw.dll?PortalPages

U.S. Environmental Protection Agency. (2016A). Information for States about Building the Capacity of Drinking Water Systems. [website]. Retrieved from https://www.epa.gov/dwcapacity/information-states-about-building-capacity-drinking-water-systems

U.S. Environmental Protection Agency. (2016B). Analyze Trends: Drinking Water Dashboard. Enforcement and Compliance History Online. [Data set]. Retrieved from https://echo.epa.gov/trends/comparative-maps-dashboards/drinking-water-dashboard

U.S. Environmental Protection Agency. (2017). Water System Partnerships: Cooperative Approaches to Drinking Water Challenges. [webinar presentation presented 30 May 2017].