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Communication at your fingertips:
Using Billing Data to Get to Know your Customers

By Christine E. Boyle, Shadi Eskaf, Mary Tiger
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Despite utilities' best efforts to promote conservation while providing high quality and cost-effective water and sewer services, water and wastewater utilities in the United States continue to struggle over how to effectively communicate important messages over rate and service issues to customers. Lessons learned from the 2007-08 drought here in North Carolina taught us that the scale and importance of communication challenges can be daunting. Increasingly complex conservation and public health measures, combined with fiscal strain on utilities make communicating for North Carolina's 2,128 community water systems, providing water services to over 7.3 million customers annually, all the more important and yet difficult to carry out. With these challenges in mind, utilities must develop new ways to understand customer water use patterns, and put this understanding to good use via customer communication. One underutilized, and highly accessible, resource for understanding customers is monthly billing data.

> "By using the data at your fingertips, your utility can close the feedback loop of communication between the utility and your customers."

Customer information at your fingertips

Have you ever wondered what your neighborhood grocery store does with the data it collects on your purchases every time you scan your key-ring, 'Super Saver' card? For-profit entities are constantly trying to gain access to and effectively use customer data to better communicate and market to their customer base. Every billing period, water utilities collect valuable data about their customers when they read a customer's meter. Typically, utilities simply use metering data to send out bills, monitor system-wide usage and collect revenue. But why shouldn't they use the same sort of data when considering a pricing change or a new marketing strategy? And further, how should utilities do this?

To answer these questions, the Environmental Finance Center at the University of North Carolina (EFC) collaborated with several Urban Water Consortium (UWC) utilities in North Carolina to investigate how customer sales information can be collected and analyzed in ways that support water services management decisions and strategically target customer communication.

Although customer communication has not traditionally been top on the agenda for water utilities, complex rate changes and demand-side management are bringing it to the forefront of utility management. A closer look at customer information opens up new avenues for strategically targeted communication efforts.

There are three primary drivers motivating this approach to utilizing customer sales data for marketing and communication. First, customer billing data is available and relatively easy to access from a utility's finance or customer billing department. Next, using customer billing data to target groups and personalize rate and service messages can be more cost-effective than using broadcast media and other broad public outreach approaches. Third, personalized customer communication achieves results. Research shows that customer understanding of a policy helps increase rates of compliance in dealing with water scarcity management. Puget Sound Power Utility, serving greater Seattle, recently added direct messages on customer bills to target conservation messages toward customers with the largest room for conservation gains.

Programs such as education, outreach, home visits and bill messaging show the effectiveness of communication to change customer water use patterns, but what is missing from the both the research and policy agenda are cost-effective and practical strategies to learn more about customer preferences and usage patterns, in order to more effectively target and personalize communication.

Currently, water utilities throughout North Carolina are grappling with a number of specific policies that are influenced by customer behavior. The EFC-UWC work sought to address specific policies such as:

- **Pricing:** How are individual customers and groups of similar customers likely to react to changes in price and rate structure?
- **Conservation Marketing:** As with any marketing campaign, understanding who the target audience is and how they behave is essential. Can efforts designed to reduce or change usage patterns be made more efficient by incorporating customer sales analyses?
- **Customer Assistance:** How much effort should a utility devote to addressing problems low income customers may have in meeting their payment obligations? Can sales data provide insight on whether these programs are needed and how best to design and budget for these programs?

In this research, the EFC began with the customer's billing experience, and worked backwards through timeliness of payment, cutoff patterns, usage fluctuation, and rate structures to understand the relationships among utilities' customer characteristics, usage patterns, and rate structures.

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Turning data into a useful and cost effective communication tool

Last year, utilities within the UWC provided water and/or wastewater services to approximately 2.4 million people across North Carolina. The sales transactions for these services typically occur once a month or every two months with a total price based on the amount of metered water use during the preceding billing cycle. This project involved compiling billing data in a form that permitted studying customer sales patterns for individual customers for 30 consecutive months between July 1, 2006 and December 31, 2008. The five utilities included in the study were Greenville Utility Commission (GUC), City of High Point, and Fayetteville Public Works Commission (PWC), Orange Water and Sewer Authority (OWASA), and Charlotte-Mecklenburg Utilities (CMU). Comparing the analyses between utilities revealed some important similarities and differences in customer characteristics and customer behavior. The following section describes some of the key findings from this comparative analysis.

