

## Chapter 2

# w a t e r c o n s e r v a t i o n



# Chapter Two

## Water Conservation

### 2.0 Overview

Los Angeles has historically taken a leadership role in managing its demand for water. Water conservation, or demand management measures, is largely responsible for closing the gap between supply and demand in a time marked by significant reductions in the City's imported water resources. Los Angeles consistently ranks among the lowest in per person water consumption when compared to California's largest cities. These significant accomplishments have resulted from the City's sustained implementation of effective water conservation programs, and the City's culture of conservation as a way of life.

LADWP has annually invested in water conservation programs and measures targeting reductions in water use. Looking forward, LADWP plans to continue to make investments in conservation programs, and expand its focus on landscape water use efficiency and conservation opportunities in the commercial/industrial/institutional customer sectors. LADWP's conservation planning process includes working with other City departments to ensure that mutual needs are addressed and goals are achieved (e.g., landscape water use efficiency and dry weather runoff reduction).

The civic culture of water conservation in Los Angeles began with the installation of water meters on all services in the early 1900's. At that time, this basic conservation measure resulted in a 30 percent reduction in water use. The recurrence of periodic droughts has illustrated the concern and responsiveness of LADWP customers in times of water shortage. When faced with significant supply shortages, City residents have responded with unprecedented reductions in their water use. Los Angeles was the only city in southern California to invoke mandatory water rationing during the 1976 through 1977 drought. While severe, the two-year drought resulted in only a temporary reduction in water use, as a subsequent series of wet years erased memories of the water shortage experienced during

the brief drought period. However, it was the drought that followed the 1978 through 1986 wet cycle that would prove to be the turning point in Los Angeles' water use awareness.



The drought of 1987-1992 left a permanent imprint on Los Angeles water customers. In response to this drought, LADWP

expanded a voluntary water conservation program in 1990. Prompted by an extensive public awareness program and education campaign, LADWP customers responded not only with water saving practices but also by installing conservation measures in their homes and businesses. Devices such as low-flow showerheads and ULF toilets replaced existing non-water saving devices. These hardware changes, coupled with more responsible use habits, have kept the City from becoming more dependent on imported water supplies.

Despite the fact that total water demand has been slowly increasing since the end of water rationing in 1992, water conservation levels remain above 15 percent (meaning that total demand is at least 15 percent lower than it would be without conservation). Conservation has had a tremendous impact on Los Angeles' water use patterns, and has become a permanent element of LADWP's water management philosophy. Water usage in the City is the same as it was 20 years ago despite an increase in population of over 750,000 people (see Exhibit 2A). Los Angeles' conservation efforts since the City began its voluntary conservation program in 1990 are shown in Exhibit 2B. It is worthwhile to note that the conservation efforts shown correspond to actual water savings that have been brought about by hardware measures and changes in the water usage pattern of City residents.

