Water and Wastewater Rates and Rate Structures in North Carolina

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March 2017

Click on any of the following questions:

Tools for Comparisons
- How many and which utilities and types of rates are analyzed in this report?
- Where can I find tools and tables I can use to help me evaluate our rates?

Four Myths about Rates
- Myth #1: Higher rates are bad.
- Myth #2: Comparing rates is simple.
- Myth #3: Pricing is simple.
- Myth #4: Promoting conservation requires increasing block rate structures.

Current Rate Structure Designs
- What are the utilities’ base charges, and consumption allowances?
- What are the most common rate structure types in North Carolina?
- How do rate structures differ between commercial and residential customers?
- How do rate structures differ between indoor and irrigation/outdoor rates?
- For block rate structures, how much consumption is included in the first block?
- How much do utilities charge per 1,000 gallons near the average consumption level?
- What does the State recommend for residential rate structures?

Current Rates
- How much is charged for residential consumption?
- How much is charged for commercial consumption?
- How much is charged for residential irrigation water?
- How do rates differ based on utility size, utility type, water source, or river basin?
- How do rates differ for customers inside or outside municipal boundaries?

Rates Changes Over Time
- How often do utilities change their rates?
- How have residential rates changed in recent years?

Affordability
- What does the average North Carolinian pay for water and/or wastewater service?
- How affordable are utility rates in North Carolina?

Promoting Conservation
- What can utilities do with rates to encourage conservation? *Click to download guidelines for promoting conservation through rate structures.*

Cost Recovery
- Are utilities financially self-sufficient in North Carolina?
Water and Wastewater Rates and Rate Structures in North Carolina
March 2017

This report details the results of a survey of water, wastewater and residential irrigation rates and rate structures conducted by the Environmental Finance Center at the UNC School of Government and the North Carolina League of Municipalities. Rates and rate structures that were in effect in January 2017 are analyzed for 441 local government and non-governmental utilities throughout the State of North Carolina. For more information, or to download tables of every rate structure and its computed bills, use the interactive NC Water and Wastewater Rates Dashboard designed to allow you to compare rates using multiple selection criteria, and to view rate sheets of individual utilities, please visit [www.efc.sog.unc.edu/project/north-carolina-water-and-wastewater-rates-and-rate-structures](http://www.efc.sog.unc.edu/project/north-carolina-water-and-wastewater-rates-and-rate-structures) or [www.nclm.org](http://www.nclm.org).

All references to tables, figures or subheadings, whether in the table of contents or within the text, are hyperlinked. Click on them to jump to the corresponding page.

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Introduction

Water and wastewater rate setting is one of a local government’s most important environmental and public health responsibilities. Water and wastewater rates ultimately determine how much revenue a community will have to maintain vital infrastructure. The purpose of this document is to help utilities in rate setting by providing an up-to-date, detailed survey of current statewide rate structures and trends. This report represents a collaborative effort between the NC League of Municipalities (NCLM) and the Environmental Finance Center (EFC) at the UNC School of Government.

Over the course of this survey, 523 water and/or wastewater utilities owned by local governments, not-for-profit associations, and multi-system for-profit companies were contacted by email or phone, and 441 utilities (84%) responded by sending in their rate schedules. These utilities serve approximately 7.6 million North Carolinians and account for 95% of the population served by community water and wastewater systems in the state. Table 1 describes the utilities analyzed in this survey. Some utilities use more than one rate structure for different portions of their service areas, raising the total number of “rate structures” in our sample to 483. Many analyses in this report refer to statistics of the 483 rate structures.

<table>
<thead>
<tr>
<th>Institutional Arrangement</th>
<th>Provides Water and Wastewater</th>
<th>Provides Water Only</th>
<th>Provides Wastewater Only</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipality</td>
<td>284</td>
<td>26</td>
<td>16</td>
<td>326</td>
</tr>
<tr>
<td>County/District</td>
<td>27</td>
<td>27</td>
<td>4</td>
<td>58</td>
</tr>
<tr>
<td>Sanitary District</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Authority</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Metropolitan District</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Not-For-Profit</td>
<td>1</td>
<td>25</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>For-Profit Multi-System Utility</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total Number of Utilities</strong></td>
<td><strong>326</strong></td>
<td><strong>88</strong></td>
<td><strong>27</strong></td>
<td><strong>441</strong></td>
</tr>
<tr>
<td><strong>Number of Rate Structures</strong></td>
<td><strong>341</strong></td>
<td><strong>107</strong></td>
<td><strong>35</strong></td>
<td><strong>483</strong></td>
</tr>
</tbody>
</table>

In addition to this report, tables of each utility’s rates and key components of their rate structures are available from the EFC and NCLM, as well as copies of the rate structures of participating utilities. Those resources are available at [http://www.efc.sog.unc.edu/project/north-carolina-water-and-wastewater-rates-and-rate-structures](http://www.efc.sog.unc.edu/project/north-carolina-water-and-wastewater-rates-and-rate-structures), along with a free, interactive NC Water and Wastewater Rates Dashboard that combines a utility’s financial, physical, and customer characteristics with the capability of comparing rates among utilities that are similar in various categories.
Four Myths about Pricing

There are many oversimplifications and bits of “conventional wisdom” in the world of water finance and pricing which do not necessarily hold up upon deeper investigation. Some of the myths dispelled by the analysis in this report include:

1. **MYTH: Higher rates are bad.** Higher rates often do not necessarily reflect poor or inefficient management. In fact, data show that some utilities with low rates do not generate sufficient revenue to properly maintain their system’s assets, which could ultimately lead to long-term adverse cost and service impacts. Pressure to maintain low rates has the potential to force utilities to run a deficit or avoid making necessary operational and capital expenditures. Some utilities may have low rates because they have not re-examined their rate structures in many years, and their pricing structure may not support key finance and policy goals such as promoting conservation or maintaining affordability.

2. **MYTH: Comparing rates is simple.** An examination of rates and rate structures will only tell part of the story, and there are many different methods of comparing pricing. Ideally, rates should reflect the cost of providing service. Cost of service depends on diverse factors including geographic location, size of treatment facilities, customer base, age of assets, site-specific regulatory requirements, type of water supply, and quality of source water and receiving waters. Two neighboring utilities with similar customer bases may have very different costs that justify very different rate structures and rates. Therefore, policy decisions drawn from the comparative information should also consider the many other factors listed above. Furthermore, figuring out the most pertinent factors to compare can be a challenge. For example, analysis revealed that in some cases, when comparing two utilities, one utility’s rate may be higher than the other utility’s rate for bills in the 0 to 4,000 gallon range, but lower at 5,000 to 10,000 gallon range, or vice versa. Comparing rates among utilities is really just a starting point for a more in-depth analysis.

