Paying for Water in Ontario’s Cities: Past, Present, and Future

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By
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Author

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Abstract
Throughout much of the 20th century, water was seen as plentiful and water rates did not promote conservation. Today, water is treated as a relatively scarce resource and governments are concerned about financing new and rehabilitated infrastructure. However, most municipalities still do not set prices for water at levels that would encourage conservation, thereby allowing the overconsumption of water, and leading to increased demand for expensive infrastructure. Setting efficient prices for water, sewage collection and treatment, and stormwater runoff would include (1) multi-part pricing for water to accommodate capacity constraints, economies of scale, and peak-load demand; (2) greater use of meters and volumetric pricing for residential and commercial sewer usage; and (3) stormwater user fees based on the volume of runoff. In smaller or remote municipalities, the amalgamation, regionalization, or privatization of water and sewer systems could lead to greater efficiencies. Meanwhile, the Province should set water safety standards, coordinate water utility systems, and put in place a regulatory framework that would support necessary but unpopular increases in water rates.

Keywords: municipalities, water systems, sewer systems, stormwater, full-cost pricing

JEL codes: H41, H71, L95
For much of the 1900s, especially the period prior to the 1990s, a city's water pricing structure was seldom deemed to be an important public policy issue. Water was generally viewed as being plentiful, the provincial government doled out grants to cover up to 85 percent of water and sewer infrastructure costs, capital costs were not amortized over the life of the infrastructure, asset management programs were basically non-existent, and water rates or pricing structures were generally set without consideration for efficiency criteria and conservation goals.

Since 1990, however, a number of changes have emerged in water pricing. Water, for the most part, is now treated as a relatively scarce good; meters are in place almost everywhere; full-cost recovery is widespread, although there is considerable disagreement about what full-cost recovery means; ongoing annual provincial grants have largely disappeared; amortization of capital costs is now required; asset management programs are now mandatory, although funding them adequately remains a budgetary challenge for some municipal authorities; and financing new and rehabilitated infrastructure has moved to the forefront as a policy concern.

Despite these advances, there remains much to do. At the forefront, water is becoming an increasingly scarce resource. In some parts of the United States and many other countries, it has already become very scarce. It is therefore imperative that pricing structures be designed or redesigned, with efficiency criteria and conservation goals playing an important role. Increased attention must be directed to pricing of sewage and stormwater runoff. Infrastructure financing is a hot issue, especially given concerns over reducing the alleged infrastructure deficit gap. Concerns over the capacity of some municipalities or local utilities to adopt efficient pricing and be sustainable bring out the need to reconsider the way in which smaller and remote municipalities provide water and wastewater. Have we moved to the point where we need a provincial water regulator? These are some of the issues discussed in this paper. The paper is organized in the following way. The first section comments on where we have come from; the second part considers where we should go; and the final section provides a summary and offers some observations on the future.

1. Where Have We Come From?

It could be argued that the first comprehensive report on water pricing and water sustainability in Ontario was published in 1990 (Fortin and Mitchell 1990). This report argued that municipalities must raise the price of water to reflect its true cost; they must charge for water according to volume consumed; revenues received from water must be reserved and spent only for operating and maintaining water
and sewage systems; and senior governments must commit or arrange for special funding for catch-up where municipalities are unable to do so by themselves. Much has happened in the water and wastewater field since then, most notably the events surrounding and responding to the Walkerton tragedy in 2000.\(^1\)

In May 2000, the municipal water system in Walkerton was tainted with the dangerous O157:h7 strain of *E. coli* bacteria, affecting more than 2,500 water consumers, of whom five died and many others endured long-term health effects. Because of that crisis, the Ontario government appointed Justice Dennis O’Connor to review the circumstances of the Walkerton tragedy, with a mandate to recommend measures to prevent a repetition (O’Connor 2002).

The O’Connor Inquiry offered a number of constructive suggestions in its 121 recommendations. Among the most relevant was its advocacy for fiscal sustainability of water services by implementing full-cost accounting and full-cost pricing. That report also argued that water systems should take advantage of economies of scale by organizing on a regional, watershed, or commercial basis, where they could benefit from both operational and financial benefits, including overcoming the political reluctance to embrace full-cost pricing at the local level. Despite the fiscal constraints of the period, Justice O’Connor challenged the conventional and accepted view among municipalities, utilities, and local water consumers that water and wastewater services should continue to receive ongoing provincial subsidies.

The report also made it clear that full-cost pricing included more than just the cost of ongoing operations and repairs. It extended to all aspects of waterworks system sustainability, including depreciation, replacement, upgrading, expansion, and technological improvement. In an era before widespread public concerns about climate-change impacts and prudent water use, it employed conservation arguments. By taking a full-system approach, the inquiry recognized that high and wasteful consumption inevitably leads to demands for very expensive capital expansions and the costly consequences of unaddressed issues of system leakage (O’Connor 2002).

After five years of activity by the Ontario government, its agencies, and municipal water utilities in response to the O’Connor Inquiry, the government took stock of Ontario’s water services. This culminated in the appointment of the Water Strategy Expert Panel that, in May 2005, produced a report entitled *Watertight: The Case for Change in Ontario’s Water and Wastewater Sector* (Swain et al. 2005). Recommendations in this report mirrored many of those in the O’Connor report. Despite reasoned and well-researched findings, both the Swain and O’Connor recommendations met strong headwinds. While the recommendations called for

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1. For a more detailed discussion of this and other parts of this paper, see Fenn and Kitchen (2016).
increasing investments in water systems, and by implication, higher water rates to sustain those investments, there was strong, local resistance to increasing rates and provincial officials were sensitive to cost increases and public backlash. The result was, by and large, tight budgets that rationed investment in refurbishment and improvements to existing water, wastewater, and stormwater infrastructure.

These reports highlighted a number of issues that were relevant then and are still relevant today. Of particular note is progress on water, sewer, and stormwater pricing and changes in these pricing practices since 1990. Before we discuss this progress, readers are referred to Box 1, where a plea is made for improved data collection and analysis.

1.1 Water Pricing
Over the past two to three decades, water rates in Ontario have been characterized by two general structures: flat rates that do not vary with consumption and a variety of volume-based charges. Regardless of the pricing structure and changes in their relative importance, however, it should be noted that municipalities in Ontario are no longer permitted to fund municipal water systems from the general property tax – funds must come from charges on users (LAC and Associates 2015, 3). Even though municipalities or utilities cannot overtly cross-subsidize, decisions about what constitutes full-cost recovery might have the effect of shifting some operating costs from the utility rates to the property tax base. This is unlike Québec, however, where municipalities may overtly fund water and wastewater systems from the general property tax base. This practice is far from efficient and fair because there is no incentive for managing water in an efficient and conservation-oriented manner and it provides no incentive for municipalities to control leakage losses in potable water.

Flat Rates
Flat rates are the simplest structures to understand and administer. Flat rates are fixed payments per billing period that are unrelated to volume consumed but may vary by customer class (residential vs. commercial) and property type, such as the number and types of rooms, size of lot, the number of water-using fixtures, whether or not there is a swimming pool, and so on. For flat-rate charges, meters are not required because the water price is not related to consumption.

