

CONSERVATION-ORIENTED RATE STRUCTURES

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Georgia Environmental Protection Division
Watershed Protection Branch

Guidance Document

Conservation-Oriented Rate Structures

Developed by the Georgia Environmental Protection Division (EPD)
To support the “Coastal Georgia Water and Wastewater Permitting Plan for Managing
Saltwater Intrusion”

August 2007

This guidance document is intended for local and regional water providers in the 24-county area of Georgia’s coast addressed in the “Coastal Georgia Water and Wastewater Permitting Plan for Managing Saltwater Intrusion”, referred to hereafter as the 2006 Coastal Permitting Plan”. It applies to the following categories of public/private drinking water suppliers:

- Privately Owned or Operated Public Community Drinking Water Systems with ONLY an Operating Permit;
- Public Community Water Systems with Water Withdrawal and/or Operating Permits;
- Governmentally Owned or Operated Public Drinking Water Systems with an Operating Permit; or
- Governmentally Owned or Operated Transient Non-Community or Non-Transient Non-Community Public Water Systems with either an Operating Permit and/or a Withdrawal Permit.

It is designed to guide the development and implementation of a conservation-oriented rate structure for public/private community water systems withdrawing water from the Upper Floridan aquifer.

When to use this guidance document: All public/private community water systems permittees located in the 24 coastal counties must adopt and implement a conservation-oriented rate structure as a condition of new or modified withdrawal permits. This document provides guiding principles and a step-by-step process to follow when considering an effective conservation rate structure for your area. Many other rate models are available through material published by the American Water Works Association (www.awwa.org) and provided by most environmental consulting firms that specialize in water supply planning. A copy of the adopted conservation rate structure must be submitted to the appropriate EPD District office no later than 12 months from the permit issue date. Contact information for the EPD District offices can be found on line at <http://www.gaepd.org/Documents/wpbd.html>.

How to use this guidance document: This guidance document consists of two parts: Part 1 provides an introduction to conservation-oriented rates. Part 2 presents a general process for determining the best approach and steps for implementing conservation-oriented rates in your service area. The EPD Guidance Document entitled “Method for Determining Future Water Demand Needs for Public/Private Water Systems”, available on line at <http://www.gadnr.org/cws> is referenced in this guidance document, and you will need to complete it before doing some of the calculations needed to develop conservation-oriented rates.

EPD contact: If you have any questions, or require additional information, please contact the EPD Water Withdrawal Program, at 404-675-1680. As the 2006 Coastal Permitting Plan is implemented, EPD will welcome feedback from permittees regarding this guidance document.

Part I: Introduction to Conservation-Oriented Rates

A) Background

Prices can reveal the value of a product or service and can be an important tool in guiding customer decisions. Water costs are low in comparison to other goods and services because they do not fully reflect all costs associated with delivery, and because affordable water is considered a public good. Conservation-oriented rate structures are useful in communicating the value of limited water resources.

Conservation-oriented rates are intended to reduce water usage for discretionary purposes and encourage users to choose more efficient ways to meet their water needs. Equitable pricing is critical to the success of a conservation program and the basic operation of a utility. It is important to set rate structures in a way that does not undermine the ability of all users, regardless of income or location, to have access to affordable water and service. Before a rate structure is selected, a utility should spend a great deal of time researching its community's needs to avoid imposing inequitable rates.

Many water providers are concerned that implementing a conservation-oriented rate structure will cause too much rate instability and that the utility may lose revenue. Loss of revenue is a major concern for any utility manager and decision maker. Utility rates must be sufficient to generate current and future revenues and cover operation, maintenance, capacity, customer service, and administrative costs.

For this reason, many experts suggest handling revenue requirements separate from, but not unrelated to, the volume of water used above a certain base rate. This is a good way for a utility to send "price signals" about the true value of water and water services. Managers and rate analysts should design conservation-oriented rates that reflect the future cost of water and water services.