Exhibit 2A  
City of Los Angeles Water Use

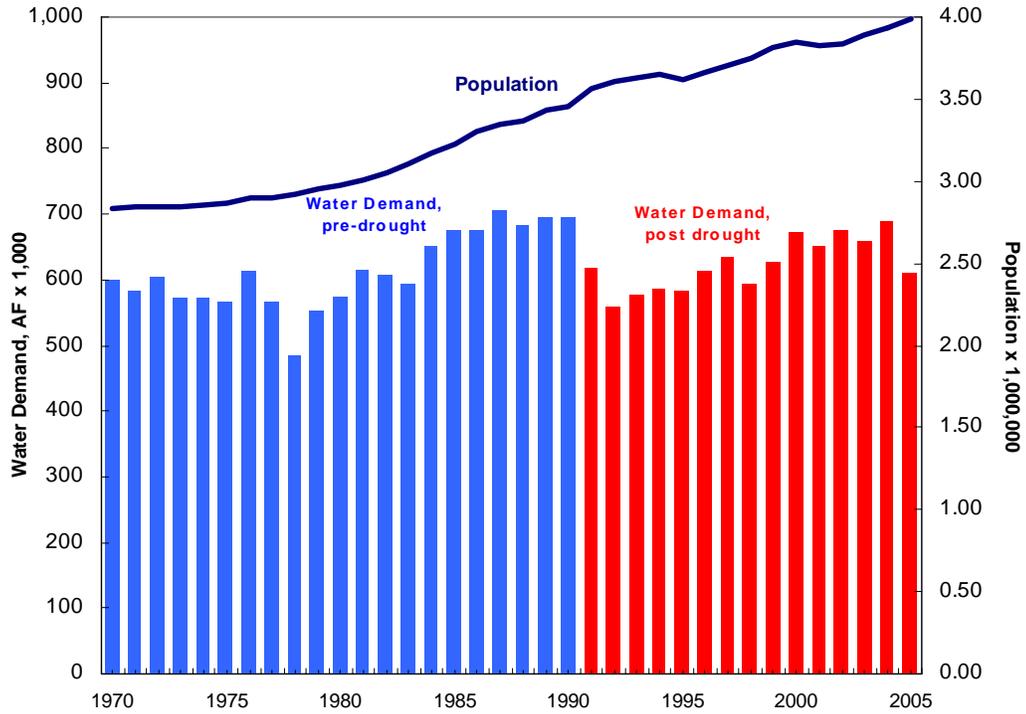
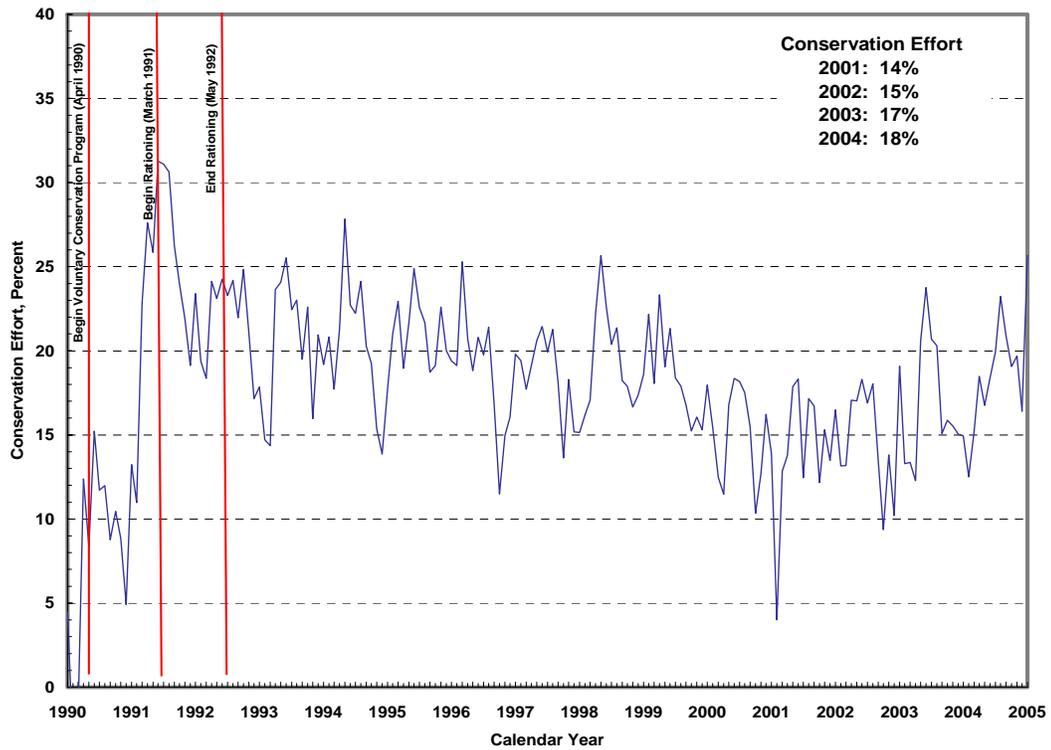


Exhibit 2B  
Water Conservation Effort



Conservation benefits the City by improving water supply reliability and reducing energy use for water treatment and pumping. Conserving customers see a tangible benefit as well through monetary savings on their water bill. Another ancillary benefit of conserving water is that the need for costly sewer facility expansions is deferred by reducing wastewater discharge into the sewer collection and treatment systems. In the end, the primary beneficiaries of conservation are the water customers themselves and the environment from where the sources of supply originates.

Los Angeles has been implementing permanent conservation since the 1980's. In 1988, the City adopted a plumbing retrofit ordinance to mandate the installation of conservation devices in all properties and to require water-efficient landscaping in new construction. The ordinance was amended in 1999, requiring the installation of ULF toilets and water saving showerheads in single-family and multi-family residences prior to resale. LADWP's water conservation programs have assisted customers affected by the ordinance by offering free ULF toilets and showerheads, free installation of ULF toilets and showerheads, as well as rebates for ULF toilets purchased and installed.

