City of Phoenix

Background
The city of Phoenix is the county seat of Maricopa County and has an estimated population of 1,575,423 residents.* Phoenix provides water service across a 546-square-mile area within the Salt River Valley and Gila River Watershed and is the largest water provider in the state.

Phoenix is located in the Basin and Range physiographical province. It has an annual average precipitation of 7.66 inches, with average summer highs near 106 degrees (°F) and winter lows around 44 degrees (°F).†

Water Supply and Deliveries
The city of Phoenix maintains a diversified water source portfolio and has significantly reduced its reliance on groundwater in order to comply with the Phoenix Active Management Area’s goal of achieving safe yield by 2025. In 2008, local surface water from the Salt River Project (SRP) and imported water from Central Arizona Project (CAP) made up the vast majority of Phoenix’s supplies. Almost half of all water in the city was delivered to single-family residential accounts in 2008, a substantial amount was provided to commercial customers, and approximately 5% of the water supply was lost or unaccounted-for.

Per Capita

The city of Phoenix significantly and consistently reduced its gallons per capita per day (GPCD) water use from 2003 through 2008 across all metrics: single-family residential (-14.0% change), system-wide potable (-12.0% change), and system-wide total (-15.3% change).

<table>
<thead>
<tr>
<th>Phoenix GPCD</th>
<th>2003</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family Residential</td>
<td>143</td>
<td>134</td>
<td>123</td>
</tr>
<tr>
<td>System-Wide Potable</td>
<td>197</td>
<td>189</td>
<td>173</td>
</tr>
<tr>
<td>System-Wide Total</td>
<td>217</td>
<td>204</td>
<td>184</td>
</tr>
</tbody>
</table>

* Treated water deliveries to single-family accounts ÷ single-family residential population
* Total treated water delivered ÷ service area population
* Total raw water from all supply sources + direct effluent use ÷ service area population

Rate Structure

The city of Phoenix uses a flat fee for individual residential water accounts inside the city that includes 6 Ccf of water from October to May, and 10 Ccf of water from June to September. Water use in excess of the amount included with the flat fee is charged according to a fixed rate, which varies depending on whether water use occurs during a “high,” “medium,” or “low” month (medium months are not shown below).

<table>
<thead>
<tr>
<th>Low Months (Dec, Jan, Feb, Mar)</th>
<th>Usage Per Dwelling Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 4,488 gallons (&gt; 6 Ccf)</td>
<td></td>
<td>$2.18 per 748 gallons (per Ccf)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Months (Jun, Jul, Aug, Sep)</th>
<th>Usage Per Dwelling Unit</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 7,480 gallons (&gt; 10 Ccf)</td>
<td></td>
<td>$3.51 per 748 gallons (per Ccf)</td>
</tr>
</tbody>
</table>

Residential accounts have a base service fee of $4.64 (for a 5/8” meter) and an environmental charge of $0.40 per 748 gallons (per Ccf). The base fee represents 18% of the average customer’s monthly bill for 10,000 gallons during the low season, and 21% for the high season. For low months, the slope of Phoenix’s average price curve is 0.0123, indicating that the average price of water increases as consumption increases. For high months, the slope of the average price curve is 0.0444, indicating a more substantial increase in the price of water as consumption increases.

Conservation Measures

The city of Phoenix is regulated as a large municipal provider under the Total GPCD Program in the Phoenix Active Management Area. The city does not have plans to transition to a different regulatory program and is currently in compliance with Total GPCD requirements set forth in the third management plan.

Customer Rebates

Residential Interior Retrofit Program – Low-income homes are retrofitted with high-efficiency fixtures and the irrigation system is evaluated for leaks.

Water Resource Acquisition Fee Credits* – Credits toward water resource acquisition fees are available to new residential and commercial developments when it is demonstrated that conservation savings exceed current standards and conservation savings are long-term. (Implementation of this program has been delayed due to state law establishing a moratorium on changes to impact fee programs.)

Ordinances/Rules

Permit Required for New Turf-Related Facilities† – Further use of potable water for landscape irrigation at new turf-related facilities is contrary to the city’s policies of water conservation. A permit is required for landscape irrigation at a new turf-related facility.

