

FOCUS ON ENERGY

How asset management can help improve energy efficiency in the water/wastewater industry.

By Dianne Saxe



Focussing on energy can help improve the management of our water and wastewater assets.

Asset management planning plays an increasingly larger role in municipal infrastructure decision-making. Some form of asset management plan is essentially mandatory now in Ontario for municipalities to access federal and provincial infrastructure grants, and other provinces are likely to follow suit.

What role should energy use and energy efficiency play within such plans? This question is particularly relevant to municipal water and wastewater systems, which have a large energy footprint. In Ontario, water and wastewater systems make up almost 40 per cent of reported municipal energy use and one-third of municipal greenhouse gas emissions, costing municipalities a quarter of a billion dollars a year in energy bills. The Environmental Commissioner of Ontario's recent report, *Every Drop Counts: Reducing the Energy and Climate Footprint of Ontario's Water Use*, asked whether asset management can help reduce this footprint.

Energy considerations in asset management

Other initiatives have been only modestly successful in encouraging energy efficiency in the Ontario water/wastewater sector. This sector has had limited participation in utility conservation programs, realizing only one-tenth of the electricity savings as the average Ontario electricity customer.

Many municipalities have aging water and wastewater systems coupled with limited financial and human resources, competing municipal priorities and significant budget shortfalls. Energy efficiency is often not considered, or is seen as a frill.

A key benefit of asset management is therefore simply to document (for councils,

funders, and the public) the true long-term capital and operating cost of keeping water infrastructure at acceptable service levels. This can trigger discussion as to how to sustainably fund these systems, as well as design choices that lower long-term energy footprints and costs.

Understanding energy use and reducing energy waste can contribute to the goal of asset management; to help municipalities make the best possible decisions about their assets. This includes reducing overall infrastructure costs by making timely investments throughout the life-cycle to prevent asset deterioration. One estimate is that asset management can save wastewater utilities 20-to-30 per cent of future life-cycle costs.

Deterioration in infrastructure performance over time can cause increased energy use and operating cost. This is most obvious for water pipes. In addition to outright leakage (up to 40 per cent of water use in some Ontario municipalities), pipe deterioration and debris result in higher friction, requiring disproportionately more energy to pump the same amount of water through the system. But declining energy performance is a concern with all aspects of the water system, not just the pipes. For example, a large scale performance test done in Ontario on 150 water pumps showed that on average, pump efficiency had declined by about nine per cent since manufacture. Refurbishments of two of these pumps recovered about two-thirds of this drop in efficiency.

Asset management brings a welcome focus on maintaining asset efficiency. It also focusses the conversation for every asset as to whether to maintain, repair, or replace. Energy efficiency can and should be part

of this conversation. At a minimum, asset management should involve life-cycle cost comparisons that incorporate not just capital costs, but ongoing energy costs (and the high differential in operating costs between efficient and inefficient equipment). More sophisticated models can incorporate predicted future changes in energy prices (including a value for carbon emissions reductions) and broader consideration of environmental aspects. Asset management can help prioritize projects that deliver a higher financial and sustainability return on investment.

As with all areas of asset management, better field data will lead to better decision-making. The field data needed includes energy audits of key energy-using processes and equipment, such as water pumping and wastewater aeration. Individual energy sub-metering of major equipment, such as pumps, can help identify when equipment is becoming less energy efficient and make the business case for refurbishment or replacement.

The evidence to date from Ontario

Unfortunately, our review found that energy has not been a focus of Ontario asset management plans to date. It is difficult to make the best decision when much of the required information is missing. There was no discussion about the assumptions made for future energy and carbon costs or how these assumptions impacted life-cycle costing analysis. Municipalities rarely included any energy-specific targets or performance indicators, with a few exceptions. For example, the municipalities of Toronto and Niagara both include energy intensity (energy per unit of water pumped or treated) as a performance metric. The

Figure 1: Ontario municipal energy consumption by facility type, 2011.

Source: O. Reg. 397/11, 2011 normalized data.

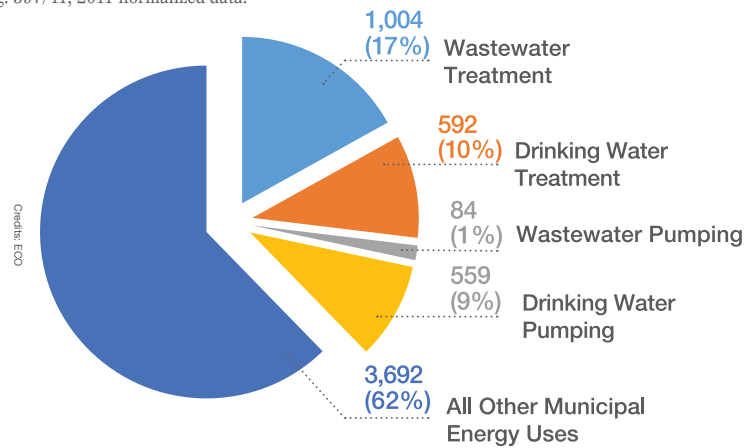


Figure 2: Investing in maintenance of assets pays off over the long term.

