UNC
SCHOOL OF GOVERNMENT
ENVIRONMENTAL FINANCE CENTER

The State of Full Cost Pricing:

Full cost pricing among public water & sewer utilities in the Southeast[1]

October 10, 2008

Introduction

On August 1st, 2007, in the middle of rush hour traffic, the I-35 bridge over the Mississippi River in Minneapolis collapsed sending 13 people to their death and injuring hundreds more. In the aftermath, major news media outlets devoted hours of coverage to the tragedy asking how this could have happened. If there was a silver lining, it was that the deterioration and underfunding of our national infrastructure was brought to public attention in a big way. Suddenly, community, state and national leaders were all asking questions about the state of our national infrastructure, demanding to know what we need to do to prevent something like this from happening again.

The questions eventually evolved beyond roads and bridges to include all types of infrastructure. Many groups have studied and continue to study the extent of our water and sewer infrastructure needs and the difference between those needs and current funding levels known as the infrastructure "funding gap." In 2001, the American Water Works Association estimated that, on average, the cost to replace water infrastructure currently installed in the United States was $10,000 per household[2]. The EPA's Office of Water estimated in 2000 that, at current levels of spending, the point-estimate infrastructure funding gap between then and 2019 was $122 Billion for wastewater and $102 Billion for drinking water[3].

One of the less well understood aspects of the funding gap is whether utilities are charging enough to operate and maintain their infrastructure. Some utilities may be able to cover all their infrastructure capital needs through user rates and fees. Other utilities, however, may not, either because residents are too poor or because infrastructure is too costly. The larger, nationwide studies of the funding gap do not address full cost pricing directly. The EPA study, for example, uses local spending data from the US Census Bureau's annual Survey of State and Local Government Spending which records local capital outlays but not interest payments when infrastructure projects are financed. Therefore, these studies may underestimate local expenditures.

There is great potential at the local level to cover infrastructure costs, but this can only happen if utilities follow full cost pricing principles. Full cost pricing is not as simple a concept as it first seems. It will vary depending on whether you choose to include the cost of depreciation or replacement value of assets, whether you are budgeting for future capacity expansions, whether you take into account the costs of protected watersheds for water supply, etc.

Full cost pricing is further complicated when you consider that one utility's actions may affect costs for another utility as when a wastewater utility discharges nutrients into a river which raise treatment and

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[1] Funding for this study was provided by the U.S. Environmental Protection Agency.
[2] "Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure." AWWA. May 2001.
[3] "The Clean Water and Drinking Water Infrastructure Gap Analysis." US EPA. September 2002.

possibly infrastructure costs for a water utility downstream. In that case, costs are incurred to the water utility because of actions (or inaction) taken by the wastewater utility. Even if the wastewater utility was charging rates which cover the cost of operating and maintaining infrastructure, the rates might not reflect full cost pricing if the utility was not doing its fair share to protect water quality in the river. These types of equity questions are beyond the scope of this report, but it is important to remember that "full cost pricing" means much more than merely balancing the books.

Through this project, the Environmental Finance Center (EFC) at the University of North Carolina at Chapel Hill has had the opportunity to examine full cost pricing practices among utilities in the southeastern United States. Through statewide rates surveys, the EFC has been able to examine revenue and expenditure data for nearly 900 systems in Georgia and in North Carolina. Additionally, the EFC has been able to explore full cost pricing attitudes and practices through focus groups and work with technical assistance providers in those states. Finally, the EFC has been able to explore first hand decision making on utility service pricing through their direct technical assistance to communities in their financial management and planning efforts.

Findings

Balancing the books

Determining whether a utility employs full cost pricing starts with looking at how the system's operating revenues and operating expenses compare. A common measure for this balance is the Operating Ratio (OR) which is defined as operating revenues divided by operating expenses. Thus if operating revenues equals expenses, the utility OR is 1.0. The OR will be greater than or less than one depending on whether the utility is collecting more or less revenues than their expenses, respectively.

A utility that employs full cost pricing will have a an OR greater than 1.0 because while the OR does account for asset depreciation, there are many future expenditures it does not account for; these include the full cost of asset replacement (which is constantly inflating), the cost of upgrading treatment facilities to meet tightening water quality standards, the cost of managing operating emergencies or other unexpected events, etc. There are no generally accepted benchmarks for full cost pricing and any benchmark belies the fact that there are major variations from one utility to the next. Nevertheless, the OR provides a useful tool for determining an individual utility's financial position with respect to revenues and expenses.

