THE CASE FOR A MORE SUSTAINABLE BUSINESS MODEL FOR WATER UTILITIES IN THE SOUTHEAST

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Abstract. With a long history of relative water abundance and lack of concentrated demand, the Southeast has had little reason to focus on water efficiency. But recent water shortages, more limited storage opportunities, the inseparable relationship between water use and energy use, and interstate water disputes have created a need to prioritize water efficiency in communities across the region.

However, for most utilities, the reality of reduced water demand presents a significant financial challenge: rising infrastructure costs must be recovered from a sinking sales base. Simply raising rates will not necessarily solve the problem. To the extent that demand for water is elastic, increases in water rates can actually drive water use down further. Additionally, the public may perceive an increase in rates as "punishment" for reducing their water use.

INTRODUCTION

For the purposes of this paper, the term "water conservation" refers to any beneficial reduction in water use or in water losses (not necessarily curtailment of use). "Water efficiency" refers to accomplishment of a function, task, process or result with the minimal amount of water feasible; in other words, it is a tool of water conservation that reduces water demand without changing the quality of the use.

"Conservation Conundrum" - Most water and wastewater utilities are established as enterprise funds within local governments. A well-managed enterprise fund completely covers the cost of its operations with the revenue that it generates. Enterprise funds are typically discouraged from using tax revenues to cover the cost of operations. Water and wastewater utilities most commonly generate revenue by charging rates for water usage. Thus when a utility promotes conservation or efficiency, it is essentially eroding its sales base.

The problem is even more stubborn since the utilities set these rates by allocating costs according to demand patterns. Since the majority of rates (over 97% of rates in Georgia) are based on volumetric demand (UNC Environmental Finance Center and Georgia Environmental Finance Authority, 2010), customer consumption has a direct link to utility revenues. As customer consumption decreases, so do utility revenues. This can become a sort of downward spiral: as customers respond to higher bills with decreased consumption, the utility needs to raise rates again to make up for the lost revenue. Meanwhile, especially in the short-run, the cost of operating a utility remains fixed because of its capital intensive nature, and reductions in use do not reduce costs.

Many utilities are facing this conundrum despite having little utility programming to promote conservation. Average residential water use is on the decline across the country due to factors outside of utility control, such as demographic and plumbing code changes (Rockaway et. al, 2011). In fact, the State of Georgia recently passed the Water Stewardship Act of 2010 limiting outdoor water use for all utilities and requiring high-efficiency plumbing fixtures in all new construction permitted on or after July 1, 2012.

Few viable businesses thrive by encouraging a decrease in customer use. Yet, as the environmental and collective impacts of energy and water use are realized, society is asking water utilities to implement conservation programs to reduce utility demand from their customers. This paper explores alternatives to the aforementioned water business model that may better address the conservation conundrum.

FRAMING THE PROBLEM

At least one third of water and sewer utilities in Georgia have operating ratios of less than 1, meaning that their revenues are less than current expenditures (UNC Environmental Finance Center and Georgia Environmental Finance Authority, 2010). This paints a fairly vulnerable financial outlook, and the instability of revenues described below only serves to exacerbate the problem.

Water and Wastewater utilities are very capital intensive in that the vast majority of the expenses for a utility are tied to capital and administrative costs. These f*ixed costs* do not decrease in the short-run when customers demand less water. However, the majority of revenue comes from the amount of water sold. In other words, if customers conserve, revenues drop significantly, but not costs.

For example, in 2008 Charlotte-Mecklenburg Utilities in North Carolina estimated that 82% of their revenues were based on usage, while in the short-term only 6% of their expenses varied with usage. Thus, when customers reduce their consumption significantly (e.g. during mandatory watering restriction periods), revenues fall and overall costs do not. This is the reason that utilities frequently have to increase rates on the heels of water restriction periods.

A utility's rate structure has much to do with how conservation impacts its bottom line. A utility could mitigate this short-term impact by charging a higher non-variable base charge, but this method does little to promote responsible use of treated water. On the other hand, if a utility with an increasing block rate relies on its higher tiers of consumption for a significant portion of its revenues, restrictions and other conservation initiatives targeted at that highest level of consumption can seriously hurt the bottom line.

In the long-run, conservation can help decrease and/or delay some of the fixed costs, but it takes some planning on behalf of the utility to take advantage of this financial boon. Conservative finance models, multi-year finance plans, annual rate adjustments and customer analysis can help a utility mitigate the financial detriments of conservation and even take advantage of the financial benefits.

