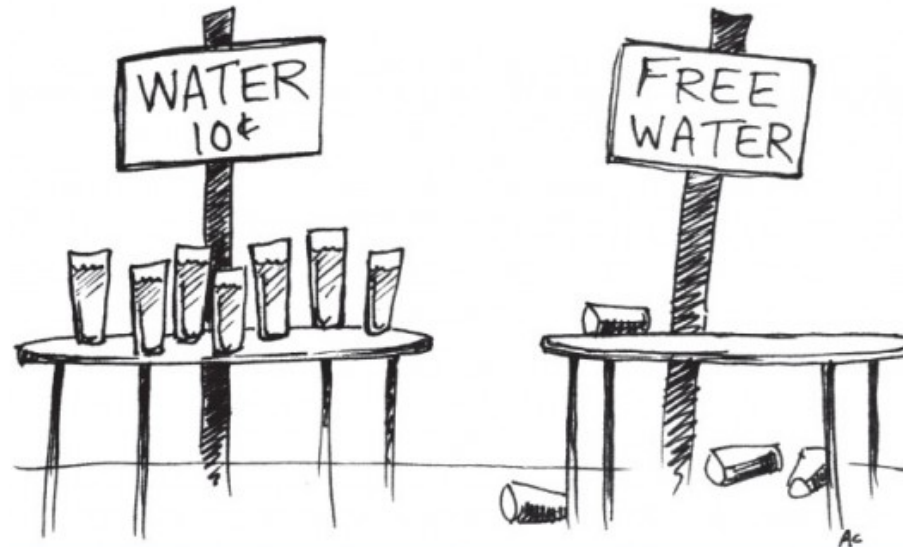




# Water System Economics



**What are the costs of supplying water?**



# What are the costs of supplying water?

A brass faucet is shown at the top right, with a glass tube containing various coins (quarters, dimes, pennies) attached to its side. Several coins are falling from the faucet into a pile of coins on the surface below.

- Administrative
  - salaries, office space/equip/supplies, billing operations, legal fees, permit fees, staff training/certification....
- Capital Costs
  - Land, storage tanks, pipes, pumps, vehicles, other infrastructure & equipment...
- Operations & Maintenance
  - Chemicals, filters, electricity, gasoline, waste disposal, water quality testing, meter reading...
- Other
  - Interest on loans, insurance, consulting fees...

# Let's Characterize Those Costs

**Predictability:** how well do we know how much they will be and when they will occur?

**Timing of when incurred:** do they occur at regular intervals or are they intermittent?

**Fixed or variable:** does the amount vary with the volume of water produced?

# Characterizing Costs

<b>Cost</b>	<b>Predictability</b>	<b>Timing</b>	<b>Fixed/ Variable</b>
Administrative	Mostly predictable	Mostly regular, some intermittent	Fixed
Capital	Mostly predictable, some emergencies	Intermittent	Fixed
Operations & Maintenance	Mostly predictable, some emergencies	Mostly regular, some intermittent	Variable
Other	Mostly predictable, some emergencies	Mostly regular, some intermittent	Fixed

# Main Messages

- Costs are both fixed and volume dependent.
- At times, large sums of cash must be available to cover expenses.
- Need to have a “rainy day” or “emergency” fund for unexpected costs