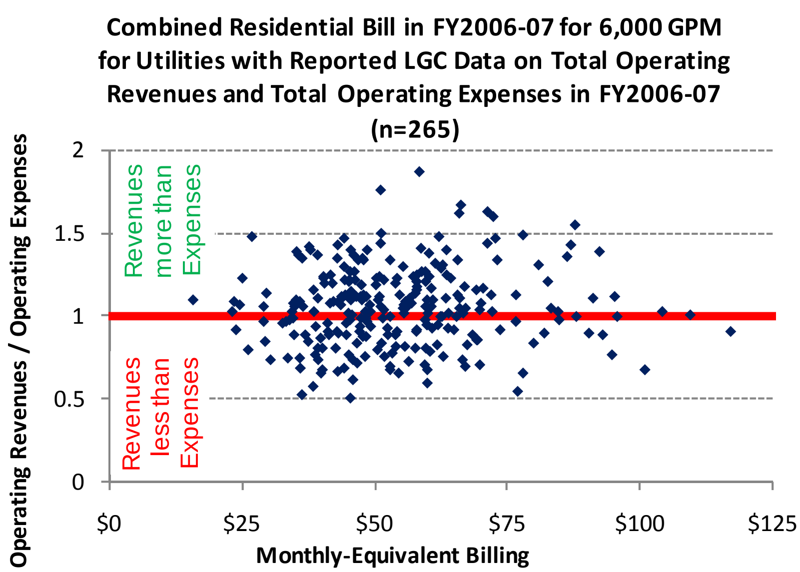

Figure 1: Operating Ratio versus Monthly Bills for utilities in North Carolina

A plot of utility rates against the OR for utilities in Georgia and North Carolina reveals interesting features. Notably, only half of utilities in North Carolina has an OR greater than 1.0 (Figure 1). In Georgia, roughly two thirds have an OR greater than 1.0, but asset depreciation is not included for that data set so the ratio numbers are artificially inflated (Figure 2). Since OR does not account for the cost of emergencies, future capital projects, etc., even many of those systems with an OR greater than 1.0 are not recovering the full cost of service. It is clear from these two figures that anywhere from two-thirds to one-half of utilities in this sample are not using full cost pricing.

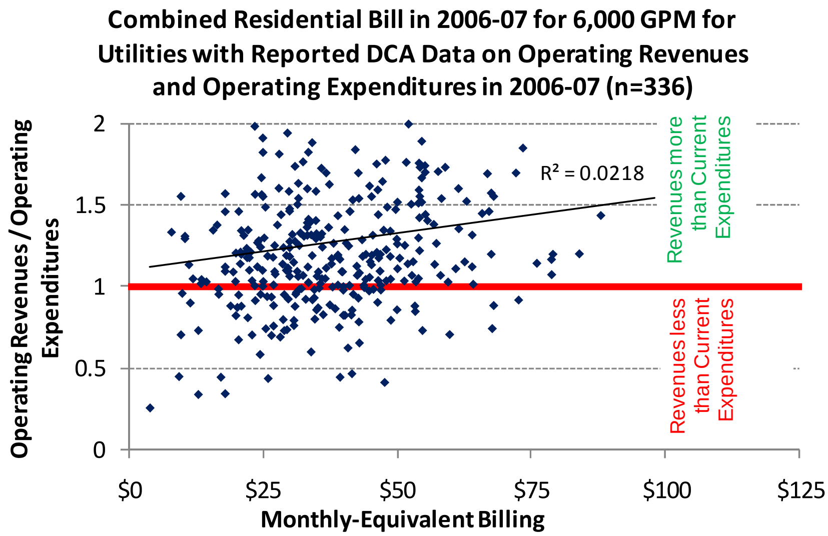

Figure 2: Operating Ratio versus Monthly Bills for utilities in Georgia

User rates and fees are a utility's primary source of revenues for operations, maintenance, administration and capital funding. It is therefore pertinent to understand what utilities are charging their customers and what relationship this has to full cost pricing principles.