## 2.1 Water Conservation Goal

Water conservation reduces demand that typically rises over time with growth in population and commerce. By mitigating those increases in demand, water supply reliability is improved while costs are reduced. In the early 1990s, City residents responded with conservation levels exceeding 30 percent due to increasingly drier conditions and mandatory conservation. As normal water supply conditions returned and with continuation of LADWP's conservation program, conservation levels stabilized at approximately 15 percent. In this Water Plan, LADWP has increased its goal of achieving water conservation with a 20 percent reduction over historical water usage within the City. This level of conservation will further lessen the City's reliance on imported water while providing a drought-proof resource that is not subject to weather conditions.

LADWP is committed to conservation as a means of providing a sustainable source of water supply to the City. Measures such as tiered water pricing, financial incentives for the installation of a variety of conservation measures, ULF toilets, free low flow showerheads, Technical Assistance Program incentives for business and industry, and large landscape irrigation efficiency programs are just some of the ways LADWP provides leadership and results in the conservation area. Conservation is a key component of LADWP's water resource planning efforts and will continue to be implemented over the long-term.

This Urban Water Management Plan outlines programs to achieve this conservation goal over the next 25 years. LADWP intends to continually examine the water conservation program to assess progress toward this goal. Programs will be revised, and new programs will be developed to increase conservation levels as water demands grow with increased population.

## 2.2 Conservation Pricing Structure

In 1993, Los Angeles restructured its water rates to provide customers with a clear financial signal to use water more efficiently. It was the first time in LADWP's history that an ascending tiered rate structure was used. This conservation-based rate structure remains in use and applies a lower first tier rate for water used within a specified allotment, and a higher second tier rate for every billing unit (748 gallons) that exceeds the first tier allotment. A unique feature of the rate structure is that the first tier allotment considers factors that influence individual residential customer's water use patterns (i.e. lot size, climate zone, and family size).

The goals of LADWP's two-tiered water rate structure are to:

- Use price as a signal to encourage the efficient use of water.
- Provide basic water needs at an affordable price.
- Provide equity among customers.
- Use price to stabilize water use during a shortage.
- Generate adequate revenue for maintaining and upgrading the water system.

In a period where increasing demands and reductions in water supply are becoming more commonplace, a rate structure that provides appropriate signals to encourage efficient water use has become a necessity for many areas, including Los Angeles.

The substantial investments required for water quality improvements, security, and supply development have significantly raised the cost of delivering water. As rates increase, water agencies have noticed a change in use patterns. Because there is a known correlation between price and use, agencies use rates to encourage conservation activities and to postpone the need to construct new facilities or purchase even larger quantities of imported water.

LADWP's tiered rate structure, first implemented in 1993 with assistance from a broad-based group of stakeholders, applies a lower tier block rate for responsible water use within a specified amount of water, and a much higher rate for every billing unit above this block. The higher block rate reflects the "marginal cost," or the projected cost for additional water that would be required to meet these needs.

To further emphasize the conservation message, water charges are based solely on water used. This eliminates the inclusion of fixed charges. There are automatic adjustments triggered when a water shortage exists. These adjustments are based on the actual water use patterns that occurred during the 1991 period of mandatory water rationing. The purpose of these adjustments is to use price to encourage additional conservation and to provide LADWP with the revenue necessary to operate the system efficiently during a shortage.

The combination of hardware-based demand reduction programs, education, and the use of price signals to encourage efficient water use has to date successfully maintained Los Angeles' water use to approximately the same levels seen in the mid-1980s. This achievement is made even more significant by the fact that the City's

population has increased by more than 750,000 residents since that period.

### 2.3 Best Management Practices

The California Urban Water Conservation Council (CUWCC) is the voice of urban water conservation in California, and LADWP has been active in the CUWCC since its inception in 1991. Instrumental in the development of the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU), LADWP was also one of the original signatories. The MOU identifies "Best Management Practices," or BMPs, as proven conservation measures as determined by the CUWCC. All Group One (water purveyor) signatories to the MOU are committed to implement the BMPs.