In municipalities where flat rates have been used over the past 25 years, average daily residential consumption per capita has been considerably higher than in municipalities where volume-based charges have been used (Table 1). In fact, as reported in column 4 of Table 1, the average daily residential consumption per capita under flat-rate systems exceeded volume-based consumption by something between 37 percent and 133 percent, depending on the year. Regardless of the rate structure, however, water consumption per household in most Canadian cities has declined over the past two decades, largely because of two initiatives: higher water rates and a variety of water-conservation initiatives.
Box 1: A Note on Data Availability

Given the rising importance of water services in the 21st century, one might assume that the resources devoted to data collection and analysis by federal and provincial agencies and water-related associations would be sustained and expanded, and the outputs would progressively improve in quality, reliability, and usefulness. Unfortunately, that has not been the case.

Somewhat surprisingly, researchers and policy makers will find that the traditional source of survey and analysis on water and wastewater services in Canada, Environment Canada, discontinued publishing its work with the 2009 survey (reported in 2010 and 2011). For its part, the Ontario Ministry of the Environment and Climate Change or other provincial ministries and agencies (which routinely collect all manner of municipal data and plan documents) do not have publicly available information on comparative water rates, water consumption, and full-cost pricing. Given the considerable (and encouraging) efforts that have gone into ensuring that municipalities develop plans for both asset management and water system planning over the past 15 years, it would appear logical to make public those results on a comparative basis (e.g., progress towards full-cost pricing, cataloging of rate structures, expansion of water metering, reductions in water consumption and energy consumption, and so on).

In the absence of such information, one can only use samples from disparate municipal data sources and projections based on anecdotal evidence, supplemented with interviews and inquiries. While it makes comparisons to older and more comprehensive data sets less reliable, this approach may be sufficient for the time being. Furthermore, from this miscellaneous collection of material and information, it is apparent that the statistical pattern noted in the data from 1991 to 2009 has continued since 2009. As an example, the City of Peterborough was not metered in 2009 but is now metered. Actions such as this support the trends noted in this paper.

The issues addressed in this paper are important, and so are the data necessary to understand them. Federal and provincial governments are best positioned, both in vantage point and resources, to restore this important basis for making evidence-based policy decisions, especially with the federal government’s renewed interest in investing in infrastructure and addressing climate change impacts. Municipalities and utilities often complain about intrusion in their affairs by other orders of government and their agencies. In this area, a return of federal involvement should be encouraged and welcomed.

Flat-rate charges have virtually disappeared in Ontario. In 1991, 18.6 percent of the residential population with water systems was served by flat-rate pricing structures (column 2 of Table 2). By 2009, only 2.1 percent of the residential population faced flat-rate charges, a considerable decline over the 25-year period. Since then, this percentage has declined even further. A similar trend has emerged in other OECD countries (OECD 2010).

<table>
<thead>
<tr>
<th>Year (1)</th>
<th>Flat ADF in litres per capita (2)</th>
<th>Volume ADF in litres per capita (3)</th>
<th>Percentage by which flat-rate use exceeds volume-based use (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>392</td>
<td>234</td>
<td>67.5</td>
</tr>
<tr>
<td>1994</td>
<td>412</td>
<td>230</td>
<td>79.1</td>
</tr>
<tr>
<td>1996</td>
<td>416</td>
<td>239</td>
<td>74.1</td>
</tr>
<tr>
<td>1999</td>
<td>428</td>
<td>254</td>
<td>68.5</td>
</tr>
<tr>
<td>2001</td>
<td>425</td>
<td>258</td>
<td>64.7</td>
</tr>
<tr>
<td>2004</td>
<td>573</td>
<td>246</td>
<td>132.9</td>
</tr>
<tr>
<td>2006</td>
<td>495</td>
<td>249</td>
<td>98.8</td>
</tr>
<tr>
<td>2009</td>
<td>302</td>
<td>221</td>
<td>36.7</td>
</tr>
</tbody>
</table>

Source: Municipal Water and Wastewater Survey, Environment Canada, Ottawa, selected years. Reported in the table called “Residential Flat versus Volumetric Rate Average Daily Water Use Per Capita.”

Volume-Based Rates

Volume-based rates link the amount paid for water to the amount of water consumed. They require the use of meters, which are now largely universal. These rates take a variety of forms including constant unit charges, decreasing block rates, increasing block rates, or some combination of these. As noted in column 7 of Table 2, the use of volume-based charges and, hence, meters, covered about 98 percent of the residential population served by water utilities/departments in 2009, up from a little over 81 percent in 1991.

Constant unit charges (CUCs) are by far the most common volume-based charge (column 3 of Table 2). They served almost 53 percent of the population in 1991, rising to more than 60 percent through the remainder of the 1990s before falling to about 45 percent in 2001 and then rebounding to almost 80 percent by 2009.

2. This is the last year for which data were collected.
Declining block rate (DBR) structures generally include a basic or fixed service charge per period, combined with a volumetric charge that decreases in blocks (discrete steps) as the volume consumed increases (the more you use, the less you pay per unit). Typically, one or two initial blocks cover residential and light commercial water use, with subsequent blocks levied on heavy commercial and industrial uses. The fixed component of the charge often varies with the size of the service connection. Minimum charges that correspond to a minimum amount of water consumption in each billing period are common in systems of this kind.

DBRs were more common in the 1990s than they are now. Their use declined from servicing more than 20 percent of the population in 1991 to serving less than 5 percent in the early 2000s before rising to around 8 to 10 percent by 2006 and 2009 (column 4 of Table 2).

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**Table 2: Residential water rate structure: Percentage of population served by each rate structure, Ontario, 1991–2009**

<table>
<thead>
<tr>
<th>Year (1)</th>
<th>Flat rate (2)</th>
<th>CUC (3)</th>
<th>DBR (4)</th>
<th>IBR (5)</th>
<th>Complex (6)</th>
<th>Total volume (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>1991</td>
<td>18.6</td>
<td>52.7</td>
<td>23.3</td>
<td>4.1</td>
<td>1.0</td>
<td>81.4</td>
</tr>
<tr>
<td>1994</td>
<td>16.8</td>
<td>61.5</td>
<td>11.9</td>
<td>4.9</td>
<td>5.0</td>
<td>83.2</td>
</tr>
<tr>
<td>1996</td>
<td>15.8</td>
<td>62.8</td>
<td>11.2</td>
<td>5.1</td>
<td>5.0</td>
<td>84.2</td>
</tr>
<tr>
<td>1999</td>
<td>15.3</td>
<td>63.1</td>
<td>11.7</td>
<td>4.8</td>
<td>5.0</td>
<td>84.7</td>
</tr>
<tr>
<td>2001</td>
<td>12.6</td>
<td>45.6</td>
<td>1.2</td>
<td>39.0</td>
<td>1.5</td>
<td>87.4</td>
</tr>
<tr>
<td>2004</td>
<td>3.6</td>
<td>55.8</td>
<td>3.8</td>
<td>36.8</td>
<td>–</td>
<td>96.4</td>
</tr>
<tr>
<td>2006</td>
<td>2.6</td>
<td>51.8</td>
<td>9.8</td>
<td>35.8</td>
<td>–</td>
<td>97.4</td>
</tr>
<tr>
<td>2009</td>
<td>2.1</td>
<td>79.6</td>
<td>8.7</td>
<td>9.6</td>
<td>–</td>
<td>97.9</td>
</tr>
</tbody>
</table>

1. Prior to 2009, municipalities that had more than one pricing scheme (for different water-distribution systems or different areas of the municipality) reported only the one that applied to the largest number of people. For 2009, all of the pricing schemes and their associated populations were reported. 2009 is the last year for which data were collected.
2. CUC is constant unit charge.
3. DBR is declining unit rate.
4. IBR is increasing unit rate.
5. Complex systems have decreased in popularity and are no longer reported as a separate category. They may combine two different DBRs (one for residential and one for commercial) onto one schedule or they may arise if sewer charges are calculated on the basis of block limits that differ from block limits used for the water-rate schedule.

