The Next Challenge in Eliminating Sewer Overflows: Who Pays?

by John M. Mastracchio

Many wastewater systems in the Northeast have combined sewers and/or significant infiltration and inflow of water into the wastewater collection system during wet weather, resulting in periodic sanitary sewer overflows (SSOs) or combined sewer overflows (CSOs). To address these issues, many municipalities have developed long-term control plans to satisfy the U.S. Environmental Protection Agency (USEPA) requirements, eliminate sewage overflows, and reduce pollution. The USEPA estimates that $50.6 billion will be needed for CSO control at the national level, and an estimated $88.5 billion will be needed to reduce the frequency of SSOs caused by wet weather and other conditions *(Report to Congress on the Impacts and Control of CSOs and SSOs,* USEPA 833-R-04-001, August 2004.)

While federal and state funding of CSO and SSO projects through grants would ease the burden on local communities, the reality is that most will have to fund the majority of these projects on their own. As municipalities begin to implement infrastructure improvements, a cost recovery mechanism needs to be in place to support the funding of these projects. For most municipalities, this will result in the need to significantly increase wastewater rates. As rates rise, it will become increasingly important to ensure that costs are recovered in an equitable manner.

A fair rate structure can be developed by following a three-step, rate-setting process.

Step 1: Financial Management Plan Development

Developing a financial management plan is the first step in designing equitable and defensible wastewater rates. A sound financial management plan should identify how capital programs will be financed, such as pay-as-you-go funding, cash reserves, revenue bonds, general obligation bonds, or state revolving loan funds, or a combination of financing sources. The plan should also establish reserves and other financial policies, a long-range forecast of revenues and expenditures, and an estimate of the annual rate revenues that will be necessary to support operations, maintenance, capital improvements, and other program initiatives.

Financial management planning can also help to develop, prioritize, and schedule capital improvements by evaluating the resulting impact on customer rates under multiple scenarios using a financial model. An interactive financial model can provide management with the ability to assess the financial impact that capital planning, financing, and other decisions will have on average customer rates and the future financial position of the utility. An interactive financial model should have the ability to change key variables and assumptions quickly and easily, and contain a graphical interface that clearly demonstrates the impact of changes on the variables and assumptions.

Methods of Allocating Wet Weather Costs to Customers

Customer Allocation Basis: Amount of Wastewater Generated **Assumption:** A correlation between the amount of wastewater generated by customers and the amount of water entering the system.
Customer Allocation Basis: Number of Utility Customers **Assumption:** A correlation between the number of customer connections and the amount of water entering the system.
Customer Allocation Basis: Linear Front Footage of Property **Assumption:** A correlation between the length of the sewer pipe in front of each customer's property and the amount of water entering the system.
Customer Allocation Basis: Impervious Surface Area **Assumption:** A correlation between a property's impervious surface area and the amount of water entering the system.

Step 2: Cost of Service Evaluation

When determining who should pay for the costs associated with minimizing sewer overflows, or any costs related to providing wastewater service, it is important to consider the factors and customer characteristics that cause the utility to incur costs. Once these cost drivers are identified, they can be used to allocate costs to each customer class and determine each customer's cost responsibility.

Typical Wastewater Rate Structure Components

Rate Structure Component: Customer Charge **Description/Purpose:** Recovers the cost of meter reading, billing, customer service, and other customer related services.
Rate Structure Component: Fixed Charge **Description/Purpose:** Recovers a portion or all of the fixed costs. The greater the fixed charge, the more stable the revenues.
Rate Structure Component: Commodity Charge **Description/Purpose:** Recovers variable costs and a portion of the fixed costs based on the amount of wastewater generated. The more wastewater a customer generates, the higher a customer's sewer bill.
Rate Structure Component: Strength Surcharge **Description/Purpose:** Recovers the cost of treating high-strength wastewater. Strength is typically measured by biological oxygen demand, suspended solids, and nitrogen concentrations.

Most typically, wastewater cost drivers are based upon the number of customers served and the volume and strength of the wastewater discharged (including biological oxygen demand, suspended solids, nitrogen, and phosphorous concentrations). However, since sewer overflows, in part, may be caused by water inflow through unsealed manholes, roof drain connections, and infiltration into leaking collection system infrastructure, the cost responsibility for treating or otherwise managing wet weather flows should be based upon the characteristics that result in water entering the system.

Most wastewater utilities have assigned the cost responsibility of treating water that enters the wastewater system to customers in proportion to the volume of wastewater generated or the number of customers connected to the system, while a smaller number of utilities have assigned responsibility based on the number of linear feet of property front footage or impermeable property surface area. Each of these cost drivers is based on a specific rationale, and utilities must consider the suitability of each cost driver as it relates to their system. However, as costs associated with minimizing or eliminating sewer overflows become a larger fraction of a wastewater utility's total "spend," cost drivers based on impervious surface area or property front footage may become more prevalent.

Another important consideration when selecting the cost driver to be used to allocate cost is how administratively feasible and expensive it is to collect and maintain the necessary information. One could envision the most equitable method of assigning wet weather costs to customers based on actual measurements of the amount of runoff from each property that ends up in the sewer system. However, an extensive measurement and monitoring program would be cost prohibitive and potentially technically infeasible to implement. Therefore, each municipality must balance equity with administrative costs and complexity when selecting which cost drivers to use to allocate costs to customers.

Step 3: Rate Design and Pricing

Once a utility understands the cost responsibility of its customers, rates can be designed to equitably recover these costs. Typical wastewater rate structures include one or more of the following components: a per customer or fixed charge, a commodity charge based on the amount of wastewater generated, and a surcharge to reflect the strength of wastewater discharged. In addition to rate equity, a utility's pricing objectives may include revenue stability, low-income affordability, simplicity, and administrative feasibility. These pricing objectives can often conflict with a customer's cost of service. For example, satisfying a low-income affordability objective through a "lifeline" or subsidized rate for qualifying customers would result in under-recovering costs from low-income customers and over-recovering costs from other customers, which conflicts with a pure cost-of-service approach.

When designing rates, utilities need to strike a balance between meeting pricing objectives and maintaining rate equitability. An interactive rate model can be a useful tool to strike such a balance. The model can provide management with the ability to immediately assess the financial impact that various rate structure alternatives will have on the average customer, and in meeting pricing objectives. A rate model can also be used to evaluate the establishment of separate or new utility charges and consider other economic factors, such as the potential impacts of elasticity of demand.

For many wastewater utilities, the costs associated with minimizing sewer overflows and peaking due to wet weather will become a larger fraction total "spend," and rate structure components closely related to the causality of wet weather flows are likely to become more widespread. Such rate structure components many include separate charges for SSO or CSO abatement, or inflow and infiltration reduction programs that are designed to recover their associated cost. For example, the City of Detroit, Michigan, recently implemented a separate wastewater drainage charge to recover the costs of its long-term CSO control plan. In Detroit, a customer's drainage charge is based on the amount of impervious surface area of their property. Furthermore, for municipalities that have established separate storm water utilities, decisions will need to be made as to whether wet weather costs incurred by the wastewater system should be partially or completely recovered through storm water utility fees, instead of wastewater rates.

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As many utilities begin to spend the millions of dollars necessary to minimize or eliminate sewer overflows, simply increasing rates by a uniform percentage for all customers may not be the best method of generating additional revenues to pay for these programs. Alternatively, a three-step rate-setting framework, consisting of developing a financial management plan, completing a cost-of-service evaluation, and designing rates based on cost responsibility and a utility's pricing objectives can ensure that wastewater rates are equitable, defensible, and acceptable in your community.

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