3. **MYTH: Pricing is simple.** North Carolina utilities employ a tremendous variety of pricing structures. Utilities show wide variation in how they set base charges and design block structures. Utilities have many design choices and should be thoughtful in customizing their rate structure to serve their specific needs, objectives and priorities as they evolve in time, rather than maintaining outdated rate structures or copying their neighbor’s rate structure.

4. **MYTH: Promoting conservation requires increasing block rate structures.** Several utilities are facing water supply challenges and are looking for ways to use pricing structures to promote conservation. Many different types of pricing structures can be adopted to encourage conservation; some of these are quite complicated and some are very simple. Increasing block (or tiered) rate structures are sometimes heralded as the solution to conservation rate setting. While increasing block rates are sometimes priced in a way to encourage conservation, the analysis shows that some utilities with simpler rate structures – such as uniform rates – sent customers stronger conservation price signals than other utilities with increasing block structures. In fact, a significant minority of the utilities using
increasing block rate structures had less effective conservation pricing signals than some utilities employing aggressive uniform rates. Rather than focusing on rate structure designs alone, utilities should consider all aspects of pricing. The rates set at each block are more important than having a block rate structure by itself. Above conservation, utilities must determine if their rates are set to truly reflect their costs, and make sure that rates are not artificially low.

Overview of Rate Structures

Utilities employ a variety of rate structures to determine what their customers pay. Almost all utilities use a combination of base charges and variable charges in their rate structures. There is considerable variation in how these are calculated and how they are charged for different classes of customers.

Base Charges

Base charges contribute to revenue stability because they do not vary from month to month, regardless of consumption. However, high base charges can create affordability concerns and also make it difficult for a utility to encourage conservation for the same reason. The range of residential base charges are shown in Figure 1. The median\textsuperscript{1} residential base charge across all rate structures in the state in 2017 is $15.50 per month for water and $16.80 per month for wastewater. For combined utilities, the median combined water and wastewater base charge is $31.52 per month.

While nearly every rate structure (\textasciitilde100\% of water and 98\% of wastewater rate structures) has a base charge, their amounts vary by utility size. The median residential base charges are presented in Table 2 by utility size. The largest utilities have smaller base charges than the smallest utilities. This may be a reflection of the fact that larger utilities have broader customer bases that provide a more stable revenue stream. Smaller utilities may, on average, have less stable customer consumption and therefore decide to shift a greater portion of their operating costs into the base charge.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure1.png}
\caption{Monthly Base Charges for Residential Customers Among 446 Water and 369 Wastewater Rate Structures}
\end{figure}

\begin{table}
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{Monthly Base Charge} & \textbf{Water} & \textbf{Wastewater} \\
\hline
$1-5$ & 50 & 10 \\
$6-10$ & 50 & 10 \\
$11-15$ & 25 & 15 \\
$16-20$ & 25 & 15 \\
$21-25$ & 20 & 10 \\
$26-30$ & 15 & 10 \\
$31-35$ & 5 & 5 \\
$>35$ & 0 & 0 \\
\hline
\end{tabular}
\caption{Median Residential Base Charges by Utility Size}
\end{table}

\textsuperscript{1} Most of the statistics cited in this report refer to medians. Exactly half of the rate structures in the sample have a value that is equal to or greater than (or equal to or lower than) the median value. The median is preferred over the average because averages are influenced by exceptionally high or low values whereas medians are not.
Table 2: Monthly Residential Base Charges in Water and Wastewater Rate Structures, by Utility Size

<table>
<thead>
<tr>
<th>Size of Utility (Service Population)</th>
<th>Total Number of Structures</th>
<th>Number with Base Charge</th>
<th>Median Base Charge</th>
<th>Total Number of Structures</th>
<th>Number with Base Charge</th>
<th>Median Base Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 999</td>
<td>85</td>
<td>85</td>
<td>$18.00</td>
<td>72</td>
<td>72</td>
<td>$19.75</td>
</tr>
<tr>
<td>1,000 – 2,499</td>
<td>72</td>
<td>72</td>
<td>$16.05</td>
<td>63</td>
<td>63</td>
<td>$17.00</td>
</tr>
<tr>
<td>2,500 – 4,999</td>
<td>75</td>
<td>74</td>
<td>$15.00</td>
<td>70</td>
<td>68</td>
<td>$17.89</td>
</tr>
<tr>
<td>5,000 – 9,999</td>
<td>67</td>
<td>66</td>
<td>$16.66</td>
<td>47</td>
<td>46</td>
<td>$16.00</td>
</tr>
<tr>
<td>10,000 – 24,999</td>
<td>79</td>
<td>79</td>
<td>$15.00</td>
<td>60</td>
<td>58</td>
<td>$14.96</td>
</tr>
<tr>
<td>25,000+</td>
<td>69</td>
<td>69</td>
<td>$12.00</td>
<td>57</td>
<td>55</td>
<td>$12.50</td>
</tr>
<tr>
<td>All Rate Structures</td>
<td>448</td>
<td>446</td>
<td>$15.50</td>
<td>376</td>
<td>369</td>
<td>$16.80</td>
</tr>
</tbody>
</table>

A large number of residential rate structures (58% of water and 50% of wastewater rate structures) include a minimum amount of water consumption or wastewater disposal with their base charges (see Figure 2). For these utilities, the variable charges of the rate structure only take effect when a customer uses more than the consumption allowance included in the base charge. Thus, all customers of these utilities who consume or dispose of an amount up to the minimum allocation would receive the same bill, which is equal to the base charge. For both water and wastewater utilities, the median amount of allowance included with the base charge is 2,000 gallons per month. Only 3% of water and 4% of wastewater rate structures include more than 3,000 gallons/month with the base charge.