Source: Municipal Water and Wastewater Survey, Environment Canada, Ottawa, selected years. Reported in the table called “Residential Population Served Water by Rate Type, by Province.”
Increasing block rate (IBR) structures are the opposite of DBRs in that the more you use, the more you pay per unit. The first block for a given class of customer is generally designed to cover the normal water use of an average customer in that class. IBRs were not prominent in the 1990s, accounting for 5 percent or less of all water systems (column 5 of Table 2). In the early 2000s, their reported usage increased dramatically, rising to between 35 and 40 percent of all systems. By 2009, their reported use had decreased to less than 10 percent. It is not clear why this dramatic decline came about, but it may have been partially triggered by a change in reporting methodology (see note to Table 2).

Seasonal-rate systems and peak-load demand rates are used in some municipalities. As well, municipalities often use variations or combinations of the different pricing structures. Two-part pricing schemes, for example, are fairly common in any pricing structure. They consist of a fixed charge designed to cover meter reading, billing, customer accounting, and capital and maintenance costs of meters plus a constant commodity charge applied to all consumption. Another variant is the lifeline rate, which is an artificially reduced price for a minimum amount of water that is deemed to be required for essential water consumption. It is introduced to assist low-income households. Lifeline pricing is most common in cities with a fixed charge as all customers must pay the fixed charge regardless of consumption. Other variants include vintage rates, which distinguish between new and existing customers, or seasonal or peak-demand rates to reflect increased cost of delivery or a desire to reduce consumption during certain seasons or times of the day. A few municipalities have combined components of residential and commercial pricing systems into one schedule. For example, some impose declining block rates to “subsidize” major employers that depend on high volumes of low-cost water; others impose progressively more expensive increasing block rates to promote conservation or to reflect the marginal cost of infrastructure to meet peak demands.

1.2 Sewer Pricing

For residential, small commercial, and small industrial users, sewage collection and treatment expenses are almost always recovered through surcharges on water bills, not on sewage discharge. This is largely for administrative simplicity. In most cities, the surcharge is a percentage of the water bill but in some cities, it might be a fixed charge or a flat rate.

Large industrial and commercial users are metered in some cities. As well, many of these cities have adopted sewer use bylaws limiting the concentration of contaminants allowed in wastewater. Some bylaws also have over-strength discharge fees with the fee based on the differential between the actual and permitted level of contamination (Elgie et al., 2016).

1.3 Stormwater Pricing

Traditionally, stormwater infrastructure has been funded by property taxes and development charges. More recently, however, the impact of climate change
(severe storms and flooding) has created a demand for more robust and resilient systems and increased funding for stormwater infrastructure (sewers, spillways, retention and detention ponds, etc.) and, where it exists, for the separation of sanitary sewers from storm sewers. These developments have given rise to a desire by some municipalities to convert stormwater facilities to a utility model, supported by “user” charges.

The following two examples will serve to illustrate the type of change that is emerging in Ontario. The City of Kitchener’s stormwater user rate is based on the contribution of stormwater runoff as calculated by the impervious surface area of the property. The city uses a 13-tiered flat fee rate schedule to calculate the rate for each property, which is administered on monthly utility bills. The tiers are based on property type (residential, multi-residential, and non-residential) and impervious area of a property (“smallest” to “largest”) or number of residential units. For example, the average single-dwelling homeowner is currently charged approximately $11.44/per month for stormwater management. The city also offers incentives to all ratepayers who demonstrate best practices for managing stormwater runoff.

In 2016, the City of Mississauga started funding stormwater management through a stormwater charge. The city previously funded this service through property taxes and reserves. Mississauga’s stormwater charge is based on the amount of impervious area of a property. Residential properties are categorized into five tiers based on the size of their rooftop (“smallest” to “largest”) as an indicator of total impervious area, with charges ranging from $50 to $170 per year. The charge for multi-residential and non-residential properties is determined by dividing the property’s total impervious area by a single billing unit (267 m²) and then multiplying it by the stormwater rate ($100). To make it easy for property owners to determine their charge, the city created an online “stormwater charge estimator” where property owners can enter an address to determine what their charge might be.

1.4 Tracking Pricing Practices and Spending since 1990

There are a number of ways in which one might track the change in water/sewer prices and spending over time. Table 3 records the monthly residential water rate per cubic metre for Ontario for the period from 1991 to 2009. Here, it is noted that the price per cubic metre more than doubled under almost all measures.

Table 4 considers more recent data (2011 to 2015) on water pricing for a handful of Ontario municipalities. Here, one may observe, prices vary widely. Some municipalities use only variable charges (Toronto, Mississauga, Brampton, Markham, and Vaughan). Some have both a fixed charge and a volumetric charge. Where fixed monthly charges are high – Sarnia, for example – volumetric charges are low. London, as with some other cities, has a lifeline rate (the first seven cubic metres per month are free) to assist low-income users.
Table 5 is another way in which one might compare residential spending on water. In particular, it records mean (average) and median monthly residential spending at specific consumption levels (10, 25, and 35 cubic metres), along with expenditures at the tenth and ninetieth percentiles for the same years. As in Table 3, mean and median expenditures more than doubled over this period.

For commercial water rates (Table 6), prices increased modestly for 10 cubic metres, more than doubled for 35 cubic metres, and in some cases tripled for 100 cubic metres. In every scenario, water rates increased and spending rose over the two decades – some might even say significantly.

This outcome is not surprising, because increased prices and spending have been driven by a number of factors, not the least of which is the higher cost of labour and materials, increased emphasis on improved treatment especially from large industrial consumers, greater monitoring and reporting requirements to meet tougher legislative requirements, and a reduced reliance on provincial grants for capital purposes, which has forced municipalities to carry a higher proportion of rehabilitation costs and to recover them through higher water rates.
Whether this increase in price is significant is a debatable question. To shed light on this, let’s cast this pricing and spending pattern another way. Take the average monthly spending on water at each cell in Table 5 and multiply it by 12 to obtain an estimate of yearly spending for 10, 25, and 35 cubic metres respectively. Next, take the yearly expenditures for each cubic measure as a percentage of after-tax economic family income. This is a definition of a family unit that is used by Statistics Canada. These percentages are reported in Table 7 for three different consumption levels. Depending on the measure and the year, spending on water seldom exceeded 1 percent of after-tax family income. More specifically, it exceeded 1 percent only for the 90th decile of users at 25 and 35 cubic metres and only since 2004. And it amounted to 1 percent of after-tax family income for the mean and median user at 35 cubic metres per month. In none of these cases does spending on water appear to have reached critical levels when it comes to affordability. For those where it might be a problem, and as mentioned earlier, there are income relief programs that may be accessed.

