Can You Achieve Financial Sustainability in the Water Sector Without Getting Soaked?

As presented at Utility Management Conference, Phoenix AZ, March 12th, 2013.

C.S. Lombard*, D. Main*

*AECOM, 4th Floor, 3292 Production Way, Burnaby, BC, Canada, V5A 4R4
(E-mail: *christiaan.lombard@aecom.com; david.main@aecom.com*)

Abstract
AECOM has been leading the benchmarking of Canadian water, wastewater and storm water utilities since the late 1990s through the National Water and Wastewater Benchmarking Initiative (NWWBI). With fourteen years of utility performance data at its disposal, the Initiative is ideally positioned to observe some of the macro trends evident in the industry, including the financial challenges utilities are experiencing. This paper will focus on defining how to measure financial sustainability in the context of water and wastewater utilities, and share some of the strategies that utilities can follow to become financially sustainable.

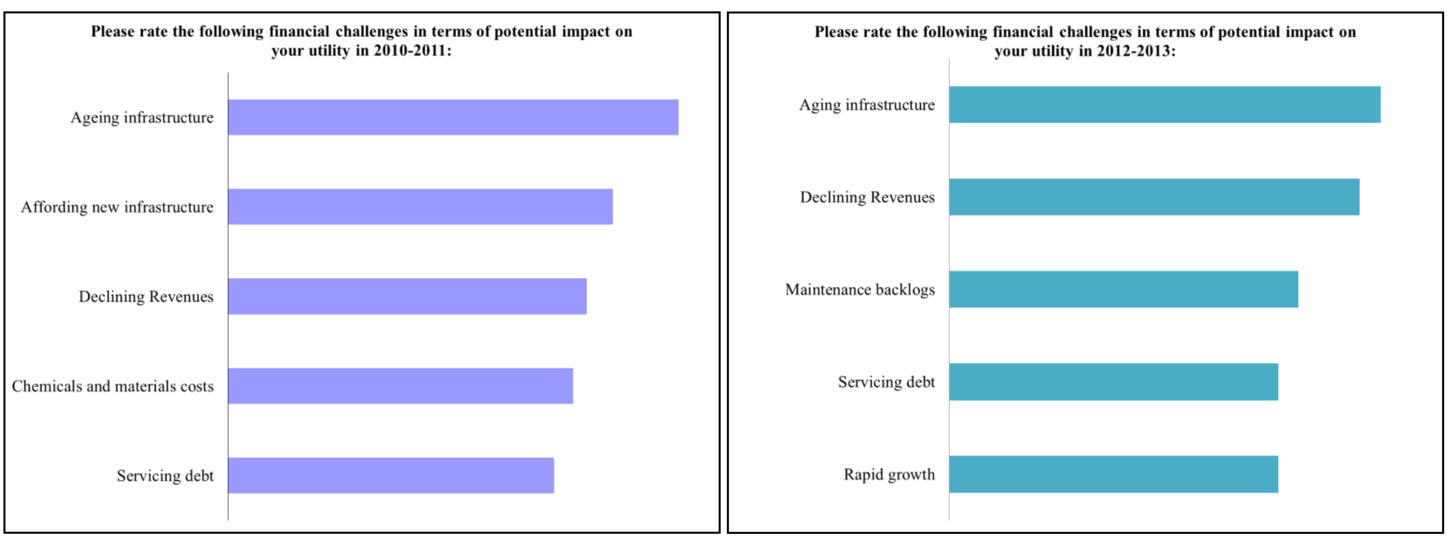
Keywords
Financial sustainability, water and wastewater utilities, benchmarking, rate structures, financial sustainability dashboard.