Figure 2: Consumption Included with the Base Charge for Residential Customers among 448 Water and 376 Wastewater Rate Structures

A large number of utilities vary the base charges based on the customer’s water meter size in order to distinguish between large commercial and industrial users from residential and small commercial customers. Of the 448 water rate structures applied to commercial and non-residential customers, 108 (24%) vary the base charge by meter size. Similarly, of the 376 wastewater rate structures for commercial customers, 82 (22%) vary the base charge by the water meter size. The range of meter-based base charges used by this subset of utilities is shown in Table 3. For example, half of the commercial rate structures that vary by meter size charge base charges up to $65.91 per month for water a 2” meter and up to $172.48 for a 4” meter.
Table 3: Maximum Monthly Base Charge Applied to Commercial Customers by Utilities Whose Base Charges Vary by Meter Size

<table>
<thead>
<tr>
<th>Percentage of Meter-Based Commercial Rate Structures</th>
<th>10%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>90%</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water (n = 108)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>$5.93</td>
<td>$9.86</td>
<td>$13.23</td>
<td>$18.62</td>
<td>$24.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>$6.11</td>
<td>$10.11</td>
<td>$13.23</td>
<td>$19.75</td>
<td>$24.48</td>
<td>$100.00</td>
</tr>
<tr>
<td>1&quot;</td>
<td>$11.00</td>
<td>$15.00</td>
<td>$22.35</td>
<td>$36.75</td>
<td>$50.00</td>
<td>$150.00</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>$14.94</td>
<td>$21.48</td>
<td>$37.34</td>
<td>$61.06</td>
<td>$90.68</td>
<td>$200.00</td>
</tr>
<tr>
<td>2&quot;</td>
<td>$19.71</td>
<td>$32.36</td>
<td>$65.91</td>
<td>$99.25</td>
<td>$161.80</td>
<td>$444.43</td>
</tr>
<tr>
<td>3&quot;</td>
<td>$28.88</td>
<td>$59.61</td>
<td>$120.41</td>
<td>$187.83</td>
<td>$277.70</td>
<td>$886.93</td>
</tr>
<tr>
<td>4&quot;</td>
<td>$40.00</td>
<td>$82.52</td>
<td>$172.48</td>
<td>$301.93</td>
<td>$450.20</td>
<td>$1,594.60</td>
</tr>
<tr>
<td>6&quot;</td>
<td>$40.00</td>
<td>$103.94</td>
<td>$264.23</td>
<td>$560.75</td>
<td>$756.40</td>
<td>$3,506.25</td>
</tr>
<tr>
<td>8&quot;</td>
<td>$40.11</td>
<td>$131.68</td>
<td>$342.62</td>
<td>$654.33</td>
<td>$912.62</td>
<td>$3,506.25</td>
</tr>
<tr>
<td>10&quot;</td>
<td>$40.11</td>
<td>$146.87</td>
<td>$374.46</td>
<td>$695.52</td>
<td>$1,181.29</td>
<td>$3,506.25</td>
</tr>
<tr>
<td><strong>Wastewater (n = 82)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>$4.94</td>
<td>$10.02</td>
<td>$14.42</td>
<td>$21.00</td>
<td>$29.72</td>
<td>$52.26</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>$5.80</td>
<td>$10.17</td>
<td>$14.62</td>
<td>$21.00</td>
<td>$29.72</td>
<td>$52.26</td>
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<tr>
<td>1&quot;</td>
<td>$8.30</td>
<td>$17.90</td>
<td>$24.61</td>
<td>$35.82</td>
<td>$52.95</td>
<td>$130.65</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>$13.04</td>
<td>$26.13</td>
<td>$40.71</td>
<td>$63.47</td>
<td>$104.52</td>
<td>$261.30</td>
</tr>
<tr>
<td>2&quot;</td>
<td>$19.64</td>
<td>$37.76</td>
<td>$65.32</td>
<td>$113.69</td>
<td>$174.27</td>
<td>$418.08</td>
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<tr>
<td>3&quot;</td>
<td>$30.63</td>
<td>$61.56</td>
<td>$114.77</td>
<td>$214.79</td>
<td>$344.83</td>
<td>$842.88</td>
</tr>
<tr>
<td>4&quot;</td>
<td>$50.24</td>
<td>$78.43</td>
<td>$179.24</td>
<td>$362.48</td>
<td>$558.34</td>
<td>$1,899.50</td>
</tr>
<tr>
<td>6&quot;</td>
<td>$68.72</td>
<td>$122.55</td>
<td>$355.72</td>
<td>$641.34</td>
<td>$1,136.78</td>
<td>$3,371.53</td>
</tr>
<tr>
<td>8&quot;</td>
<td>$75.18</td>
<td>$159.20</td>
<td>$488.79</td>
<td>$995.08</td>
<td>$1,470.26</td>
<td>$3,371.53</td>
</tr>
<tr>
<td>10&quot;</td>
<td>$75.18</td>
<td>$165.95</td>
<td>$521.94</td>
<td>$1,074.50</td>
<td>$1,812.39</td>
<td>$4,025.62</td>
</tr>
</tbody>
</table>

**Variable (Volumetric) Charges**

When customers consume above the consumption allowance included with the base charge, volumetric rates apply and the customers are charged based on the volume of water or wastewater they use. Figure 3 through 6 present information on the volumetric water and wastewater rate structures for “inside” customers, i.e. those who live within a utility’s political jurisdiction or municipal boundaries.

The three most common rate structures are uniform, increasing block, and decreasing block. In a **uniform rate structure**, the volumetric rate at which water/wastewater is charged does not change as the customer uses more water. In an **increasing block structure**, the volumetric rate increases with greater water consumption. This structure is often employed by utilities that want to encourage conservation. In a **decreasing block structure**, volumetric rates decrease as consumption rises. This structure might be used to encourage economic development. Other rate structures used in North Carolina include a hybrid of increasing and decreasing blocks where rates increase or decrease for specific targeted blocks of consumption, seasonal rate structures applying different rates at different times of the year, uniform wastewater rates that are capped at a maximum billable...
consumption amount, tiered flat fees, and a block rate structure that charges all consumption at the rate of the last used block. Seasonal rate structures support conservation, especially for those utilities that experience large seasonal consumption changes (e.g. tourist locations). Wastewater bills are almost always calculated based on the amount of metered water consumption. However, a fraction of wastewater utilities use rate structures with a cap on residential wastewater consumption. For example, if a utility caps its wastewater bill at 20,000 gallons, a customer that uses 25,000 gallons of water will only be charged for 20,000 gallons of wastewater disposal.

Most water and wastewater utilities use the same rate structure for residential, commercial, and industrial customers, but some have separate rate structures. In this survey, 31% of water rate structures have separate, unique rates for their commercial customers, and a fraction of these also have unique rates that pertain to their industrial (or other types of non-residential) customers. On the wastewater side, 27% have separate, unique rates for their commercial customers. The type of rate structures applying specifically to commercial customers (see Figure 5 and Figure 6) are different than those that apply to residential customers.