Over the last 14 years, LADWP has played a significant role in the governance and policy making at the CUWCC, holding a seat on the Steering Committee (i.e., Board of Directors), Strategic Planning Committee, By-Laws Committee, and as co-chair of the Membership Committee. LADWP also has been actively involved in all of the revisions that the MOU has undergone to date.

One of the obligations as a signatory to the MOU is to submit a Best Management Practices Retail Water Agency Report to the CUWCC. Previously submitted annually, this report is now submitted biennially and details progress in implementing the 14 BMPs as currently specified in the MOU. LADWP actively implements the BMPs and the CUWCC BMP reports are available for review through the internet by accessing CUWCC's website at [www.cuwcc.org](http://www.cuwcc.org).

In the early 1990s, the State Water Resources Control Board identified urban water conservation as a major means for resolving problems in the Bay-Delta. Large water agencies, including LADWP, actively participated in work groups to develop conservation strategies. The result of this effort is the aforementioned MOU.

The MOU commits signatory water suppliers to develop comprehensive conservation programs using sound economic criteria and to consider water conservation on an equal footing with other water management options. The MOU established the CUWCC to monitor implementation of the BMPs, and to maintain the list of BMPs.

A BMP is defined as:

(a) An established and generally accepted practice among water suppliers that results in more efficient use or conservation of water.

(b) A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation-related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

LADWP implements all of the BMP requirements in the MOU except for BMP 10, which applies only to wholesale water agencies. A listing of the 14 BMPs is shown in Exhibit 2C. Potential BMPs and other additional conservation measures that have been implemented by LADWP are shown in Exhibit 2D.

The remainder of this chapter focuses on existing and future water conservation measures in Los Angeles. Information is provided on the different categories of LADWP conservation programs, conservation measures identified in the 2000 Urban Water Management Plan that have been implemented, the current BMPs and potential BMPs as determined by the CUWCC, and funding sources that enable LADWP to implement these programs.

Exhibit 2C		
BMPs FOR URBAN CONSERVATION IN CALIFORNIA		
	PRACTICES	STATUS
1.	Interior and exterior water audits and incentive programs for single- and multi-family residential customers	Implemented
2.	Residential plumbing retrofit	Implemented
3.	Distribution system water audits, leak detection and repair	Implemented
4.	Metering with commodity rates for all new connections, and retrofit of existing connections	Implemented
5.	Large landscape water audits and incentives	Implemented
6.	High efficiency washing machine rebate program	Implemented
7.	Public information	Implemented
8.	School education	Implemented
9.	Commercial and industrial water conservation	Implemented
10.	Wholesale agency assistance program	Not applicable
11.	Conservation pricing	Implemented
12.	Water conservation coordinator	Implemented
13.	Water waste prohibition	Implemented
14.	Residential ULF toilet replacement program	Implemented

Exhibit 2D	
POTENTIAL BMPs AND OTHER CONSERVATION MEASURES IMPLEMENTED	
Direct installation of ULF toilets, showerheads, and aerators	
Public Agency Retrofits (through TAP and ULF Toilet programs)	
Large Industrial Incentive Program (through TAP)	
Industrial Cooling Water Study	
Large Industrial Incentive Program	
Ascending Block Rate Structure and other economic incentives	
Development and use of ULF toilet Supplementary Purchase Specification	
Homeowner Association Irrigation Pilot Program and Study	
Landscape Education (in English and in Spanish through Protector del Agua Program)	
ULF toilet installation on resale ordinance	
Residential Evapotranspiration-Based Irrigation Controller Program - pilot	
Toilet Flapper Study and Replacement Program	
Graywater use	
Customer class-based billing records	

## 2.4 Evaluation and Selection Criteria

LADWP develops cost effective programs to achieve multiple goals of cost-effective demand reduction, customer service, and environmental responsibility. Conservation potential is considered in determining program approach and duration. Some types of conservation programs result in savings that are more easily measured than others. Demand-side management programs, like the rebate programs for ULF toilets and high-efficiency washing machines, produce results that are measurable. Public information, education and other

general conservation awareness programs are intended to alter customers' behavioral patterns on water use, and thus are more difficult to quantify. It is such behavioral change in water use, however, that the City can point to as the primary reason for significant reduction in water consumption during drought periods.

LADWP's conservation programs generally break down into five categories: awareness/support, residential, commercial/industrial/institutional (CII), landscape, and system maintenance measures. Specific programs (past and present) associated with these categories are broken down in Exhibit 2E, and are fully discussed below.