Conservation-oriented rates should also be designed to educate customers on the cost of services and reduce customer bills. Reducing customer bills is not equivalent to reducing the cost of each unit of water provided. For example, conservation rates, when designed thoughtfully, increase the rate charged per volume of water over a threshold amount and encourage customers to use less. Furthermore, by informing customers on how much it costs to deliver water service, water rates provide fundamental information that customers rely on to make choices about their water use, including whether or not to use water saving equipment or appliances, what type of landscape to install, or whether to irrigate or not (Chesnutt et al, 1997).

Conservation-oriented rates should not be implemented as the only element of a conservation program. Combining conservation-oriented rates with conservation incentives and educational programs is the best way to educate users as to how much they are using and offers ideas and tools to help them change personal, household, or business practices to reduce water usage.

B) Definitions

Water Conservation – The beneficial reduction in water use, water waste, and water loss.

Conservation-oriented rate structures – A rate structure adopted by a water utility or provider designed to reflect the cost of providing water, send a price signal about the marginal cost of additional water, and encourage efficient use of water by customers.

Base Charge – A fee used to recover non-volume related costs, usually associated with billing, meter reading, and a portion of administrative costs. The base charge may also include a capital portion or meter replacement fee. The amount is the same each billing period regardless of water used by the end user and may increase based on meter size.

Base Rate – The monetary fee for the first volume block of water used by a customer, used in a multi-tiered rate structure. The rates for subsequent blocks are typically referenced in percentage terms above the base rate.

Block (Tier) – A volume range where the unit charge is uniform. An example of a three block (tier) rate structure may be 0 – 10,000 at \$3.00 per 1000 gallons; 10,001 – 15,000 at \$4.50 per 1000 gallons; and volumes consumed above 15,000 would be at \$6.00 per 1000 gallons.

Cost – The expense of producing and delivering a unit of water.

Declining block rate – A pricing structure in which the amount charged per unit of water (i.e. dollars per 1,000 gallons) decreases as customer consumption increases.

End user – A consumer of water for residential, commercial, industrial or agricultural purposes.

Marginal Costs – The cost of water and services that reflects an estimate of the cost of developing the next increment of supply needed to satisfy an increase in water usage. Also known as incremental costs.

Price – The rate charged to a customer for the unit of water delivered. Prices are usually based on costs. Utilities strive to recover the capital and operating expenses by developing rates based on cost of services.

Unit Charge – This typically recovers the actual cost of operating and maintaining the water system and retiring outstanding debts not covered in the base charge and is based on the volume of water used. Typical units are 1000 gallons or 100 cubic feet (CCF).

Part II: Choosing and implementing conservation-oriented rates in your service area

Several different conservation-oriented rate structures can meet the needs of communities in coastal Georgia. This document does not present a “one size fits all” rate structure for every utility, but instead provides step-by-step advice on how to set the most appropriate rate structure for your service area.

A) Setting revenue requirements and assessing cost of water services

Step 1) Determine revenue requirements

Revenue requirements are the total costs that must be recovered through water rates and charges. This is usually determined by collecting data and information from a “representative year”, adding anticipated new debt payments and coverages and any changes in future operational costs. Typically, a representative year is the most recent 12-month period for which cost accounting data are available or data produced during the latest audit of the system. A representative year can also be a future year, allowing for more accurate estimates in growth of service, the needed cost of expansion and/or volume growth, inflationary costs, and pre-funded capital.

Step 2) Determine cost of services and assess marginal price of water

Cost of service is critical in rate making. Federal and state agencies require that rates adhere to a cost of service justification. In other words, rates should be designed so that users pay for the costs they impose on the water system.

Consider the financial impact of supplying water to growing areas. Expanding supplies or adding new supplies to meet growing demands can cause a utility to incur high *marginal* costs for that new water. These high marginal costs are often diluted by low base charges, which are traditionally set using average costs of water services. Therefore, when base charges are based on *average* costs, and not *marginal* costs, customers do not see or pay for the true cost of this additional water. As a consequence, customers are likely to use more water than they would with accurate pricing, and suppliers will have to add capacity to meet the increased demand.