While some utilities design separate rate structures for commercial users, other utilities use only one rate structure but design the blocks so that they inherently distinguish residential use from that of large non-residential customers. A common practice is to set the first block high enough so that essentially all residential consumption is charged one rate (which is equivalent to a uniform rate for these customers) while most large
commercial customers will typically exceed the first block, thus paying an increasing or decreasing block rate. Figure 7 shows how many rate structures include various amounts of consumption and disposal in the first block of their residential block rate structure.

Figure 7: Maximum Quantity in the First Block among 195 Water and 101 Wastewater Residential Block Rate Structure

An examination of rate structures over the range of typical residential consumption reveals that many increasing and decreasing block structures are effectively uniform below 15,000 gallons/month (shown in Figure 8 and Figure 9). For example, whereas 7% of residential water rate structures are decreasing block structures (Figure 3), only 4% actually apply decreasing rates within the first 15,000 gallons/month of consumption (Figure 8) – the rest have a first block that exceeds the range of typical residential use. Figure 8 and Figure 9 also show the percent of the population served under each rate structure applicable to consumption/disposal levels of up to 15,000 gallons/month. While only 30% of the water rate structures are increasing block structures through 15,000 gallons/month, 52% of all residential customers are served by these rate structures. Figure 9 shows that the vast majority of residential customers pay uniform rates for wastewater disposal.

Figure 8: Water Rate Structures Applicable to Residential Consumption up to 15,000 gallons/month (n=448)

Figure 9: Wastewater Rate Structures Applicable to Residential Disposal up to 15,000 gallons/month (n=376)
The State of North Carolina is now actively discouraging the use of decreasing block rate structures for residential consumption. In 2008, the General Assembly created G.S. 143.355.4 stating:

“To be eligible for State water infrastructure funds from the Drinking Water State Revolving Fund or the Drinking Water Reserve or any other grant or loan of funds allocated by the General Assembly whether the allocation of funds is to a State agency or to a nonprofit organization for the purpose of extending waterlines or expanding water treatment capacity, a local government or large community water system must demonstrate that the system:

... (5) Does not use a rate structure that gives residential water customers a lower per-unit water rate as water use increases.”

As shown in Figure 8, 4% of the water rate structures analyzed in this study are still designed to charge residential customers using less than 15,000 gallons/month decreasing rates as water use increases. To be eligible for the aforementioned funds, these utilities would need to change their water rate structures.

Residential customers in North Carolina consume an average of 4,000 to 5,000 gallons/month. Among the 448 water rate structures in the sample, the median price for the next 1,000 gallons (not including base charges) at the consumption level of 5,000 gallons/month is $4.72 per 1,000 gallons – 50% of the water rate structures have a price that is between $3.30 and $6.00 per 1,000 gallons.

The price for wastewater is higher. Among the 376 wastewater rate structures in the sample, the median wastewater price for the next 1,000 gallons at 5,000 gallons/month is $5.79 per 1,000 gallons – 50% of the wastewater rate structures have a price that is between $4.35 and $7.70 per 1,000 gallons. The range of water and wastewater prices for the next 1,000 gallons at the 5,000 gallons/month consumption level is shown on Figure 10. Among the 341 combined water and wastewater rate structures, the median combined price for the next 1,000 gallons is $10.32 per 1,000 gallons – 50% of the combined rate structures have a price that is between $7.90 and $13.60 per 1,000 gallons.

**Figure 10: Price for the Next 1,000 Gallons at 5,000 gallons/month for 448 Water and 376 Wastewater Rate Structures**
Many utilities provide the option to residential customers to install separate irrigation meters to supply their outdoor water usage. In some cases, the utilities have created a separate, unique rate structure specifically for these irrigation meters. In our sample of 448 water rate structures, only 73 (16%) had a unique rate structure for residential irrigation meters. All 73 of these use a uniform or an increasing block rate structure. Read more about irrigation rates, and how they compare to standard rates, on page 14.

Changes in Residential Rate Structures in the Last Year

Most North Carolina utilities actively evaluate and modify their rate structures every one to two years. The calendar year in which each of the 468 rate structures active as of January 2017 were first put into effect is shown in Figure 11. The figure shows that about 42% of the current rate structures were made effective since January 2016, and 60% have changed their rates in the last two years. Only approximately 16% of the rate structures were instated in 2012 or earlier (at least five years ago).

The trend among North Carolina utilities for many years has been to move away from decreasing block rate structures to either uniform or increasing block structures. This trend is largely driven by an interest in preserving water supplies by promoting water conservation and discouraging excessive or wasteful consumption. The trend is in keeping with the state’s encouragement of using conservation-oriented rates and rate structures as mentioned previously.

This year’s survey included 386 water rate structures and 328 wastewater rate structures that were also included in the 2016 survey. Out of the 386 water rate structures included in last year’s rates survey, 11 changed in the last year, shown in Table 4. Most of the changes were from uniform rates to increasing block rates. Overall, 3 decreasing block rate structures were changed in the last year, and 5 increasing block structure was gained. There are 12 wastewater rate structures that were changed between 2016 and 2017, out of the 328 surveyed in both years. An analysis of how much rates have increased in the past year is shown on page 13.
What Utilities Charge their Customers

The following sections present information on the water and wastewater bills charged to “inside” customers, i.e. those who live within a utility’s political jurisdiction or municipal boundaries. For rates and bills charged to “outside” customers, go to page 20.

Residential Water and Wastewater Bills

Figure 12 and Figure 13 show the median amount that utilities bill their residential water and wastewater customers, respectively, for a range of consumption/disposal amounts on a monthly basis\(^2\). These calculations include base charges, consumption allowances, and volumetric rates. The colored bars highlight what the middle 80% of utilities charge (between the 10th and 90th percentile) across the consumption spectrum.

\(^2\) For utilities that bill on a non-monthly basis (bi-monthly or quarterly), charges have been calculated and presented on a monthly basis to allow for accurate comparison.
The median monthly amount charged for zero gallons of water is $15.50, $32.63 for 5,000 gallons and $56.66 for 10,000 gallons. As a point of comparison, a gallon of potable water at a major grocery retailer is approximately $1.00 while the median bill for 5,000 gallons of tap water is approximately $0.0065 per gallon, or 153 times cheaper. Wastewater bills are generally higher than water bills. The median monthly wastewater bill for customers disposing zero gallons is $16.47, $40.74 for 5,000 gallons and $69.03 for 10,000 gallons.