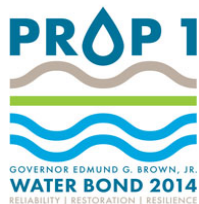
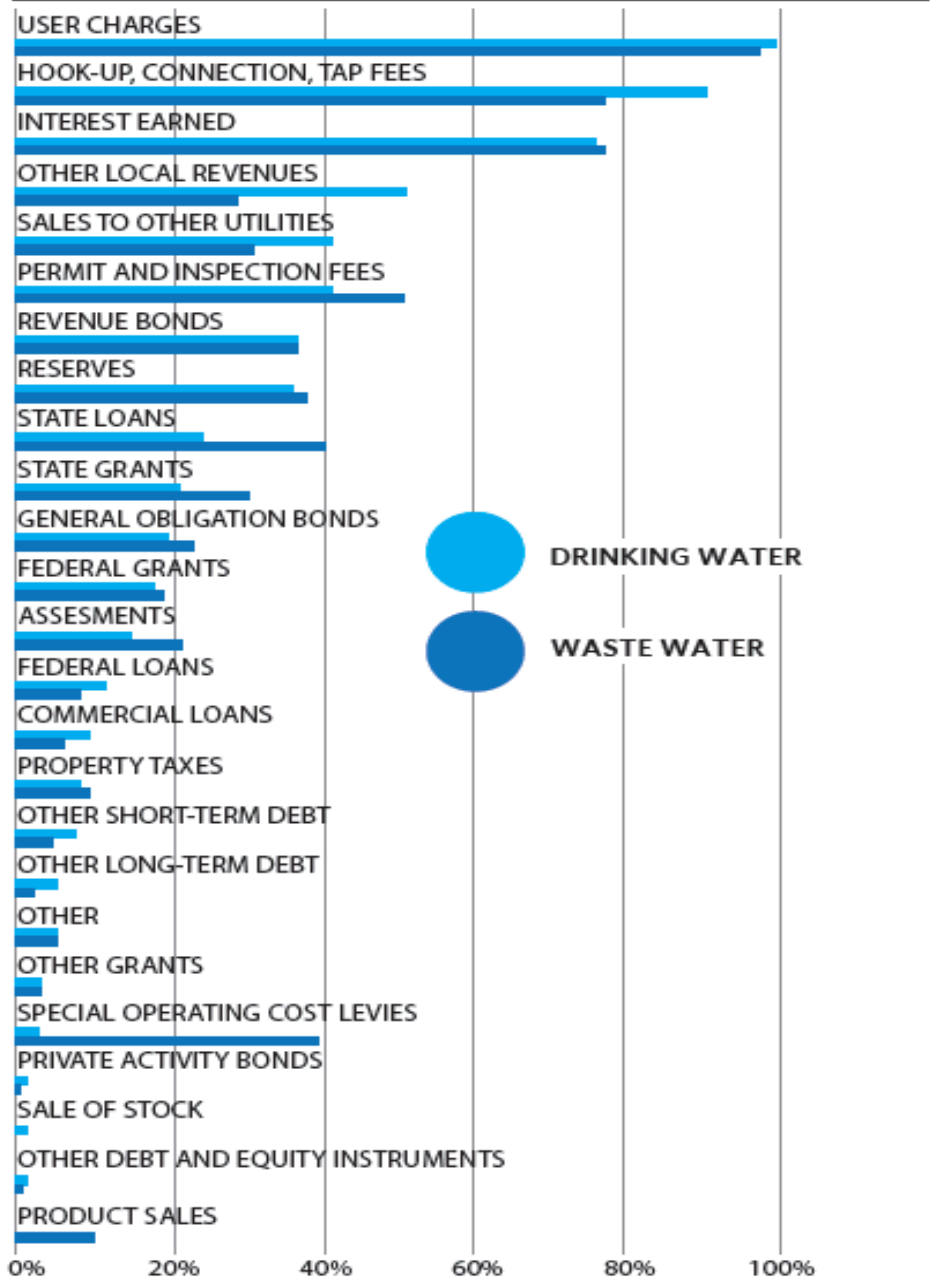
# How to water providers get \$?



# Sources of Revenues

- Subsidies & Transfer Payments
- Grants
- Bonds & Loans
- User Fees

Figure 1. Estimated percentage of utilities using source of funding



Source: U.S. General Accounting Office Water Infrastructure: Information on Financing, Capital Planning and Privatization, August 2002.



# Let's Characterize Those Revenues

**Predictability:** how well do we know how much they will be and when they will occur?

**Timing of when incurred:** When are they available? Do they occur at regular intervals or are they intermittent?

**Fixed or variable:** does the amount vary with the volume of water produced?

# Characterizing Revenues

Revenue	Predictability	Timing	Fixed/Variable
Subsidies/Transfer	Mostly predictable	Immediate, intermittent	Fixed
Grants	Unpredictable	Future, intermittent	Fixed
Bonds & Loans	Mostly predictable, some emergencies	Immediate, intermittent	Fixed
User fees	Somewhat predictable	As used, regular	Variable

# Main Messages

- Water providers have limited sources of revenues.
- Many of those sources are not guaranteed.
- Many of those sources require substantial capacity to obtain.
- Need to match the timing of revenues with the timing of costs.

What affects the decision to use one over another?