INTRODUCTION

NWWBI Task Force on Financial Sustainability

Canadian water and wastewater utilities are experiencing financial challenges at a time when regulatory changes and the challenge of balancing the demands of growth with asset renewal and replacement are placing severe pressure on the bottom line. The National Water and Wastewater Benchmarking Initiative (NWWBI, see www.nationalbenchmarking.com) has been measuring and comparing Canadian water, wastewater and storm water utility performance since the late 1990s. With fourteen years of utility performance data at its disposal, the Initiative is ideally positioned to observe some of the macro trends evident in the industry. As such, the NWWBI administers a survey every two years to the NWWBI participants to gauge their outlook on financial matters and some of the key challenges they are facing. **Figure 1** presents a summary of the top five financial challenges that NWWBI participants are dealing with as per surveys administered in the first quarters of 2010 and 2013, respectively

Figure 1. Outlook on Top Five Water and Wastewater Utility Financial Challenges for 2010-2011 and 2012-2013



The top five challenges named above indicate that utilities are confronted by aspects related to ageing infrastructure, declining revenues, rising costs and managing debt. The water sector is one of the most capital intensive industries, approximately 20 times more capital intensive than the Standard & Poors (S&P) 500 (WaterRF, 2009). A significant portion of any utility's annual expenditure goes towards the creation of new infrastructure and / or the replacement of existing infrastructure. As such, many utilities are realizing that they have neglected investment in infrastructure rehabilitation and replacement and will have to significantly increase such reinvestment expenditures in the future, while still meeting the demands of growth and new regulations. The combination of having to deal with ageing infrastructure at a time when revenues are declining is of particular concern to the NWWBI participants. To address these financial challenges the NWWBI created a task force to explore utility financial sustainability, in terms of the following:

- Maintaining revenue stability as a result of declining water demands, economic contraction, etc.
- Debt management.
- Enhancing utility revenues.
- Operating and capital reserves.
- Ageing infrastructure and asset management.
- Financial planning and prioritization of capital projects.
- Financing strategies.
- Fixed versus variable rates.
- Communication and education.
- Other, as needed.

The Meaning of "Financially Sustainable"

This paper will focus on some of the lessons learnt through our investigation of the above topics, the development of the NWWBI financial sustainability dashboard, some of the key metrics used and our findings on what it means for a water and wastewater utility to be truly "financially sustainable". A financially sustainable water or wastewater utility is defined as *having sufficient funding to sustain assets in such a manner that meets present infrastructure needs without compromising the ability of future generations to meet their infrastructure needs*. This definition of course leaves much open for interpretation, especially how to measure present and future infrastructure needs.

We will share in the following sections some of the experience gained on the NWWBI as well other asset management projects, on how to measure, plan for and communicate aspects around financial sustainability.

