

## Irvine Ranch Water District's Allocation Based Rate Structure – The Foundation of a Successful Water Use Efficiency Program

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### SUMMARY

Irvine Ranch Water District (IRWD) is a recognized leader in water use efficiency as evidenced by the District's pioneering water recycling program which began in the late 1960's. Water resource stewardship has been a hallmark of IRWD since its inception. The District set an aggressive tone to promote the efficient use of all water resources beginning in the late 1980's and into the drought of the early 1990's. This effort, which included intensive communication with the various customer groups and some of the first home water audit and ultra low flush toilet programs in the state, culminated in the adoption of an allocation-based tiered rate structure by the IRWD Board in 1991. The rate structure is a foundational tool in IRWD's successful water use efficiency programs, and has resulted in significant water use reductions. Secondary benefits include reductions in urban runoff flows, energy savings and reduced green house gas (GHG) emissions.

The rate structure was instituted to promote the efficient use of water, and is designed to provide customers a significant economic incentive to use the proper amount of water required to serve indoor, landscape, commercial/industrial and institutional demands. This is accomplished by setting a customized "allocation" for each customer account that is based upon a variety of factors such as: irrigated area, daily weather characteristics, number of residents, industrial or commercial business type, and other more unique characteristics such as the presence of a pool, livestock or specialized industrial equipment. Water is then sold to customers under a five tier structure based upon their monthly allocation which varies for landscape use relative to weather patterns. Customers using water within their allocation purchase water in the lower two tiers (including a below cost first tier) and are rewarded with very low water bills. Customers using in excess of their allocation also purchase water in one to three steeply ascending upper tiers, resulting in relatively high water bills and a strong pricing signal for excessive use. IRWD's 2010 commodity rates for each of the five tiers are shown in Table 1.

**Table 1**

<b>Tier</b>	<b>Rate Per CCF</b>	<b>Use (As a Percent of Allocation)</b>
Low Volume Discount	\$0.91	0-40%
Conservation Base Rate	\$1.21	41-100%
Inefficient	\$2.50	101-150%
Excessive	\$4.32	151-200%
Wasteful	\$9.48	201% +

*Rates Effective July 1, 2010*

IRWD also assesses a monthly fixed charge based upon meter size. This fixed charge provides adequate funding for all operating costs other than the water commodity itself and the district's water use efficiency and related programs. As such, IRWD enjoys revenue stability regardless of the amount of water sold or the degree of conservation experienced from customers' water use efficiency practices.

The rate structure not only signals customers when they are over-using water, but also signals IRWD as to which customers need the greatest degree of attention. This two-way communication helps IRWD focus its financial and staff resources efficiently. Customer service is also emphasized. For example, billing adjustments are provided for customers that have over-allocation use related to leaks if the customer shows evidence of the leak repair. In addition, customers that have habitual over-allocation use are contacted by IRWD staff and offered leak detection services, as well as water use efficiency education and assistance.

Revenue from higher tier, over-allocation water use is "reinvested" to fund tailored programs and rebates for long-term improvements in water use efficiency and to support IRWD's urban runoff source control and treatment programs. The rate structure is designed to derive sufficient revenues from the over-allocation use tiers to completely fund these programs. Because a substantial portion of water consumption in southern California is for outdoor irrigation, the rate structure also helps control over-irrigation and the associated generation of pollutant-carrying dry weather runoff which flows into environmentally sensitive creek and estuary systems. The relationship between over-irrigation and urban runoff generation provides an appropriate role and nexus for IRWD's participation in urban runoff treatment and source control programs.

## **ALLOCATION FORMULA**

The rate structure is designed to encourage efficient usage by sending an economic signal to customers when they exceed their water allocation. As a result, developing and setting valid, scientifically-based allocations is essential to effectiveness of this system. For residential customers, for example, allocations are calculated using the following formula:

$$\text{Allocation} = \frac{K_c \times ET \times LA \text{ (acres)}}{\text{Efficiency}} + \text{Indoor Use (if applicable)}$$

$K_c$  = Crop Co-efficient. The relative amount of water needed to irrigate the landscape. IRWD assumes 100% warm-season turf.

$ET$  = Reference evapotranspiration. The amount of water that evaporates into the air and the amount of water that is transpired through the vegetation. Evapotranspiration values are computed daily from IRWD's three weather stations.

$\text{Indoor Use}$  = Based on number of people per household for residential accounts. Based on number of employees and business process water for commercial/industrial accounts.