While it seems reasonable to expect that utilities that charge more for service are more likely to have full cost pricing, the data does not bear this out. Although there is a slight trend among utilities in Georgia (Figure 2) there is generally very little correlation between the amount that utilities charge for, in this case, 6,000 gallons per month and the system's operating ratio. This means that utilities which charge very little for water service are almost as likely as utilities which charge very much for water service to have full cost pricing and vice versa. The implication of this is that, on average, full cost pricing is not the only priority in utility rate setting. Indeed for many communities, full cost pricing is less important than keeping rates low for residential, commercial and industrial customers. There is ample anecdotal evidence of the tremendous political pressure placed on public utilities to keep rates low, even at the expense of community infrastructure such as in the case of the Town of Belmont, NC where the Mayor was elected on a platform of lowering rates[4]. The impact of the political process on keeping rates down has also been measured empirically[5].

To help counterbalance the pressure to keep rates low, the EFC has developed a series of "Rates Dashboards" in North Carolina and Georgia which simultaneously facilitate the comparison of rates among systems in each state and provide information on full cost pricing, in the form of the OR for each system. It is common for Dashboard users to find that even if their rates are high compared to, e.g., systems within a fifty mile radius, or like-sized systems, their rates are insufficient from a revenue

[4] "Electric, water and sewer rates debate continues in Belhaven". Washington Daily News. 11 May 2006.
[5] Mann, P. "The political influence of residential customers on water rates." J. Amer. Water Res. Assoc. 9 (5) 976-984.

standpoint because their OR is less than 1.0. The OR is displayed as a gauge such that any value less than 1.0 is in the red while any value in the range of 1.0 to 1.2 is in the yellow and they are in the green above 1.2, thereby providing a visually compelling and intuitive link between rates and full cost pricing for decision makers and the general public. Rates Dashboards are available at: efc.unc.edu.

Paying for Debt

Much of water and sewer infrastructure is not funded on a pay-as-you-go basis. When cash is not on hand and grants are not available, many communities turn to debt to finance their infrastructure. Debt, of course, comes at a cost. Whether in the form of low-interest state revolving funds or revenue bonds, long-term USDA loans or general obligation bonds, nearly all forms of debt will carry interest as well as various transactional fees which the utility will have to cover. It is therefore important that full cost accounting include the cost of debt service.

A common measure of the utility's ability to cover debt service is the debt service coverage ratio (DSC). The debt service coverage ratio is measure of the amount of cash available to pay debt service after paying for operating expenditures:

$$DSC = \frac{Operating\ Revenues - Operating\ Expenditures}{Debt\ Service}$$

Utilities with a DSC ratio of 1.0 have just enough cash to cover debt service, but will have trouble meeting their debt service requirements if water sales drop or there are operational emergencies requiring money elsewhere. Utilities with a DSC of less than 1.0 are not operating as an independent enterprise as they are likely paying debt service with transfers from the general fund.

Figure 3 shows the DSC ratios among 168 utilities currently carrying debt in Georgia. Only 47% of systems have a DSC equal to or greater than 1.0 while 25% have DSC ratios equal to -2.0 or less. Systems with negative ratios are necessarily using other non-rate revenue sources to cover their debt obligations. A common strategy is to use general fund (tax) revenues to make up the difference. Clearly, a large number of systems are not using full cost-pricing with respect to debt service.