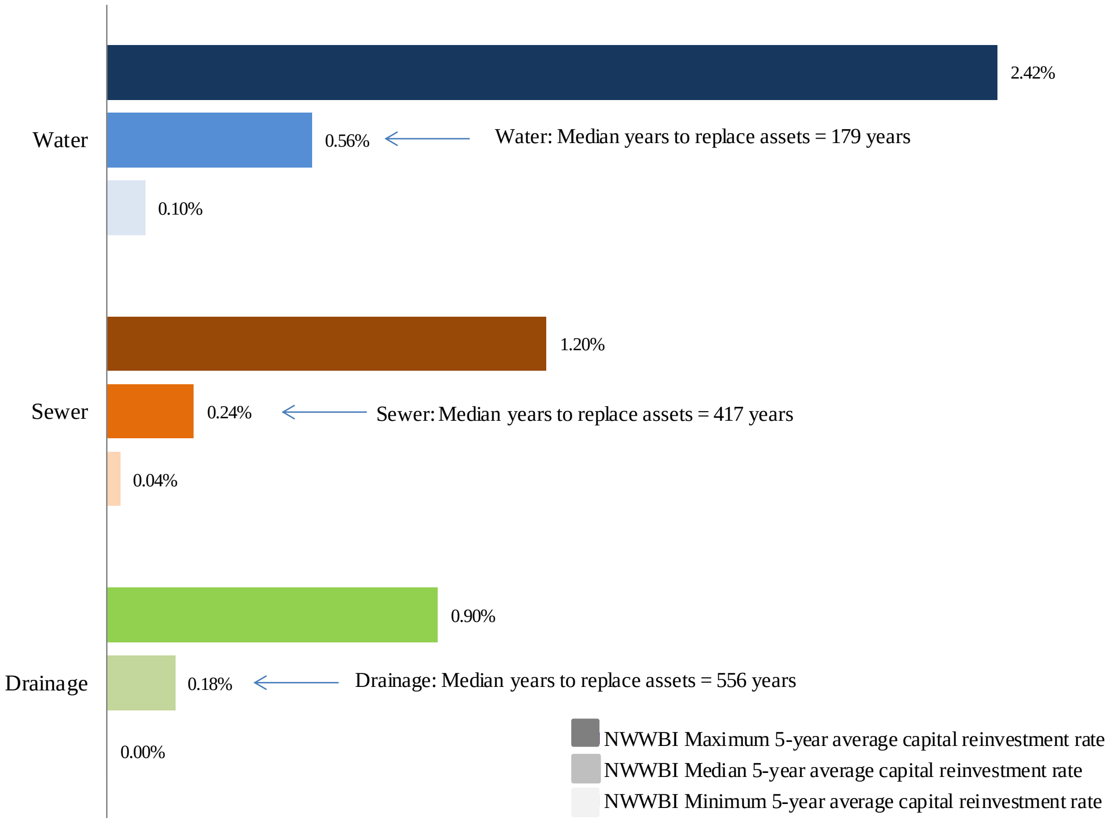
AGEING INFRASTRUCTURE

Measuring Infrastructure Reinvestment

Since the inception of the Benchmarking project, one indicator has been used consistently to highlight the urgent need for increasing the spending on renewal and replacement of existing infrastructure. This measure is commonly known as the "infrastructure reinvestment" measure and is calculated by dividing the annual amount of expenditure on reinvestment in a particular asset class (e.g., water distribution systems; wastewater collection systems; etc.) by the total replacement value of the respective assets. This indicator focuses attention on whether the current infrastructure "owners" are compromising the ability of future generations to meet their own infrastructure needs by under-investing in infrastructure renewal and replacement.

For example, a utility with a reinvestment rate of 1% would take 100 years to fully replace its assets; a utility with a reinvestment rate of 2% would take 50 years to replace all its assets, and so forth. **Figure 2** presents the five year average range of reinvestment rates of the NWWBI participants in terms of % reinvestment and a sampling of the related number of years it would take to replace the infrastructure.

Figure 2. Reinvestment Rates of NWWBI Participants



A number of observations could be made on the values presented in **Figure 2**: Water assets tend to receive the most funding for reinvestment as a percentage of replacement value, followed by sewer and drainage assets.

The Canadian Public Sector Accounting Board 3150 (PS 3150) initiative required all municipal governments to record and include all tangible capital assets (TCA) in financial statements since the 2009 reporting year. **Table 1** presents a range of some of the expected service lives typically seen in TCA statements:

