Pricing Water to Achieve Full Cost Recovery

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Rate Setting Objectives

Full cost recovery/revenue stability

Encouraging conservation

Fostering business-friendly practices

Maintaining affordability
Session Objectives

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

• Discuss what factors can impact
Understanding Water Revenues

https://www.youtube.com/watch?v=0jf83mE0Lyk
Full Cost Pricing

• 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
Exercise

Let’s figure out some rates for Irvindale that cover the full cost of providing water service
## Non-Rate Revenues

<table>
<thead>
<tr>
<th>Account</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-329-00 W/S INTEREST EARNED DEPOS</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-334-00 CONTRIBUTIONS/DONATIONS</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-335-00 W/S MISC. REVENUE</td>
<td>$700.00</td>
</tr>
<tr>
<td>30-336-00 FUND BALANCE APPROPRIATED</td>
<td>$9,187.87</td>
</tr>
<tr>
<td>30-345-01 SALES TAX REFUND</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-371-01 W/S CHARGES</td>
<td>$344,445.00</td>
</tr>
<tr>
<td>30-371-02 W/S ADJUSTMENTS</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-373-00 TAP CONNECTIONS</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>30-373-02 SERVICE CHARGES/CUT OFFS</td>
<td>$12,500.00</td>
</tr>
<tr>
<td>30-373-04 IMPACT FEES</td>
<td>$1,000.00</td>
</tr>
<tr>
<td>30-373-05 CAPITAL CONTRIBUTIONS</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-374-00 Online W/S Payment Fee</td>
<td>$1,600.00</td>
</tr>
<tr>
<td>30-375-80 Contributed Capital - G.R.S.P.</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-375-81 Contributed Capital Fund</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-377-00 RBEG - Pump Station</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-378-00 I&amp;I Study Grant - Commerce</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>30-385-00 SALE OF ASSETS</td>
<td>$0.00</td>
</tr>
<tr>
<td>30-386-00 TRANSFER FROM OTHER FUND</td>
<td>$0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$382,932.87</strong></td>
</tr>
</tbody>
</table>
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

\[
\frac{\$344,445.00}{450} = \frac{\$765.43}{12} = \$63.79
\]

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>In Town</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>$ 7.72 per 1000 gallons</td>
</tr>
<tr>
<td>Sewer</td>
<td>$ 10.73 per 1000 gallons</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Out of Town</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>$ 15.44 per 1000 gallons</td>
</tr>
<tr>
<td>Sewer</td>
<td>$ 21.46 per 1000 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

\[
\frac{\$344,445.00}{32,877,590} \times 1,000 = \$10.48
\]

Total Needed Revenue

Total Gallons

Price per 1,000 Gallons
Which Rate Setting Objectives?

- Full cost recovery/revenue stability
- Encouraging conservation
- Fostering business-friendly practices
- Maintaining affordability
Base Charge for Fixed Costs; Volumetric Charge for Variable Costs

- 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>0.000000</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></td>
<td>76%</td>
<td>91%</td>
</tr>
<tr>
<td></td>
<td>24%</td>
<td>9%</td>
</tr>
</tbody>
</table>

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

- What information do we need to make this calculation?
- Total revenue needed to cover fixed costs
- Total Accounts
- Total revenue needed to cover variable costs
- Total gallons sold
Base Charge for Fixed Costs; Volumetric Charge for Variable Costs

$292,045
Fixed Annual Cost

$648.99
Total Annual Bill

\[
\frac{450}{12} = \frac{\$52,400}{\$54.08}
\]

Monthly Base Bill

$52,400
Variable Annual Costs

1,000

\[
\frac{32,877,590}{1,000} = \frac{\$1.59}{Price per 1,000 Gallons}
\]

Total Gallons

$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

- Randomly 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 IN TOWN</th>
</tr>
</thead>
<tbody>
<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

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

Total Revenue Needed: $344,445

Total from Base Bill: $135,000

Total Needed from Volumetric: $209,445

Total Needed Volumetric: $209,445

Total Gallons: 32,877,590

Price per 1,000 Gallons: $6.37
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

Water & Wastewater Rates Analysis Model
Version 2.8.2 (last updated August 4, 2015)

DESCRIPTION
A do-it-yourself, simplified financial model to assist utility managers and private system owners in setting water and wastewater rates.

FEATURES
- Comparisons of annual fund balance projections (for up to 20 years) under proposed new rates vs. staying with existing rates
- Adjust rates for the next 1-5 years
- Model changes to accounts and water use
- Up to 12 rate structures
- Customizable list of operating and capital expenses
- Uniform or block rates (up to 10 blocks)
- Building up reserves through rates
- Compare monthly bills under new rates vs. existing rates
- Assess revenue sufficiency and fund balance
- Error notifications

INSTRUCTIONS
1) Navigate using worksheet tabs at bottom of screen or following arrows and clicking on buttons
2) In the green "Data Input" worksheets, input data in the dark green cells

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
These numbers are based on Irvindale’s budget.