To carry out this research project, the EFC used statistical software to view customer-level water consumption history and construct comprehensive customer profiles. These profiles are useful in:

- determining the effect of rates and rate structures on subsections of the customer base,
- predicting future water use,
- estimating the amount of discretionary water use that occurs in the summer months,
- organizing customers for focus groups,
- developing and marketing relevant demand-side management programs,
- calculating the demand for irrigation meters and the need for customer assistance programs, and
- other aspects of planning for and managing a utility's resources, finances, and customer service programs.

One of the key strengths of this research is being able to track each customer's indoor and outdoor consumption over time. Utilities often track various meters that belong to the same house or lot under one premise number, but using several account numbers. For example, a household might have a different account number for their irrigation meter than their standard domestic meter. In this case, the premise would include two water meters. This analysis combined these two meters for an overall premise (or household)-level consumption over the 30-month study period.

Example data use: Determining and using peaking behavior

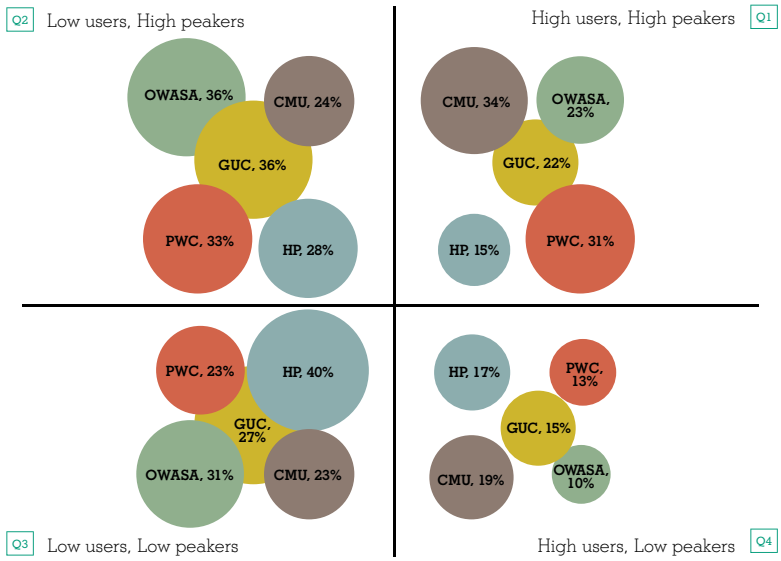
Average household water use alone does not speak to the changes in household consumption behavior in a given year. In order to reflect water use fluctuations, the EFC profiled residential customers based on their peaking behavior. A peaking household is one whose three months of highest usage divided by their three months of lowest usage is greater than two. In other words, for a quarter of the year, peaking households use more than double of what they use during another quarter of the year. This behavior suggests that these households had some discretionary use, a significant portion of their demand that they could live without for at least three months out of the year.

This consumption pattern is important to highlight because utilities often use pricing and conservation marketing to reduce, punish or collect on discretionary uses. For example, most increasing block rate structures are structured to charge lower level of consumption (sometimes referred to as lifeline consumption) inexpensive rates and to charge higher levels of consumption higher rates. Furthermore, utilities design many of their facilities to meet their customers' maximum usage during the year. Customers that use 20,000 GPM for three months and 5,000 GPM for the rest of the year have a much different impact on a utility's facilities than customers that use 8,000 GPM all year long, although both customers would have the same annual average household use.

Figure A divides customers in each participating utility into four groups based on their average usage and peaking patterns:

- **Q1:** The upper right-hand quadrant shows the percentage of customers that use a lot of water on average and also have a high peaking ratio throughout the year. These customers are typically the stated targeted population for increasing block rate structures, with the theory that their high usage and peaking causes a utility to design larger facilities than they might otherwise need, and that their peaking is indicative of discretionary use that can be influenced and reduced through pricing incentives. These

FIGURE A: Profiles of household water use patterns in Fiscal Year 2008



Q3: This quadrant contains customers that are consistently conservative with their water use all year long. There will not be a lot of water savings to be gained from this group. A utility that is promoting efficiency may want to send thank you letters to this group.