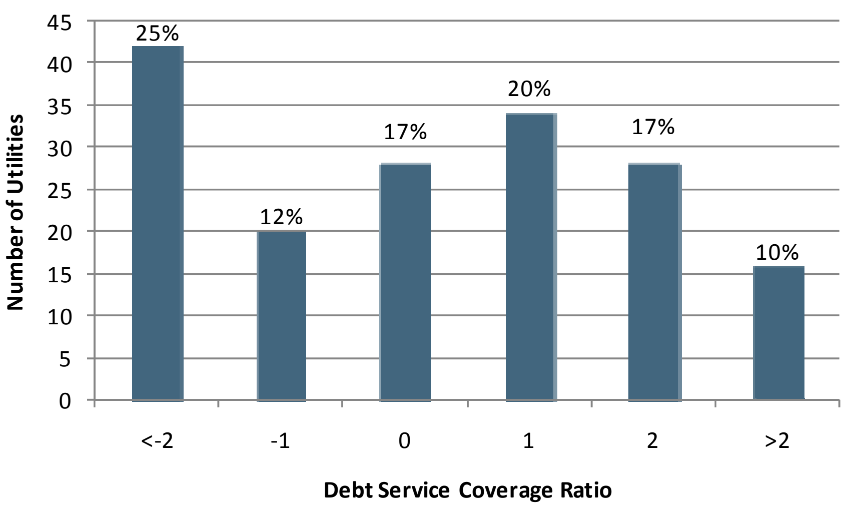

Figure 3: DSC Ratio among 168 debt-carrying utilities in Georgia

While a community with a DSC less than 1.0 may be able to cover debt service through a combination of rate revenues and general fund taxes, this is not a cost effective strategy for systems that will need to access private capital for infrastructure financing. Bond rating agencies frequently use the DSC as a core measure of a utilities' debt carrying capacity. In 2007, for example, the utilities which received "AAA" ratings from Standard & Poor's had a median DSC ratio of 1.5. The median for systems with a "AA" rating was 1.35 and the median for "A" rated systems was 1.32; as expected, systems with a higher DSC ratio are seen as less of a credit risk and are given a higher rating by bond rating agencies. Systems with lower DSC ratios will either be unable to access this type of debt, or they will pay more for it when they do.

The larger impact of these trends is that if only one-half to one-third of utilities will have a sufficiently high DSC to access bond funding, the other one-half to two-thirds of systems will have to rely exclusively on subsidized forms of debt (state or federal funding) for their capital financing needs, thereby putting a greater demand on limited public funding resources.

Active debt

While not a direct measure of full cost pricing, active debt is an important indicator of the extent to which utilities are financing major capital projects. As grant sources dry up and infrastructure comes due for replacement, utilities will be forced increasingly to debt. Thus it is crucial to understand where utilities stand with regard to their capacity to take on new debt.

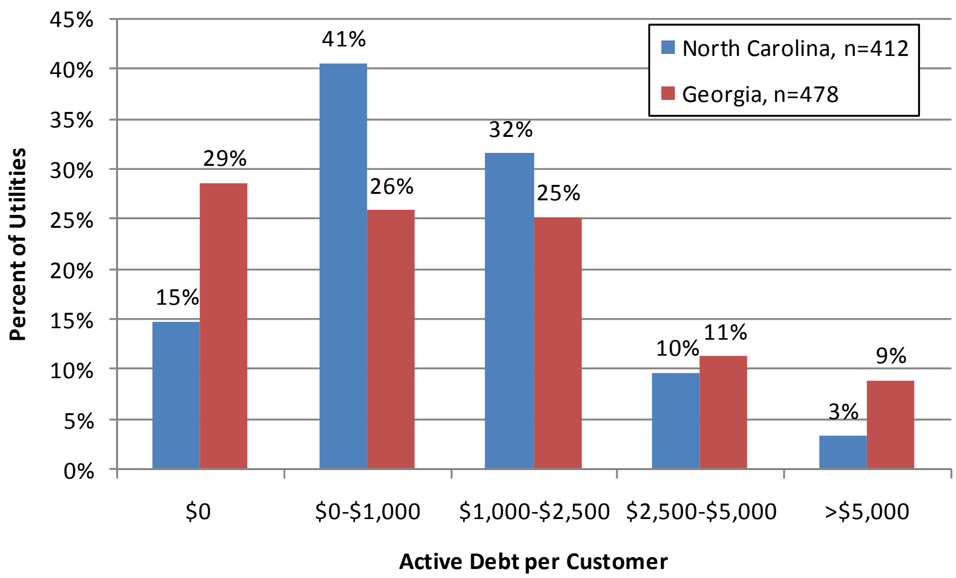

Figure 4: Active debt per water customer among water utilities in Georgia (in 2006) and North Carolina (in 2005)

Active debt per customer is a great measure of a utility's capacity for new debt. It is difficult to set a ceiling on the appropriate amount of debt per customer because there are many variables which confound the measure for a given utility. For example, wealthier communities might be able to take on more debt because they can afford more debt service than low income communities. Also, certain types of debt, such as 20 year, 2.0% interest from a state revolving loan fund, are much cheaper than others and debt capacity per customer will be higher for systems that access cheaper capital. Nevertheless, there are practical limits to each of these confounding factors which guarantee that most systems will fall within a range of debt capacity per customer.

As Figure 4 shows, the great majority of utilities have less than or equal to $2,500 debt per customer. About 13% of systems have more than $2,500 debt per customer in North Carolina, 20% of systems are above that benchmark in Georgia. These systems may have a harder time taking on new debt in the future. As a point of comparison, municipal general fund debt (excluding water, sewer and other enterprise fund debt) in North Carolina in 2007 averaged $1,863[6] per household[7].