<table>
<thead>
<tr>
<th>Year</th>
<th>Ottawa Fixed water rate</th>
<th>Markham Variable cubic metre</th>
<th>Hamilton Variable cubic metre</th>
<th>London Variable cubic metre</th>
<th>Toronto Variable cubic metre</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>2.63</td>
<td>2.86</td>
<td>3.22</td>
<td>2.71</td>
<td>2.28</td>
</tr>
<tr>
<td>2012</td>
<td>2.73</td>
<td>3.04</td>
<td>3.62</td>
<td>3.11</td>
<td>2.49</td>
</tr>
<tr>
<td>2013</td>
<td>2.93</td>
<td>3.25</td>
<td>3.63</td>
<td>3.48</td>
<td>2.71</td>
</tr>
<tr>
<td>2014</td>
<td>3.14</td>
<td>3.48</td>
<td>3.06</td>
<td>3.63</td>
<td>2.96</td>
</tr>
<tr>
<td>2015</td>
<td>3.33</td>
<td>3.69</td>
<td>3.32</td>
<td>3.69</td>
<td>3.20</td>
</tr>
</tbody>
</table>

Table 4: Average water rates for 20 cubic metres per month in selected Ontario cities, 2011–2015

1. Hamilton has a tiered rate. The rate in this table is a blended rate. For 2015, the rate on the first 10 cubic metres was $1.37 per cubic metre and on subsequent cubic metres it was $2.73.
2. London has a tiered rate; however, the first 7 cubic metres per month are free – referred to as a lifeline rate.
3. A minimum monthly charge of $16.

n.a.: fixed charges do not apply.


...
2. Where Should We Go?

Historically, pricing and managing water and sewer systems have been viewed as an engineering issue rather than an economic issue. Local politicians and administrators, reluctant to use water prices to promote efficiency and conservation, have relied on technological improvements and non-price demand management tools such as restrictions on use – for example, forbidding lawn watering during periods of low rainfall or limiting residential construction until water/sewer infrastructure capacity expands. These may be useful but they are not as effective as properly set prices and pricing structures in generating efficient outcomes and proper levels of infrastructure investment. Fortunately, improvements have recently been made in the way in which prices are structured. Through Public Sector Accounting Board (PSAB) requirements and asset management programs, capital costs are recorded and recovered through these prices. There remain, however, a number of issues about costs to be recovered, pricing structures and efficiency, infrastructure financing, production and delivery, and the possibility of regulating water rates. These are discussed next.

3. An asset management plan is a strategic document that states how a group of assets is to be managed over a period of time. The plan describes the characteristics and condition of the infrastructure, the levels of service expected from it, planned actions to ensure that assets are providing the expected level of service, and financing strategies to implement the planned actions.
**Table 6: Commercial water prices for selected volumes of service in Ontario, 1991–2009**

<table>
<thead>
<tr>
<th>Year</th>
<th>10 cubic metres per month</th>
<th>35 cubic metres per month</th>
<th>100 cubic metres per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Med.</td>
<td>10th per.</td>
</tr>
<tr>
<td>1991</td>
<td>$23</td>
<td>$26</td>
<td>$27</td>
</tr>
<tr>
<td>1994</td>
<td>$26</td>
<td>$24</td>
<td>$10</td>
</tr>
<tr>
<td>1996</td>
<td>$27</td>
<td>$24</td>
<td>$11</td>
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<tr>
<td>1999</td>
<td>$29</td>
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<td>2001</td>
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<td>2006</td>
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<td>$36</td>
<td>$9</td>
</tr>
<tr>
<td>2009</td>
<td>$26</td>
<td>$20</td>
<td>$13</td>
</tr>
</tbody>
</table>

Figures are rounded to the nearest dollar.
Mean is the average of all water operations.
Med. is the mid-value for all water operations.
10th per. is the value at the tenth percentile.
90th per. is the value at the ninetieth percentile.

Source: Municipal Water and Wastewater Survey, Environment Canada, Ottawa, selected years. Reported in the table called “Commercial Water Prices ($ per month) for Volume Based …”

**Table 7: Estimated total residential water payments per year as a percentage of after-tax economic family income in Ontario, 1991–2009**

<table>
<thead>
<tr>
<th>Year</th>
<th>10 cubic metres per month</th>
<th>25 cubic metres per month</th>
<th>35 cubic metres per month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Med.</td>
<td>10th per.</td>
</tr>
<tr>
<td>1991</td>
<td>0.2</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>1994</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>1996</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>1999</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>2001</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>2004</td>
<td>0.4</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>2006</td>
<td>0.4</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>2009</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Total yearly residential payments obtained by multiplying average monthly payments from Table 5 by 12 months and taking this total as a percentage of after-tax economic family income.

Source: Same as CANSIM table 202-0802 with after tax income data from Statistics Canada, CANSIM.
2.1 Full-Cost Pricing
While there is a growing consensus on the merit of imposing “full-cost pricing” for water and wastewater services, there is no consensus on what is meant by full-cost pricing and what it should include. Many practitioners argue that full-cost pricing is achieved if revenues from water and wastewater systems cover all production and maintenance costs. Most medium-sized and large municipalities in Ontario are doing this now, although some municipalities are phasing in full-cost recovery programs over a 10- to 15-year period. Others, mainly the smaller systems, are concerned that they may not be able to achieve full-cost recovery because of the impact of water rates on their customers’ ability to pay (Watson and Associates and Dillon 2012).

Others take a more expansive view of the costs of a water system, in part as a response to contemporary utility accounting practices. They recognize that replacement costs may be greater than anticipated, due to more demanding technical specifications, greater system resilience to deal with climate change, and enhanced environmental provisions, such as those separating stormwater runoff from sanitary sewers. These calculations of “full-cost” add full valuation of water-related assets and liabilities, the use of depreciation and provision for replacement, and lifecycle capital planning.

Still others argue that the current approach ignores additional costs that should be included. They suggest that the definition of annual operating and capital costs is too narrow, because it ignores the opportunity cost of water withdrawn from the natural environment, including the commercial exploitation of aquifers such as is being witnessed in the controversy with Nestle’s bottled-water plant in Aberfoyle, Ontario, and its potential impact on regional wells; the opportunity cost of land holdings; the opportunity cost of invested capital; and the harm caused by pollution (Renzetti 2009). Here, it must be noted, these costs are significant (Dupont et al. 2013).

From an economics perspective, opportunity costs are a complete and accurate way of measuring all costs. They capture the return that would be generated if the resources were put into their next best alternative. One study on one municipality in Ontario in the late 1990s highlighted the magnitude of these costs. The study concluded that the wholesale price for water would have to increase by at least 15 percent and possibly by as much as 45 percent if all of these costs were to be recovered (Renzetti and Kushner 2001). On this basis, one may infer that most Ontario municipalities are far from full-cost pricing if all financial and social costs are to be included (Environment Canada 2011, 14). We are, however, closer to full-cost pricing than we were in 1990, largely because of the advances in accounting rules and provincially mandated asset management

programs. As well, the elimination of the provincial capital grant program in 19925 forced municipalities to raise their prices annually to recover an annualized portion of capital costs.

