

Description of Conservation-oriented Rate Structures from
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Health, December 1995, p. 4-5, 19-25.

Description of conservation-oriented rate structures

Customers respond to price and make a decision to consume or not consume water based on the price signal they receive as a result of the rate structure that is in place. Generally, higher water rates lead to lower water consumption. By structuring conservation-oriented rates which are higher at certain usage levels or during certain time periods, customers will be encouraged to consume less water overall, or during peak periods. Of course, only customers who are metered receive a price signal based on water use. It is important to note that conservation-oriented rates are meant to restructure rate components rather than increasing rates overall.

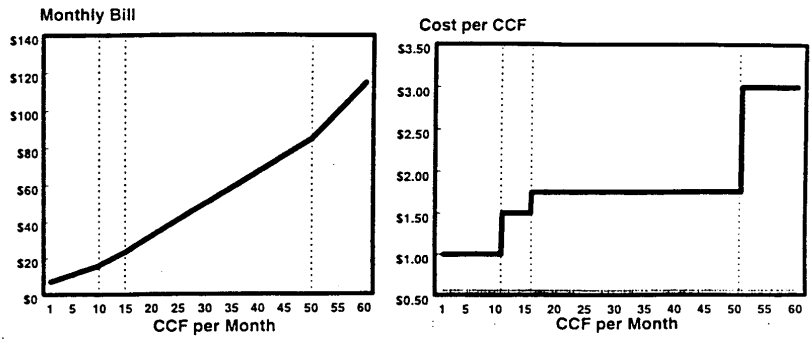
The two most common rate structures generally considered to be conservation-oriented are:

- Inverted Block Rates
- Seasonal Rates

Other less frequently used conservation-oriented rate structures are discussed in Section 2 and include:

- Time of Use Rates
- Individualized Goal Billing Rates
- Excess Use Rates

An **inverted block rate** structure separates consumption levels into two or more blocks, with rates per unit increasing as the level of consumption increases. With this type of rate, customers who have high levels of consumption will face higher rates and therefore will pay higher costs. This rate structure is illustrated in Figure 1.



Note: CCF = hundred cubic feet of water or 748 gallons

Figure 1. Inverted block rate structure

A seasonal rate structure prices water at different levels depending on the season. Generally, seasonal rate structures are designed to reduce summer water use to reflect constraints on water supplies and higher costs during that period. This rate structure is illustrated below in Figure 2.

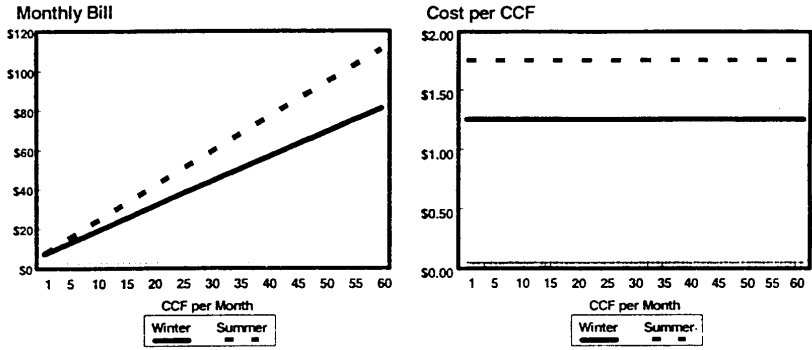


Figure 2. Seasonal Rate Structure

Section 2

Description of conservation-oriented rate structures

General description of conservation-oriented rates

Customers respond to the price of water and make a decision to consume or not consume water based on the price signal they receive as a result of the rate structure that is in place. Generally, higher water rates lead to lower water consumption. Price elasticity defines and measures the response in the use of a product relative to its price. A product is elastic if there is a large change in consumption due to a change in the price of the product. Because some types of water use are necessary in daily life, basic water use is inelastic and does not change significantly with price. Other types of water use are elastic, such as lawn watering, and may be cut back in response to higher rates.

By structuring water rates to be more expensive at certain usage levels or during certain time periods, customers will be encouraged to consume less water overall, or during peak water use periods. Of course, only metered customers can receive a price signal based on water use since consumption cannot be measured without meters. It is important to note that conservation-oriented rates are meant to restructure rate components rather than increase overall rates.

There are many ways to structure water rates. However, they generally contain the following two basic elements:

- Up-Front Fixed Charges
- Commodity Charges

For example, a rate structure may have a fixed charge of \$5.00 per month and a commodity charge of \$1.00 per unit of water used.