However, these strategies are more reactive in nature. A successful and proactive rate structure must strike a balance between revenue stability and conservation.

THE UTILITY BUSINESS MODEL CONTINUUM

The figure below illustrates the tradeoff between a rate structure that ensures revenue stability and a rate structure that encourages customer conservation. In a way, the diagram represents the progression that the industry has generally taken. The authors plotted classic and burgeoning rate structures on the continuum to demonstrate weaknesses and opportunities in meeting the conflicting objectives. They are explained below.

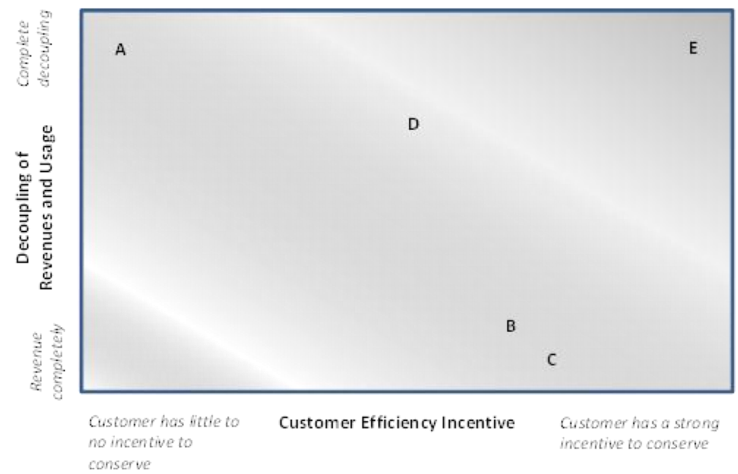

Figure 1: The Utility Business Model Continuum

Rate Structure A charges every customer a flat charge with no consideration for usage. In fact, Utility A does not even meter usage. While customers do pay a water bill, there is no financial incentive to conserve water because they pay the same amount of money regardless of the amount of water they use. In terms of utility revenue, this situation involves a very stable and predictable revenue stream. This rate structure is rarely used anymore. In fact, less than 3% of water utilities in Georgia use these flat charges (UNC Environmental Finance Center and Georgia Environmental Finance Authority, 2010).

Rate Structure B charges each customer a small, fixed monthly base charge. But, the bulk of a customer's bill is based on metered usage charged against a uniform rate. In this case, there is some financial incentive for customers to reduce water use, since their water bill will be smaller when they use less water. The utility using this rate structure now has less predictable revenue though, as much of it is based on customers' water demands. However, the rate structure does not distinguish between water demands. One thousand gallons conserved in response to irrigation restrictions will have the same financial impact to the utility as one thousand gallons conserved from a household's base demand. This situation reflects a large percentage of Georgia utilities, since 47% of utilities in Georgia employ this type of uniform pricing (UNC Environmental Finance Center and Georgia Environmental Finance Authority, 2010).

Rate Structure C charges each customer a small, fixed monthly base charge. The bulk of a customer's bill is based on metered usage charged against an increasing block rate. In an increasing block structure, the rate increases with greater water consumption. In this case, the incentive to reduce water use is even greater because as customers reach these higher consumption block levels, they see sharper increases in their bills. However, this rate structure leaves a utility's revenue more vulnerable to compliance with irrigation restrictions. This is another common scenario in Georgia with 34% of utilities using increasing block rates (UNC Environmental Finance Center and Georgia Environmental Finance Authority, 2010).

Rate Structure D bundles a customer's needs and offers them as a service. Rather than charging for every thousand gallons or cubic foot, this rate structure bundles services and charges accordingly. A customer can add irrigation service or other discretionary uses on top of their base. This rate structure is commonly used by cable and cell phone companies. In this scenario customers have picked the services that best suit their needs and ability to pay. Budget-based rate structures (discussed below) are a move toward this type of model in the utility world. By bundling services and pricing them based on their necessity, this rate structure incentives conservation. However, because customers will typically pick a plan and stay with it, the utility can expect a more stable revenue stream.

Rate Structure E is the goal for sustainable urban water use and revenue stability. It is somewhat of a utopia where customers receive effective signals to use water responsibly, yet the utility is not financially crippled by a reduction in the number of gallons of water it sells. The authors have yet to define this rate structure, but believe that the following models offer a progression toward rate structure E from rate structures B and C.

ADDRESSING THE PROBLEM

The following section outlines models that have and can be used to help utilities address the conservation conundrum.