# Considerations

- Transaction costs
- Competition with other agencies
- Interest rates
- Politics (esp related to taxes)
- Locus of control
- Ability to repay

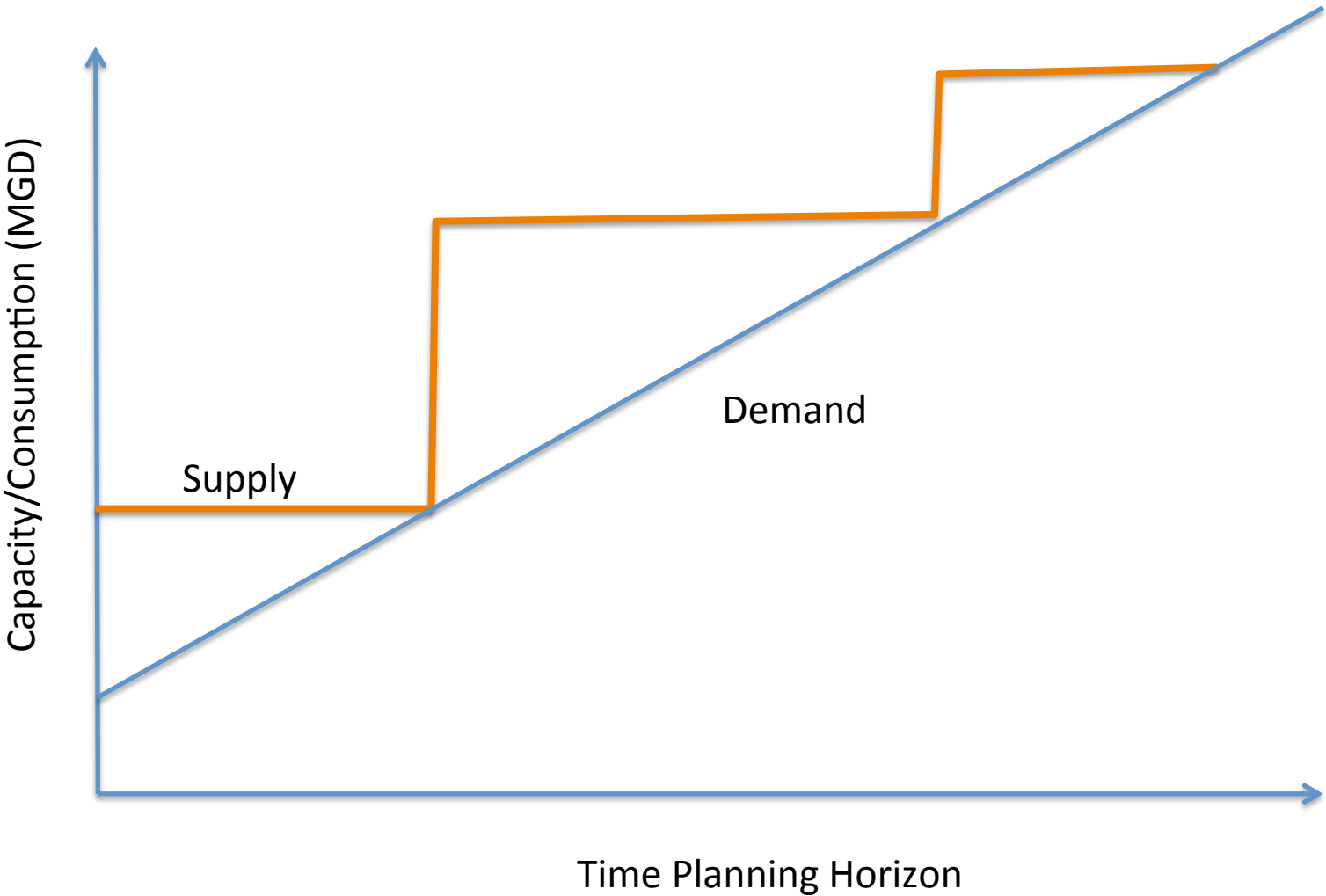
# User Fees

- Main source of revenue
- Under control of utility (mostly)
- Predictable (mostly)

BUT.....