Much of the opposition to the implementation of full-cost pricing has come, in part, from a desire to retain existing rate structures to preserve and possibly increase revenues. Many system operators and municipal officials have argued that moving to efficiency-based prices will discourage consumption, thereby reducing total revenues, making it difficult to cover costs. In response, there are at least two comments that should be made. First, it is suggested that the existing plant capacity may be too big and there is evidence that some municipalities, in the past, overbuilt largely because of inefficient prices (Strategic Alternatives et al., 2001, 39; Swain et al. 2005, 53–4). Second, because the demand for water is inelastic (Kitchen 2007, Table 3), an increase in price will be accompanied by a much smaller percentage reduction in quantity, leading to an overall increase in total revenue, not a decrease.

2.2 Pricing Structures

In principle, water and sewer rates should be set so that the charge per litre equals the extra cost of supplying and treating the last unit; that is, price should equal marginal cost (OECD 2010; Kitchen and Tassonyi 2012). The efficiency advantages of marginal-cost pricing are well documented, but municipalities seldom implement marginal-cost pricing as usually proposed by economists. One study on 77 water utilities in Ontario (Renzetti 1999) estimated that the marginal cost of supplying water exceeded the price for water in every municipality studied. Specifically, the average price for residential customers was calculated to be $0.32 per cubic metre while the estimated marginal cost was $0.87 per cubic metre. By comparison, the average price for the non-residential sector was $0.73 per cubic metre and the estimated marginal cost was $1.49 per cubic metre. At the same time, the average marginal cost of sewage treatment was $0.52 per cubic metre while the average price was $0.13 per cubic metre. Another study estimated that Ontario municipalities recovered only 64 percent of the full costs of water and wastewater services from water revenues. This shortfall, the study argued, led to “rust-out, less reliable service, more leaks, increasing risk to public health and convenience, environmental damage and demand for subsidies” (Swain et al. 2005, 53). Failure to include all costs leads to overconsumption, overinvestment, and larger facilities (and obviously more costs) than would exist if more efficient pricing practices were in place (Clayton 2014).

Not only have Canadian studies found that the price level affects demand (Kitchen 2007, 2010), there is some evidence suggesting that households respond to the structure of water prices as well. For example, Reynaud, Renzetti, and

5. From 1974 to 1992, the Ontario government provided grants to municipalities that covered up to 85 percent of all capital costs for municipal water systems.
Villeneuve (2005) found that the sensitivity of Canadian residential water demand to a 1 percent increase in price differed according to the pricing scheme used. For flat rates, demand increased by 0.02 percent; for constant, decreasing, and increasing block rates, demand decreased by 0.16 percent, 0.10 percent, and 0.25 percent respectively. An earlier study on the manufacturing sector concluded that firms also respond to water prices; specifically, water intake fell by 0.8 percent for each 1 percent increase in price (Dupont and Renzetti 2001).

**Volumetric Water Pricing Structures and Efficiency Effects**

The range of water pricing structures was outlined earlier. Each has its own set of incentives or disincentives, as discussed below, in meeting efficiency objectives. A constant unit charge, which is a prominent structure, is an efficient pricing policy only if the marginal cost of water is constant (in which case, the average cost will be constant). We know, however, that the marginal cost is not constant – it either rises or falls with quantity consumed. Since price must equal marginal cost for efficient use, this pricing structure is inefficient and is not effective in encouraging water conservation.

A declining block rate (DBR) is efficient if the marginal cost of water provision is falling, such as may exist if economies of scale are present when servicing large-volume customers. Critics argue, however, that DBRs do not promote water conservation since the price of water declines as more water is used, and hence there may be little incentive to economize on water use.

An increasing block rate may be appropriate for residential customers who as a customer class are the main cause of peak demand, and for industrial customers if limitations on the availability of water justify shifting the cost burden to the largest users. Here, it is these users that have the largest impact on water system planning and sizing, since systems are built to meet the largest demands. Of particular interest to policy makers interested in promoting conservation, price differences from block to block could be set in a way that would give the customer a clear and strong incentive to conserve water.

A humpback block rate system of water charges combines increasing and decreasing block rates to produce the rate structure, shaped like an inverted “U.” Under this approach, the municipality applies its highest rate to the consumption block that captures the peak seasonal demand of residential customers. The intention is to encourage water conservation by residential customers by encompassing residential use within increasing block rates while offering large industrial users block rates that decline as use increases and thereby benefit from the economies of scale associated with providing water to customers of this kind.

This structure is sometimes used in municipalities that are promoting economic development. Unlike the 1990s, when manufacturing had just begun

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6. For a more detailed discussion, see Kitchen (2007), Kitchen and Tassonyi (2012), and Renzetti (2009).
its decline in Ontario, many municipalities today are eager to leverage any competitive advantage that they may enjoy, with a view to retaining and attracting industries and jobs. Despite some implicit cross-subsidization among classes of users, the ready availability of clean water at a reasonable price can be a distinct advantage in sectors like food processing or beverage manufacturing. For example, the City of London is quite explicit in characterizing a lower block rate for major users as being for “economic development” purposes (Canadian Municipal Water Consortium 2015, 19).

A seasonal-rate or time-of-day system applies a high volumetric rate during the peak water-demand season or time of day and a lower rate during the remainder of the year or day. By targeting peak demand, higher rates can promote water conservation. The economic rationale for a peak-demand system is that in order to meet this demand, the municipality must maintain supply facilities that are larger than they need to be to meet demand for most of the year or most of the day. A peak charge recovers the extra costs of this excess capacity directly from the component of demand that causes those costs.

An excess-use rate is a high volumetric rate that applies to all consumption during the peak water-consumption season in excess of a threshold amount. The amount is set equal to the average off-peak-season consumption or a modest multiple of this consumption – for example, 1.3 times winter consumption. The municipality applies a base charge to all of a customer’s off-peak-season consumption and to the portion of peak-season consumption that is below the threshold.

Sewer Pricing
Sewage charges for residential users are based on water consumed, not sewage discharged. This is also true for small commercial and industrial users. In a few cities, however, large industrial and commercial users are metered with rates or prices varying by volume of discharge but often not by quality. In addition, some larger cities have sewer bylaws that limit the concentration of contaminants entering the sewer system. If actual levels of contamination exceed the permitted limit, over-strength fees or charges based on the difference between the actual level of concentration and the permitted limit come into effect with the fee varying by the differential. These additional fees are intended to cover the extra treatment costs (Elgie et al. 2016) or to provide an incentive for users to treat their own sewage or to minimize its impact on municipal treatment systems.