Limitations on Water Use for Turf-Related Facilities‡ – Beginning on January 1, 1992, when applying water from any source to its water-intensive landscaped area, a turf-related facility shall not use an amount greater than its applicable maximum annual water allotment, as determined in accordance with the Phoenix Municipal Code.

† Id. § 37-113.
‡ Id. § 37-110.
Limitations on Water Use* – Beginning in 1992, water supplied by the city of Phoenix to a customer shall not be used for the purpose of watering landscaping plants within the following areas unless the landscaping plants are low-water-use plants: (1) any publicly owned right-of-ways; and (2) areas located between the right-of-ways. Single-family or duplex dwellings are exempted.

Landscape Architecture† – Low-water-use plants that reflect and enhance the image of the Sonoran Desert should be used. No more than 50% of the landscaped area at maturity or 10% of the net lot area, whichever is less, should be planted in turf or high-water-use plants. Functional turf areas (parks, schools, single-family common areas, etc.) are exempted.

Site Design/Development, Desert Preservation‡ – Development should minimize the removal of existing healthy Sonoran Desert vegetation in accordance with city's Native Plant Preservation Standards. If removal is necessary, mature trees and cacti should be salvaged and utilized on site.

Escape of Water Prohibited§ – It is unlawful for any person to willfully or negligently permit or cause the escape or flow of water from any source in such quantity as to cause flooding, impede traffic, create a hazardous condition, create a threat to public health and safety, or cause damage to public streets.

Waste of Water; Failure of Consumer to Make Repairs to Pipes, Valves, and Fixtures¶ – Owners of property served by city water are responsible for all leaks, or damages on account of leaks, from the service pipes leading from the consumer's side of the meter to the premises served. Every consumer shall at all times maintain in good repair all his water pipes, faucets, valves, plumbing fixtures, or any other water appliances, to prevent waste of water.

Education

Customer Messaging – The city distributes bilingual conservation information through its water conservation website, the city's Channel 11 WaterWorks program TV station, nurseries, customer pay stations, and water bill messages sent to the more than 350,000 residential accounts. Approximately 10% of the city's literature is distributed in Spanish.

Free Bilingual Water Conservation and Drought Brochures – Homeowners are provided landscape and irrigation materials in English and/or Spanish.

AMWUA Membership – As a member of Arizona Municipal Water Users Association, Phoenix participates in the “Water — Use It Wisely” messaging campaign, SmartScape Training Program, outreach at tradeshows and conferences, and the distribution of AMWUA brochures, such as “Landscape Plants for the Arizona Desert” and “Watering by the Numbers.”

EPA WaterSense Program – Phoenix is a WaterSense promotional partner and promotes the WaterSense program through its website and via special campaigns, such as “Fix a Leak Week.”

Community Outreach – Phoenix sponsors community and public/private events, such as “Keep Phoenix Beautiful Earth Day” and the Statewide Water Conservation Information Sharing Group. The city also participates in sponsoring, planning, staffing, and providing speakers for local landscape professional conferences, like the Arizona Nursery Association Southwestern Horticulture Annual Day of Education for landscape professionals.

High-Water-Use Complaints – Customers with larger than expected water bills can receive assistance from a city team that performs a site inspection, diagnoses the issue, and provides water conservation materials.

Classroom Programs – Phoenix provides Project WET training for classroom teachers in grades preschool through 12. Four curriculum guides are offered, including two with foci on the Colorado Watershed, which covers most of Arizona, and Arizona water conservation. The city also provides assembly programs and classroom materials about water conservation, water quality, natural resources, and the environment.

* Id. § 37-111.
† Id. § II(A)(3).
§ Id. § 23-33 (2009).
¶ Id. § 37-27.
Implementation of Conservation Measures

Approximately 300 low-income homes in the “Weed and Seed” neighborhoods are retrofitted with water-efficient fixtures each year. On average in 2008, 1.13 toilets, 0.37 faucets, 1.37 aerators, and 0.71 showerheads were replaced per home. In addition, 89% of homes received irrigation system advice.