Table 1. Expected Service Lives Typically Seen in TCA Statements

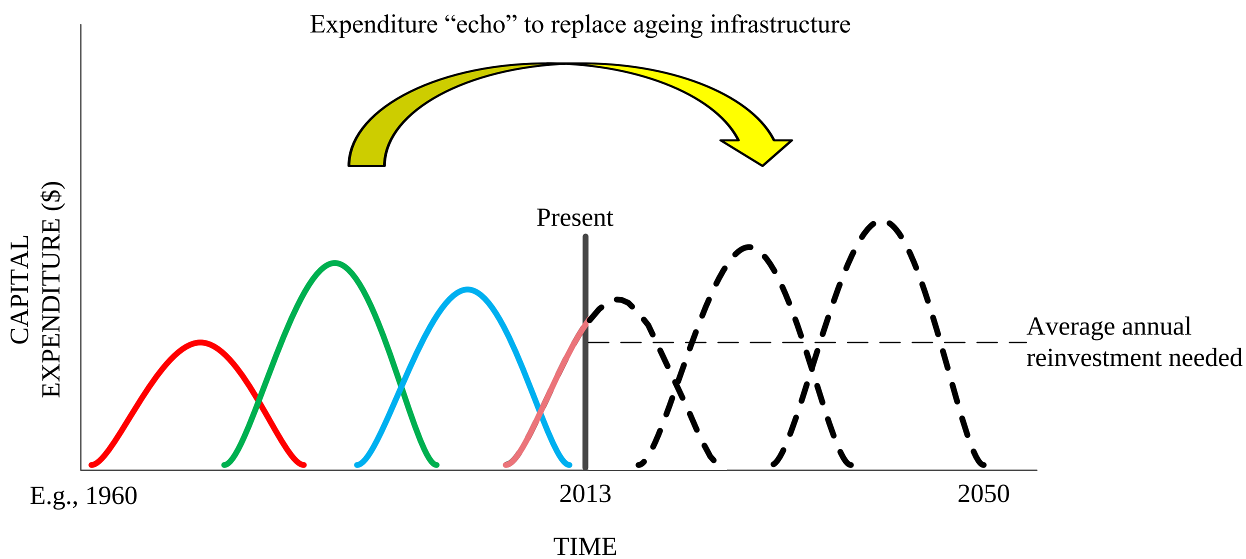
Asset Type	Expected service Life (Years)
Water mains	50 -100
Sewer & Drainage Mains	50 - 125
Structural	40 - 75
Mechanical	15 - 40
Electrical	15 - 25
Instrumentation	5 - 15

Some caution is needed when comparing expected service life (ESL) from an accounting perspective vs. an engineering perspective, as it is reasonable to expect that many assets will operate satisfactorily for a period in excess of their expected service life. However, a cursory comparison of the median "years to replace" numbers from **Figure 2** and the ESLs from **Table 1** indicates a disconnect between reinvestment and ESL; therefore it is fair to say that the reinvestment rate is insufficient to keep pace with aging infrastructure.

How to Determine a Sustainable Rate of Reinvestment?
The question that then begs to be asked is how does one determine what a sustainable rate of reinvestment is? A logical first step is to conduct a “top-down” assessment by using asset inventory data related to install dates, as explained though the following steps:

1. All infrastructure assets have a finite life. Different types of infrastructure have different life expectancies / estimated service lives. For example, water mains are expected to last in the order of 80 years whereas SCADA equipment lasts between 10 and 15 years.
2. Depending on the installation date, infrastructure assets will require replacement sometime in the future predicated by their estimated service life, as demonstrated in the “expenditure echo” diagram in **Figure 3**.
3. The particular ”mix” of infrastructure assets in need of replacement in any given year will depend on a number of factors, including the physical condition, hydraulic capacity, construction techniques, inspection and most simplistically, the installation date and estimated service life of the respective assets.
4. Sustainable infrastructure reinvestment is the level of funding required to sustain assets in such a manner that will meet present infrastructure needs without compromising the ability of future generations to meet their infrastructure needs.
5. The annual sustainable reinvestment need could in theory be determined through a detailed review of infrastructure inventory, replacement value, condition, estimated service life and investment profiling.

Figure 3. The Expenditure “Echo” to Replace Ageing Infrastructure



ADEQUATE FUNDING FOR MAINTENANCE

No discussion on ageing infrastructure and the sustainable rate of reinvestment is complete without also considering the impact of maintenance, or the lack thereof, on asset condition and longevity. Utilities often find that short-term savings in maintenance costs could be had by reducing preventive and predictive maintenance programs. However, the benefits of this type of strategy is short-lived, as assets tend to break down at unforeseen times requiring costly corrective maintenance, oftentimes at overtime rates. In addition to increasing the risks posed by asset breakdowns to the utility and customers, a lack of asset maintenance also tend to shorten asset service lives, resulting in assets having to be replaced earlier than expected. Depending on the cost to replace these assets, such incidents could play havoc on a utility’s capital and or/ operating budgets and deplete its reserves.