The range of combined water and wastewater bills for various usage levels is shown on Figure 14. The median monthly combined bill for zero gallons is $31.47, $70.65 for 5,000 gallons and $124.00 for 10,000 gallons.

Figure 14: Monthly-Equivalent Residential Combined Water and Wastewater Bills by Consumption (n=341)

Residential Bills By Utility Size

Table 5 shows that water and wastewater bills are generally higher among the smallest utilities. This is probably because large utilities are able to spread their fixed costs among a greater customer base.

<table>
<thead>
<tr>
<th>Utility Size (Service Population)</th>
<th>Water Rate Structures</th>
<th>Wastewater Rate Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Rate Structures</td>
<td>Median 5,000 gallons/month Monthly Bill</td>
</tr>
<tr>
<td>1 - 999</td>
<td>85</td>
<td>$34.50</td>
</tr>
<tr>
<td>1,000 – 2,499</td>
<td>72</td>
<td>$35.70</td>
</tr>
<tr>
<td>2,500 – 4,999</td>
<td>75</td>
<td>$31.63</td>
</tr>
<tr>
<td>5,000 – 9,999</td>
<td>67</td>
<td>$33.00</td>
</tr>
<tr>
<td>10,000 – 24,999</td>
<td>79</td>
<td>$30.88</td>
</tr>
<tr>
<td>25,000+</td>
<td>69</td>
<td>$29.87</td>
</tr>
<tr>
<td><strong>All Rate Structures</strong></td>
<td><strong>448</strong></td>
<td><strong>$32.63</strong></td>
</tr>
</tbody>
</table>
Residential Bills By Type of Utility Ownership

Table 6 shows that municipal utilities generally have lower water and wastewater bills than other service providers, possibly because the population density is highest for municipal utilities, which translates into lower per customer costs (and therefore bills) for distribution and collection. Conversely, County utilities, which are typically more spread out, have the highest water bills.

Table 6: Median Residential Water and Wastewater Monthly Bills at 5,000 gallons/month, by Utility Type

<table>
<thead>
<tr>
<th>Utility Type</th>
<th>Number of Rate Structures</th>
<th>Median 5,000 gallons/month Monthly Bill</th>
<th>Number of Rate Structures</th>
<th>Median 5,000 gallons/month Monthly Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipality</td>
<td>320</td>
<td>$30.86</td>
<td>308</td>
<td>$38.83</td>
</tr>
<tr>
<td>County/District</td>
<td>70</td>
<td>$42.42</td>
<td>42</td>
<td>$47.24</td>
</tr>
<tr>
<td>Sanitary District</td>
<td>19</td>
<td>$36.00</td>
<td>10</td>
<td>$46.52</td>
</tr>
<tr>
<td>Authority/Metropolitan District</td>
<td>9</td>
<td>$38.89</td>
<td>10</td>
<td>$45.38</td>
</tr>
<tr>
<td>Not-For-Profit</td>
<td>26</td>
<td>$33.41</td>
<td>1</td>
<td>$48.00</td>
</tr>
<tr>
<td>For Profit</td>
<td>4</td>
<td>$36.64</td>
<td>5</td>
<td>$62.81</td>
</tr>
<tr>
<td>All Rate Structures</td>
<td>448</td>
<td>$32.63</td>
<td>376</td>
<td>$40.74</td>
</tr>
</tbody>
</table>

Residential Bills By Water Source Type

Table 7 shows the median water charge for 5,000 gallons/month based on the water supply source. The water rates set by purchase water systems (those that buy at least a portion of their water from another water system), are on average higher than those of groundwater or surface water systems. Purchase water systems must account for their own operational costs in addition to the costs of the supplier treating the water. Water systems treating their own water face costs that are dependent on the source of water. Generally, treating surface water is more expensive than treating groundwater. In North Carolina, water rates for water systems that withdraw surface water are lower at the median than water rates for water systems withdrawing groundwater, but this could be due to the fact that surface water systems in North Carolina tend to be much larger than groundwater systems.

Table 7: Median Residential Water Monthly Bills at 5,000 gallons/month, by Type of Water Supply

<table>
<thead>
<tr>
<th>Water Supply Type (as determined for regulatory purpose)</th>
<th>Total Number of Rate Structures</th>
<th>Median Monthly Water Bill at 5,000 gallons/month</th>
<th>Median Service Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater</td>
<td>138</td>
<td>$32.63</td>
<td>1,877</td>
</tr>
<tr>
<td>Surface Water</td>
<td>116</td>
<td>$28.87</td>
<td>15,023</td>
</tr>
<tr>
<td>Purchase*</td>
<td>190</td>
<td>$36.60</td>
<td>4,672</td>
</tr>
<tr>
<td>All Water Rate Structures</td>
<td>444</td>
<td>$33.00</td>
<td></td>
</tr>
</tbody>
</table>

* “Purchase” water systems are those that buy at least a portion of their water from another water system, which could be either surface water or groundwater.
Residential Bills By River Basin

It is important to consider the operating environment when comparing rates among utilities. Source water quality and quantity can have a significant impact on the cost to produce water. Likewise, receiving water quality can have a major impact on the cost of wastewater treatment. In an attempt to consider these impacts, median water and wastewater bills for 5,000 gallons/month were calculated for each of North Carolina's major river basins, shown in Figure 15.

The highest median water charges in river basins with a sample of more than 10 rate structures can be found in the Tar-Pamlico river basin. The lowest median water charges, by contrast, are found in the Lumber river basin. The highest median wastewater charges can be found in the Pasquotank river basin. Wastewater charges in the Neuse and the Tar-Pamlico river basins are higher than average for the state, and both river basins are under stringent discharge regulations. The lowest median wastewater charges can be found in the French Broad river basin.

**Figure 15: Median Residential Water and Wastewater Monthly Bills at 5,000 gallons/month, by River Basin**

Underlying river basin map is from the NC Wildlife Resources Commission's website.
Commercial Water and Wastewater Bills

Figure 16 and Figure 17 show the median monthly water and wastewater bills, respectively, for commercial customers at different levels of disposal\(^3\). The middle 80% of charges also are indicated. The median monthly bill for commercial customers consuming zero gallons (on a 3/4” meter)\(^4\) is $16.61 for water and $18.00 for wastewater. The median monthly bill for 50,000 gallons/month is $253.13 for water and $313.24 for wastewater. The median bill for those consuming 500,000 gallons/month (on a 1½” or 2” meter) is $2,406.21 for water and $3,017.75 for wastewater. The variation in commercial bills across rate structures increases significantly as the consumption/disposal amount increases.