The marginal cost of water should be the primary factor in setting volumetric rates for each water user. Calculating marginal costs is a difficult exercise. It is recommended that marginal costs be assessed at least every five years. Appendix C of Chesnutt et al (1997) provides technical details on how marginal cost methods can be implemented. Also, the American Water Works Association (AWWA) offers 2-day workshops to assist utilities (www.awwa.org)

An alternative, and simpler, method to determine marginal costs could achieve a similar result as the method described above. Specifically, a utility can examine average cost, separate billing volumes into multiple blocks or tiers, set the base rate below average cost and the higher billing volume blocks above average cost so that the appropriate revenues are generated assuming reduced usage in the higher blocks. Two examples are provided:

Example #1: General example used in some cities and counties nationwide

Block 1 = Block rate is set at 90% base rate

Block 2 = Block rate is set at 150% of base rate

Block 3 = Block rate is set at 300% base rate, etc...

Example #2 – From the North Georgia Metropolitan Water Planning District (2003)

Tier 1 = Base rate covers up to 125% of average winter use

Tier 2 = Rate should be at least 25% higher than the first tier rate. Volume is

determined by upper end of the first tier and the lower end of the third block.
Tier 3 = Rate should be at least 200% of the billing rate for the first tier (targeted at the highest 5-10% of customers who typically use 10-20% of the total volume of water used). This block volume is best determined by a rate study.

The primary goal is to set the blocks or tiers in a way that assures your costs will be covered. Excess revenue, based on higher rates for blocks 2 and 3, can offset the minimal rate charged for Block 1 (often referred to as a “lifeline rate”).

Any revenue generated beyond that required to recover operation and maintenance (or beyond base charges) can be reinvested in a conservation program to help reduce the number of customers whose use falls into Blocks/Tiers 2 and 3.

Certain industrial/commercial/institutional water users may need to have their individual systems analyzed to determine appropriate base rates and tier levels.

Step 3) Analyze future demand through billing information

A future water demand analysis should begin with the worksheet calculations shown in the EPD Guidance Document “Method for Determining Future Water Demand Needs for Public/Private Water Systems”, found on line at <http://www.gadnr.org/cws>; specifically, those calculations and tabulations on population served, future and historic use, and per capita use.

Using information from your demand forecasting work sheets, divide end uses of water into several categories. Examples include, but are not limited to:

- ◆ Single family residential
- ◆ Multifamily residential
- ◆ Commercial
- ◆ Industrial
- ◆ Institutional/governmental
- ◆ Sales to other areas
- ◆ Irrigation meters

If this information is not readily available to you, an alternative is to divide end uses of water based on meter size and/or pipe size. Traditionally, meter sizes include $\frac{3}{4}$ ”, $\frac{5}{8}$ ”, 1”, 2”, 4”, and 6” meter size.

Once these end use categories have been established, calculate future demand based on the current level of water use for each category. Then re-calculate future water use with conservation practices implemented (including user response due to conservation-oriented rates – see below).

Additional assistance on breaking out billing data and organizing it in a helpful fashion is available from EPD in the “Water Use Profiles and Conservation Analysis“ Technical memorandum #2.

B) Evaluating alternative conservation-oriented rate structures

Step 1) Analyze Financial and Revenue Requirements

The most important element of this step is to determine future water sales so that the rate necessary to achieve the revenue requirement can be determined. Remember that future water sales and water services depend on water availability, future water demand, weather, and the response of demand to rates. You can base your future demand forecasts on the Guidance Document “Method for Determining Future Water Demand Needs for Public/Private Water Systems”, but for accuracy you must be sure to consider the effect of weather, demand response, etc. as you work through the exercise.

Simple financial analysis (such as estimating that water sales will be like last year or growth will be similar to trends of the past few years) will not account for the seasonal impact of weather on water use or the effect rates can have on demand. There are several steps you can take to correct for these shortcomings.