# Water Infrastructure is Lumpy!



# Water Rates are Regulated!!!

**Monopoly:** the exclusive possession or control of the supply or trade in a commodity or service.





# Water is considered a public good

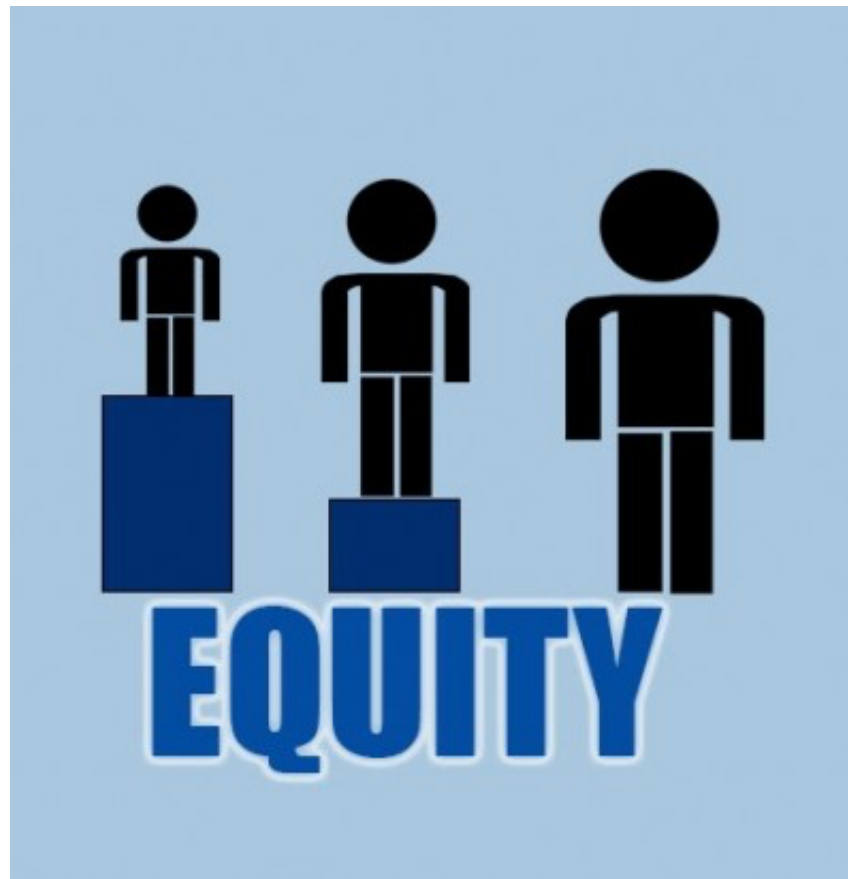


# Water is considered a public good

Life-line Rates,  
Low-Income Assistance Programs



# Need to address equity

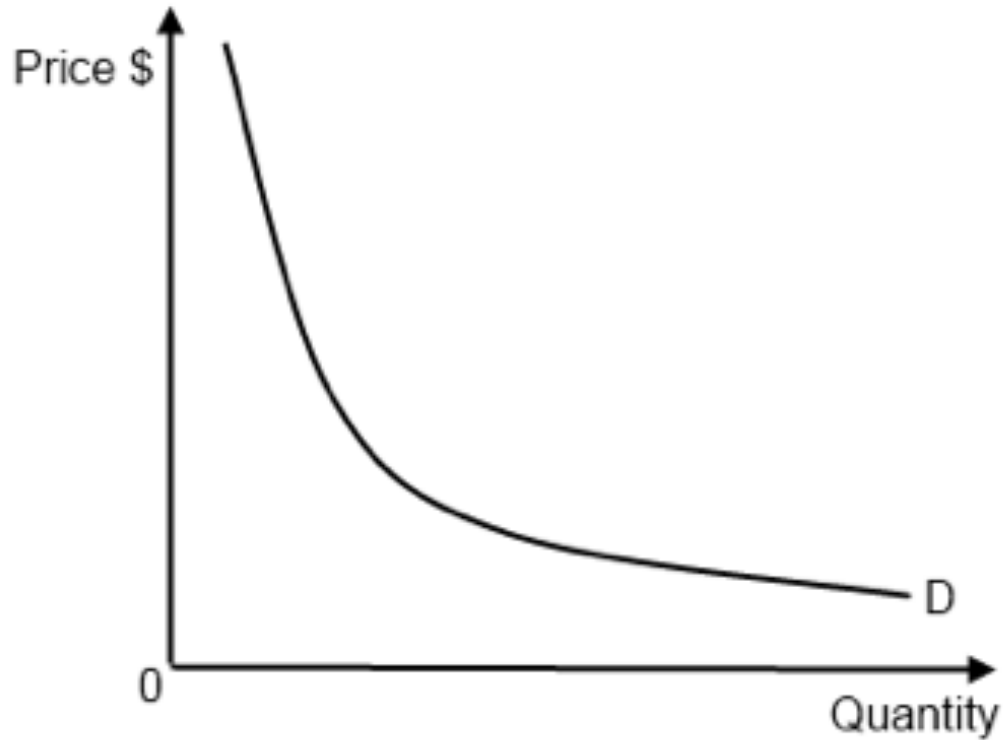


# Need to address equity

## CUSTOMER CLASSES

- Demand load
- Location
- Type of main
- New development
- Use type

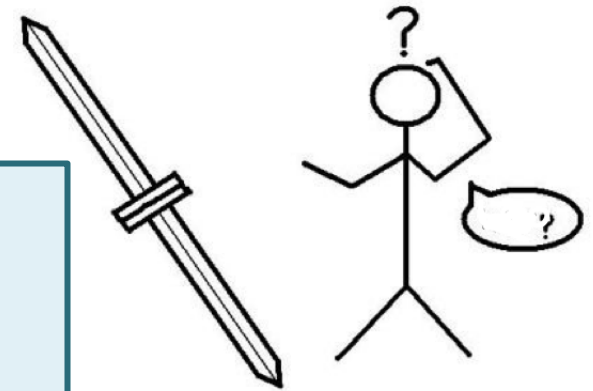
# Water is an economic good



# Water is an economic good

## Conservation is a Double-Edged Sword

- Reduced demand potentially enables water to be supplied at a lower cost
- When demand decreases, revenues decrease, resulting in a loss to water suppliers, who still have to cover fixed costs