Exhibit 2E			
Conservation Measure Categories			
BMP #	AWARENESS/SUPPORT	pre 1985	Year in Service
	<b>Pricing</b>		
4	Full Metering and Volumetric Pricing	x	
11	Sewer Charge using Volumetric Pricing	x	
11, 13	Tiered Rate Structure		
7	<b>Public Information</b>		
	Advertising	x	

Exhibit 2E (Continued)			
Conservation Measure Categories			
BMP #	AWARENESS/SUPPORT	pre 1985	Year in Service
	Bill inserts	x	
	Brochures	x	
	Community Involvement Program	x	
	Exhibits	x	
	Hotline	x	
	Speakers Bureau	x	
	ULFT Customer Satisfaction Survey		1992
	<b>School Education</b>		
	Lower Elementary	x	
	Upper Elementary	x	
	Junior High	x	
	High School in concert with the Environment - Student Home Water/Energy Survey		1994
	<b>RESIDENTIAL</b>		
2	Better Idea/Neighborhood Bill Reduction Service Program --Showerhead installation		1993
14	Community-Based Organization Toilet Distribution Centers, Direct Install		1992
6	High efficiency washing machine rebate program		1998
1	Home Water Surveys		1990
2	Retrofit Kits Distribution		1988
2	Ultra-Low Flush Toilet Rebate		1990
	<b>COMMERCIAL/INDUSTRIAL/GOVERNMENTAL</b>		
2, 9	Commercial Rebate Program		1991
9	Commercial/Industrial Conservation Guidebook		1992
9	Cooling Tower Manual and Workshops		1992
1	Interior Water Use Audits		1991
7	Targeted Literature Mailing		1993
9	Technical Assistance Program (TAP)		1991
1, 3, 5	Typical Audits		1991
	<b>LANDSCAPE</b>		
2	Large Turf Irrigation Controller Pilot Program		2000
7	Demonstration Gardens		1988
5	Improving Irrigation Performance Manual & Workshop		1993
5	Large Turf Audits and Audit Training		1993
7	Lawn Water Guide Direct Mailing (as requested)		1989
5	Protector del Agua -- English and Spanish Language Workshops		1995
5	Ten Percent Large Turf Water Reduction Program		1988
	<b>SYSTEM MAINTENANCE MEASURES</b>		
3	Cement Mortar Lining of Pipelines	x	
3	Corrosion/Cathodic Protection	x	
3	Fire Hydrant Shutoffs		1991
3	Infrastructure Program	x	
3	Meter Replacement Program		1988

Note: Department-implemented water conservation programs are overseen by a water conservation coordinator (BMP No. 12).

## 2.5 Conservation Measures - Existing and Proposed

Conservation programs can be grouped into five categories: awareness/support, residential, commercial/industrial/institutional, landscape, and system maintenance measures. LADWP's programs include traditional demand-side management measures, as well as infrastructure improvement programs that contribute to water waste reductions. Combined with LADWP's conservation pricing structure discussed in section 2.2, these programs increase system reliability and efficiency.

### Awareness/Support Measures

Awareness/support measures can be active or passive. Active components include full metering of water use, assessment of volumetric sewer charges, and a conservation rate structure. Passive components typically include providing educational materials for schools, community and customer presentations, maintaining a conservation hotline, and a wide range of information distributed through customer bills, advertising in public venues, LADWP's website, and direct mail. Passive awareness/support measures provide the foundation for conservation by raising water use awareness, water conservation program visibility, and encouraging community involvement.

Another aspect of awareness/support is that of advocacy. LADWP has been instrumental in the development of more stringent standards (Supplementary Purchase Specification) for ULF toilets that are in use within the City as well as by other water agencies in California and other areas. LADWP also assisted in the adoption of higher residential clothes washer efficiency standards by the California Energy Commission. Recognizing the importance of this activity, LADWP actively participates in advocating local and statewide conservation research and planning.



### Residential Category

Conservation programs were developed and launched during the drought of 1987 through 1992. In 1990, the ULF Toilet Rebate Program was initiated, followed two years later by the ULF Toilet Distribution Program. In 2003, a well-received free installation service component was added to the ULF Toilet Distribution Program that includes free water-saving showerheads, faucet aerators and replacement toilet flapper valves. These programs have proven to be very popular, and are the most successful of their kind in the country.