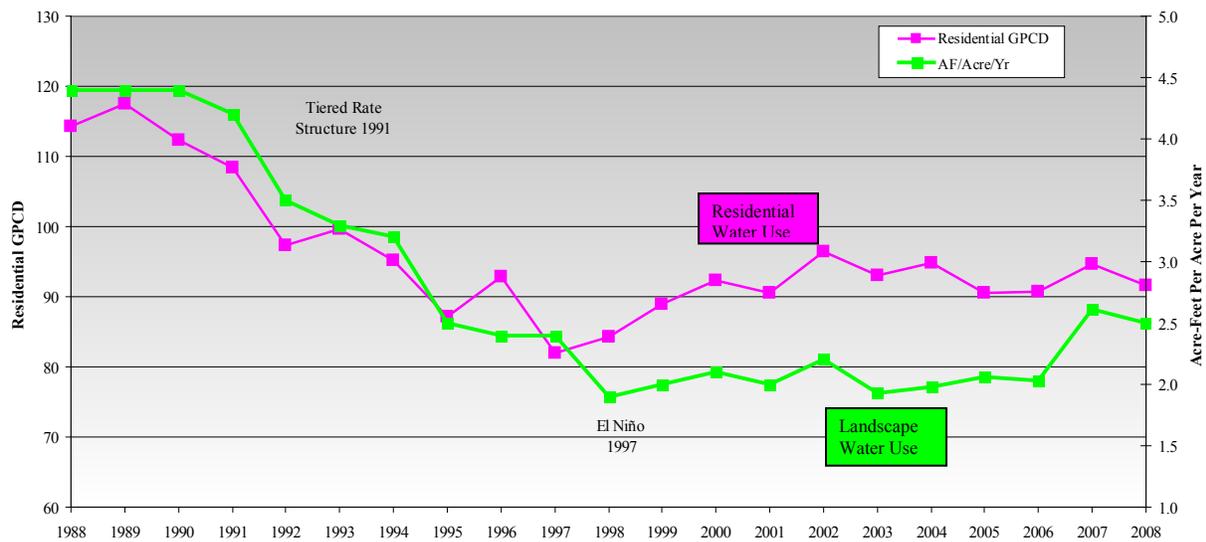
$LA$  = Landscape area in acres.

$\text{Efficiency}$  = Application efficiency. This is the efficiency of the irrigation system. Irvine Ranch Water District assumes 71%.

## RESULTS

Figure 1, below shows residential and landscape water use in the IRWD service area from the inception of the allocation-based rate structure through calendar year 2008. As the figure illustrates, water consumption on both residential per capita and landscape acre-foot per acre bases have dropped dramatically. These results are directly attributable to the rate structure and the associated implementation of IRWD's water use efficiency programs.

**Figure 1 - IRWD Residential and Landscape Water Usage 1988-2008**



Since the introduction of IRWD's allocation-based rate structure in 1991, the following has been observed:

- The rate structure had an immediate effect on the landscape account usage with a 0.5 acre-foot per acre reduction in the first six months following its adoption.
- For landscape accounts, water consumption has dropped by 43% from 4.4 to 2.5 acre-feet per acre. The associated energy savings with the reduction in imported water requirements is estimated at 1,250 kilowatt hours/acre/year.
- Water consumption for residential accounts has dropped 20% from 115 gallons per capita per day (GPCD) to 92 GPCD. The associated energy savings with the reduction in imported water requirements is estimated at 70 kilowattt hours per capita per year.
- Urban runoff (dry weather flow) in the major creek system has only nominally increased, while irrigated acreage has increased over 400%, from 3,300 acres in 1991 to 15,500 acres, presently.
- As a result of the strong economic signal provided with the rate structure and proactive customer outreach, fewer than 3% of residential customers currently pay the highest tier charges in any given month.

- Both residential and non-residential customers give IRWD high marks in customer satisfaction, with customer service rating of “excellent” from 87.1% of surveyed customers.

The reductions in per capita and landscape water use have been critically important in IRWD’s efforts to reduce the district’s dependence on imported water. Since 1990, the district has reduced the percent of imported water it serves its customers from approximately 64% of total supply to less than 30% in 2010. This has been achieved through a combination of water use efficiency and local water supply projects.

Because imported water is one of IRWD’s most costly supplies, reducing the demand for imported water has not only kept IRWD’s rates low, but has resulted in energy savings and greenhouse gas reduction. Water imported to Southern California through the State Water Project consumes more energy than local supplies since it must be pumped over the Tehachapis. Moreover, customer end uses of water result in significant additional energy utilization for heating, pumping and other on-site activities. Water use efficiency results in a double energy consumption benefit by simultaneously reducing both demands for imported water and customer end-uses of water. The estimated energy savings from IRWD’s water use demand reductions of 25 gallons per capita for residential use, and 2.2 acre-feet per acre/year for landscape use is approximately 63,000 mega-watt hours (MWh) per year. That represents an annual reduction in greenhouse gas emissions (CO<sub>2</sub>e) of approximately 20,000 tons.

## **CONCLUSION**

IRWD’s allocation-based rate structure is a foundational tool for water use efficiency, with the additional benefits of urban runoff reduction, energy savings and reduction of greenhouse gas emissions. It effectively communicates the value of water to customers and rewards appropriate water use through economic incentives. It provides a mechanism by which to identify wasteful use, and thereby effectively target customers for assistance. It provides revenue stability for IRWD, while at the same time promoting and achieving long-term water conservation. The rate structure also provides funding for critical water conservation and runoff reduction programs. It has a very high degree of customer acceptance and is viewed by customers as being fair and equitable. IRWD’s customers consistently rate their satisfaction with IRWD above 90% on surveys. Overall, the rate structure has provided exceptional results, and as provide substantial benefits for IRWD and its customers.