- Decreasing use places downward political pressure on water bills



# Information Needed to Set User Fees

- Expenditures & Expected Costs
- Customer Info
  - Number of service connections
  - Metered consumption
  - Peak demand
  - Socio-demographic information

# Rate Structures

- Fixed:
  - Recovers the fixed cost components that remain the same regardless of the amount of water produced—examples are staff salaries and debt service. The amount of the fixed charge does not vary with the amount of water consumed.
  
- Variable (Volumetric)
  - Recovers the usage based cost components and varies with the amount of water used.



# Flat Rate

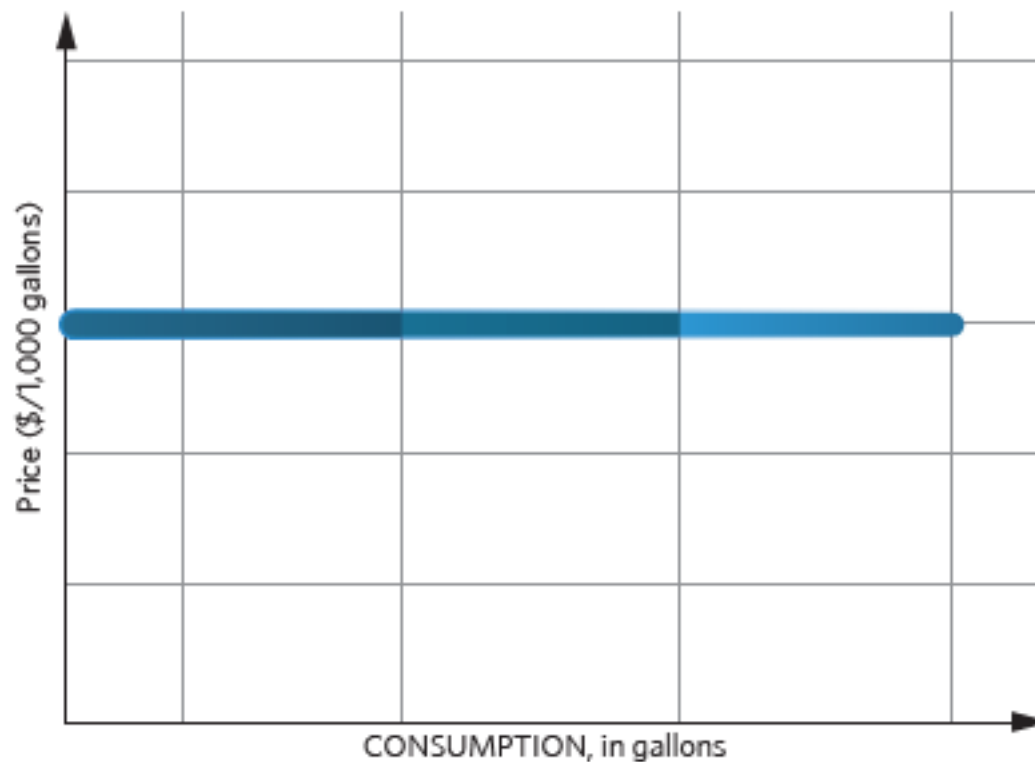
Customers are charged a constant amount that does not change based on water use