Irrigation Bills for Residential Customers

Residential customers that water their lawns, wash their cars, or otherwise use water outdoors frequently use much more water outdoors than they do indoors. An EFC study of customers in five cities in North Carolina shows that residents with irrigation meters tend to use, on average, two to seven times as much water outdoors in the summer months as they do indoors\(^5\). With such large volumes of water used outdoors, particularly in the summer months, and with G.S. 143.355.4 clearly encouraging the use of rates to support conservation, some utilities have taken the opportunity to charge for water used through irrigation meters at a unique rate structure.

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\(^3\) The residential rate structure is used to calculate the billings for commercial customers except for the utilities that specify different rates and rate structures for commercial or non-residential customers.

\(^4\) Some utilities use different base charges for different meter sizes for customers. Bills for consumption or disposal of up to 100,000 gallons/month was computed assuming a 5/8” or 3/4” meter size, 250,000 gallons/month assuming a 1” meter size, and 500,000 gallons/month assuming a 1½” or 2” meter size. When applicable, the “next largest” meter size is used in calculating the bills when a utility does not utilize a specific meter size.

In our survey, 73 rate structures included such unique rates. Typically, irrigation rates are higher than the standard water rates, but less than the combined water and wastewater rates. The ratio of the irrigation water bill at 15,000 gallons/month to the residential (indoor) water-only or combined bill is shown in Figure 18. The irrigation bill for 15,000 gallons/month is higher than what the customer would have been charged under the standard water rate structure for that consumption amount in 45 out of the 73 rate structures (62%). However, 15 of the irrigation rate structures actually provide a price discount to customers for their outdoor water usage, which essentially discourages water conservation.

Figure 18: Comparing the Irrigation Bill to the Combined Water and Wastewater Bills and Water-Only Bills for Residential Customers at 15,000 gallons/month among the 73 Unique Irrigation Rate Structures

Nearly all of the irrigation rate structures provide residential customers with a price break compared to the combined water and wastewater charge for 15,000 gallons/month. This is logical, since outdoor water usually does not enter the sewer system after use, and therefore the utility does not encounter wastewater treatment costs for the water that flows through the irrigation meters. However, a small number of utilities charge irrigation bills that are higher than their combined water and wastewater bills for high volumes of irrigation water. In these cases, the utilities are setting irrigation rates that strongly incentivize conservation.

Whether or not a utility has a unique rate structure for irrigation water, all utilities must evaluate carefully what they are charging for large consumption of water through their residential rate structures. The monthly-equivalent bills for all 448 rate structures in our sample are shown in Figure 19 for a consumption range that is typical of residential irrigation usage.

Figure 19: Monthly-Equivalent Bills for Irrigation Water Use by Residents, by Consumption (n=448)
Changes in Residential Rates Over Time

Out of the 386 water and 328 wastewater rate structures included in last year’s rates survey, residential rates were increased from last year for 44% of the water rate structures and 46% of wastewater rate structures, as shown in Figure 20.

**Figure 20: Percent of Rate Structures that Increased Residential Rates in the Last Year**

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>44%</td>
<td>46%</td>
</tr>
<tr>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 21 and Figure 22 show the residential monthly bill increase for customers that use 5,000 gallons/month among the 170 water and 152 wastewater rate structures that have raised rates in the last year. The median increase was $1.29/month for water (a 4.1% increase) and $1.80/month for wastewater (a 4.9% increase).

**Figure 21: Increase in Residential Monthly Bill Amount Since Last Year for 5,000 gallons/month among 170 Water and 152 Wastewater Rate Structures that Raised Rates**

**Figure 22: Percent Increase in Residential Monthly Bills Since Last Year for 5,000 gallons/month among 170 Water and 152 Wastewater Rate Structures that Raised Rates**

Among 179 water rate structures were were collected in the survey every single year since 2006, usually more than half raised rates from one year to the next, as shown in Figure 23. Between 2007 and 2011, a larger proportion of the water rate structures raised rates, possibly in reaction to reduced water demands from customers during and after a significant drought that affected the majority of the state in 2007-2008. As water

16
customers cut demand, utilities were forced to raise rates in order to balance their budgets since declining demands do not reduce utilities’ expenses at the same rate.

Figure 23: Rate Structures Changing Water Rates among the Same 179 Water Rate Structures Since 2006

The effects of declining demands during and after the drought are also evident in the magnitude of the rate increases adopted by these 179 water rate structures, as shown in Figure 24. The median rate increases implemented prior to 2012 was around 6-7%, and a quarter of the utilities that raised rates had rate increases greater than 15% in 2009 and 2010. By comparison, since 2012, fewer utilities raised rates (as shown in Figure 23), and rate increases for water were more consistent and typically ranged between 2.5% and 8%. The median rate increase was also consistent among these 179 rate structures since 2012, at around 4-5%/year.

Figure 24: Percent Increase to the Water Bill for 5,000 Gallons/Month in Rate Structures that Raised Rates among the Same 179 Water Rate Structures Since 2006

The cohort of rate structures is consistent across all years.

Only rate structures that raised rates are analyzed in each year.


**Pricing to Incentivize Water Conservation**

Many North Carolinian residents are currently paying water bills under increasing block rate structures (see Figure 8), which increases the volumetric rate as the customer consumes more. If designed well, increasing block rate structures can incentivize customers to be efficient in their water use in order to avoid reaching the higher tiered water rates. Furthermore, some utilities are charging customers higher irrigation water rates than the standard water rates, which specifically targets incentivizing outdoor water use (see Figure 18). There are other methods utilities could design their water rate structures to incentivize efficiency and conservation.

One of the water rate structure components that utilities can manipulate to send a strong pricing signal to encourage water conservation is the rate that customers pay at higher levels of consumption. The annual average residential consumption for most utilities is usually below 5,000 gallons/month. Seasonal use of water can raise consumption levels for some residential customers to two or three times this amount, or more, in peak usage months, which drives up the capital costs of constructing water systems to be able to deliver peak demands. Utilities can discourage excessive discretionary water use by setting high prices for the next 1,000 gallons of water at those high levels of consumption.

