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The Quiet Hero – the Water Meter

Urban water efficiency programs and policies, implemented over the past 25 years, have resulted in lower per capita water use across the US, extending water supplies and reducing infrastructure costs. The United States Geological Survey (USGS) water use statistics have documented dramatic reductions in municipal water withdrawals over the past 15 years. These important changes in water demand were made possible by a humble and somewhat mundane measurement device – the water meter; this singular device, in conjunction with policies that require all water customers pay for what they use, is the catalyst for recent reductions in water use. The water meter is the quiet, but essential hero of urban water management.

Humans have managed water as a limited resource to be carefully and equitably apportioned and paid for since the beginning of public supply. Precise water apportionment and measurement procedures have been central to the provision of public water supply for more than 2,000 years as documented by the brilliant Roman engineer Frontinus. The AWWA M6 Manual, Water Meters—Selection, Testing, and Maintenance (5th ed.) notes that it, “took thousands of years for the science of water supply and distribution to reach its present state” (AWWA 2012).

The “present state” almost always includes a water meter at every service connection which is used to bill the customer for the volume of water used. The fact that water is accurately measured in a timely fashion by the water utility engenders consumer confidence and enables reliable revenue collection, a win-win situation. Meter accuracy and reliability has enabled water utilities to implement more effective water rate structures where the price of water increases as usage increases, thus incentivizing efficiency.

Ensuring each water meter is right-sized represents an on-going challenge in the water industry. Properly sized water meters allow for full and accurate revenue recovery for the utility through its chosen rate structure. An accurately sized meter delivers satisfactory water service and pressure to end users and ensures customers only pay for the water they use. Inaccurately sized water meters, either too big or too small, can create financial and maintenance problems.

Modern fixtures like toilets and faucets have gotten substantially more efficient due to state plumbing codes and efforts to get useful information from the meter. Traditionally water meters are “out of sight, out of mind,” located in a meter box or pit at the street or in the building basement. As droughts and water supply shortages were confronted in the late 20th century, some water utilities began encouraging their customers to finally take full advantage of water meter information for more effectively managing irrigation, eliminating waste, identifying abnormal usage, and lowering water bills through reduced consumption. The potential is significant, but the utility investment is substantial so it will likely take 10 to 20 years to complete this transition as water utilities slowly modernize metering systems.

The value of metered consumption data is further enhanced by pairing water consumption with information such as the number of residents or customers, size and description of the landscape, water using fixtures and practices. These data enable the efficiency of water use to be quickly and effectively evaluated. This information becomes particularly important during drought, when supplies and demands must be managed carefully.

We all know the saying, “you can’t manage what you don’t measure,” and the truth is water has been managed for thousands of years using measurement devices of ever increasing complexity and accuracy. The Romans carefully managed the aqueduct supplies just as modern water utilities carefully manage surface and groundwater resources.

Over the past 25 years, for the first time in US history, per capita water use and total withdrawals have measurably declined, saving billions of dollars in avoided infrastructure costs. The accurate measurement of water use has played a quiet but essential role in reducing urban water demand and helping manage our water resources to this new level of efficiency. As we confront the water supply challenges of the next 25 years, the trusty water meter will be right there to help manage through good and bad times with maximum efficiency and accuracy.

Peter Mayer is a professional engineer and expert in urban water management. He is vice chair of the American Water Works Association Customer Metering and Practices Committee. He is a four-time winner of the AWWA and American Society of Civil Engineers Journal “Best Paper” awards, and a regular contributor to the AWWA Journal.