Pricing Water to Achieve Full Cost Recovery

Glenn Barnes
Environmental Finance Center
The University of North Carolina at Chapel Hill
919-962-2789
glennbarnes@sog.unc.edu
Webinar Objectives

• Understand how to calculate the base charges and volumetric charges to cover the full cost of providing water service

• Demonstrate the impact of different pricing structures on different customers

• Discuss what factors can impact your pricing assumptions
Rate structures are the primary way that we as water systems “communicate” with our customers.

Here’s a question we hear often...
Are our rates right?

It depends…
Water System Objectives

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
Bring in enough revenue to cover the full cost of running the water system:

- O&M
- Capital needs
- Debt service

Why do this?
Polling Questions
The goal of full cost pricing is to have the charges for water cover the entire cost of running the water system today and into the future.

Of course, there are many ways in which you can get to the right dollar figure. Some of it comes down to your rate setting philosophy.
Rate Setting Philosophies

• Payment for access vs. payment for volume of product received

• Fixed charges for fixed costs and variable charges for variable costs

• Some mix of the above ideas
Rate Setting Philosophies

Jeff Hughes

The Painful Art of Setting Water and Sewer Rates

- An increase in mergers and acquisitions
- Almost $8 billion in assets and more than $1 billion in annual revenues¹
- Changing regulations, affecting the bottom line
- A backlog in capital investment needs
- Interruptions in supplies that hurt revenues
- Loss of major customers
- Innovative pricing and customer-relations strategies
- Sagging revenues

typically fall on governing boards that were chosen not as business or technical experts but as representatives of their constituents on a broad range of matters.

The drought of 2002 brought two types of water stories to the headlines: (1) the struggles of many communities to maintain their water supplies and (2) the financial difficulties of many communities due to decreased sales. The response to the first type of circumstance was immediate and significant: an executive order requiring conservation, and statewide initiatives to examine current supplies. The response to the second type of circumstance has been less obvious and less pronounced.

Table 1). These numbers are impressive. However, the projected numbers are staggering. According to a study by the North Carolina Rural Economic Development Center, the state will need more than $11 billion in investments to meet its capital needs for water and sewer infrastructure over the next twenty years.²

In North Carolina, as throughout the country, numerous water and sewer enterprises owned by local governments benefited from the federal government’s ambitious construction grants program of the 1970s (for the patterns of federal wastewater funding from 1970 to 2000, see Figure 1). Many local government officials fondly remember those days of
Let’s figure out some rates for an example water system that cover the full cost of providing water service
Greetings from Irwindale USA
Irvindale, USA Exercise

Small town with a water and wastewater system

Population: 1,100

Service Connections: 450

MHI: $24,432
# Non-Rate Revenues

<table>
<thead>
<tr>
<th>Account</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 30-329-00 W/S INTEREST EARNED DEPOS</td>
<td>$0.00</td>
</tr>
<tr>
<td>2 30-334-00 CONTRIBUTIONS/DONATIONS</td>
<td>$0.00</td>
</tr>
<tr>
<td>3 30-335-00 W/S MISC. REVENUE</td>
<td>$700.00</td>
</tr>
<tr>
<td>4 30-336-00 FUND BALANCE APPROPRIATED</td>
<td>$9,187.87</td>
</tr>
<tr>
<td>7 30-345-01 SALES TAX REFUND</td>
<td>$0.00</td>
</tr>
<tr>
<td>9 30-371-01 W/S CHARGES</td>
<td>$344,445.00</td>
</tr>
<tr>
<td>10 30-371-02 W/S ADJUSTMENTS</td>
<td>$0.00</td>
</tr>
<tr>
<td>11 30-373-00 TAP CONNECTIONS</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>13 30-373-02 SERVICE CHARGES/CUT OFFS</td>
<td>$12,500.00</td>
</tr>
<tr>
<td>14 30-373-04 IMPACT FEES</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>15 30-373-05 CAPITAL CONTRIBUTIONS</td>
<td>$0.00</td>
</tr>
<tr>
<td>16 30-374-00 Online W/S Payment Fee</td>
<td>$1,600.00</td>
</tr>
<tr>
<td>17 30-375-80 Contributed Capital - G.R.S.P.</td>
<td>$0.00</td>
</tr>
<tr>
<td>18 30-375-81 Contributed Capital Fund</td>
<td>$0.00</td>
</tr>
<tr>
<td>19 30-377-00 RBEG - Pump Station</td>
<td>$0.00</td>
</tr>
<tr>
<td>20 30-378-00 I&amp;I Study Grant - Commerce</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>22 30-385-00 SALE OF ASSETS</td>
<td>$0.00</td>
</tr>
<tr>
<td>23 30-386-00 TRANSFER FROM OTHER FUND</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

Total: $382,932.87
For the Exercise

Total Revenues: $382,932.87

Revenues from Rates: $344,445.00
Payment for Access

• In its pure form, everyone in the water system pays the same amount for access to the system, regardless of how much water they use.
Payment for Access

We charge a flat rate of $15.00 monthly.