Drought Surcharges

A temporary increase in water rates during a water shortage can help a utility recover the deficit created from customer conservation, while sending an economic signal to conserve. Airlines use this type of rate structure to help them recover fluctuating fuel costs. A few utilities across the country are using this model and typically refer to them as drought surcharges. Figure 2 outlines the drought surcharge structure used by the Orange Water and Sewer Authority in North Carolina.

Individually-metered Residential Accounts					
Block of consumption	1	2	3	4	5
Use level	0-2,999	3,000-5,999	6,000-10,999	11,000-15,999	>16,000
Stage 1 of drought	No surcharge	No surcharge	No surcharge	1.5x normal block 4 rate	2x normal block 5 rate
Stage 2 of drought	No surcharge	No surcharge	1.5x normal block 3 rate	2x normal block 4 rate	3x normal block 5 rate
Stage 3 of drought	No surcharge	1.25x normal block 2 rate	2x normal block 3 rate	3x normal block 4 rate	4x normal block 5 rate

Figure 2: Surcharges in Water Shortage for Individually-metered Residential Customers – Orange Water and Sewer Authority, Chapel Hill, NC

However, drought surcharges only apply when there is a drought (and correspondingly should be established prior to the drought and based on quantifiable triggers). They do little to stabilize rates when it rains a lot or when utilities experience a steady decline in average house water use.

Budget-based Rates

Water budget-based rates can be thought of as "individualized" rates. Similar to increasing block rates, a budget base rate charges more for higher and higher levels of consumption, but the levels are set by using one or more customer characteristics. Characteristics used include average water use for the household, number of residents and size of yard.

Many of the utilities that have implemented water budget-based rate structures have experienced substantial conservation savings attributable to the rate structure and accompanying customer outreach programs. Analysis by Irvine Ranch Water District (IRWD) in California staff concluded that the program increased outdoor efficiency by sixty percent (60%). At the same time, IRWD found that the water budget rate structure had improved revenue stability – customers had adjusted to their allocations and demand had stabilized, making it easier for the utility to set rates and meet revenue requirements.

Water budgets are cited with the following **advantages**:

1. Effective promoting water efficiency
2. Perceived fairness

3. Affordable for essential uses
4. Allow for better drought response
5. Promote communication between utility and customers

However, they are also cited with the following drawbacks:

1. Significant data and software requirements
2. High administrative cost
3. Actual equity (large families and homes may be granted higher budgets)
4. Complicated to communicate to customers

A Water Cooperative

Another business model that may hold promise, but has not been attempted to the authors' knowledge is a version of a "water cooperative." In this scenario the water utility would be following in the steps of an organization such as Recreation Equipment Inc. (REI). Customers are treated as "members" who earn dividends from the utility.

Using this model, a utility would clearly define its revenue needs and establish a price to cover those needs. At the end of the fiscal period, the utility would return any revenue in excess of its annual needs to its customers/members based on its performance.

REI and other cooperatives base their dividend on the amount a member spends at the store in a given year. These are "good customers" for that cooperative. A utility could define a "good customer" as one that used less than their water budget. Therefore rewarding conservation, but at the same time ensuring full-cost recovery.

One assumed advantage of this arrangement is that it would allow the utility to raise the revenue it expects to need without fear of being maligned in the media as a profit-seeking entity. Customers might see themselves as members/co-owners of the utility.

The utility may also have a higher chance of operating as a true "enterprise fund" since any "excess" revenue that is generated after sufficient reserve funds etc. are not transferred to the general fund, but returned to customers. In a state like Georgia where water rate-setting is not governed by the Public Service Commission, this co-op model may also be useful in taking some of the local politics out of the rate-making process. For instance, local government officials have often campaigned for office on a platform of lowering, or more realistically not raising, water and wastewater rates. Such a platform seems less enticing when voters/customers know that if the utility overshoots its revenues, the money will come back to the customers anyway. In fact, elected officials may delight in being able to "cut checks" to citizens at an opportune time of year (perhaps December 1st).

This model would represent a considerable paradigm shift for the industry, and there are potential barriers to its implementation that deserve to be explored. The authors are currently exploring an opportunity to try to implement this model at a pilot utility.

ACHIEVING SUSTAINABILITY

Water and wastewater utilities provide public health and environmental protection. The ultimate sustainability goal for a utility, financially, ecologically and socially, is to utilize a business model that incentivizes customers to use less water without compromising the revenues it needs to provide these essential services. Utilities that plan for conservation, by either incorporating water conservation into their existing, long-term business model or adopting a new business model, will have a better chance at achieving sustainability.

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