LADWP has been assisted by community-based organizations (CBOs) to reach the milestone of more than 1.24 million toilet installations to date. CBOs have been integral to LADWP's success, reaching into the communities they serve to convey the conservation message and directly undertake conservation activities. Benefits of this approach accrue to community participants through reduced water bills, to the CBOs through employment opportunities and revenues earned, and to the City through significant water savings achieved. Funded at more than \$7 million annually, the program produces estimated water savings of more than 20,600 AFY. Water savings are delivered from these toilets and other measures over time at a cost of \$315 per AF.



The High Efficiency Washer Rebate Program was initiated in 1998 and promotes the purchase and installation of high efficiency models that save both water and energy. As of 2005, more than 32,000 machines have been purchased and installed through the program. The program's minimum efficiency requirements for rebate eligibility were increased January 1, 2004, resulting in the promotion of higher efficiency models. New State efficiency standards for clothes washers are due to become effective on January 1, 2007. Continuance of LADWP's rebate

program in 2007 will be assessed prior to that time. Initial co-funding of the program was provided by the City's Department of Public Works Bureau of Sanitation (responsible for wastewater treatment), and by the Southern California Gas Company. Ongoing co-funding for the program is provided by MWD.

Since an amendment to the City's existing plumbing retrofit ordinance in 1999, all residential properties (single-family and multi-family) sold within the City must have ULF toilets and low-flow showerheads installed prior to the close of escrow. This progressive requirement is implemented with the help of local real estate professionals and is strongly supported by LADWP's toilet replacement programs. LADWP has explored the expansion of the City's Retrofit on Resale Ordinance to include nonresidential properties. However, such changes were determined to be infeasible due to concerns over the applicability of certain provisions of the Americans with Disabilities Act whereby the replacement of a toilet could trigger requirements for costly accessibility improvements.

As part of past programs promoting residential water conservation measures, students conducted home water surveys through a resource efficiency education program implemented by LADWP in Los Angeles area high schools. While water conservation curricula is still a component of the education program, local CBOs now visit many Los Angeles residences throughout the year, assessing water conservation opportunities in the home and installing applicable measures to immediately capture water savings.

Water-saving showerheads are still available to LADWP customers, free of charge, upon request. These devices supplement the over 1.5 million water conservation retrofit kits that were distributed throughout Los Angeles during the last drought. The kits included one-gallon toilet displacement bags, low-flow showerheads, and toilet leak detection tablets.



LADWP has conducted a toilet flapper valve replacement pilot program. Although long-term water savings from ULF toilets are predicated on timely replacement of leaking toilet flapper valves with appropriate replacement units, findings from the pilot program indicate

a small incidence of leaking flapper valves in toilets rebated or distributed by LADWP. However, toilet leak testing and flapper valve replacement was added to the ULF Toilet Distribution Program's installation service component for toilets not replaced through the program.

Finally, a pilot program examining the effectiveness of weather sensitive irrigation controllers in residential applications is presently underway. Information obtained from this pilot and others conducted in southern California will guide development of a long-term program to support this technology.



### **Commercial/Industrial/Institutional Category**

This category represents some of the largest volume water users in LADWP's customer base, and represents a great deal of conservation potential. LADWP, in partnership with MWD, has implemented a commercial rebate program designed specifically for customers in the CII category. In addition, packaged water use efficiency solutions are being developed for specific business sectors. Efforts are also underway to better promote the financial incentives available that make water conservation retrofits more cost effective for business and industry. LADWP takes full advantage of regional programs offered by or through MWD for the CII sector.

The Commercial Rebate Program was launched in 2001 to provide menu-based rebates for water conserving measures applicable to many types of CII facilities. The list of measures includes ULF toilets and urinals, high efficiency coin operated clothes washers, cooling tower conductivity controllers, and other devices. The program design provides for ease of participation, and has been well-received by LADWP customers. As of 2005, rebates have been paid for more than 15,500 ULF toilets and 5,600 high efficiency clothes washers through the Commercial Rebate Program.

The Technical Assistance Program (TAP) was created in 1992 to provide incentives for retrofitting water-intensive equipment. Different from the Commercial Rebate Program, the TAP encourages site-specific projects and TAP incentives are based on a given project's water savings. The estimated unit cost for TAP overall is about \$315 per AF saved.



