by Fabian Papa

Water Loss = Money Loss

While the title of this article presents an obvious truth, many owners and operators of water supply and distribution systems – typically municipalities (or municipally-owned utilities) – continue to host a vast amount of potential savings, in both financial and environmental terms, that are effectively trapped from becoming realized. What's more is that the value of these unrealized savings has been, and continues to be, increasing with the rising costs of both water and energy. Stricter attention to controlling water losses can yield substantial short- and long-term benefits to a municipality including:

- reduced costs for water purchased or produced;
- increased servicing capacity for development;
- reduced water and carbon footprint;
- improved budget predictability;
- improved control of tariff increases; and
- increased revenues.

In this article, each of the above avenues is explored with respect to how they work to improve the drive towards sustainability in our municipalities.

Taking a Closer Look

While the objective ought always to be that of operating our water systems efficiently and taking a close look at the accounting of water into and out of the system (or water balance), it is not uncommon to see municipalities claiming that their systems are "tight" and not subjecting themselves to rigorous analysis. This is somewhat natural and can be likened to the relationship between a patient and a doctor: a regular and rigorous analysis of our water balance is tantamount to undergoing an annual physical. We know it is a good thing to do, yet many of us are reluctant to go, perhaps fearful of what we might learn. However, if one doesn't look, one cannot find or, as Galileo Galilei aptly put: "All truths are easy to understand once they are discovered; the point is to discover them." (The section below titled "Tangential Benefits" illustrates this point, based on a real example.)

Reducing costs

Municipalities that provide water supply and distribution services to their citizens and businesses pay for the water used in their systems through some combination of self-production and bulk purchases from an external supplier. The customers are then billed for the water they use, either through metered or non-metered payment structures.

For municipalities that purchase most or all of their water from bulk suppliers, the business cases to advance their water loss reduction practices are often significantly compelling (if not blatantly obvious). Furthermore, the movement in recent years towards full cost pricing has begun to remove distortions in economic analyses and acted to cast the appropriate light on the need and economic benefit of water loss monitoring and control programs.

Increasing servicing capacity

In the past 10 to 15 years, several municipalities in the rapidly growing Greater Toronto Area (GTA) area have faced significant restrictions on their rate of development as a result of insufficient servicing capacity. This has restricted the supply of housing available, which in turn has contributed to increased prices, as well as hampered economic development. To further exacerbate the problem of affordability, some of the solutions applied to capacity challenges have involved large expenditures of capital, resulting in increased development charges. Identifying and controlling water losses is often one lever that can be used, in conjunction with other measures such as conservation, to defer capacity expansions by making more efficient and productive use of existing infrastructure. In fact, it is often a far more economical and effective lever than some of the other measures.

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Reduced water and carbon footprint

It is fairly obvious that controlling the loss of water has several environmental benefits, and it is simply good practice to make wise use of a valuable resource of which many Canadians enjoy an abundance. What is perhaps less obvious is the positive impact that controlling water loss has on energy conservation. A tremendous amount of energy is needed to produce, transport, and deliver good quality water at usable pressures in a reliable manner. Treatment, pumping, and related activities all consume energy. Thus, reducing water loss carries the benefit of reducing energy consumption as well.

Improved budget predictability

It is not uncommon for municipalities to be hit with "surprises" that materially affect the variances in approved budgets and are a source of angst. A well-monitored water distribution system can greatly assist in understanding the nature of flows throughout the system, improve the predictability of water purchases and sales (i.e., consumption), and identify opportunities for preventative maintenance – all of which help reduce variances in the budget. In addition, it can generally be said that many municipalities across Canada stand to benefit from improved metering of flows within their systems; many municipalities simply do not have system meters (rather than customer meters) installed. As a result, they cannot effectively understand the performance of localized zones within their system.

Improved tariff controls

The financial burden imposed by water loss is typically felt in the following ways:

- upward pressure on tariffs; and/or
- downward pressure on operation and maintenance expenditure (and, hence, level/quality of service).

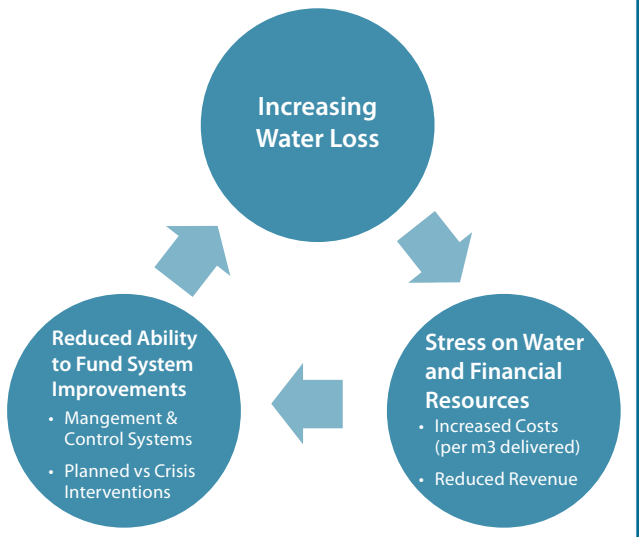
Both of the above are undesirable mechanisms to balance the financial impact of water loss and should be mitigated. The reality of many of our infrastructure systems is that they are generally approaching the end of their service lives and that these systems will continue to deteriorate. The pipes are getting older, and the extent to which they leak will invariably increase. While the period since World War II was one of impressive growth and construction, the next phase of handling our infrastructure systems will largely be characterized by their intelligent management and operation. Carefully monitoring and managing our water systems will help us avoid the dangers of the vicious circle associated with uncontrolled increases in water loss rates (see Figure 1).

Increased revenues

Although related to non-revenue water, rather than water loss, proactive assessment of water losses also

Figure 1

Viscious Circle of Water Loss



requires an understanding of matters related to customer metering, such as meter accuracy. Knowing the accuracy of the installed metering base can help to formulate strategies to improve revenues – without increasing tariffs – by more accurately assessing the volume consumed by each user.

Tangential Benefits

The practical reality is this: when a formal, systematic methodology for monitoring and controlling water losses is applied, there are often serendipitous results that serve to further improve system performance.

As a hard example, one GTA municipality recently discovered that it had been overbilled a significant quantity of water as a result of a bulk supply meter data transfer error that had gone unnoticed for several years. This error was identified while attempting to isolate an area of potentially high leakage, based on anomalous flow information in relation to the service area in question. The problem was in fact *not* a leak, but rather the erroneous information from the meter that suggested such. This result allowed the municipality in question to claw back more than $1 million in historical overbillings, not to mention the value associated with the avoidance of future overbillings had the original leak investigation not been undertaken.

On the heels of this success, the municipality has since undertaken a formal City-wide Water Audit exercise, which has identified that savings on the order of $20 million are plausible over the next 10 years (ignoring the benefit beyond that time horizon). Moreover, the investment required to achieve this is a mere fraction of the potential benefit, thereby resulting in a rather

strong business case, in addition to yielding benefits to the environment (e.g., less stress on water and energy resources).

One Step Beyond

The characteristics of water loss control initiatives can often lend themselves towards engagement structures that shift the burden of responsibility for achieving results onto the private sector contractors, whereby payments are directly linked to performance. This creates an alignment of incentives between the municipality and its service provider in a competitive environment through which a municipality can extract value. Many municipalities, however, may not have the procurement policies or structures in place to take advantage of these performance-based contracting opportunities and, quoting this magazine's editor from the May 2011 edition on the topic of achieving success through partnerships: "Sometimes, it just requires openness to a different approach." *MW*

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