In practice, pricing schemes for sewage collection and treatment are far from optimal. Charges prorated on the basis of the water bill are inefficient because they fail to reflect accurately the marginal cost of sewage disposal. The assumption that residential water consumption is directly and positively correlated with

7. Examples include food and beverage establishments and laundries with business revenues exceeding a threshold limit.
sewage generation is often inaccurate. For example, a large component of water consumption may be attributed to lawn sprinkling, car washing, swimming pools, and many other household uses, almost all of which are unrelated to sewage generation; that is, the runoff generally goes into the stormwater system, not the sanitary system, unless the two sewers are combined, which is common in older, more densified areas of many cities.

Like the underpricing of water, the underpricing of sewage (collection and treatment) is allocatively inefficient because there is no incentive to restrict use. Underpricing has also led to investment in sewage treatment facilities that are larger than they would be under a more efficient pricing policy (Renzetti 1999). One empirical study on pricing of sewage by Norwegian local governments (Borge and Rattso 2003) showed that sound user-charge financing of sewer services significantly reduced the cost of providing sewer services. Finally, it has been observed that underpricing of both water supply and sewage treatment has discouraged the development of alternative water and sewage treatment technologies (Gardner 1997).

For commercial and industrial properties, efficiency objectives and conservation goals could be improved through the efficient use of meters with sewer rates based on both the volume and quality of the discharge (Elgie et al. 2016). Pricing based on quality is currently used in some places in Ontario, but much more could be done. In fact, it is quite possible that metering of sewage discharge would help in identifying unauthorized sewage discharges such as is observed when smaller, older industries like auto body shops, paint shops, and metal fabricators dump high levels of waste into both sanitary and storm systems.

**Stormwater Pricing**

Surface water is a direct source of potable water for some water systems, and its impact on the recharging of aquifers affects the groundwater sources of many municipal and private drinking water systems. Many older waterworks systems are still working to separate stormwater and sanitary sewage carried in the same pipes, either routinely, or during peak flows.8 These combined flows must, of course, be treated as sanitary sewage when they reach the end of the pipe, creating significantly higher demands on sewage treatment plants and overflow cisterns. The majority of municipal water departments and utility corporations in cities and towns in Ontario do not have a separate charge for stormwater. It is generally lumped in with the wastewater charge and calculated as part of water consumption. This aggregation, however, means that consumers don’t know what they are paying for stormwater management.

Since 1990, with the increasing impact of climate change (severe storms and flooding), there have been notable design requirements for more robust

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8. Newly developed areas in most cities now require the separation of stormwater runoff from the sanitary sewer system.
and resilient systems, and, correspondingly, increased funding required for stormwater infrastructure (sewers, spillways, retention and detention ponds, etc.) and, where they persist, for separation of sanitary sewers from storm sewers. These developments have given rise to a desire by some municipalities to convert stormwater facilities to a utility model, supported by “user” charges. User fees make considerable sense because benefiting properties are those that add runoff or are served by the provision of stormwater services and they can be identified. As such, fees paid by stormwater generators can be based on the estimated amount of water that leaves their property or in relation to the services that the property receives. Those who live or have businesses on properties whose impervious area is large will pay higher user charges than owners of properties that do not burden the drainage system to the same degree. As long as user charges are based on the property’s burden on the stormwater infrastructure, an incentive is provided for property owners to reduce that burden by reducing the amount of runoff discharged into the municipal system (Aquije 2016).

2.3 Infrastructure Financing

For financing purposes, a distinction may be made between financing infrastructure for growth-related projects and infrastructure for renewal or rehabilitation purposes. In either case, however, the underlying principle is the same as the criteria for financing the operating costs of water and sewer systems; that is, those who use the system should be those who pay for it. In particular, payments should be in the form of user fees that reflect usage levels (Clayton 2014; Ontario Institute for Competitiveness and Prosperity 2015).

Growth-Related Infrastructure

Development charges are used by all large and medium-sized Ontario municipalities to finance the off-site capital cost of new development that requires water, sewer, and stormwater infrastructure. In the early 1990s, development charges were used mainly by larger municipalities and a few medium-sized cities and towns. Since then, their use (in coverage and dollar value) has expanded to include more services and all cities, towns, and municipalities that are trying to cope with the cost of providing infrastructure to service new growth.

An efficient development charge must cover the full cost of delivering the service. This should include a capacity component that covers the capital cost of constructing the facility, plus a location or distance/density charge that reflects the capital cost of extending the service to properties or neighbourhoods (Kitchen and Tassonyi 2012). The most efficient development charges vary by type of property (residential, commercial, or industrial), neighbourhood, and distance from source of supply, so that each charge captures the extra cost of the infrastructure required to service the new growth.

9. On-site services are the responsibility of the developer in most municipalities and are included in subdivision approval plans.
However, most Ontario municipalities do not use variable charges to capture cost variations. Instead, they impose identical charges on all properties of a particular type, regardless of location. The same charge, then, is levied on residential dwellings in low-density neighbourhoods as on residential dwellings in high-density neighbourhoods. This occurs even though the marginal cost per property of infrastructure projects in low-density areas is higher, which can lead to urban sprawl (Slack 2002). Developments close to existing infrastructure are charged the same as developments farther away. As well, similar charges are often levied on properties that absorb different amounts of resources, due to factors such as terrain or soil type. Practices such as these encourage development in the wrong places. While it may be naive to expect municipal officials to calculate the infrastructure cost for each new property, costs could and should be calculated for each new development area or neighbourhood, to discourage inefficient patterns of development (Kitchen and Tassonyi 2012).

A recent study, however, has taken a contrasting view. It opposes development charges for water and sewers (Clayton 2014). In particular, it argues that development charges for these services should be terminated and replaced by user fees that are high enough to cover the costs of new infrastructure (which could be financed initially by borrowing). The argument continues that development charges are not used for other similar monopolistic-type community utility businesses such as natural gas. This change, the study suggests, would lead to increased efficiency and conservation because each litre consumed would be priced more efficiently. At the moment, the development charge is a lump-sum up-front payment, and, as such, there is no reason to recover this cost through annual water prices. Consequently, prices are lower than they would be if they captured all annualized costs on a per-unit basis. As noted earlier and repeated here, lower prices lead to overconsumption and overinvestment in infrastructure. As well, the report continues, it would be fairer because new users, through existing water rates, pay a share of the costs of providing water to existing customers while new customers are not being supported likewise by existing users. It could also increase housing affordability, the study maintains.

Renewing or Rehabilitating Infrastructure
Renewing or rehabilitating existing infrastructure has become a major concern at the municipal level. In fact, it has led to a number of estimates on the size of the infrastructure deficit and what should be done to eliminate it. Before considering financing tools, I must express caution about buying into the existing estimates of the size of the municipal infrastructure deficit, primarily because of the way in which these estimates have been made (Fenn and Kitchen 2016, Box 4). In short, it is difficult to find a clear-cut definition of what is meant by the infrastructure deficit. In general, one may argue it exists if the level of government responsible for spending on a physical asset to meet some desired or acceptable standard is deemed to have insufficient revenue or a lack of revenue capacity to pay for the asset. Such a definition, however, begs the question of what is insufficient
revenue or lack of revenue capacity and, for that matter, are the desired standards appropriate?

