Conservation Pricing

Presentation to the NE IL RWSPG
March 25, 2008

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Presentation Content

• Water Pricing
  – Background
  – Water Prices in US Cities

• Water Rate Structures (WRS)
  – Definition, Types, Design

• Conservation Pricing (CP)
  – When WRS promotes conservation result is CP
  – CP & WRS: conservation goals, evaluation
  – What the region does
  – What others do

• Recommendations
Water Supply Planning

Includes:

- Amount of additional water to develop
- Timing and cost of development
- Design, financial and legal issues
Water Pricing

• Historically, water has been under-priced to foster objectives of public health & safety, and economic development
Water Pricing (contin.)

- Price that Municipal Water Utilities charge their customers.
- Costs cover:
  - Utility O & M
  - Costs to procure & develop additional water supplies to meet growing demands
  - Social & environmental opportunity costs of losing other benefits of the water & natural waterways, e.g. ecological & recreational values of river basins
Utility Total Budget (I)

\[ \text{Total Budget} = \text{Cost to Provide Current Water Service} + \text{Cost of Long Term Planning (Demand & Supply Mngmnt)} \]

Source: Johns, G. (2007)
Key Points (Part I)

Water Utilities are designed to meet the maximum/peak demand.

It is in the best interests of utilities to reduce/manage this peak demand to reduce investment in capital assets.

Demand Management can be achieved by Water Conservation- a cost effective substitute for water supply development.
Water Prices in US Cities ($/10,000 gallons)

Source: Water Demand & Planning Report- Twin Cities MN; May 2004
Water Rate Structures (WRS)

- Made up of 2 charges:
  - Service Charge: fixed service fee per billing period regardless of consumption level
  - Consumption/Commodity Charge: price for each unit of water consumed

- Utilities decide what to achieve, promote or discourage with WRS
Utility Total Budget (II)

\[
\text{Total Budget} = \text{Cost to Provide Current Water Service} + \text{Cost of Long Term Planning (Demand & Supply Mngmnt)}
\]

\[
\text{Rate Structure} = \text{Fixed Rates} + \text{Variable Rate}
\]

Source: Johns, G. (2007)
Rate-setting Objectives

- Revenue Sufficiency/Adequacy: cost recovery
- Net Revenue Stability: for contingencies
- Rate Stability: continuity
- Equity and Fairness: cost of service
- Affordability: the 4% rule
- Efficiency & Conservation: wise use
- Political Acceptability: “offsetting squack”
- **Demand Reduction & Cost Deferral: postponement**
- Others: ease, simplicity, legality
WRS Types: Decreasing Block Rate

Uniform Rate

Increasing Block Rate

Volumetric Cost for $Q^* = (P_{b1} \cdot Q_1) + P_{b2} (Q_2 - Q_1) + P_{b3} (Q^* - Q_2)$

Seasonal Block Rate

Types of WRS

- Uniform Rate
  - Conservation Neutral
  - Non-Conservation
- Decreasing Rate
- Seasonal Rate
  - Conservation Rate Struct.
- Increasing Block Rate
Conservation Pricing

• AWWA stated that Conservation Pricing is among the best management practices for urban water conservation.
• Concerns the elimination of non-conserving pricing policies & adoption of a structure that provides incentives to customers to reduce average or peak usage and use surcharges to encourage conservation.
Conservation Pricing & WRS

• Utility’s Perspective
  – Revenue requirement, ROI, Long-term Planning

• Customer’s Perspective
  – Equitable, Affordable, Understandable

• Society’s Perspective
Key Points (Part II)

- Customers determine quantity of service utility must provide
- Water Customers react to water prices
  - Restrictions in water use reduce demand
  - Lower water rates tend to produce higher per capita use
- Benefits of conservation = avoided costs of H2O development
- Avoided cost is present value of new H2O project without conservation less present value of project with conservation
Avoided Cost Savings - Example

• If a water supply project that costs $200,000/year to operate is delayed by 6 years:

Savings = $5.8 million

Source: Johns, G. (2007)
Avoided Cost Savings- Example

Source: Johns, G. (2007)
Marginal Cost & Variable Rate Structure

Basic Rate Structure: \[ \text{Bill}_{n,t} = F + p \times w_{n,t} \]

More Elaborate: \[ \text{Bill}_{n,t} = F + p_1 \times w_{n,t} + p_2 \times (\Delta w_{n,t}) \]