The most common up-front charge is a meter or service charge. The monthly charge is based on the meter size and generally reflects costs associated with metering, billing and other costs not based on consumption levels. In some cases, an amount of water may be included within the service charge, however, inclusion of water within the service charge does not send the price signal that water use incurs costs to the system. Having an adequate meter or service charge reflects fixed costs and helps to ensure a stable revenue base but does not encourage water conservation.

The second part of a typical water rate is the commodity charge, which is a per unit charge for the quantity of water consumed. With a commodity charge, customers receive a signal that their bills will increase as their water use increases. There are three general approaches to collecting commodity charges. They are as follows:

- Declining Block Rate Structure
- Uniform or Flat Charge Rate Structure
- Inverted Block Rate Structure

Declining block rates have a commodity charge that decreases as the quantity of water consumed increases. Uniform rates have a constant commodity charge, regardless of consumption level. Inverted block rates have a commodity charge that increases as water consumption increases.

A simple illustration of the difference in pricing philosophy between these different commodity charge rate forms is presented in Table 3.

Block size	Declining block	Uniform block	Inverted block
0–10 CCF	\$1.00/CCF	\$0.75/CCF	\$0.50/CCF
11–20 CCF	\$0.75/CCF	\$0.75/CCF	\$0.75/CCF
Over 20 CCF	\$0.50/CCF	\$0.75/CCF	\$1.00/CCF

Note: CCF = hundred cubic feet of water or 748 gallons.

A comparison of these three rate structures is illustrated in Figure 3.

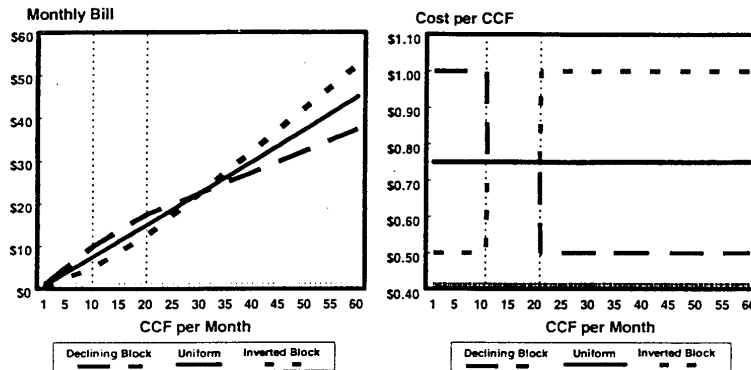


Figure 3. Commodity charge alternatives

Conservation-oriented rates generally place more emphasis on the commodity portion of the rate structure. The two most common conservation-oriented rate structures are:

- Inverted Block Rates
- Seasonal Rates

Other less frequently used conservation-oriented rate structures include:

- Time of Use Rates
- Individualized Goal Billing Rates
- Excess Use Rates

An **inverted block rate** structure separates consumption levels into two or more blocks, with rates per unit increasing as the level of consumption increases. With

this type of rate, customers who have high levels of consumption face higher rates and water bills. Rates for water in the upper rate block are often tied to the cost of new water resources so that customers can understand the impact of increased water consumption. Table 4 provides an example of an inverted block rate structure.

Table 4
Inverted block rate structure

Monthly Service Charge	\$6.00 per month
Commodity Charge	
Monthly use of	
1–10 CCF	\$1.00 per CCF
10–15 CCF	\$1.50 per CCF
15–50 CCF	\$1.75 per CCF
Over 50 CCF	\$3.00 per CCF

This rate structure is illustrated below in Figure 4.

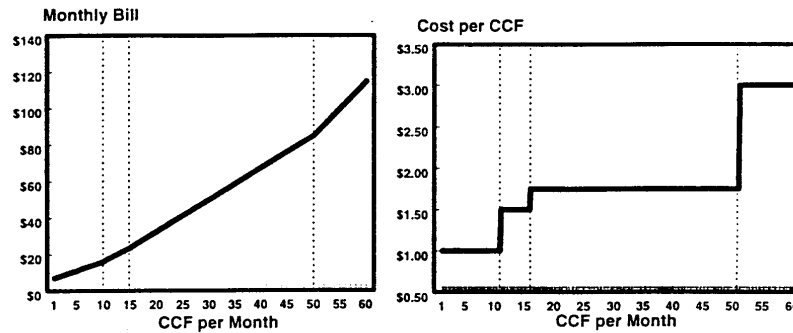


Figure 4. Inverted block rate structure

A **seasonal rate structure** prices water at different levels by season. For purposes of designing a seasonal rate, the particular seasons used and the difference in price between the seasons should be based on the public water system's own circumstances and unique characteristics and costs. A seasonal rate attempts to closely match the costs, which may vary by time period, to the price charged in that time period. Generally, seasonal rate structures are designed to reduce summer water use to reflect constraints on water supplies and higher costs during the period. Table 5 provides an example of a seasonal rate structure.

