

CONSERVATION IN THE PORTFOLIO OF WATER SUPPLY OPTIONS FOR REGIONAL RESERVOIR PLANNING

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Abstract. This paper will outline the key considerations in the structuring of water conservation initiatives that afford local governments requisite flexibility while ensuring that conservation is appropriately incorporated in the portfolio of prospective water supply options. In particular, the fundamental issues involved in implementation of water conservation pricing options as a foundational element in ensuring efficient use of existing water supplies are outlined.

As Georgians face the water supply challenges of the 21st century, long-term movements of markets and behaviors will enable achievement of water use efficiency and help ensure the necessity of new water supply development. In that reductions in water demands effectively afford the state an opportunity to realize new 'sources of supply', conservation initiatives may be viewed as an investment in the portfolio of resources securing Georgians water future.

INTRODUCTION

The State of Georgia is facing a series of unprecedented water resource management challenges imposed by burgeoning economic development, impaired quality of numerous stream segments, and limitations on existing water supplies. As the State addresses these challenges, its approach to development of new water supplies should embrace a broad spectrum of supply alternatives including, perhaps most notably, water conservation. While this 'source of supply' does not involve construction of a specific facility, it may nevertheless be considered a component of an environmentally sustainable, economically efficient, 'portfolio' of water supply options.

The implementation process for developing a comprehensive and sustainable water conservation initiative is complex and requires grounding in a focused evaluation of water demand characteristics and potential water use efficiencies. These analyses

provide a technical basis for establishing measurable water conservation goals, typically expressed in terms of a defined reduction in per capita (or per employee) water demand or a percent reduction in water use by sector (residential, commercial, agricultural, etc.).

Given measurable water conservation savings goals, a comprehensive water conservation initiative involves definition of four fundamental program elements. These elements include, but are not limited to, regulatory measures, education, and rebate and retrofit programs supported by conservation pricing. Effective water conservation mandates typically provide local governments and service providers flexibility in tailoring program elements to local circumstances.

WATER CONSERVATION INITIATIVES

Insofar as the State of Georgia faces unprecedented challenges in management of its water supplies, it has become incumbent on state officials, local governments and water utilities to enhance water use efficiencies. Absent a defensible claim to ensuring careful use of existing resources, development of new water supplies is in most cases, neither fiscally nor environmentally prudent. Accordingly, various efforts are planned or underway to accelerate Georgians adoption of water conservation measures and practices. Whether implemented as state-wide, regional or local initiatives, several fundamental attributes of sound programming of water conservation efforts prevail.

In particular, water conservation programs should not simply provide a cosmetic salute to environmental stewardship. Rather, water conservation initiatives and individual programs should contemplate specific, measurable water use efficiency goals that result in cost savings to benefit water users and reductions in water withdrawals to benefit the environment.¹ Benchmarking

¹ See, for example, U.S. Environmental Protection Agency, Water Conservation Plan Guidelines, EPA-832-D-98-001, (August 1998), p.45.

current water use levels and practices establishes a baseline for estimates of water use reductions as initiatives are implemented and enables assessment of the water conservation savings potential in individual service areas.

Water conservation initiatives can be comprised of 4 complementary elements that include regulatory measures, education, rebate and retrofit programs and pricing. Fundamentally, each is designed to induce water consumers to install conservation devices and/or alter water use practices.

Regulatory Measures

Regulatory measures include (typically low-cost, high impact) actions like plumbing code modifications and ordinances restricting water use practices. They are low cost because supporting programmatic requirements are largely limited to enforcement efforts; they are high impact because most consumers within the relevant jurisdiction are subject to the restrictions, under penalty for non-compliance. They may also be highly controversial and considered to be unduly invasive, as highlighted by recent attempts to roll-back national plumbing standards related to low-flush toilet requirements.

Education

Public acceptance of all aspects of a water conservation initiative is critically dependent on effective communication of program merits and how individual users may participate. Prospectively in Georgia, this will involve translating newsworthy accounts of the ACT/ACF ‘water wars’² and the recent state-wide drought into a mandate for local action. Historical perceptions of abundance of water resources must be qualified with recognition of prevailing and projected scarcities, and a general obligation for effective stewardship of existing water supplies.

Though the ratio of cost to benefit is difficult to measure, education supports all aspects of conservation program efforts. These education efforts may range from media placements of general conservation messages, to advertisements and target marketing of specific conservation programs. School curricula and programs are often viewed as an important long-term investment affecting both student and parent behaviors.

² See, for example, the Atlanta Journal Constitution’s coverage of the Apalachicola-Chattahoochee-Flint / Alabama-Coosa-Tallapoosa (ACF-ACT) compact negotiations related to tri-state water supply allocations.