P.O. Box 133
Jacksonville

We are a small town we do not have sewage.

Jacksonville, GA
Payment for Access

• What information do we need to make this calculation?

• Total revenue needed from rates
• Total number of accounts
Payment for Access

\[
\frac{\$344,445}{450} = \frac{\$765.43}{12} = \$63.79
\]

Total Needed Revenue

Total Annual Bill

Total Accounts

Monthly Bill
Which Rate Setting Objectives?

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
Payment for volume of product received

• In its pure form, everyone in the water system pays for the volume of water received and only for the volume of water received
Payment for volume of product received

**WATER & SEWER RATES**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In Town</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>$ 7.72 per 1,000 gallons</td>
</tr>
<tr>
<td>Sewer</td>
<td>$10.73 per 1,000 gallons</td>
</tr>
<tr>
<td><strong>Out of Town</strong></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>$15.44 per 1,000 gallons</td>
</tr>
<tr>
<td>Sewer</td>
<td>$21.46 per 1,000 gallons</td>
</tr>
</tbody>
</table>

Troutman, NC
Payment for volume of product received

• What information do we need to make this calculation?

• Total revenue needed from rates
• Total gallons sold
Payment for volume of product received

\[
\frac{\$344,445}{32,877,590} \times 1,000 = \$10.48
\]

Total Needed Revenue

Total Gallons Sold

Price per 1,000 Gallons
Which Rate Setting Objectives?

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
In its pure form, all of the fixed costs of the water system would be covered by the base charge, and all of the variable costs would be covered by the volumetric rate.
Base Charge for **Fixed Costs**; Volumetric Charge for **Variable Costs**

<table>
<thead>
<tr>
<th>Base Chrg Lower Bound</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.00</td>
<td>0 0.000000</td>
</tr>
<tr>
<td>4</td>
<td>9.500000</td>
</tr>
</tbody>
</table>

Readsboro, VT
Base Charge for **Fixed Costs**; Volumetric Charge for **Variable Costs**

<table>
<thead>
<tr>
<th></th>
<th>Revenue</th>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>76%</strong></td>
<td>24%</td>
<td>91% 9%</td>
</tr>
</tbody>
</table>

Readsboro, VT
What information do we need to make this calculation?

- Total revenue needed to cover fixed costs
- Total number of accounts
- Total revenue needed to cover variable costs
- Total gallons sold
Revenues from Rates: $344,445

For Irvindale

$292,045
Fixed Cost

$52,400
Variable Cost

Everything else

W/S Utilities
Chemicals & Salt Purchase Water Bill
Base Charge for Fixed Costs; Volumetric Charge for Variable Costs

$292,045  
Fixed Annual Costs

$648.99  
Total Annual Bill

450  
Total Accounts

=  

12  
Monthly Base Bill

$52,400  
Variable Annual Costs

x 1,000 =  

32,877,590  
Total Gallons Sold

$1.59  
Price per 1,000 Gallons
Which Rate Setting Objectives?

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
$25 Base Charge; Rest from Volumetric Rates

• Pick a base charge and see what the volumetric charge would need to be
$25 Base Charge; Rest from Volumetric Rates

<table>
<thead>
<tr>
<th>WATER &amp; SEWER RATES AND FEE SCHEDULE</th>
<th>EFFECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN TOWN</td>
<td></td>
</tr>
<tr>
<td>WATER MINIMUM (1000 GALLONS)</td>
<td>$25.00</td>
</tr>
<tr>
<td>SEWER MINIMUM (1000 GALLONS)</td>
<td>$25.00</td>
</tr>
<tr>
<td>DISPOSAL FEE</td>
<td>$ 5.00</td>
</tr>
<tr>
<td>ADDITIONAL WATER PER 1000 GALLONS</td>
<td>$ 6.15</td>
</tr>
</tbody>
</table>
$25 Base Charge; Rest from Volumetric Rates

• What information do we need to make this calculation?