A useful indicator of whether a utility is performing adequate maintenance on its assets is the amount of hours spent on unplanned maintenance as a percentage of total maintenance hours per year. The median unplanned maintenance hours fall between 15% and 20% of total maintenance hours for the NWWBI utilities. Any value much higher than 20% should indicate that a utility is not performing sufficient maintenance on its assets by virtue of having to perform so much unplanned maintenance.

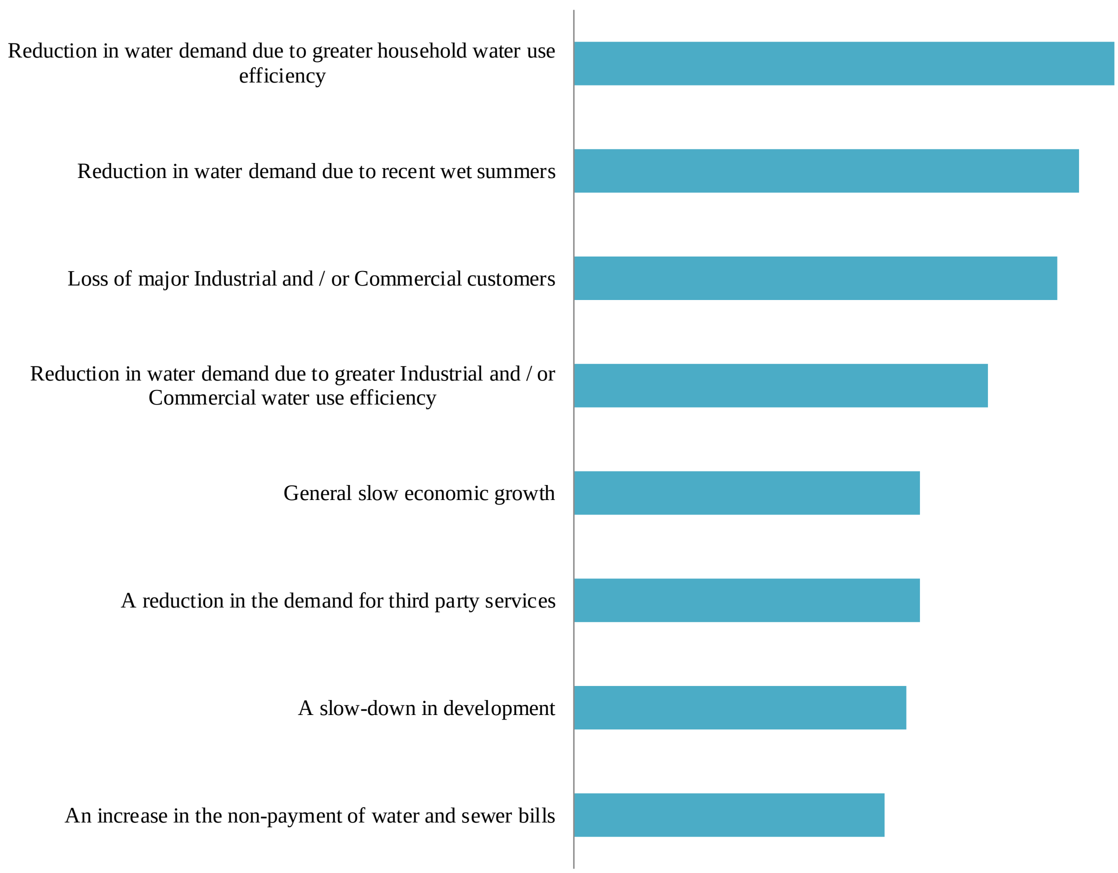
The topic of how much maintenance is adequate to sustain a utility's assets is a whole discussion on its own, and will not be dwelt on in more detail, other than to say that utilities should have adequate maintenance budgets to perform the required asset maintenance in a timely manner.