Table 5
Seasonal rate structure

Monthly Service Charge	\$6.00 per month
Commodity Charge	
September–May	\$1.25 per CCF
June–August	\$1.75 per CCF

This rate structure is illustrated below in Figure 5.

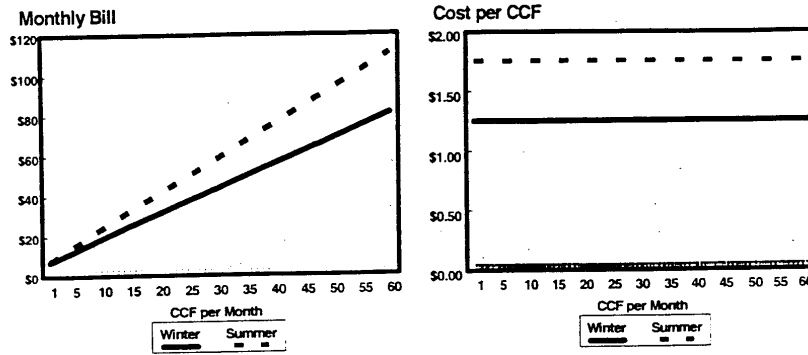


Figure 5. Seasonal rate structure

Any change in rate structure where the price is set more closely to cost is a movement towards a conservation-oriented rate structure. For example, movement from a declining block rate to a uniform rate should send a better price signal for water use. However, a uniform rate does not send as strong a message regarding efficient use of water as an inverted block rate, and is generally not considered a conservation-oriented rate.

Time of use rates go a step beyond seasonal rates and provide separate charges based on various time periods beyond seasons. Rates may be higher during peak times during the day or on certain days of the week. Seasonal differences are often incorporated along with hourly rate differences. An example of a time of use rate is shown in Table 6.

Table 6
Time of use rate structure

Monthly Service Charge	\$6.00 per month
Commodity Charge	
On Peak Hours	\$2.00 per CCF
Off Peak Hours	\$1.00 per CCF

On Peak Hours: 11:00 a.m. to 7:00 p.m. Monday through Friday.

Off Peak Hours: 7:00 p.m. to 11:00 a.m. Monday through Friday and all day on weekends.

This rate structure is illustrated below in Figure 6.

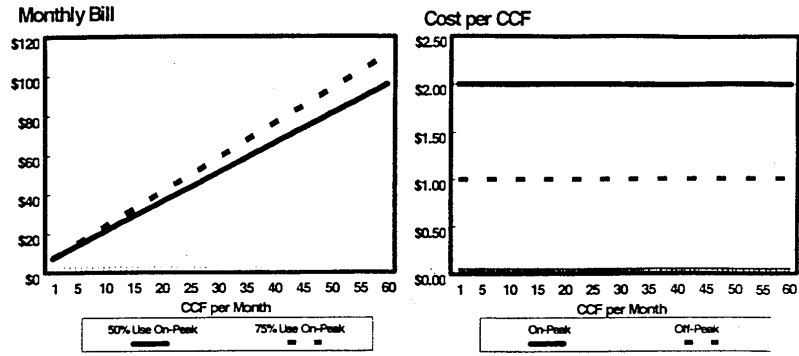


Figure 6. Time of use rate structure

The **individualized goal billing** structure is similar to an inverted block rate structure, except that the block sizes are set for each customer based on a usage "goal." The usage goal is based on the public water system's own philosophy or goals. For example, the initial block size may be average winter water use for the customer. Any usage above the customer's average winter water figure would be priced at a higher unit cost. Alternative goals might include consumption for a given month during a previous year with low consumption, or a consumption level tied to number of persons per household. Customers that meet their goal receive a discount or rebate on their bill. Table 7 provides an example of an individualized goal billing rate structure.

Table 7
Individualized goal billing

Monthly Service Charge	\$6.00 per month
Commodity Charge	\$1.80 per CCF
Discount for Meeting Monthly Goal of 4 CCF per Person in Household	20%

The goal billing rate structure is illustrated below in Figure 7.