Does budget = reality?
These numbers are based on Irvindale’s budget.

Does budget = reality?

Maybe
Consider the annual revenues of a small water and wastewater system that has not changed its rates in 7 years (real life example)
Operating revenues from a small municipal water and wastewater system fluctuated every year, despite water and wastewater rates not changing for those seven years.

Total operating revenues of the water and wastewater enterprise fund in each fiscal year are compared to the FY2009 total. Certified municipal population estimate in each year is compared to the 2009 estimate.

Data sources: Annual audited financial statements of a municipality in North Carolina, compiled by the NC Local Government Commission; and certified municipal population estimates by the State Demographic branch of the NC Office of State Budget and Management. Data graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
Operating revenues from a small municipal water and wastewater system fluctuated every year, despite water and wastewater rates not changing for those seven years. And despite municipal population growing over time.

Total operating revenues of the water and wastewater enterprise fund in each fiscal year are compared to the FY2009 total. Certified municipal population estimate in each year is compared to the 2009 estimate.

Data sources: Annual audited financial statements of a municipality in North Carolina, compiled by the NC Local Government Commission; and certified municipal population estimates by the State Demographic branch of the NC Office of State Budget and Management. Data graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
What could be causing this variation?
As rates go up, usage goes down.

As a rule of thumb, typically usage goes down 3-4% for every 10% increase in rates.
Population Change

Customers could be coming into your system or leaving your system
Loss of a Big Customer

Some customers use significantly more water than others. Losing a single big user can have a disproportionate impact on revenues.
Economic downturns can cause customers to cut back on water use. Conversely, periods of economic growth can lead to higher water consumption.
Changes in Collection Rates

Even if the number of customers doesn’t change, how often they are paying you may be changing.
Rainy conditions or dry/drought conditions can impact how much water customers use for outside irrigation.

Weather
Water Use Restrictions

Whether due to water supply shortages or drought conditions, restricting water use will obviously impact revenues.
Technology

Fixtures use less water today than in the past, and overall per capita water demand is decreasing across the country.
# Bill Correctly

<table>
<thead>
<tr>
<th>Volume From Own Sources</th>
<th>System Inputs</th>
<th>Water Exported</th>
<th>Authorized Consumption</th>
<th>Billed Authorized Consumption</th>
<th>Unbilled Authorized Consumption</th>
<th>Water Exported</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water Exported</td>
</tr>
<tr>
<td>Imported Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Billed Metered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Billed Unmetered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unbilled Metered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unbilled Unmetered</td>
</tr>
</tbody>
</table>

- **Water Exported**: Water supplied to your system
- **Billed Authorized Consumption**: Authorized consumption billed
- **Unbilled Authorized Consumption**: Authorized consumption unbilled
- **Unbilled Water Exported**: Water exported unbilled

## Revenue Water

- **Unauthorized Consumption**: Unauthorized water consumption
- **Customer Metering Error**: Metering errors
- **Systematic Data Handling Errors**: Systematic errors
- **Mains Leaks**: Mains system leaks
- **Service Leaks**: Service system leaks
- **Tank Overflows**: Tank overflows

## Real Losses

- **Apparent Losses**: Apparent losses

## Water Losses

- **Authorized Consumption**: Authorized consumption
- **Unbilled Authorized Consumption**: Unbilled authorized consumption

- **Unbilled Water Exported**: Unbilled water exported

## Non-Revenue Water

- **Water Exported**: Water exported

What to do?

• Multiple forecasts based on different assumptions

• Ideally, be conservative
Find the most up-to-date version in Resources / Tools
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
Water Utility Revenue Risk Assessment Tool

Comparing Revenues After a Significant Decline in Water Use

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?

### Portions of Annual Revenues under REFERENCE and COMPARATIVE Rate Structures that are at Risk of Loss Due to Significant Reductions in Average Water Use

- **REFERENCE Rates**
  - $18,000,000
- **COMPARATIVE Rates**
  - $16,500,000

### Decline in Total Annual Revenues for a:

<table>
<thead>
<tr>
<th>Decline</th>
<th>REFERENCE Rates</th>
<th>COMPARATIVE Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% reduction</td>
<td>$1,311,000</td>
<td>$1,319,000</td>
</tr>
<tr>
<td>20% reduction</td>
<td>$2,181,000</td>
<td>$2,167,000</td>
</tr>
<tr>
<td>10% reduction</td>
<td>8.5%</td>
<td>8.0%</td>
</tr>
<tr>
<td>20% reduction</td>
<td>14.2%</td>
<td>13.2%</td>
</tr>
</tbody>
</table>

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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