The median water volumetric rate at 14,000 gallons is $4.87/1,000 gallons, meaning that a customer would pay another $4.87 in their water bill if they increase their water use from an already-high 14,000 gallons to an even-higher 15,000 gallons. Half of the residential water rate structures charge between $3.45/1000 gallons and $6.45/1000 gallons for the next 1,000 gallons at 14,000 gallons/month (see Figure 25). These rates are only slightly higher than the volumetric rates residential customers are paying near the average level of consumption at 5,000 gallons/month (see Figure 10). One utility is charging $20.00/1,000 gallons for water at 14,000 gallons, strongly incentivizing residential customers to keep their consumption below 15,000 gallons.

**Figure 25: Volumetric Rate for Water at 14,000 gallons/month in 448 Water Rate Structures**

Keeping in mind that most residential customers do not ever use 14,000 gallons in a single month, many customers will never be charged the volumetric rates set at these high volumes. Those customers are likely not irrigating their lawns or using excessive amounts of water to begin with. However, utilities that are interested in
incentivizing all of their customers to conserve in order to prevent water shortages or delay expensive expansion projects could do so by charging high volumetric rates at lower levels of consumption, such as the volumetric rate set at near the average consumption levels (see Figure 10). Increasing the volumetric rate at 5,000 gallons/month rather than at 14,000 gallons/month is an effective method to encourage all customers to cut back, rather than just large users or peakers.

Another way to measure the strength of the conservation pricing signal of water rates is to determine how much of a financial reward (decrease in water bill) a customer will receive by lowering their water consumption from a high volume (10,000 gallons) to an average level (5,000 gallons). The reduction in the water bill acts as a price incentive to encourage conservation for large users, and is measured both in terms of absolute bill savings and as a percentage of bill reduction. Figure 26 shows that there are some utilities that reward customers substantially in terms of bill reduction percentage for cutting back (e.g. nearly halving the bill when customers halve their consumption), whereas other utilities provide relatively little incentive (e.g. only a 35% reduction in bill).

Interestingly, while some increasing block rate structures clearly send very high conservation pricing signals, there are many increasing block rate structures that send a weaker pricing signal (less than a 40% reduction in bill) than some uniform rate structures that achieve 45% or higher reductions in bill. Put another way, a utility with a uniform rate structure that charges a high price for water, say $7.00 per thousand gallons, sends a significantly higher pricing signal than a utility that charges $3.00 per thousand gallons even if the utility has an increasing block rate structure. It is possible to design a simple, uniform rate structure to incentivize water conservation as well as, or sometimes better than, many increasing block rate structures currently in use.

**Figure 26: Reduction in Monthly Water Bill from 10,000 gallons/month to 5,000 gallons/month**

![Reduction in Water Bill after Halving Consumption from 10,000 gallons to 5,000 Gallons](image)

- Uniform Rate
- Increasing Block
- Decreasing Block

Middle 80% of Utilities

Median
What Utilities Charge Outside their Political Boundaries (i.e. “Outside Rates”)

All of the charges presented above refer to what utilities charge customers that live within their political boundaries. Municipal utilities often serve customers who live outside of city limits, and a handful of other utilities specify geographical boundaries within their service areas and identify their customers as residing “inside” and “outside” those boundaries. In many cases, utilities charge different rates for customers living inside or outside the boundary. Overall, 62% of water rate structures and 63% of wastewater rate structures specified different rates for customers living outside, and the vast majority were for municipal utilities. In fact, 83% of the municipal rate structures charged more for outside customers than for inside customers. At 5,000 gallons/month, water rate structures that charge outside customers a different rate are, at the median, charging a water bill that is 1.86 times more than inside customers. For wastewater, the median ratio is 1.94. Most utilities with different outside rates charged less than double the inside charges, as shown in Figure 27. Figure 28 shows median charges for combined residential water and wastewater service for all utilities that have a separate rate schedule for outside customers for both water and wastewater service. For utilities that charge for both water and wastewater and have outside rates, the median combined bill charged to inside customers for 5,000 gallons/month is $77.68 compared to $137.21 for outside customers.

There are at least three reasons why utilities might charge more for outside customers. Inside customers, as citizens of the local government that provides the utility service, bear more of the investment risks of owning and operating a utility. They also bear more of the burden of financing and facilitating its operations through their local government unit6. In the case of municipalities, higher outside charges might be part of managing growth and annexation, or to make contributions alongside the property tax base that secures certain types of bonds and loans serving the entire water or wastewater system. For all utilities, outside customers are often more expensive to serve because of lower densities and the fact they reside farther, on average, from the water or wastewater treatment plant than inside customers, increasing costs for distribution and collection.

Affordability of Residential Rates

What the Average North Carolinian Pays for 5,000 Gallons

As mentioned above, the median price for 5,000 gallons/month across all the rate structures is $32.63 for water and $40.74 for wastewater, using “inside” residential rates. This indicates that half of the 448 water rate structures in this sample charge more than $32.63 for water for 5,000 gallons/month, and half of 376 wastewater rate structures charge more than $40.74 for wastewater. However, as shown in Table 5, larger utilities may be charging lower rates because they are able to spread their costs across a large customer base. The utilities in this study serve about 7.6 million North Carolinians. If we assume that everyone in this sample pays “inside” rates only, the average North Carolinian in this sample would be paying a weighted average of $28.50 for water, $39.19 for wastewater or $76.20 for combined water and wastewater for 5,000 gallons/month. These numbers represent a good estimate of average bills across the population of the state. The actual average bill for a North Carolinian for 5,000 gallons is likely to be higher, however, since a substantial portion of the citizens are paying “outside” rates that are greater than “inside” rates as shown in Figure 27. Furthermore, some citizens may be paying a portion of their water bill through irrigation rates, making it impossible to accurately estimate what the average North Carolinian actually pays for 5,000 gallons.

Annual Bills as a Percent of Household Income

Is the weighted average bill of $76.20 per month for combined water and wastewater for 5,000 gallons too high for most North Carolinians? Compared to monthly electric bills, grocery bills, and even discretionary bills such as cable TV bills or high-speed internet bills, water and wastewater bills usually make up a smaller portion of a household budget. Nevertheless, because citizens may not have an alternative to the water service they are currently receiving, and water service is necessary for public health, and because water and wastewater rates continue to rise faster than inflation, the issue of affordability of rates remains vital.

