AUSTIN'S INTEGRATED WATER RESOURCE PLANNING PROCESS

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INTRODUCTION

The City of Austin initiated a water conservation program as a response to overloaded water and wastewater plants in the mid-1980s. Once the emergency situation was resolved through substantial plant capacity construction, the role of water conservation in utility planning needed to be redefined.

In 1990, the Austin City Council passed a resolution that included a goal of reducing peak-day water use by 10 percent and average-day water use by 5 percent by the Year 2005. These goals were not derived from a detailed analysis but were intended to be a policy commitment to demand side management. The 10 percent reduction in peak-day water use translates into a 20 million gallon per day (mgd) reduction over projected peak-day water use. If this peak-day goal is achieved through a combination of indoor and outdoor water conservation programs, reuse and conservation rate structures, average-day water use will also be reduced by at least 10 percent.

In 1992-93, the City completed three significant reports: Master Planning for Recycled Water (CH2M Hill, 1992a), Water and Wastewater Cost of Service Rate Study (CH2M Hill, 1992b) and a Water Conservation Plan (Montgomery Watson, 1993). In the Fall of 1993, the three project managers of these studies formed a team to discuss the development of an integrated water resource plan that would incorporate the results of the three separate studies.

IRP: A PORTFOLIO APPROACH TO WATER EFFICIENCY

By using integrated resource planning (IRP), the City does not have to rely on any single demand reduction or supply option (see AWWA, 1994). For example, water conservation programs require the interest and cooperation of water customers to succeed. In addition, some of the proposed conservation programs are relatively new and actual savings will not be known until evaluations are complete. Use of recycled water has raised environmental concerns and requires substantial public education before public acceptance. Also, recycled water will not be available to all parts of the City. Finally, though considerable research has been completed on the impact of conservation rate structures on demand reduction, these studies have produced a wide range of results that make predicting demand decreases an inexact science.

Due to these concerns, the consensus was to initially proceed on all three investment fronts. The investment decisions will be periodically revised and allocations adjusted based on results of participation in the water conservation and reuse programs and the response of customers to a conservation rate structure.

INTEGRATING THE ELEMENTS OF AN IRP

Since the three study areas have traditionally been thought of as separate areas in the utility, a team approach is needed. Research will be gathered to determine the effectiveness and reliability of water conservation efforts as well as the potential and persistence for demand reduction through a conservation rate structure in Austin. Reuse will only be possible in certain areas of the City in the near future. To provide assurance that the reuse lines will be used, ordinances and/or an effective marketing plan are needed for areas to be served by reuse water. Public involvement has been and will continue to be extremely important to the success of all these programs. A citizen's advisory committee will need to be formed to assure adequate community involvement in implementing the IRP.

BENEFITS OF MEETING COUNCIL GOALS

The tangible impacts of achieving the 10 percent peak-day reduction goal and resulting 10 percent reduction in average-day water use are as follows:

- A 10 percent reduction in peak-day water use would delay the next water plant expansion at the Ullrich

Treatment Plant by 7 years (2008 to 2015) and delay the construction of Water Plant No. 4 by 8 years (2015 to 2023).

- A 10 percent reduction in average-day water use would delay the date when the City will have to purchase water from the Lower Colorado River Authority (LCRA) by 4 years (2002 to 2006). The City has 270,000 acre feet of water rights but under agreement has to pay the LCRA for managing the reservoir system when withdrawals exceed 150,000 acre feet per year.

- A 10 percent reduction in average-day water use will also reduce flows to the wastewater plants. On average, the planned water conservation programs will reduce wastewater flows by 43 percent of the reduction in water flows. This flow reduction will total approximately 8.6 MGD. The next expansion for the Walnut Creek WWTP will be deferred four years (2005 to 2009) The next two expansions at the South Austin Regional WWTP Plant will be delayed 3 and 5 years respectively.

- Achieving the reduction goals would allow the City to extend the life of its existing water rights and delay the need to develop additional water supply. Current projections show that the City will be using all its water rights by 2037. Achieving a 10 percent average-day reduction will extend the life of the water rights 5 years to 2042.

- Implementation of an aggressive IRP would provide leverage in future water rights hearings concerning the transfer of water from the Colorado River Basin to other cities that have immediate and long-term water supply needs such as San Antonio and Corpus Christi. Austin hopes that if it demonstrates success in conserving water, and assuming that the other cities do not have similar efforts, the City's IRP program will assist the City in making its case for keeping water available in the Colorado Basin for future use by the City.