- **Bill}_{n,t}:** water bill of nth customer in month t
- **F:** fixed charge
- **p:** water rate (varies with amount of water use)
- **p_1:** current costs per 1,000 gallons of water used
- **p_2:** avoided costs per 1,000 gallons associated w/reduced water use
- **w_{n,t}:** water use of nth customer in month t
- **\Delta w_{n,t}:** water use- meant to approximate discretionary water use

Source: Johns, G. (2007)
Avoided Costs

• Included in rate structures
• Can be placed in a trust account to fund:
  – conservation programs that allow for plant delay and
  – capital investments as needed
WRS Effectiveness In CP

- Fixed Service Charge
- Price Sensitivity
- Billing Frequency & Ease of Communication
## CP Benefits for Utilities

<table>
<thead>
<tr>
<th>Water Utility</th>
<th>Pop Served</th>
<th>Net Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Water Resources Authority</td>
<td>2,200,000</td>
<td>$111- 153 mil</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>1,700,000</td>
<td>$262 mil</td>
</tr>
<tr>
<td>Albuquerque, NM</td>
<td>483,000</td>
<td>Avoided water shortages</td>
</tr>
<tr>
<td>Irvine Ranch, CA</td>
<td>150,000</td>
<td>$28.2 mil</td>
</tr>
<tr>
<td>Santa Monica, CA</td>
<td>85,000</td>
<td>$9.5 mil</td>
</tr>
<tr>
<td>Cary, NC</td>
<td>80,000</td>
<td>Delayed 2 plant expansions by 2 years</td>
</tr>
<tr>
<td>Ashland, OR</td>
<td>20,000</td>
<td>$6.9- 10.1 mil</td>
</tr>
<tr>
<td>Gallitzin, PA</td>
<td>2,000</td>
<td>$25,000/year</td>
</tr>
</tbody>
</table>

## CP* Benefits for Individuals

<table>
<thead>
<tr>
<th>Water Utility</th>
<th>Pop Served</th>
<th>Net Benefit Per Person#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts Water Resources Authority</td>
<td>2,200,000</td>
<td>$50- $70</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>1,700,000</td>
<td>$154</td>
</tr>
<tr>
<td>Irvine Ranch, CA</td>
<td>150,000</td>
<td>$188</td>
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<tr>
<td>Santa Monica, CA</td>
<td>85,000</td>
<td>$112</td>
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<tr>
<td>Ashland, OR</td>
<td>20,000</td>
<td>$345</td>
</tr>
<tr>
<td>Gallitzin, PA</td>
<td>2,000</td>
<td>$13</td>
</tr>
</tbody>
</table>

*CP is included with other conservation programs e.g. public education & information

#Benefit varies with utility

WRS in NE IL Communities (Lake Michigan-served Communities)

Source: Lake Michigan Water Survey - IL Dept. of Natural Resources; July 2005
WRS in Minnesota

1993: Amendments to MN statute requiring water suppliers to employ water-use demand reduction measures including evaluation of a conservation rate structure.

Source: Water Demand & Planning Report- Twin Cities MN; May 2004
WRS in Minnesota

Source: Water Demand & Planning Report- Twin Cities MN; May 2004
WRS in Utah

Conclusions

• CP gives the customer the option to choose the amount of water based on willingness to pay
• CP can result in delaying the development of new infrastructure to meet increasing demands
• Savings from CP are significant to both water utilities and customers
Recommendations - General

- NE IL communities/utilities should review their WRS to decide whether rates reflect the cost of water use
- Communities should study the modification of WRS to include CP in rate setting
- Public involvement should be solicited in any future rate setting that includes CP
- A strong public information campaign should insure that residents understand that CP is beneficial to them individually and to the community as a whole
Recommendations- General

- Combine and implement CP with other water conservation tools such as regulatory mechanisms (watering policies, erosion & sediment control, water conservation ordinances, native planting) and education programs.
Recommendations- Specific

• Tier I- State:
  – Review utility water rates and recommend the inclusion of Conservation Pricing within rate structure

• Tier II- Regional:
  – Provide Technical Assistance for utilities with various conservation programs

• Tier III- Water Utilities:
  – Model WRS to reflect regional goals and objectives as well as satisfy local revenue requirements
Questions for RWSPG

• Does CP serve conservation purposes?
• Do you agree that CP reduces costs?
• Will CP be a sustainable measure for water supply planning?
• Would the region benefit from CP policies?
• Should CP be a recommendation in the Plan for efficient water use?
Other Questions?

Thank you.

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