Reserves

When infrastructure components are operating well, OR and DSC are sufficient measures of financial position. However, components frequently fail because of operator error, natural wear and tear and environmental hazards. When this happens, a utility will require emergency reserves to manage the immediate problem, to continue operation and eventually to repair or replace the component. Thus, sufficiently funded emergency reserves are another measure of full cost pricing. Capital reserves, on the other hand, are more of an indirect measure of full cost pricing; it depends on the capital financing strategy for the particular community. For example, some systems have stated or working policies to pay for all capital projects with cash. These systems will logically have much larger capital reserves than others. Because of the potential for vast differences in capital reserve policies, it is hard to compare capital reserves among systems. Thus, this analysis will focus solely on emergency and operating reserves which every system should have.

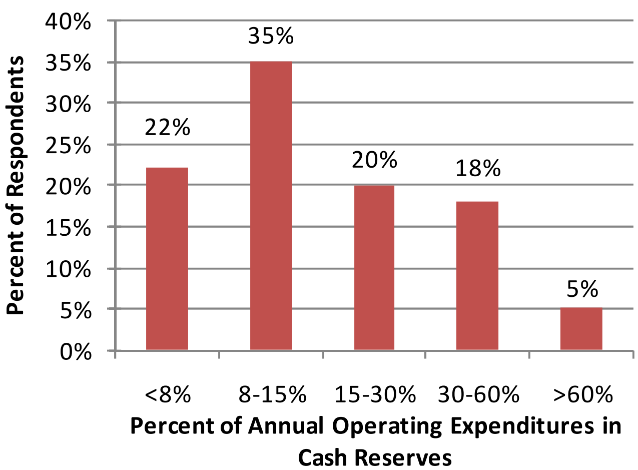

Figure 5: Cash reserves among 100 utilities in Georgia in 2008

Emergency and operating reserves should bear a reasonable relation to the characteristics of the system. For example, a utility might choose to set aside the cost of replacing its largest pump in case of pump failure. Without referencing utility characteristics, others have recommended that a utility maintain one month's worth, or 8%, of annual operating expenditures in cash reserves. Among 125 utilities responding to a survey in Georgia, 80% (100 systems) reported that they do have emergency or operating reserves. As shown in Figure 5, 22% of those systems have less than 8% of annual operating expenditures saved up. Therefore, among all the survey respondents, only about 62% report that they have sufficient emergency or operating reserves. Given that the survey was voluntary, those responding to the survey are likely to have greater finance and management capacity that most utilities, it is therefore probable the actual fraction of all systems statewide with adequate reserves is smaller than 62%.

[6] Analysis of debt of North Carolina Municipalities at 6-30-2007. Dept. of State Treasurer, Division of State and Localt Government Finance. February 2008.

[7] Averaged among communities (not weighted by population). Assumes 2.5 persons per household.

Case Studies

Statewide and regional statistics are useful for understanding general trends but they can sometimes mask what is happening in individual communities. At the individual utility level, full cost pricing practices are diverse for both big and small systems alike. Many large systems have good asset management and capital financing programs that are tied to a full cost rates as exemplified by Charlotte-Mecklenburg Utilities (CMU). In addition to their fully funded annual budget, CMU has a 5 year capital plan wherein capital projects are prioritized according to whether they help meet regulatory standards, maintain customer service levels and meet community objectives; they also have a 10 year strategic plan which is used to identify projects and begin to determine scheduling and financing plans. Because of its long range approach to strategic planning and sound financial management, Standard & Poor's and Fitch's have both awarded CMU 'AAA' credit ratings.

There are, however, large systems with supersized financial problems that will be felt beyond the immediate community. Jefferson County, Alabama, for example, has amassed $3.2 Billion dollars worth of sewer debt, due to poor asset and financial management and is now in technical default on that debt. As a result of their outsized debt load, which amounts to around $17,500 per household, Jefferson County may soon enter the largest local government bankruptcy in American history. Various proposals have been offered regarding how to pay for the debt including removing a 15% residential sewer discount, reducing general fund expenditures through massive layoffs and courthouse closings and raising additional funds through a sales tax increase. In exchange for these measures, Wall Street bankers would agree to write off $1 Billion of the debt[8].