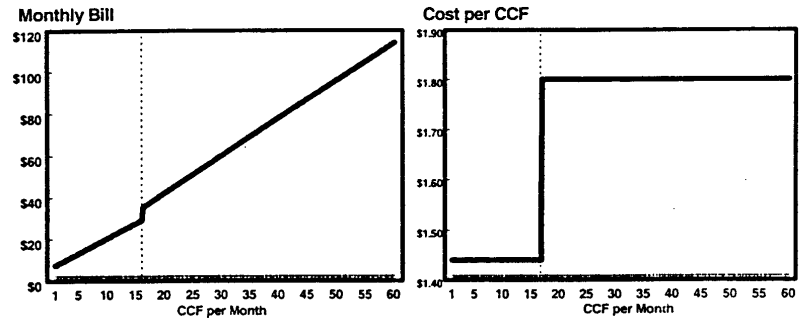


Figure 7. Individualized goal billing structure

Excess use rates are similar to goal billing rates; but the customer receives a penalty for exceeding a certain consumption level rather than a discount for meeting their goal. An example of an excess use rate is shown in Table 8.

Table 8
Excess use rate structure

Monthly Service Charge	\$6.00 per month
Commodity Charge	\$1.50 per CCF
Surcharge if Monthly Use Exceeds 4 CCF per Person in Household	15%

This rate structure is illustrated below in Figure 8.

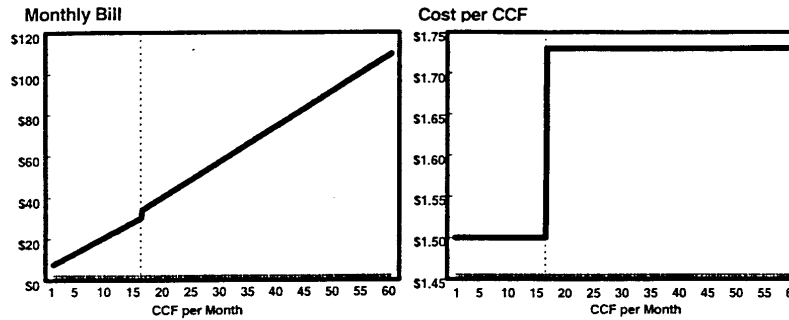


Figure 8. Excess use rate structure

Impacts of conservation-oriented rates

Different rate structures have different impacts on consumption. To illustrate this, one only needs to consider the number and sizing of blocks used in a rate structure, along with the level of price inversion. Two different commodity charge examples shown in Table 9 may help illustrate this idea.

Table 9
Inverted block rate example

<i>Example 1</i>	
0–20 CCF	\$0.85/CCF
Over 20 CCF	\$1.00/CCF
<i>Example 2</i>	
0–3 CCF	\$0.40/CCF
4–10 CCF	\$0.60/CCF
Over 10 CCF	\$2.25/CCF

Note: CCF = hundred cubic feet of water or 748 gallons.

These two examples are illustrated below in Figure 9.

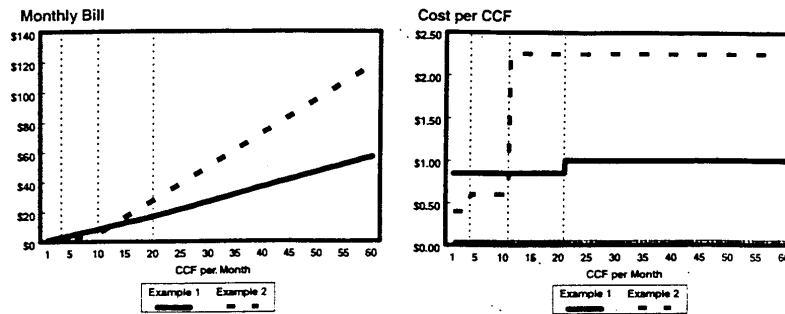


Figure 9. Inverted block rate examples

Customers should react much differently to these two examples. As can be seen in Example 1, the block size is set at a fairly high point where only a few customers are subjected to the second block price. In contrast, the second example is much more steeply inverted on price, and the block sizes have been changed so that more customers fall into the third block. Under Example 2 bills will be increased for a larger number of customers and the response in terms of water conservation should be higher than with Example 1.

The level of water savings that can be achieved by implementing conservation-oriented rates is dependent on a number of variables. Among these are the following:

- Existing rate structure
- Type of rate structure proposed
- Level of rates proposed
- Existing level of water consumption
- Number of customers facing bill increases
- Public education efforts undertaken by the public water system
- Other conservation programs available to customers
- Amount of conservation already in place
- Demographics of public water system customers
- Mix of customer types

For additional details and information related to conservation-oriented rates, system and customer impacts associated with rate changes, rate setting practices, criteria for selecting rate structures and case studies on conservation-oriented rates, please refer to the *Overview of Conservation-Oriented Rate Structures for Public Water Systems* available from DOH.