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customers would be great candidates for target marketing on any efficiency/conservation program that the utility offered for both indoor and outdoor water use.

- **Q2:** The upper left-hand quadrant might also be a target group for increasing block rate structures. The households in this quadrant are those that have a low annual average, but that also use significantly more water for a few months out of the year. An example might be a small family that uses a moderate amount of water in the winter, but that waters the lawn in the summer. While these customers are probably using their indoor water efficiently, and would be good candidates for outdoor water efficiency programming.
- **Q3:** This quadrant contains customers that are consistently conservative with their water use all year long. There will not be a lot of water savings to be gained from this group. A utility that is promoting efficiency may want to send thank you letters to this group.
- **Q4:** Some economists worry about the unintended impacts of increasing block rate structures on customers that have less discretionary use. For example, a household that has a large family may use a lot of water all year and have little discretionary use, but would still have to pay higher unit costs for their water. Many of these customers fit into the lower right hand quadrant of the figure showing customers that use a relatively high amount of water all year, but who are less inclined to peak. A utility with a large number of these types of customers (like Charlotte-Mecklenburg Utilities) that implements an increasing block rate structure will likely see less of a drop in water usage than a utility with more high use, high peaking customers. These customers would be good targets for affordability programs and indoor efficiency programs.

Figure A helps reinforce the point that customer bases differ among utilities across the state. Therefore, rates and marketing can and should be customized to address individual situations, rather than broadly promoted and applied.

Conclusion

With a little bit of effort, your utility can learn a lot from your customers, and in turn, make sure that your customers can learn a lot more from you. By using the data at your fingertips, your utility can close the feedback loop of communication between the utility and your customers by better targeting pricing and communication, evaluating the impact, and then going back to revise pricing and communication strategies. This article highlights just one way for a utility to do this. For more information on the EFC's research on household water consumption behavior, visit: *http://efc.unc.edu/projects/ResidentialWaterConsumptionBehavior.htm.*

Author Bios

Christine Boyle *is a doctoral candidate in UNC's Department of City and Regional Planning. Christine is working on EFC's current project analyzing relationships between customer characteristics, consumption patterns, and rate structures across North Carolina's water utilities. Prior to working at EFC, Christine worked on several research teams looking at different aspects of sustainable rural development in China. She has conducted research on water demand forecasting, as well as analyzing investment patterns in irrigation infrastructure in China's agricultural sector.*

Shadi Eskaf *joined the Environmental Finance Center in 2004 and has worked on projects analyzing environmental systems in local, statewide and regional settings. Shadi conducts research on a range of topics including water systems collaboration and regionalization, water and wastewater rates and rate-setting, residential water consumption, infrastructure capital needs and funding. Shadi is currently a doctoral student in the University of North Carolina, Chapel Hill's Department of Environmental Sciences and Engineering.*

Mary Tiger *is a project director for the Environmental Finance Center and provides outreach and research services to local communities on water conservation strategies and sustainability. Mary holds a masters of public administration from the University of North Carolina at Chapel Hill and a BS in Environmental Journalism from the University of North Carolina at Asheville. Prior to moving to Chapel Hill, she served as the utility conservation coordinator for Loveland Water and Power in Colorado.*

[1] EPA (2009) "Safe Drinking Water Inventory and Addresses" Safe Drinking Water Information System (SDWIS) Washington DC: July

[2]For further reading on this trend, look up these two articles: First, Chestnutt, Thomas W. & Janice A. Beecher (1998) "Conservation rates in the real world" Journal AWWA, 90 (2), 60-70. And, Olmstead, Sheila M., W. Michael Hanemann, Robert N. Stavins (2007) "Water demands under alternative price structures" Journal of Environmental Economics and Management, 54 (2007) 181-198.

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