Among smaller systems, we see a similar diversity in full cost pricing practices. Through this project, the EFC has encountered several small to medium sized systems which have excellent pricing and financial management practices as exemplified by the Town of Conway. In Conway's case, historically conservative financial management has left the town with very large financial reserves ($950,000 compared to an annual operating budget of $335,000). These reserves enabled them, with financial planning assistance, to begin to address their recently compiled CIP.

The medium-size City of Henderson, North Carolina has a reasonably sound track record of historical financial management. However, forces beyond the utility's control such as a depressed local economy have limited their capacity to raise rates in recent years. As the economy shifts away from manufacturing, Henderson and many other similar cities are faced with the loss of major industrial water and sewer customers. City residents are then left with the costs of maintaining oversized infrastructure. This problem is compounded by the loss of jobs and depressed wages that accompany the economic shift. Together, rising costs and lower incomes can make basic water and sewer services unaffordable. Even with comparatively low water and sewer rates, roughly one-quarter of Henderson's customers receive late notices for past due accounts and nearly 7% of its customer accounts are cut-off monthly for unpaid bills.

[8] "JeffCo considers cutting jobs, budgets to resolve sewer debt." Birmingham Business Journal, October 9, 2008.

Good financial management and full cost pricing, however, are hardly universal in small and medium sized utilities. In many cases, financial management capacity is limited by a minimal city staff. Only medium and larger systems can afford full time finance officers. Smaller systems have access to inter-local associations to pool planning and management resources such as Regional Councils, Government Finance Officers Associations, Rural Water Associations, and other professional local government and water system organizations. Nevertheless, many important financial decisions are made by councilmen and women who often have limited data to support politically risky rate hikes. In those situations, rate increases are frequently delayed. Consequently, asset refurbishment and rehabilitation is frequently deferred resulting in infrastructure components which do not run efficiently, further impacting the system's financial situation. In the worst cases, this leads to a vicious cycle of inefficient operations and limited financial resources to address them. In a handful of these cases, there is a silver lining. When major assets fail, there is a resulting public outcry over mismanagement followed by a change of strategy and/or leadership and rate increases to pay for the strategy.

The Town of Marshall, North Carolina, provides a good case study in the problems of managing an underfunded system. Marshall's is a groundwater system with 384 residential customer accounts. Asset management was minimal for many years. "Band-aids" were used for aging components when replacement was necessary. This is largely due to the fact that rates have, for many years, been far short of full-cost: Marshall's Operating Ratio as of FY04-05 was 0.59, and the ratio of assets to liabilities was only 0.73, compared to a state average of 2.26. A large portion of annual operating costs was subsidized through the general fund.

Surprisingly, utility rates in Marshall are not low by statewide standards. In 2006, the bill for a customer using 3,000 gallons per month (approximately the average per customer demand) in Marshall was $33.75 compared to a statewide average of $31.60 among other groundwater systems. At the 6,000 gallon per month level, Marshall actually charges considerably more than the groundwater system average: $58.50 versus $48.25. Despite charging more than the statewide average for water and sewer services, Marshall still has an extremely low OR, indicating relative inefficiencies in Marshall's water and sewer system.

Raising rates in Marshall is extremely difficult considering that the median household income in 2000 was only $24,188 and nearly 1 in 4 households are below the poverty line. Social security is the primary source of income for many of Marshall's residents. In a city as small as Marshall, a large portion of residents have personal relationships with the Mayor and with Council members who know how costly utility bill payments can be for their friends and family members on fixed incomes.

Operating inefficiencies and a depressed local economy combine to make it very difficult for Marshall to deal with new demands on Marshall's system. Recently, when private developers inquired about getting water service extended to a planned residential development, the project was limited by the fact that the City did not have adequate capacity and would have to invest heavily in new wells and distribution mains to expand. Although new residential development would bring much needed customer base and tax base expansions to the City, the project could not move forward until the City secured outside funding sources to expand the water system.

The natural environment has strained Marshall's resources as well. Marshall lies along the French Broad River Valley in a mountainous region. When rains are particularly heavy, the French Broad has flooded the island on which the wastewater treatment plant is located and causes excessive inflow and infiltration throughout the collection system. Mountainous terrain also poses challenges for the distribution system which leaks extensively and which provides inadequate fire protection capacity in some parts of the City.