Cooling tower (pictured) water use represents a significant water conservation opportunity, and cooling tower projects are funded through TAP. Through a cooling tower controller upgrade and enhanced water treatment, a typical cooling tower project can save one million gallons of water annually. TAP incentives are available and have been paid for such projects through LADWP.

Another promising technology funded through TAP is an x-ray processor recirculation system. Described in the 2000 Water Plan, a single recirculation system can save one million gallons annually and a typical hospital may have as many as 15 processors. As a result of a Proposition 13 Water Use Efficiency grant awarded to LADWP and the San Diego County Water Authority (in

partnership), 250 x-ray processor recirculation systems (such as one shown below) will be installed free of charge in medical facilities in Los Angeles.



### Landscape Category

Recognizing that a substantial amount of water is used outdoors for irrigation, LADWP continues to invest in landscape irrigation efficiency programs and projects.



In 1988, the City passed a plumbing retrofit ordinance that included a requirement for LADWP customers with three acres or more of turf to reduce consumption by 10 percent from 1986 levels or face a 100 percent surcharge on their water bills. To help these customers comply with the ordinance, LADWP has sponsored free training courses specifically targeting the City's large turf customers. To further assist this group, LADWP developed a guidebook, "Improving Irrigation Performance" to demonstrate ways for enhancing existing irrigation systems.

LADWP has also sponsored conservation and garden expos to highlight various aspects of efficient outdoor water use and planting practices, and emphasizing native, drought-tolerant plants. Funding was provided for three demonstration gardens to showcase the use of drought-

tolerant plants and flowers, including the landmark Lummis Home in Highland Park. Lawn watering guides were mailed to all single-family and duplex residences. Planting guides for native and drought-tolerant plants are also available upon request. Additionally, to demonstrate the beauty and appeal of a water-conserving landscape, LADWP's John Ferraro Building facility (below) has a drought-tolerant garden that is open to visitors year-round.



The City's Landscape Ordinance (No. 170,978) became effective in May 1996 and includes requirements for water management and irrigation specifications, planting techniques, plant materials, and source reduction of waste. The City adopted this ordinance to comply with the California Water Conservation in Landscaping Act (AB325).

LADWP contributed to the work of the state's Landscape Task Force (established through AB 2717), serving as co-chair of the Economics Workgroup. Among the recommendations approved by the Task Force are incentives and disincentives for landscape water use, and water budget based rates as well as other effective rate structures. The subject of water rates was referred to the CUWCC for consideration under a revision to BMP 11, conservation pricing. The work of the Task Force offers significant potential for further landscape water use efficiency statewide.

Landscape irrigation improvement projects are currently funded through the TAP, with incentives calculated on the basis of a project's water savings. LADWP staff includes

certified landscape auditors, and large landscape audits are available upon request.

LADWP is also investigating new programs using data obtained through pilot program efforts. A recent pilot program was conducted to determine the effectiveness of weather sensitive irrigation controllers in large landscape applications. This technology was shown to save, on average, one acre-foot of water per acre controlled per year. Additional efforts are being undertaken to make available a landscape irrigation education program for homeowner associations and other large landscape customers. This program would focus on common green areas in multi-unit complexes to improve irrigation efficiency, including irrigation system maintenance and repair, and plant selection. LADWP will continue to study smart irrigation controllers with a goal of developing a financial incentive program to expand their use.

There is also potential for the use of non-potable water for irrigation, which can help extend the utility of the City's traditional water supplies. Through recycled water, increased stormwater capture, and groundwater recharge with captured storm and irrigation runoff, imported surface water and local groundwater used for landscape irrigation can be conserved. The potential to use such non-potable water supplies is further discussed in the Water Recycling and in the Beneficial Reuse of Urban Runoff sections (Chapters 3 and 5, respectively).

Innovative ways to conserve water for landscape use has also been implemented within the City through the work of TreePeople, who has partnered with various City departments, including LADWP, through programs such as Cool Schools and the Open Charter Stormwater Project.

The Open Charter Elementary School Stormwater Project is one of several stormwater management systems that TreePeople has established in Los Angeles over the past six years that include: a 250,000-gallon underground cistern in Coldwater Canyon Park, a retrofitted home in

South Los Angeles, a 7,600-square-foot infiltration field at a Pacoima elementary school and, with the County Department of Public Works, a 2,700-acre watershed retrofit in Sun Valley. These activities create the foundation that will lead to further landscape water conservation to preserve the City's limited water supplies.

