

# *Metering of Individual Units*

## **Metering of Irrigation Use and Individual Dwelling Units at Apartments, Condominiums, Townhouses, Mobile-home Parks, and Commercial Facilities**

From a water management perspective it makes sense to meter as many end uses of water as practical. This includes separating and metering irrigation use from other uses since efficiency standards can be established for landscapes based on irrigated area. That said, this discussion focuses on the metering of individual dwelling units at commercial and multi-family properties since it is important to understand many of the issues involved before implementing an expanded metering program targeted for this sector.

Most water providers currently bill apartments, condominiums, townhouses, mobile-home parks, and commercial properties through one or several master meters. Charges for water are allocated and included in the occupants' monthly rent. Occupants do not receive a water bill from the water provider directly. This practice provides little or no financial incentive to use water efficiently or to report leaks. The effects may be exacerbated during water shortages, when requests by the water provider to curtail usage are not directly conveyed to the occupants or can be easily dismissed.

In many large urban areas, much new residential construction is projected to be multi-family (MF) buildings. If new MF buildings continue to be master-metered and charges for water use allocated, a growing percentage of the urban population will not be directly metered and, therefore, not directly responsible for their own water use. By 2040, this condition may apply to as much as 30 to 50 percent of urban end users of water.

Because these practices neither promote conservation nor provide for awareness of water use and responsibility, water providers may wish to implement a program to meter individual units in new MF and commercial properties to capture the water-saving benefits. One state now requires all new apartments, condominiums, and mixed-use units to be plumbed for meters, and proposed local regulations would require water billing in new apartments and mixed-use buildings to be based upon actual metering and not allocation.

Metering that occurs downstream of a master meter is referred to as "submetering." Programs to meter individual units are not considered submetering if no master meter is used.

*Much of the benefit to metering of individual units in multi-family dwellings and shared business spaces has to do with making tenants aware of their resource use and, therefore, having them assume responsibility for conservation.*

## *Water Savings and Other Benefits*

A national study on submetering and allocation programs conducted in 2004 found 15 percent water savings (8,000 gallons per dwelling unit) and 21 percent indoor energy savings associated with submetering by third-party billing entities (non-water providers) at existing MF buildings. In new construction, the savings is estimated to be approximately 6,000 gallons per dwelling unit, due to the installation of water-efficient fixtures required by the plumbing code. At sites where the occupants also have some landscaping, such as condominiums, townhouses, and mobile-home parks, the water savings is estimated at 20 percent.

Benefits to the property owner include not having to pay or divide up the water bill and controlling water (and wastewater) costs that are typically exceeding the rate of inflation. The benefits to the occupants are the water (and energy) savings and paying only for the water they use. The water provider will benefit through reduced operating costs and, due to direct pricing signals, the potential for better response in water-shortage emergencies.

Metering other end uses at MF and commercial properties, such as landscape irrigation and cooling-tower make-up and blowdown, also has benefits. Metering landscape irrigation allows for water budgets that can benefit both the water provider and the property owner. A growing trend is for water providers to require developers to install separate meters for irrigation in order to manage irrigation water use. California now requires separate metering of new properties with 5,000 square feet or more of landscaping.

Installing meters on individual units in commercial buildings can benefit customers where, in some cities, they are not charged wastewater fees for evaporated water from cooling towers if the cooling-tower make-up and blowdown water are metered. The same meters can be used to determine cooling-tower cycles of concentration, so operating improvements can be made. Commercial properties typically having only one meter serving multiple occupants include:

- mixed-use facilities with, for example, retail on the first floor and condos or apartments on the upper floors
- shopping and business centers
- airports that have restaurants and other vendors
- marinas

## **Metering, Billing, and Other Issues**

### *Plumbing Configuration*

A building's height and water-heating system usually determine its plumbing configuration. For example, if each unit in a building has a water heater, each unit can be served by one cold-water line. This means that just one meter is needed to record all of that unit's water use. However, in buildings with a common water heater (boiler), each unit is served by two water lines: one for cold water and one for hot water. Thus, two meters are needed to record all the water use in that unit. This makes metering much more expensive, since not only are two meters needed, but also a meter approved for up to 250° F is needed for the hot-water line. Such meters cost approximately \$100 more than cold-water meters. Alternatively just the cold-water line into each unit might be metered, and occupants may be billed for only the cold-water use, which is estimated to be 70 percent of the total. The cold-water line entering the boiler would be metered and the property owner billed for that use. Thus, all use on the property can still be metered using cold-water meters.