• Total accounts
• Total revenue needed
• Total gallons
$25 Base Charge; Rest from Volumetric Rates

\[
12 \times \$25 \times 450 = \$135,000
\]

\[
\$344,445 - \$135,000 = \$209,445
\]

\[
\$209,445 \times 1,000 = \$6.37
\]

Total Revenue Needed = $344,445
Total from Base Bill = $135,000
Total Needed from Volumetric = $209,445
Price per 1,000 Gallons = $6.37

Total Gallons Sold = 32,877,590
Total from Base Bill = $135,000
The Monthly Rate Structures

1. Base charge of $63.79

2. Volumetric charge of $10.48 /1,000 gal

3. Base charge of $54.08
   Volumetric charge of $1.59 /1,000 gal

4. Base charge of $25
   Volumetric charge of $6.37 /1,000 gal
Poll Question
How This Impacts Customers

• All four rate structures get us to the same total revenue

• But how does each approach impact different types of customers?
How This Impacts Customers

- 1,000 gallons/month
- 4,000 gallons/month
- 12,000 gallons/month
- 34,000 gallons/month
## Payment for Access

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>🏫</td>
<td>House</td>
<td>$63.79</td>
</tr>
<tr>
<td>🏠</td>
<td>Apartment</td>
<td>$63.79</td>
</tr>
<tr>
<td>☕️</td>
<td>Cafe</td>
<td>$63.79</td>
</tr>
<tr>
<td>🏠</td>
<td>House</td>
<td>$63.79</td>
</tr>
</tbody>
</table>

The total payment amount for access is $255.16.
### Payment for Volume of Product Received

<table>
<thead>
<tr>
<th>Icon</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>🍼</td>
<td>$10.48</td>
</tr>
<tr>
<td>🏡</td>
<td>$41.92</td>
</tr>
<tr>
<td>🏡</td>
<td>$125.76</td>
</tr>
<tr>
<td>🍴</td>
<td>$356.32</td>
</tr>
</tbody>
</table>
Base Charge for Fixed Costs; Volumetric Charge for Variable Costs

<table>
<thead>
<tr>
<th>Icon</th>
<th>Base Charge ($)</th>
<th>Volumetric Charge ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>$55.67</td>
<td>$60.44</td>
</tr>
<tr>
<td>House</td>
<td>$73.16</td>
<td>$108.14</td>
</tr>
<tr>
<td>Apartment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cafe</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
$25 Base Charge; Volumetric Charge for Rest

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$31.37</td>
<td>$50.48</td>
<td>$101.44</td>
</tr>
<tr>
<td></td>
<td>1,000 gallons/month</td>
<td>4,000 gallons/month</td>
<td>12,000 gallons/month</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Payment for Access (Fixed Monthly Bill)</td>
<td>$63.79</td>
<td>$63.79</td>
<td>$63.79</td>
</tr>
<tr>
<td>Payment for Volume of Product Received</td>
<td>$10.48</td>
<td>$41.92</td>
<td>$125.76</td>
</tr>
<tr>
<td>Base Charge for Fixed Costs; Volumetric Charge for Variable Costs</td>
<td>$55.67</td>
<td>$60.44</td>
<td>$73.16</td>
</tr>
<tr>
<td>$25 Base Charge; Volumetric Charge for Rest</td>
<td>$31.37</td>
<td>$50.48</td>
<td>$101.44</td>
</tr>
</tbody>
</table>
These numbers are based on Irvindale’s budget. Does budget = reality? Maybe, but probably not.
What causes variation?

- Rate changes
- Population change
- Loss or gain of a big customer
- Economic conditions
- Change in collection rates
- Weather
- Usage restrictions
- Technology
What to do?

- Multiple forecasts based on different assumptions
- Ideally, be conservative
- Don’t forget price elasticity
- Use tools to stress test projections
- Give board options
Water and Wastewater Rates Analysis Model
http://efc.sog.unc.edu or http://efcnetwork.org
Find the most up-to-date version in Resources / Tools

Created by the Environmental Finance Center at the University of North Carolina, Chapel Hill
Funded by the U.S. E.P.A. and the N.C. Department of Environment and Natural Resources
Water Utility Revenue Risk Assessment Tool

Excel tool (simplified)

Focus on residential revenues

Utility inputs own:
  - Rate structure details
  - Residential customer water use profile
  - Weather patterns
  - Assumptions on price elasticity

Tool estimates the proportion of revenues that may be lost due to changes in water use patterns due to:
  - Rate increase, alone or plus:
  - Normal weather pattern changes, or
  - One-time, significant and sudden conservation effort

Free to download and use at
www.waterrf.org
www.efc.sog.unc.edu
How do the total revenues compare under both rate structures if there is a reduction of 10% - 20% in average water use and subsequent demand distribution shifts?

The comparative rate structure generates revenues that are MORE resilient to sudden and significant declines in residential water use than the revenues generated by the reference rate structure. Revenues under the comparative rate structure are projected to drop 8% - 13.2% for a 10% - 20% reduction in average water use, and their related shifts in demand distribution. These declines occur after including the effect of price elasticity when adjusting rates from the reference rate structure to the comparative rate structure. By comparison, revenues under the reference rate structure are projected to drop 8.5% - 14.2% for the same declines in residential water use.
AWE Sales Forecasting and Rate Model

Available for Alliance for Water Efficiency members
http://www.financingsustainablewater.org/
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