### System Maintenance Category

Maintaining system infrastructure reduces water waste and allows for greater water accountability. Infrastructure maintenance is a high priority for LADWP. On-going programs such as pipeline replacement, pipeline corrosion control, and cement lining not only preserve the operational integrity of City water facilities, but also reduce unaccounted water losses.

In 1940, LADWP started a cement-mortar lining program for its older pipelines. At one-third the cost of replacement, pipes are rehabilitated through cleaning and lining with cement mortar which reduces water loss, prevents corrosion build up and improves water flows and water quality. By 2005, almost all of LADWP's 7,200-mile pipeline distribution system will be lined.

LADWP has made significant progress in replacing and/or retrofitting water meters through its meter replacement program that started in 1988. As water meters age, they typically begin reading less than 100% of their intended accuracy. The meter replacement program has been valuable in maximizing the accuracy of the approximately 700,000 meters within the City.



Water Meter

## 2.6 Funding

More than \$164 million has been invested in water conservation since 1991. Conservation is the cornerstone of LADWP's water demand management activities and ongoing investments will be made in viable programs. This commitment is subject to funding availability and LADWP's ability to implement such programs. Outside resources for funding are sought to complement the City's resources. A stronger commitment is also being made to acquire outside grant funding for City conservation projects.

Currently, the funding sources for conservation are:

- **Water Rate Adjustment** - An adjustment factor to fund both water conservation and recycling projects is part of the City's water rate structure. This adjustment pays for both programs and adds 25 cents per month to the total bill for typical customers.
- **MWD Conservation Credits Program** - MWD offers rebates to member agencies that promote water conservation through the installation of specified conservation measures. The rebates equate to \$154 per AF of water saved, or half the project cost.
- **Grant Funding** - LADWP has successfully received grant funding from the State under Proposition 13. A grant for \$615,000 supplemented the rebate funding available for commercial ULF toilets and high efficiency clothes washers. A second grant for \$623,500 will promote the installation of x-ray processor recirculation systems, funding that will be shared equally with the San Diego County Water Authority (LADWP's project partner). LADWP was awarded three grants in 2005 under Proposition 50, and will continue to participate in the competitive grant funding process.

In addition, \$5 million has been appropriated under the Environmental Water Fund (AB444) that provided money for projects with water savings that enable an equal amount of water to remain in the Mono Basin.

## 2.7 Demand Hardening

Although LADWP regularly assesses new water conservation opportunities, conservation programs may, at some point in time, have a diminishing impact on a customer's ability to further conserve water, in particular during short-term water supply shortages caused by droughts or other emergencies. This phenomenon is known as "demand hardening." The California Urban Water Agencies defines demand hardening as, "the diminished ability or willingness of a customer to reduce demand during a supply shortage as the result of having implemented long-term conservation measures." Long-term conservation measures can include hardware conservation measures, such as the installation of ULF toilets and behavioral conservation, such as watering during specified periods of the day.

Demand hardening can occur when options available for reducing water use are narrowed as the customer base is saturated with hardware conversions causing efficient water usage patterns to prevail. The impact of demand hardening can be most prevalent during water supply shortages where customers have already been implementing long-term water conservation measures.

However, it can be argued that hardware-based conservation devices will continue to be developed and piloted, such as the previously discussed weather sensitive irrigation controllers, thus improving the ability to further conserve in the future. During droughts, consumers will respond to the call for more conservation by behaviorally adjusting their water use. Additionally, full saturation of current conservation devices has not occurred, and there is still a significant potential in the landscape sector. For these reasons, others believe demand hardening is irrelevant and there is a continued need for aggressive conservation programs.

Full implementation of current conservation measures, including reducing leaks, has the potential to reduce per capita water demands even further. Past water conservation efforts have reduced water use within LADWP's service area even though the population has continued to expand as illustrated in Exhibit 2A. It is expected that future water conservation efforts will continue this trend as increased saturation of water saving hardware devices occurs and new hardware devices are developed.

LADWP will continue to develop and pilot test hardware-based conservation devices (such as the previously discussed weather-sensitive irrigation controllers) to improve the ability to further conserve in the future. These pilot tests, combined with continued implementation of conservation programs, will maximize water use efficiency within the City.