## *Meter Location*

Water providers can require MF buildings to have a water meter installed for each unit. For most MF buildings up to three stories, meters can be clustered outside the building at or near ground level or in a vault. For buildings higher than three stories, it is not practical to have meters placed on the ground level, since that would require placing numerous water lines in the walls in long runs up to each floor. An alternative is to install meters in utility rooms on various floors. For example, in a 12-story building, banks of meters could be installed outside the building at ground level to serve the first three floors and in utility rooms on the 5th, 8th, and 11th floors (with each utility room having a bank of meters serving three floors). The meters could then be monitored using remote-read technology. If a water provider were responsible for the meters and the reading-and-billing program, it would need to address meter-accessibility (for meter servicing and turning meters on and off) and liability (leak) issues. For example, all utility rooms should have floor drains in case of leaks. The costs to the developer/owner to meter occupants in buildings higher than three stories will increase by approximately \$300 to \$400 per dwelling unit over three stories or less due to the issues cited above.

## *Administration*

While it is assumed that the water provider will administer an expanded metering and read-and-bill program targeting this sector, it may not always be the case. However, since third-party billing is primarily unregulated in many regions, if a third party administers a program, the water provider should adopt appropriate regulations governing billing services. These should address bill format and information provided, prohibiting resale of water at a profit, level of service charges, late fees, complaint resolution, level of customer service, etc., unless applicable regulations have already been adopted at the county or state level.

## **Mixed-Use Development, Business Centers, and Malls**

Many mixed-use buildings being developed today have businesses on the first floor and condominiums or office space on the upper floors. Submetering, with billing based upon actual water use, is much more equitable for customers in such buildings, where water usage can vary greatly among tenants.

At master-metered business parks and centers, it may be difficult for source-control representatives to determine the type of business in each space. This may lead to unmonitored and unregulated discharges and lost discharge fees. Therefore, another benefit of metering individual units/spaces at business parks is better regulation of wastewater discharges that may not otherwise be detected. Requiring individual water meters for these occupants could eliminate or reduce these issues, especially if there is communication between the water provider and the wastewater authority.

### **Cost-Effectiveness Analysis**

Program costs and benefits can be assessed from four perspectives:

- the builder/owner
- the water provider
- the occupant
- the community

It is usually more cost-effective to meter individual units in buildings of less than four stories because the meter can be located outside the building at ground level. It is also more-cost effective, in terms of

capturing water savings, to meter those units (condominiums, townhouses, mobile-home parks) where the occupant is also responsible for outdoor irrigation.

#### *Builder/Owner*

The cost of requiring the owner to meter new construction can vary considerably and is estimated at \$100 to \$500 per dwelling unit, considering space for the meters, their installation, and meter-reading equipment (if appropriate), the potential need for utility rooms, and the type of meter-reading program and its associated hardware/software. These costs could be partially or totally offset by connection-fee (also known as a system-capacity charge) credits due to projections of lower water use related to the metering program.

#### *Occupant*

Occupants save on both water and energy use. Average water savings is estimated at 15 percent and average energy savings at 21 percent. The value of these savings will vary from region to region depending upon water and energy costs. However, these may be partially or completely offset by service charges associated with the cost of the metering program.

#### *Water Provider*

The water provider will realize various benefits through certain avoided costs (reduced operating costs and potentially reduced capital costs). Water-provider costs are passed on to end users through the water rates in service and volume charges.

#### *Community*

From the community perspective, program benefits (including customer water and energy savings, the utility's avoided costs, and improved water-consumption-management capability for the utility during water shortages) approximately equal program costs (meters, meter installation, reading and billing, and customer service). Community costs and benefits, while roughly estimated to be about equal, are dependent upon a number of variables, such as the value of the saved water to the utility, the cost of the metering program, and the value of improved response from this sector during a water-shortage emergency. These need to be assessed for merit by each water provider.

## **Recommendations**

### *Proven Practices for Superior Performance*

- Incorporate meters in new cooling-tower installations to measure make-up and blowdown water.
- Install separate irrigation meters for irrigated landscapes of 2,500 square feet or more.

### *Additional Practices That Achieve Significant Savings*

- Meter individual units in new apartments, condominiums, townhouses, mobile-home parks, and mixed-use buildings of less than four stories.
- Meter individual units at commercial centers.

## **References**

Aquacraft. 2004. **National Multiple Family Submetering and Allocation Program Study**. [www.aquacraft.com/Projects/submeter.htm](http://www.aquacraft.com/Projects/submeter.htm).

City of Austin, Texas. December 16, 1999 (adopted). "Installation of Water Meters," Section 2.3.3. **Water and Wastewater Criteria Manual**.

City of Austin, Texas. May 3, 2007. **Water Conservation Task Force Water Conservation Strategies Policy Document**, Recommendation IN-2, p. 10.

East Bay Municipal Utility District. September 2006. **Metering Program for New Non-Single Family Dwelling Units: Findings, Conclusions, and Recommendations**.

Miami-Dade County Consumer Services Department. 1996. **Miami-Dade County Water Remetering Ordinance**, 96-137.

Texas Commission on Environmental Quality. April 13, 2005 (adopted). "Utility Submetering and Allocation," **Utility Regulations**, Chapter 291, Subchapter H.