- ◆ Adjust for Weather. Demand models should be adjusted for variations in weather. This allows providers to plan accordingly for the different effect hot and dry weather will have on water demand and sales.
- ◆ Incorporate demand’s response to price. This is an important step in accurately analyzing customer response to rates. Generally, the scheduled change in price is multiplied by the price elasticity to produce a predicted change in use. However, it is not an easy process due to the inaccurate values and use information used in these assessments.
- ◆ Consider the relationship between conservation-oriented rates, the price of water, and water use. The AWWA Water Conservation Programs Planning Manual (2006) provides several points to consider. Specifically:
 - “Customers are unlikely to engage in water-saving habits, such as shorter showers, fewer number of toilet flushes, and larger laundry loads on the basis of cost alone. However, higher cost may encourage leak repair or the use of efficient fixtures.”
 - “In a two-tier rate structure, there is little latitude for setting a high second-tier rate without reducing the first-tier rate or changing the balance between fixed and volumetric derived revenue. Consequently, in using a two-tier rate structure, it is difficult to address outdoor water use even with differentials for dry/wet-season use patterns.”
 - “By using a rate structure of three or more tiers, the high end users can be targeted with high water rates for assumed wasteful water use. This can affect the top 5 – 10 percent of customers with the highest water usage rates. However, the majority of customers receive bills for unchanged or lower amounts.”

Step 2) Assess Different Conservation-oriented Rate Structures

The following examples of conservation-oriented rates include discussions of “base rates”. This refers to the base price charged for a standard volume of water a household uses, and the investment needed to treat and deliver that water (derived from aggregate estimates or individualized usage). The base rate is usually set during winter months when water usage is almost exclusively indoor use. These four examples of conservation-oriented rates should be assessed to determine the most appropriate rate structure for your service area. **It should be noted that declining block rate and uniform rates are not considered conservation-oriented rate structures, and will therefore not meet the requirements of the 2006 Coastal Permitting Plan.**

- Uniform rate plus seasonal surcharge for high usage. This option focuses on conservation in peaking and average use system-wide. All residential customers pay a base charge, plus a uniform rate for each 1000 gallons of water used. Over a certain level of use, the surcharge is applied and the user pays a higher rate per 1000 gallons over the set level of use. Typically this surcharge takes effect in warm-weather months (May, June, July and August). It is the easiest method to implement, and can encourage businesses and industry to reduce their use during seasonal peaks and thus extend the capacity of existing assets. A potential drawback is that there is little latitude in setting the surcharge rate without reducing the uniform rate.
- Inclining Block Rate Structure. This option targets conservation at peaking and average use within customer classes. All customers in the same class (residential, commercial, industrial etc.) pay a base rate per unit of water used, under a certain threshold of water use. For any use above the set threshold, a higher rate per unit of water used is charged. Additional volume blocks can be defined where higher rates are charged. The inclining block rate structure and rates for residential customers may be different from that of commercial and industrial customers. This option can target high volume users better than using individualized rates; it is effective throughout year; and it works best when customer classes are fairly homogenous. Three or more pricing tiers are recommended.
- Individualized rates. This is a version of inclining block rates in which the blocks or tiers are determined for each customer by the customer’s usage history. It targets individual customers peaking and average use. The first block/tier is generally set based on the customer’s usage during the winter months and is typically re-evaluated annually. Individualized rates can encourage conservation even at the lower volume range. Potential drawbacks are that software modifications may be more extensive than for other methods, and individuals can artificially raise their winter average to gain a higher block/tier structure. Also, this option may not successfully capture high-end water users.
- ♦ Lifeline Rates. This option applies to a provider using the inclining rate structure, but adds a volume block lower than the base volume block (for example, 0 – 3 CCF or 0 – 2000 gallons). It thus provides relief for low-income customers. Low-income households are charged lower rates on that portion of water consumption that provides basic needs for cooking and cleaning but then higher charges are levied on water consumption beyond that amount. The difference in revenues must be made up in the remaining blocks. Lifeline rates could apply to all customers regardless of income levels unless a process is developed to identify and maintain a database on low-income users.