Affordability is very difficult to assess, and there is no one true, accurate measure for affordability. The most commonly used and most cited measure in the water industry is “percent MHI” – that is, calculating what a year’s worth of water and wastewater bills for an average level of consumption (e.g.: 5,000 gallons/month) is compared to the median household income (MHI) in the community served by the utility. This indicator is easy to calculate by simply using the calculated bill amount and the U.S. Census Bureau’s median household income data from their latest 5-year American Community Survey estimates, available at [http://factfinder.census.gov](http://factfinder.census.gov). Each year, the US Census Bureau publishes a new estimate of MHI for each Census Place in the country.

Compared to the 2015 median household incomes of the communities served by the 411 water and 351 wastewater utilities in this survey, annual bills for 5,000 gallons/month range from 0.3% MHI to over 5.3% MHI for each service, as shown in Figure 29. The majority of water rates fall between 0.5% and 1.25% MHI, with a median of 1.03% MHI across all utilities. Wastewater rates are higher, with the majority of wastewater rates

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7 The “weighted average bill” is the average bill being paid by customers, taking into account the different utility’s rates and service populations, assuming that all of the customers are paying their utility’s bill for 5,000 gallons/month.
falling between 0.75% and 1.5% MHI, and a median of 1.34% MHI across the utilities. For combined water and wastewater bills at 5,000 gallons/month, half of the utilities charge more than 2.74% MHI.

There is no single target for affordability, even in terms of percent MHI. Currently, 57% of utilities in North Carolina charge more than 2.5% MHI for combined water and wastewater at 5,000 gallons/month.

**Figure 29: Annual Bills for 5,000 gallons/month as a Percent of the Serviced Community's 2015 Median Household Income (n=411 water, n=351 wastewater)**

While half of a local government’s residents make less than the median household income of the community, often utility managers are more concerned with a smaller number of residents – those in the lowest income brackets. Customers who have annual household income below $25,000 will be paying much higher proportions of their income on basic water and wastewater service than what the percent of median household income numbers reveal. Thus, whereas a utility might have combined rates that amount to 2.5% median household income, that same utility might have more than 15% of its customers paying 5% or more of their annual income for water and wastewater service at 5,000 gallons/month. Furthermore, larger low-income families, or families that live in substandard housing stock with older appliances that are less water efficient, may end up using more water and thereby paying an even higher percentage of their income for essential water service. To comprehensively assess the affordability of a utility’s water and wastewater rates using a variety of metrics, utilities are encouraged to download and use the Water and Wastewater Residential Rates Affordability Assessment Tool at [www.efc.sog.unc.edu/reslib/item/water-wastewater-residential-rates-affordability-assessment-tool](http://www.efc.sog.unc.edu/reslib/item/water-wastewater-residential-rates-affordability-assessment-tool)
Do Prices Reflect the True Cost of Water Services in North Carolina?

Comparing rates across the state or among specific utilities is further complicated by the variation in the extent to which utilities charge the full cost of providing service. In FY2015-16, 20% of local government water and/or wastewater utilities in North Carolina did not generate enough operating revenues during the year to pay for their day-to-day operations and maintenance expenses and debt service, let alone enough funds to pay for future capital expenses. While these utilities are geographically dispersed, as shown in Figure 30, nearly all were utilities that serve fewer than 10,000 accounts, and 63% serve fewer than 1,000 accounts. This reflects the difficulties that small utilities face in generating sufficient revenue from their small customer base to pay for the high fixed costs of operating a utility.

Figure 30: Local Government-Owned Water and Wastewater Utilities' Cost Recovery in FY 2016 (n=386)

Rates that provide enough revenue to balance an annual budget do not necessarily provide enough revenue to cover long term capital and maintenance needs and many utilities charge much less than the full cost of service provision. Figure 31 shows rates from FY 2015-16 in terms of combined water and wastewater charges for customers using 5,000 gallons/month plotted against the ratio of total operating revenues over total operating expenses (including depreciation) from the same fiscal year. This measure, often referred to as an operating ratio, helps identify if an entity is operating at a financial loss, financial gain, or is breaking even. Financial data were provided by the Local Government Commission (LGC) in the Department of the State Treasurer. The figure shows that many utilities are not covering their total operating expenses, making it difficult or impossible to rehabilitate aging infrastructure, save for operating emergencies, finance system improvements and expansion, and engage in proactive asset management. It is interesting to note that the utilities that did not recover their operating expenses (operating at a financial loss) are not always charging low rates – even some utilities with high rates can be operating at a financial loss. Nevertheless, there are several utilities that charged low rates (to
the left of the graph), which resulted in operating at a financial loss (below the horizontal line on the graph) in that fiscal year.

**Figure 31: Combined Residential Bill in FY2015-16 for 5,000 gallons/month for Utilities with Reported LGC Data on Total Operating Revenues and Total Operating Expenses in FY2015-16 (n=247)**

Operating ratio as calculated here may be a flawed measure, however, due to the distorting effects of book value depreciation. Due to inflation, older systems’ assets that were purchased long ago have nominally cheaper prices than assets of plants that are newer. This makes older systems’ depreciation expense smaller in comparison to the depreciation of a newer system with the same types of assets. In turn, this means that the operating ratio seems higher (better) for older plants than for newer plants, due to the effect of inflation. Despite this, the measure maintains a level of intuitive power which makes it a useful tool for examining the ongoing capacity for the utility to bring in enough revenue to cover its operating costs. The performance of each utility on several financial indicators and benchmarks can be viewed in the North Carolina Water and Wastewater Rates Dashboard at [www.efc.sog.unc.edu/reslib/item/north-carolina-water-and-wastewater-rates-dashboard](http://www.efc.sog.unc.edu/reslib/item/north-carolina-water-and-wastewater-rates-dashboard).

For advice on rate setting or more information on making appropriate rate comparisons, please contact Shadi Eskaf (eskaf@sog.unc.edu) at the Environmental Finance Center at the UNC School of Government.

**About this Report**
This report is one of an annual series of reports on water and wastewater rates and rate structures in North Carolina, compiled by the Environmental Finance Center at the UNC School of Government and the North Carolina League of Municipalities. For reports from previous years, including more in-depth analysis on the relationships between rates, rate structures, financial performance, system characteristics and policies including cost-recovery, conservation, affordability, regionalization, economic development and growth management, please visit our websites at [www.nclm.org](http://www.nclm.org) and [www.efc.sog.unc.edu](http://www.efc.sog.unc.edu). You may also access the Rates Dashboards – free, interactive tools designed to allow you to compare rates across the state along with financial, affordability and socioeconomic indicators. Each year in the Fall, we request that local government and investor-owned utilities submit a copy of their water and wastewater rate schedules to be included in the annual survey of rates and rate structures.