Achieving full cost pricing will be difficult in Marshall since the repairs that have accumulated through years of deferred maintenance may amount to more than the existing customer base can support. There are various federal and state funding programs in place, but Marshall must compete for limited funds against many other similarly situated systems across the state, some of which have better asset management records and which, therefore, are stronger candidates for funding. Another possible strategy is that Marshall partner with other local governments in the region to pool resources. The neighboring Town of Mars Hill, for example, has surplus water supplies which it could sell and Mars Hill would benefit from the excess wastewater system capacity that Marshall has. Depending on their level of engagement, other synergistic effects could include a broader customer base over which to spread rate hikes and a more resources to hire shared financial management staff time.

Recognizing the positive, synergistic impacts of local government cooperation and recognizing that state and federal funding for infrastructure rehabilitation is far short of what is needed, several states have incentives in place, through regulatory and funding mechanisms, to promote interlocal partnerships for service provision. This may prove to be one of the best tools for making the most of limited dollars for public water and sewer services on a state, regional and national scale.

Conclusions and Implications

Statistically and anecdotally, full cost pricing practices are used by only a fraction of public water and sewer utilities. Based on the simplified statistical measures in this report, that fraction is roughly one half to one third of public, community water systems in Georgia and North Carolina. The remaining one half to two thirds of systems in those states may operate successfully by subsidizing their system with general fund revenues or by significantly underfunding infrastructure maintenance. These systems will not be prepared, however, to deal with operating emergencies, infrastructure component failures, the need for capacity expansions, tightened water quality regulations or major changes in customer demand patterns.

When any of those eventualities occur, this large group of systems will have to turn to outside sources of funding, including bonds and loans when the capacity for new debt exists and grants when it does not. Bonds are typically only available to relatively large systems with significant revenues and managerial capacity. Loans and grants, on the other hand, are universally available, but both of these sources are insufficient to meet all infrastructure needs. Full cost pricing must be adopted more widely for public community water systems to operate sustainably.

The most direct tool for achieving full cost pricing is raising user rates. Indeed, rate increases are the first place many systems should turn to address insufficient cash resources after avoiding politically painful rate hikes for many years. When surveyed, roughly 50% of systems in Georgia reported that they have not raised rates since 2006, 25% of systems have not raised rates since 2005 and 10% of systems have not raised their rates in over five years[9]. With cost indices rising at 3 to 5% and more each year, few systems can afford to wait more than one or two years for a rate increase.

In many communities, however, rate hikes are problematic because, owing to economic realities, increased utility rates will be unaffordable for the lowest income groups. There are also economic development pressures which keep rates low. Communities want to maintain competitive utility rates for attracting industries and the nation as a whole has an interest in slowing down the loss of manufacturing jobs overseas and that includes keeping down production costs at home. Strategies such as low-income utility customer assistance programs and non-rate economic incentive programs may be useful ways to skirt these and other problems associated with rate hikes, but in some cases, rate hikes may not be immediately possible.

Another strategy to achieve full cost pricing in many systems is to reduce utility operating costs by increasing efficiencies. Water audits and leak detection and repair programs, for example, can have a dramatic impact on the amount of water being lost through leaking pipes. This in turn will lower treatment and pumping costs for the entire system. Improved strategic planning and asset management also have the potential to reap huge investment returns through system efficiency improvements.

Interlocal utility partnerships are yet another way to address the infrastructure funding gap. Each state varies in the degree to which they incentivize or require interlocal partnerships where feasible. Some states promote partnerships by prioritizing projects which involve utility interconnections. Other states, such as the State of Kentucky, have aggressively pursued "regionalization" to reduce the overall number of very small systems which are plagued by ageing, underfunded infrastructure and other management problems. Through regulatory measures and funding incentives, Kentucky has seen a growth in larger, regional utilities and a reduction in the number of small systems overall. As a result, the majority of counties in Eastern Kentucky have three or fewer systems per county; many counties only have one or two systems. By comparison, in neighboring Eastern Tennessee most counties have four or more systems[10].

All of these tools will be needed in the future to maintain and operate our public community water and sewer systems. Pooling of resources through state and federal loans and grants for infrastructure repair and replacement will be needed in some cases, but on average, public water and sewer systems will need to do much more to achieve full cost pricing at the individual utility level.

[9] "Water and Sewer Rates and Rate Structures in Georgia." UNC Environmental Finance Center. March 2008.
[10] "Drinking Water and Wastewater Infrastructure in Appalachia." UNC Environmental Finance Center. July 2005.