- ♦ Hybrid Rates. A conservation rate structure may use a combination of the above listed rate structures. An example would include having an inclining block rate structure with a summer surcharge. Additionally, an analysis of the customer class consumption may show a need for different conservation rate structures for different customer classes.

Care should be taken to address the top consumption customers of a water system, which are commonly commercial or industrial users. Modifications in a rate structure that puts undue burden on these customers may result in them relocating, causing a significant loss of revenue.

C) Selecting and Implementing the conservation rate best for your area

The rate analysis and comparison of alternative rate structures will generate a large volume of information. However, choosing how to use this information can be the most difficult part of an analysis.

Step 1) Identify and organize selection to include non-economic goals

You should be able to go to the public and elected officials with not only a qualitative analysis of the rate options, but also some qualitative recommendations. Such qualitative recommendations include non-economic criteria, such as, but not limited to:

- 1) Sending a consistent message that Georgia's water resources are limited and should be priced accordingly;
- 2) Political and public acceptance;
- 3) Conservation goals compatible with community goals, such as economic development, growth management, or resource conservation; and
- 4) Maintenance of community equity goals and conservation/efficiency goals.

The conservation-oriented rate structure you select should help you maintain your system and meet the non-economic goals of your community.

Step 2) Educate and engage your customers and elected officials

It is important to begin building understanding and support for the rate structure early in the research phase. The best time to begin educating your customers is when you begin researching your billing data – in other words the earlier the better. The most successful conservation-oriented rate programs do not just tell customers that rates are changing, but explain why and how it will impact them.

You could begin by distributing printed material in the water bills, mailing brochures to customers, and/or providing information on the Internet. Then, consider following up by offering a public meeting to further inform your customers of why the rates are important and the mandate behind adopting them.

DNR/EPD offers some helpful water conservation tips, educational material, and information brochures on the website: www.ConserveWaterGeorgia.net. Also, the AWWA Water Conservation Programs – A Planning Manual (M52) (2006) provides some information on effective ways to involve the public in supporting a conservation program.

Step 3) Redesign the current billing system to reflect the new rate structure

A smooth transition into a new or adjusted rate structure will require close work with your utility's billing office or financial manager. Training is often needed to adopt new billing structures or new evaluation methodologies. It is important to separate water costs from other services, such as wastewater or other utility services. New billing software may be required to accomplish the goals of a conservation-oriented rate structure.

If possible, bill your customers every month based on actual readings, not estimates determined by past usage. If this is not possible, take steps to avoid excessive estimations as this can send inaccurate conservation messages to your customers.

Providing customers with informative bills can help a water provider achieve water conservation goals and maintain a high level of customer satisfaction. In fact, providing customers with marginal price information on water bills can attain the same level of conservation with a 30 to 40% lower rate increase (Gaudin, 2006).

Step 4) Describe the conservation-oriented rates and customer usage on the bill

The price of water services and water must be clearly articulated to customers and must be consistent. Develop a water bill that informs customers:

- 1) How much water they used,
- 2) Cost per gallon of water or per cubic feet of water (for each rate block),
- 3) What their total bill is,
- 4) How they can get more information about conservation rates and reduce their usage,
- 5) Offer a comparison of their current charges to last year's usage or their charges compared to others in the service area or neighborhood.

Other ideas that may be helpful for a smooth transition to developing conservation-oriented rates are:

- 1) Showing how much money each customer could save by lowering water use to a lower tier.
- 2) Providing activities in the area related to water conservation. Examples include
 - a. WaterSmart conservation education programs for adults, children, and institutions (go to www.ConserveWaterGeorgia.net for more information.)
 - b. Workshops offered by County Extension Service, Universities or civic clubs
 - c. Local school events or festivals
 - d. Water conservation or watershed group events

A sample Georgia water bill and links to example bills in other states are available at: www.ConserveWaterGeorgia.net

Resources and References Cited

The following references were either referenced in this document, or provide additional useful information on conservation –oriented rate structures.

AWWA (2006). *Water Conservation Programs – A Planning Manual*. First Edition. AWWA Manual M52. Available www.awwa.org

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