- Implementation of the IRP would satisfy current and anticipated regulatory requirements. The State of Texas currently requires conservation plans for anyone seeking to amend or apply for a water right. In addition the recently passed Safe Drinking Water Act requires utilities to have water conservation plans.

AVOIDED COST FOR DEFERRED PLANT AND WATER PURCHASES

The estimated quantifiable benefits of the avoided costs associated with deferred plant and water purchases, based on 1993 dollars, 0 percent inflation and a real interest rate of 3 percent, are reported in table 1. The avoided water capital costs are based on achieving a peak-day reduction of 10 percent (20 MGD) by the year 2005. The benefit in dollars per 1,000 gallons saved varies depending on the number of years used for the analysis. The present value of the avoided costs is computed using the yearly avoided costs during the period of analysis divided by the total water saved during the period. For example, for the 20-year period, the total is the yearly avoided costs for the first 20 years divided by the total gallonage saved during this period by the water conservation programs. As the period is increased into the future, the present day value of the avoided costs increases at a slower rate than the rate of increase in gallonage saved. Hence, the savings per 1,000 gallons decreases as the period of analysis increases.

Determining how much investment would be warranted based on the theoretical benefits is a possible cost analysis method. The 10 percent reduction goals based on current and proposed funding levels for water conservation would be achieved by the year 2013. The reuse and conservation rate savings will help achieve the 10 percent goal at an earlier date. From the total avoided cost of $57,000,000 in 1993 dollars, a payment stream of $4,262,000 would be justified for funding the programs. Since the proposed maximum funding level needed to achieve these results is approximately $2,200,000 for water conservation, the water conservation programs are considered cost effective.

CONCLUSIONS OF THE SEPARATE STUDIES

The Water Conservation Plan and Wastewater Recycling Study identify savings that could be achieved by the Year 2005. The Conservation Plan (Montgomery Watson, 1993) includes a list of programs and ordinances that could achieve the entire 10 percent goal, or 20 MGD. The Wastewater Recycling Study (CH2M Hill, 1992) identified areas that could be served by the City that would achieve approximately 5 MGD of potable water substitution by the Year 2000 and additional opportunities for replacement of potable supply with reuse water in future years. No average or peak-day reductions are currently estimated for the conservation rate structure.

A grant has been received determine water reductions attributable to the current rate structure.

SAFE DRINKING WATER ACT

The recently passed Safe Drinking Water Act requirements for disinfection may result in rules being promulgated by EPA that accelerate the need for Austin to expand its water treatment capacity. Austin has three water treatment plants, of which, the Green Plant is the oldest and has no room to expand at its site. If the disinfection rules require Austin to modify our disinfection process such that an additional contact chamber is needed, the decision may be to abandon the Green Plant and build an expansion earlier than anticipated at the Ullrich Plant to substitute for the capacity being lost at Green. In addition, additional capacity to meet projected growth would also be added. Once the City completed the expansions, the immediate need for conservation and reuse would be reduced, jeopardizing the continuation of the IRP process.

CONCLUSIONS

The IRP process is an efficient and effective method to initiate actions for achieving the City's long term goals of reducing peak and average-day water use (see City of Austin, 1994a, 1994b). However, the IRP process must be seen as a dynamic process that will enable the City toguide its investments in water efficiency by making periodic adjustments in investment strategy.

REFERENCES

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THE AUTHOR

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TABLE 1
AUSTIN'S AVOIDED-COST ANALYSIS

PRESENT VALUE AVOIDED WATER COST	**DOLLARS (1993)**
Ullrich Capital Costs Avoided	$2,400,000
WTP4 Capital Costs Avoided	$18,100,000
Water Variable Costs Avoided	$7,102,000
Water Fixed Costs Avoided	$12,873,000
Water Purchase Costs Avoided	$16,182,000
PRESENT VALUE AVOIDED WASTEWATER COSTS	
Wastewater Capital Costs Avoided	$15,600,000
Wastewater Variable Costs Avoided	$6,062,000
Wastewater Fixed Costs Avoided	$9,753,000
PRESENT VALUE OF AVOIDED COSTS	
PV of All Avoided Costs (30 yrs.)	$83,973,000
PV of All Avoided Costs (25 yrs.)	$74,213,000
PV of All Avoided PV of Costs (20 yrs.)	$57,346,000
PV of All Avoided Costs (10 yrs.)	$22,970,000
SAVINGS PER 1000 GALLONS REDUCTION	
Savings per 1000 gallons (30 yrs.)	$0.86
Savings per 1000 gallons (25 yrs.)	$0.97
Savings per 1000 gallons (20 yrs.)	$1.19