Rebate and Retrofit Programs

Installation and use of water conservation measures – the altered behaviors elicited by education programs – are often supported technically and financially through rebate and retrofit programs. These efforts, perhaps the hallmark of water conservation programs in public perceptions, range from free water audits (that provide technical assistance to customers on adoption of efficient water use practices) to rebates for installation of water efficient toilets and appliances.

Rebate and retrofit programs, while offering cost-effective water savings³, require dedicated staffing and business processes to administer.

Pricing

Implementation of water conservation pricing policies generally⁴ involves relatively limited investment of administrative resources (though billing system constraints may limit viable rate structures). Resource requirements center around important challenges of billing water rates that vary by season and/or volume of use, and the resultant complexities of revenue forecasting.

Because conservation pricing typically does not require an administrative infrastructure and supports programmatic elements of conservation initiatives, pricing will be a primary focus as Georgia looks to enhance the efficiency of its water demand patterns.

CONSERVATION PRICING DEFINED

Conservation pricing is an elusive term with broad connotations which seem to vary based on differing perspectives of the merit of rate structures’ penalty for higher usage volumes. Arguably, any volume-based rate form whereby bills increase with the volume of water consumed may be considered a conservation rate. Price incentives are in place to limit water use – the less

³ For example, for water conservation modeling conducted to support the ongoing Metropolitan North Georgia Water Planning District’s (MNGWPD) water supply evaluation and Georgia Department of Natural Resources (GA DNR) 44-County Water Supply Needs Assessment, rebates for coin-op efficient clothes washers were estimated to provide water savings at a cost of \$0.14 per 1000 gallons saved.

⁴ Though certain customer specific water conservation rate structures including goal-based rates, indexed rates, and low-income affordability rates do require extensive, ongoing administration. For a discussion of rate structures, see the American Water Works Association’s M1 manual, *Principle of Water Rates, Fees and Charges*, 5th Ed., (2000) or M34 manual, *Water Rate Structures and Pricing*, 2nd Ed., (1999)

used, the lower the bill⁵. However, most often used connotations of ‘water conservation pricing’ suggest the imposition of higher charges per unit of volume for water use either during peak usage periods or for higher volumes of use.⁶ Two relatively simple rate forms – seasonal rates and inclining block rates – may be used to illustrate.

Seasonal rates involve changes in the unit charges on volumes of use at different periods in the year, typically with lower costs per unit in off-peak periods and higher unit costs during peak periods. For example, a simple seasonal rate would be for water to be charged at \$1.00 /kgal from October through May, and \$2.00/kgal from June through September. By making water more expensive per unit of volume during summer peak demand periods, price signals encourage conservation at these times. Seasonal rates may be particularly useful in communities with adequate annual supplies but storage or peak period delivery capacity limitations.

Inclining block rate designs, perhaps the rate form most associated with the term ‘water conservation pricing’, features incremental increases in unit charges per volume of incremental water use as the total volume of use crosses predetermined thresholds. For example, water could be charged at \$1.00/kgal for the first 3 kgal of water consumed, at \$2.00/kgal for the next 6 kgal of water used, and at \$3.00/kgal for usage at or above 10 kgal. In this case, for a 12 kgal user, while the first 3 kgal of water used cost \$3.00, the last 3 kgal of use costs \$9.00 – imposing a relatively strong conservation price signal. In general, inclining block rates are a flexible water conservation rate form, with considerable discretion afforded to rate makers through the definition of block thresholds and block unit charges.

PRICING CONSIDERATIONS

In selecting a conservation rate structure, and defining a community’s response to water conservation initiatives in the State, several issues should be

⁵ And, in those unmetered Georgia communities where bills are fixed irrespective of water use, metering and volume-based billing represents transformational conservation pricing policy.

⁶ These often used connotations are arguably simplistic insofar as true conservation pricing requires reflection of the costs of water services including development of new water supplies, and promotes resource efficiency. For a fuller discussion of this concept, see Thomas Chesnutt and Janice A. Beecher, ‘Conservation Rates in the Real World’, *Journal AWWA*, vol. 90, (February 1998)

considered to ensure the greatest effectiveness of a conservation pricing policy.

Conservation Goals

As suggested by the discussion of seasonal and inclining block rate designs, an important consideration in selecting a rate structure are the conservation goals that prevail for a particular community. While general promotion of water use efficiency may be universal, certain communities may also seek to reduce peak period demands, while others may seek to target selected rate classes.

Defining appropriate conservation goals further requires some evaluation of water savings potential. Though uniform water use reduction targets may lighten administrative burdens of conservation initiatives, goals that are blind to local conditions (e.g., lot sizes, soils, weather patterns, etc.) and fail to reflect an assessment of savings potential may frustrate achievement of permanent water use efficiencies. Accordingly, conservation rate design tends to be most effective when it reflects individual community values and circumstances.