Municipal governments, by and large, have the capacity to pay for their infrastructure, but quite often not the political will to do so if it means raising taxes or user fees. It is politically more expedient and acceptable to constituents if elected officials simply claim that they have an infrastructure deficit and require funding from a more senior level of government. Indeed, this is the scenario that plays out annually at the municipal level in Canada (Curry 2015). Municipalities through their respective municipal associations claim that there is a revenue imbalance in the Canadian political system and that they deserve/need additional revenue from senior governments, generally in the form of more grants to finance their alleged infrastructure deficit.

The bulk of the empirical evidence on the size of the deficit appeared more than a decade ago (for a summary, see Kitchen 2003), although there have been occasional updates replicating the methodology of the earlier studies. The most recent estimate for Canada has been provided by the Federation of Canadian Municipalities, where it was noted that $39 billion is needed for improving wastewater systems; $25.9 billion for drinking water, and $5.8 billion for stormwater systems (FCM 2012). All studies have a similar conclusion – a municipal infrastructure deficit exists, although its size varies from study to study.

In summary, methodological and data problems associated with existing studies lead one to wonder if discussions around the so-called infrastructure deficit aren’t largely driven by political objectives to achieve grant funding. At the same time, one could argue that it is more important to know whether current practices should be changed to assist in correcting the alleged shortfall rather than knowing whether or not a deficit or need exists and its size. An important start here would be a requirement that municipalities set efficiently designed prices for water, sewers, and stormwater. Here, it may be important to remind the reader that efficiently structured fees (prices) play an important role as a mechanism for revealing the true demand for – and therefore, indicating the efficient supply of – water-related infrastructure.

2.4 Which Financing Instrument?
There are three main instruments that are often used for financing existing infrastructure: reserves, borrowing, and grants.

Reserves
Reserves\(^\text{10}\) are created when a portion of current water rates (for example, one, two, or three cents per litre) is set aside annually in a special account accumulating interest until funds are eventually withdrawn and used to finance or partially

\(^{10}\) This discussion of reserves differs from the discussion of development charges, which also go into designated and legally circumscribed reserve funds.
finance water and sewer infrastructure. Financing through reserves is essentially the reverse of financing through borrowing.

Reserves have grown in popularity over the past few years. However, their application is not without problems. In particular, asking current users to pay for infrastructure that will benefit future users creates intergenerational inequities and has the potential for leading to a level of capital spending that may not be allocatively or economically efficient.

**Borrowing**

Borrowing makes considerable sense for water and sewer systems because the benefits from this infrastructure accrue to future users. As such, this form of financing is fair, efficient, and accountable. At the moment, many cities and regions have the capacity for more borrowing (Kitchen 2013) but are reluctant to do so. This reluctance may be somewhat short-sighted given recent evidence on the productivity-enhancing and quality-of-life benefits of investing in water and sewer infrastructure. For example, a number of studies have illustrated the extent to which spending on infrastructure is very much an investment, not just an expense. The Conference Board of Canada has suggested that infrastructure spending produces a $1.11 increase in gross provincial product for every infrastructure dollar invested and accounted for fully 12 percent of provincial labour productivity gains in the 1980–2008 period (Antunes et al. 2010; Brodhead et al. 2014). A more recent independent research study commissioned by the Residential and Civil Construction Alliance of Ontario (RCCAO) used an alternative economic modelling technique (agent-based) to make the case that investing in infrastructure pays net fiscal dividends to Canadian taxpayers that are much higher than reported in previously completed studies (Smetanin et al. 2014).

**Grants**

From 1974 to 1992, provincial grants funded 85 percent of the capital costs of community water systems. Increasing strains on provincial finances and an expanding demand for funds to finance a larger range of services demanded by a growing urbanized population in the late 1980s and early 1990s led to the program’s elimination. Since 1992, grants for water and sewer infrastructure have declined substantially. Over the past 25 years or so, they have mainly consisted of occasional one-off grants to accommodate specific requests from municipalities with financial problems or to stimulate economic growth in recessionary periods.

Most recently, grants have surfaced as a revenue source, especially through federal stimulus grant programs. These grants, by and large, have concentrated on shovel-ready projects because of the difficulty in meeting the short timeline for project approval and spending commitments, a timeline that municipalities generally could not meet for large costly projects requiring extensive planning and often time-consuming environmental assessments (Kitchen 2013). Very recently, the federal government announced a multi-billion-dollar infrastructure
investment program targeting water and wastewater infrastructure through a two-phase capital grant program beginning with near-term repair and refurbishment, to be followed by a more substantial tranche of capital grants to rebuild water, wastewater, and stormwater infrastructure in municipalities and First Nations communities across Canada.

As well, there are capital grants from the federal and provincial gas tax fund. The federal Gas Tax Fund (GTF), in particular, is a per-capita grant awarded to provinces that, in turn, allocate grants to municipalities. The latter are able to use these for 17 different types of infrastructure; 90 percent is spent on water, sewer, wastewater, local roads, and public transit.

In general, commentary at the municipal level over water and sewer infrastructure has had little to do with reforming existing water rates to achieve more efficient consumption levels and much to do with the need for more money. Is there a case for grants for water and sewers? In response, water and sewer systems provide goods that economists would classify as private goods – that is, specific beneficiaries can be identified and charged for the service and non-users can be excluded. As well, levels of consumption can be measured easily and per unit costs calculated readily. This suggests that those who use the service should be those who pay for it. Indeed, this was a recommendation of Ontario’s Drummond Commission, which stated that user fees should cover all costs of water and sewer systems (recommendation number 12.2). This, Drummond continued, would lead to stable investment in infrastructure and efficient levels of consumption, would be fair on an intergenerational basis, and would promote conservation (Drummond 2012, 45). In short, setting user fees to cover full costs is efficient, fair, accountable, and transparent.

Economic arguments for capital grants are not strong. Their use, where they are prevalent, should be conditional on recipient governments setting efficient water rates. As well, recipients should have proper asset management programs along with a requirement that asset replacement costs be included in the charge or price for water consumed. This approach seems to be progressing, and is in place in some municipalities but still has a way to go in a number of municipalities. To go even further, it may be time for the opportunity cost of water and sewer services to be used as the base for formulating pricing structures and price levels. In simple terms, if we are going to use capital grants to restore our water, wastewater, and stormwater infrastructure over the next decade to compensate for past neglect and the absence of full-cost pricing, it should be the last time we do it. Once rebuilt, our infrastructure’s users should pay the full cost of the service, including capital replacement costs.

2.5 Governance of Water-Related Services – Who Should Be Responsible?
There is a historic, dynamic tension in the organization and delivery of water services in Ontario. On the one hand, natural forces create conditions where regional factors determine the availability of water – watersheds, aquifers,
marshlands, freshwater lakes, and rivers. On the other hand, municipal waterworks have evolved historically from the efforts of several hundred local communities to provide safe drinking water, sewage treatment, and the channelling of stormwater in urban areas and agricultural drainage works in rural areas. As a result, water and wastewater systems and flood control have been municipal government responsibilities since the earliest days of Ontario’s urban development.