Source: Ontario Ministry of Infrastructure, Building Together - Guide for Municipal Asset Management Plans (2012), 10.

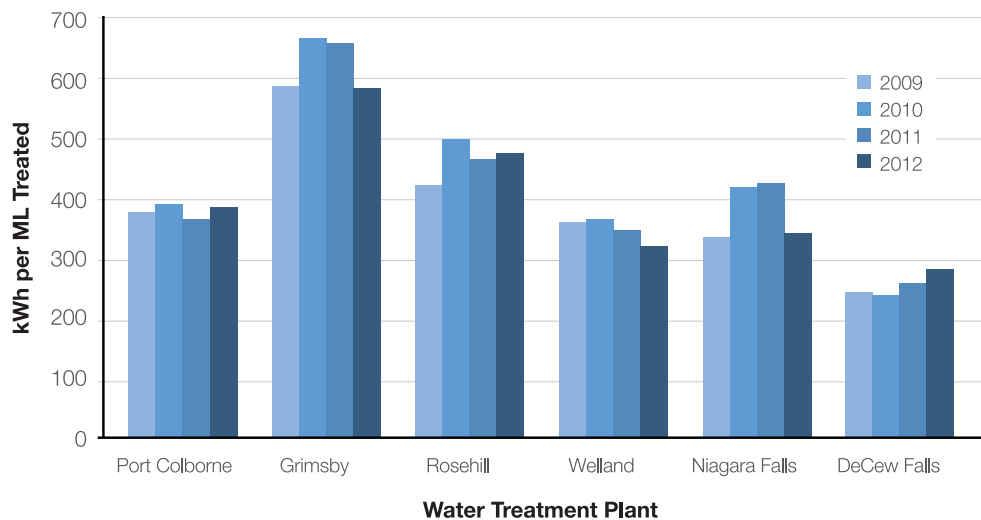


Figure 3: Benchmarking energy intensity of Niagara Region water treatment plants.

Source: Niagara Region, Asset Management Plan 2014, Figure 3.2, 26.



Lake Huron and Elgin Area Water Supply System stands out as one water provider where energy considerations are deeply integrated into its asset management plan.

We conducted a survey of all Ontario municipalities. Only half of the respondents considered energy efficiency projects for water and wastewater in their asset management plans. Municipalities that did not consider energy efficiency as part of asset management gave reasons such as:

- Asset management is too new to incorporate findings into the municipal budgeting process;
- Energy efficiency has not been a focus of asset management planning;
- Asset management planning focuses on other types of assets;
- The asset management plan is a high-level document and does not go into this level of detail; and

- Energy efficiency projects are done ad hoc when money is available.

Fortunately, this kind of inertia will now be changing. The Ontario Ministry of Infrastructure is developing a regulation to specify mandatory requirements for municipal asset management plans, bringing some consistency to their content and structure. Every Drop Counts successfully recommended that the regulation include operating energy costs, and require consideration of green infrastructure and non-infrastructure alternatives such as water conservation. The Ministry accepted these recommendations in its proposed regulation (Environmental Registry #013-0551), although the regulation has not yet been finalized (at the time of writing).

We also suggested that the government should:

- Collect more complete energy data and make it more useful via the online platform Portfolio Manager;
- Provide estimates for future energy and carbon costs which can be used in municipal analyses; and
- Encourage municipalities to develop performance measures on water and energy efficiency (for example, energy use per volume of water pumped or treated, leakage rate, water use per resident). This would help municipalities compare their performance against their peers and prioritize opportunities to improve.

Timely action needed

Integrating energy in asset management planning is pressing because provinces will soon negotiate agreements with the federal government on the second phase of federal infrastructure funding. Decisions will be made very soon on hundreds of millions of dollars in water and wastewater infrastructure spending.

So, while some municipalities are still developing asset management planning for water and wastewater systems, the time for a clearer focus on energy is now. Consideration of energy use and energy efficiency in asset management planning is not technically difficult and will help reduce costs over the long term. With this once-in-a-generation opportunity, let's do it right. ♣



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