Phoenix’s AMWUA membership has produced several quantifiable results, including the training of 60 landscape professionals through the SmartScapes program, and the following statistics for the “Water—Use it Wisely” campaign:

- 120 TV spots creating almost 6,000,000 TV impressions
- 24 billboards in weather reports
- Three live segments on Arizona Midday
- More than 3,250,000 print impressions
- Nearly 1,500,000 online impressions

Phoenix was also active in classroom education over the past year, training 178 teachers in four different courses, who then utilized the program with more than 15,000 students. Assembly programs reached an additional:

- 18,109 students through 84 H2O Magic performances
- 6,261 students through 100 Great Arizona Puppet Theater performances
- 16,371 students through 51 Childsplay performances
- 480 students through four school-based water festivals

Furthermore, Phoenix is conducting an ongoing study of in-home water use, focusing on the age of a home compared to upgrades in technologies, such as replacement of toilets and showerheads, use of smart irrigation techniques, and other water use areas, in order to assess conservation potential. Preliminary results show high penetration rates for low-flow toilets and low-flow showerheads (74% and 89%, respectively) for all homes in Phoenix. Much lower penetration rates have been measured for high-efficiency clothes washers and high-efficiency dishwashers (23% each). The study also suggests that turf landscaping has decreased over the past few decades, with 70% of homes built before 1994 using turf and about 50% of homes post-1994. Overall, technology upgrades have the lowest penetration for homes built between 1955 and 1984 and the highest rate for homes built after 2004.

Funding for Conservation

Phoenix’s water conservation division is housed within the Water Resources and Development Planning Department. In 2008, this department had a budget of $1,750,136, approximately 0.7% of the total water utility’s budget. Five employees worked in the department, with six positions left vacant. Each year, the city spends about $1.17 per customer on conservation efforts.

Water Loss

In 2008, Phoenix recorded 15,923 AF (5.2 billion gallons) of water loss, representing 5.1% of total supplies. This is the lowest water loss reported for the years of data collection (’03, ’07, ’08).

Supply-Side Efficiency Measures

The city practices an active leak detection program, tailoring the approach to the size and type of pipe being assessed. For large mains, a noise sensor attached to a small parachute is drawn through the pipeline in the direction of the flow of water. The sensor detects noise created by a leak, the location of which is then correlated to a position on the surface where to dig down and make the repair. In most cases, crews locate leaks through traditional acoustic methods, e.g., placing specially designed microphones on valves, water meters, and other appurtenances and listening for the distinctive sound a leak makes.

Initial results from the leak detection program show that the most common leak sources are fire hydrants. As this program ramps up and gains additional data, more quantitative analysis will be performed.
**Effluent Use**

The city of Phoenix generated 200,453 AF of effluent in 2008. This total includes all effluent from the 91st Avenue wastewater treatment plant, which receives wastewater from the Sub-Regional Operating Group (SROG) cities: Glendale, Mesa, Phoenix, Scottsdale, and Tempe. Almost 60,000 AF of this effluent is delivered directly to the Palo Verde nuclear power plant and 28,200 AF is delivered to the Buckeye Irrigation District, but these deliveries are made by the SROG cities as a whole, not just Phoenix. The city of Phoenix delivers approximately 1,600-1,700 AF of effluent for direct uses, which primarily is used by turf facilities located throughout the city.

Phoenix also participates in a three-way exchange with 30,000 AF of effluent. In the exchange, the city delivers effluent to the Roosevelt Irrigation District (RID) instead of RID locally pumping groundwater with even higher salinity than the effluent. Salt River Project then pumps RID’s groundwater for its deliveries, which include up to 20,000 AF to Phoenix and 10,000 AF to the Salt River Pima Maricopa Indian Community (which Phoenix may use if that Indian community does not).

The remaining effluent (approximately 80,000 AF) is mostly consumed by the Tres Rios Wetlands and other agricultural uses downstream from the 91st Avenue plant.

**Additional Information**

Phoenix continuously supports efforts, and may begin playing a larger role at the national level, to develop and improve efficiency standards for plumbing, fixtures, and irrigation systems, and to improve education and marketing in the water conservation sector. As one example, the city is conducting an efficient technology integration study to evaluate the natural rate that efficient technology is integrated and the impact new technology is having on water demand and wastewater generation.