Revenue Recovery

In general, water rates are designed to recover revenue requirements based on conservatively projected water demand levels. Conservation rate designs typically will introduce a degree of revenue instability, creating the need to employ mitigating financial management measures. These measures may range from transitioning of rate penalties for high volume use, to budgeting of insulating fund balances, to planned generation of revenue surpluses and creation of a rate stabilization fund. As with conservation rate structures, community values will also impact the acceptability of conservation rates that deviate from recovery of system requirements to generation of revenue surpluses (that may be channeled to fund conservation programs).

Implementation Requirements

Practicalities of conservation rate design extend well beyond concerns over revenue stability, however. These designs often require billing system and customer service capabilities that are not familiar to utilities that have previously employed less complex rate structures. For example, inclining block rate structures require bill frequency distribution⁷ reporting, the capacity to bill customers in rate blocks, and

⁷ Reporting of the distribution of total volumes billed across increments of consumption that is required to project revenues for alternative thresholds of rate blocks.

effective customer service procedures to respond to queries on bill calculations.

Inter- and Intra- Class Bill Impacts

Often such queries are precipitated by differential bill impacts within and across customer classes that result from implementation of conservation rate structures. For example, under conservation rate forms, it is generally more likely for neighboring customers to receive substantially different bills in a given billing period. To the extent that this reflects differences in conservation behaviors, this is desirable. However, utilities should be mindful of constraints on customers' abilities to achieve water use efficiencies. Within classes, diversity of household size and differences in commercial building uses may complicate equitable delineation of unit charge thresholds.

Across customer classes, it may be difficult to construct system-wide rate designs that achieve or preserve correspondence with allocations of costs-of-service to customer classes and that also promote water conservation. An inclining block rate structure that is appropriate for relatively lower volume users is unlikely to be suitable for higher volume industrial or commercial customers. Accordingly, conservation rates may need to be established by customer class.

Low-Income Affordability

A particularly important subset of these bill impact issues relates to impacts on low-income users.⁸ Poor quality housing stock, relatively large household sizes, and the unavailability of efficiency opportunities may challenge the affordability of basic water (and wastewater) service to low-income users. Conservation rate structures may inadvertently exacerbate these challenges. Therefore, careful consideration of low-income bill impacts and the availability of targeted low-income affordability programs is important for conservation pricing policy for Georgia communities.

Programmatic Efforts

More generally, conservation pricing should consider and be designed to support parallel water savings program efforts. Regulatory measures, rebate and retrofit programs and education efforts may be effectively reinforced, or compromised, by water rate design. Similarly, conservation pricing in the absence of accompanying programmatic efforts are likely to

have limited effect and may seem disingenuous to rate payers. Arguably it is incumbent upon water providers to assist ratepayers in effecting the conservation behaviors that their pricing policies are structured to engender.⁹ Therefore, most concerted conservation initiatives prescribe a combination of pricing and programmatic measures to effect water use reductions.

Durability of Savings – Rebound Effects

These combined efforts should also help address the potential for water use reductions to reflect largely a temporary response to rate increases or new program implementations. Particularly for regional water supply augmentation, water conservation savings achieved in early years of implementation must be durable – in fact, permanent. Accordingly, pricing and parallel programmatic measures should not be targeted to achieve a short-term response (as in the case of drought pricing) but rather must operate to advance the market for water saving technologies and engender lasting behavioral modifications.

PRICING POLICY AS A FOUNDATION FOR WATER CONSERVATION INITIATIVES

As Georgians face the water supply challenges of the 21st century, modification of markets and behaviors will enable achievement of water use efficiency and help ensure the necessity of new water supply development. To effect these changes, the state's water conservation initiatives will employ all four fundamental elements of an integrated water use efficiency strategy – regulatory measures, education, rebates and retrofits and pricing. Pricing policy will lead and serve as a foundation. For communities largely devoid of a conservation culture, conservation rates send a new price signal of resource scarcity. For those communities already inculcated, conservation rates may reinforce the merits of water use efficiency programs.

In that reductions in water demands effectively afford the state an opportunity to realize new 'sources of supply', conservation initiatives may be viewed as a cost-effective investment in the portfolio of resources securing Georgians water future. The embrace of conservation pricing policies by state, local and utility decision-makers will provide a down payment on that resource investment – a payment that is arguably long overdue.

⁸ For an extensive discussion, see *Water Affordability Programs*, prepared by Margot Saunders, Phylis Kimmel, Maggie Spade and Nancy Brockway, National Consumer Law Center for the American Water Works Association Research Foundation (1998)

⁹ It is primarily for this reason that residential water conservation audits, despite low independent benefit/cost ratios, are included in recommended conservation program packages in ongoing water supply assessment studies of the MNGWPD and GA DNR.