Where these localized arrangements proved inadequate in scale and resources, beginning after the Second World War, mandates were shifted to regional entities, such as conservation authorities after 1946 and, in the late 1960s and early 70s, to regional municipalities and their amalgamated successors. In a few places where regional governance does not exist, municipalities have co-operated in developing major water and wastewater facilities, or contracted for sharing unused capacity. An example here would be the cities of London and St. Thomas, which have a jointly operated facility to draw water from Lake Huron and Lake Erie to serve their communities. As well, the City of Hamilton and the County of Haldimand have contracted to share Hamilton’s surplus potable water supply. For much of the rest of Ontario, however, the situation remains: local authorities manage water-related functions that often transcend their political boundaries and, in smaller communities, test their technical and financial capacity. It is here where there continue to be concerns over municipalities’ ability to ensure water quality, to implement proper pricing structures to achieve full-cost recovery, and implement sustainable asset management programs. For these places, the need may exist for widespread consolidation and integration of small, local waterworks and sewage collection and treatment facilities (Manahan 2010a), or local systems may need to be contracted to an operator with technical depth and financial resources beyond that typically available to a local municipality on its own (Swain et al. 2005). The Ontario Clean Water Agency (OCWA) is a government agency whose original mandate was to build and operate water and wastewater infrastructure for the Ontario government. Over time, its mandate has expanded to allow OCWA to take over municipal facilities or to operate those facilities on a long-term contract. While it has the scale, depth, and technical knowledge needed to operate contemporary water systems, OCWA remains a government agency closely circumscribed by the policies and political sensitivities of the government of the day.

Another example of a viable approach for Ontario may be drawn from Alberta, where a small-scale “regional” model has been implemented in the Grande Prairie region. Facing many of the same issues as rural and small urban municipalities within Ontario counties, municipalities in this region of Alberta have created a municipally owned “private” utility company, Aquatera. Initially providing water and wastewater services management, it has since expanded into solid waste management and offers a range of “utility” services to other municipalities and, through a subsidiary, to industries. Aquatera appears to bring commercial discipline to utility services while generating local economic activity and yielding dividends for taxpayers through its municipal ownership (Aquatera 2014).
In other parts of the world, water services are often organized quite differently. In many parts of the United States, autonomous water and sewer districts manage their systems on a regional basis, using a utility model similar to electricity distribution. In the United Kingdom, the essential watershed linkages between water, wastewater, and stormwater produce entities that are integrated and organized regionally on a very large scale and frequently with private management or ownership (introduced to ensure more adequate investment and efficiency than was the case in its decaying infrastructure before 1989). In Europe, public ownership of water utilities is less common, with national and even transnational utility companies providing water services on contract or by franchise, much as Ontario does with natural gas distribution. The features that all of these arrangements share are: (a) a watershed-wide approach to the sourcing, treating, and managing of water resources; and (b) an in-depth capacity to deal with the many engineering, financial, water quality, environmental, and customer service issues that arise over time.

Some might argue the case for a greater degree of private operation, ownership, and investment in Ontario’s municipal water or wastewater utilities. At the moment, it is largely restricted to contracted service management by major providers, like American Water Canada or Veolia Canada. Regulated private ownership is a route that was followed by the United Kingdom to overcome chronic problems with its water and wastewater utilities, which came to a head in the 1980s. It appears to be a model that works safely, efficiently, and economically in many developed countries. In an era where infrastructure investment is a priority but government tax resources are constrained, it is a model that is favoured by major public-sector pension funds and other investment funds with an interest in public infrastructure as a class of assets.

Others might argue that we do not need to move to a full-scale privatization or contracting-out model, provided we can introduce the efficiency and operational sustainability disciplines of commercial practices while retaining public ownership or at least strong regulatory control (Swain et al. 2005). At the moment, there is no clear-cut direction as to where Ontario should go, but there would be real merit in exploring the potential for reorganizing and integrating water, wastewater, and stormwater services on a regional or watershed basis. The alternative would be to transfer these responsibilities by contract or franchise to a public or private organization with deep resources and/or regional scope that could deliver these services on behalf of the participating municipalities (Fenn and Kitchen 2016).

2.6 Regulating Water Rates?
For decades now, water and wastewater rates have been set by municipal councils or utility commissions. On the surface, this is how it should be. Water is a local service, users can be identified, production and delivery costs can be calculated, and rates can be set. If the rates are perceived to be too high, those elected to the decision-making body may be voted out at the next election. Water rates like property taxes, however, are highly visible and increases are often subject to severe criticism. Unfortunately, this has led to widespread reluctance to raise
water rates in many municipalities. It may thus be unrealistic in the current political environment to expect a local governing body to make efficient decisions about the structure and level of water rates without guidelines and support from an established province-wide regulatory body. While there may be a desire to use reduced water rates for economic development purposes, for example, or to cushion the impact on the vulnerable, system sustainability considerations should be paramount. At a minimum, the regulatory framework could be developed and used by municipal councils to approve rates and financial plans that ensure that rates attain a level sufficient to sustain the water-related systems into the future. If compliance with such a framework cannot be achieved through voluntary co-operation, there may be a need to impose some form of administrative tribunal process on those unable or unwilling to comply. This concept was unsuccessfully espoused by MPP David Caplan’s Private Member’s Bills 13/10 and 237/10, which contained a number of other “full-cost” provisions (Manahan 2010b), but it may deserve a revisit.

3. Summary and Observations

Water, for the most part, is increasingly recognized as a scarce resource; meters are in place almost everywhere and volumetric prices of one sort or another have largely replaced fixed-rate charges; full-cost recovery is widespread, although there is considerable disagreement over what full-cost recovery means; ongoing annual provincial grants have disappeared and been replaced with one-off infrastructure grants at infrequent and unpredictable intervals; amortization of capital costs is now required; asset management programs have either occurred or are in the process of being implemented; and financing new and rehabilitated infrastructure has moved to the forefront as a policy concern.

Despite these advances, shortfalls and inefficiencies remain, most of which have to do with prices and pricing structures that do not adhere to efficiently set and conservation-oriented principles. When this happens, we overconsume, which leads, in turn, to a larger-than-necessary demand for very expensive infrastructure.

What should municipalities do and what should senior levels of government do? Municipalities should concentrate on setting efficient prices for water, sewer, and stormwater runoff. For water consumption, this includes multi-part pricing to accommodate such things as capacity constraints, economies of scale, periods where peak-load demand differs from regular demand; greater use of meters and volumetric pricing for residential and commercial sewer usage; and the implementation of user fees based on volume of water runoff for stormwater systems. Concerns over the capacity of some municipalities or local utilities to adopt efficient pricing and maintain sustainability suggests that we should reconsider the way in which smaller and remote municipalities provide water and handle wastewater. This might include the amalgamation or regionalization of a number of smaller systems into one relatively large utility. It might include, as is done in a number of countries, the privatization of water and sewer systems for all municipal providers regardless of cost.
What should the province do? In essence, it should set water safety standards and serve as coordinator/planner for water utility systems. An additional responsibility and one that is almost certain to be important in the near future is that of regulator. Political repercussions from setting higher water rates at the municipal level suggest that many local councils or utilities will be reluctant to set prices at levels needed for funding annual operating and capital costs without a provincial regulatory framework to approve and support these increases. Another area in which the province could require change is in the provision of grants for water and sewer systems. Although the economic arguments are not strong, their use should be conditional on recipient governments setting efficient water and sewer rates.

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