**\$ = any amount of water**

# Uniform Rate

Customers are charged a specified unit charge per volume (\$/1,000 gallons)

Figure 15. Uniform rate per 1,000 gallons



# Block Rate

Customers are charged a unit price for water (\$/1,000 gallons) that changes according to the amount of water used.

Figure 16. Decreasing block rate

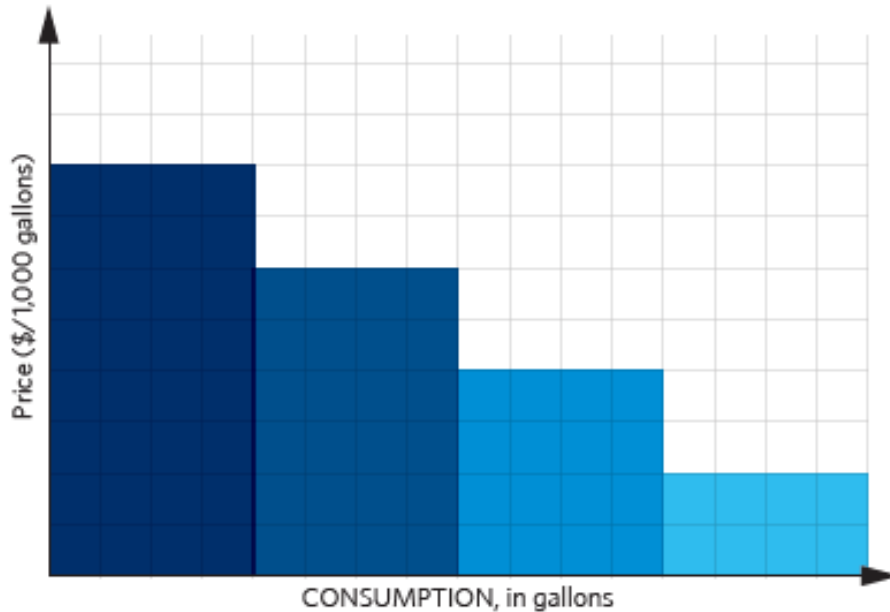
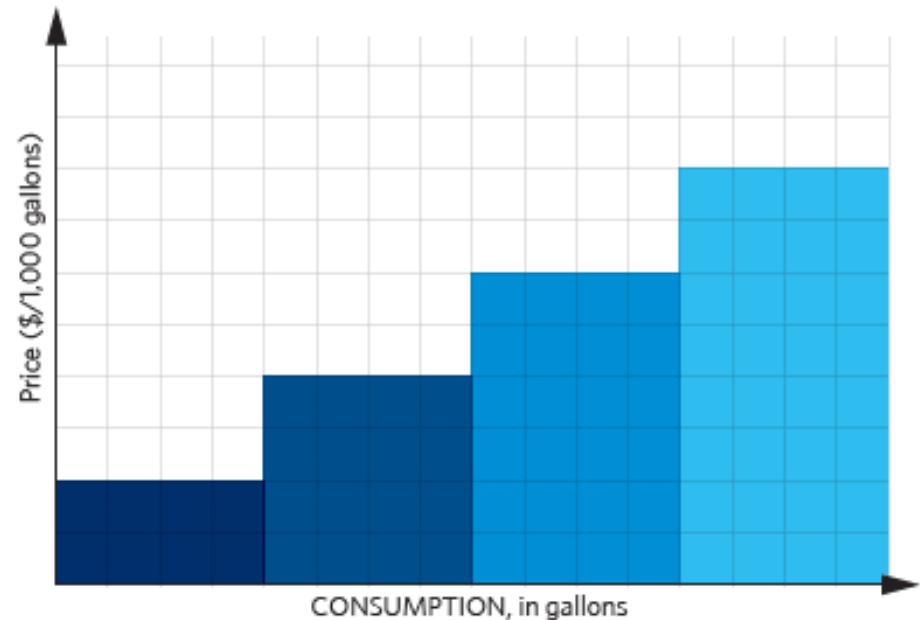


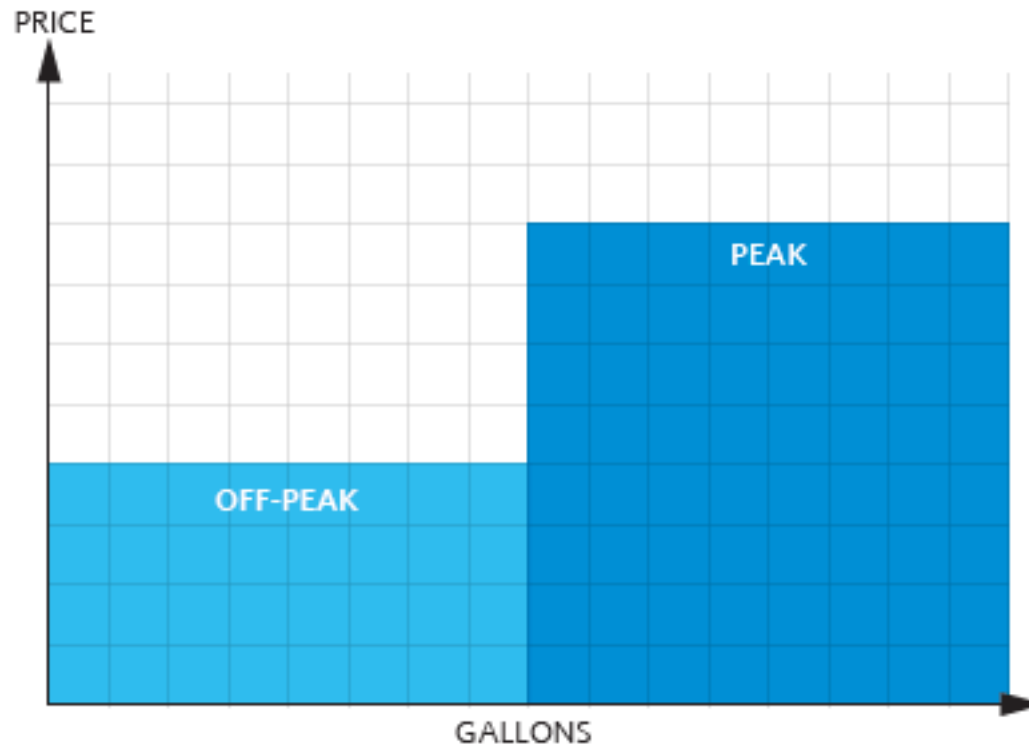
Figure 17. Increasing block rate



# Seasonal Rate

Customers are charged a unit amount that does changes based the season

Figure 20. Basic seasonal rate structure



# Comparison of Rate Structures

**Figure 14. Rate structures and objectives met**

	SIMPLICITY	EQUITY	REVENUE STABILITY	CONSERVATION	EASE OF IMPLEMENTATION
Flat rate	Y	N	Y	N	Y
Uniform Rate	Y	Y	Y	Y	Y
Decreasing Block	N	Y	Y	N	N
Seasonal Rate	N	Y	N	Y	N
Marginal Cost Pricing	N	Y	N	Y	N

Source: Author's construct.

# Conclusions

- Water utilities face challenges in balancing costs and revenues
- While smaller utilities are disadvantaged due to economies of scale, they also face other obstacles
- Utilities with higher human and technical capacities are better able to balance budgets

# Case Study Project

**\*\*\*\*Oct 10<sup>th</sup> is SOON\*\*\*\***

- Do you understand the assignment?
- Have you met as a team?
- Do you have a plan of action? Have you...
  - identified tasks?
  - allocated tasks?
  - planned meetings
  - developed a schedule?
- Questions?