DECLINING WATER CONSUMPTION EQUALS DECLINING REVENUES

A trend that is evident at many NWWBI participants (and which is presenting one of the key financial challenges) is a general reduction in water consumption. While this trend will undoubtedly have positive environmental benefits, the flip side is a general decline in utility revenues, especially at those utilities that derive a greater portion of their revenues from per-cubic meter water sales.

The recent (2013) survey of NWWBI participants on the perceived reasons for the general decline in water consumption identified the following explanations, sorted by importance:

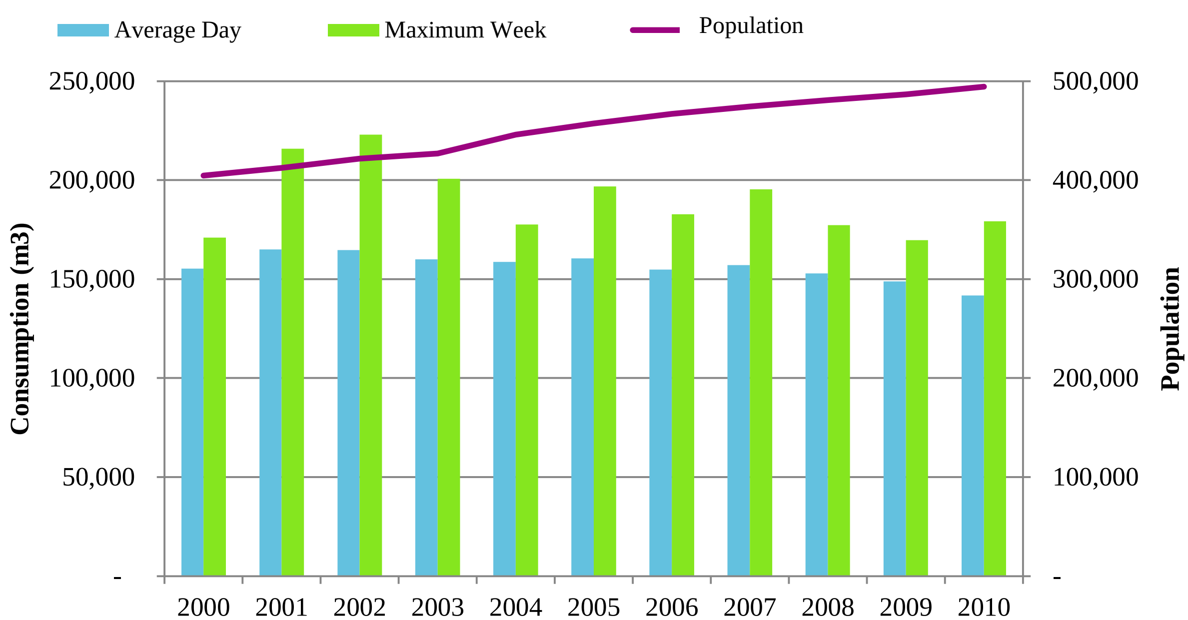
Figure 4. NWWBI Survey: Reasons for Declining Water Consumption



Experience at a Sample Ontario Municipality

As an example of a Canadian utility's experience of declining water consumption and revenues, **Figure 5** presents a comparison of annual water consumption and population for an Ontario municipality over the period 2000 to 2010. While the utility's service population increased by approximately 25%, the average day demand decreased by approximately 10% over the same period.

Figure 5. Sample Ontario Municipality: Average Day & Maximum Week Water Consumption vs. Population

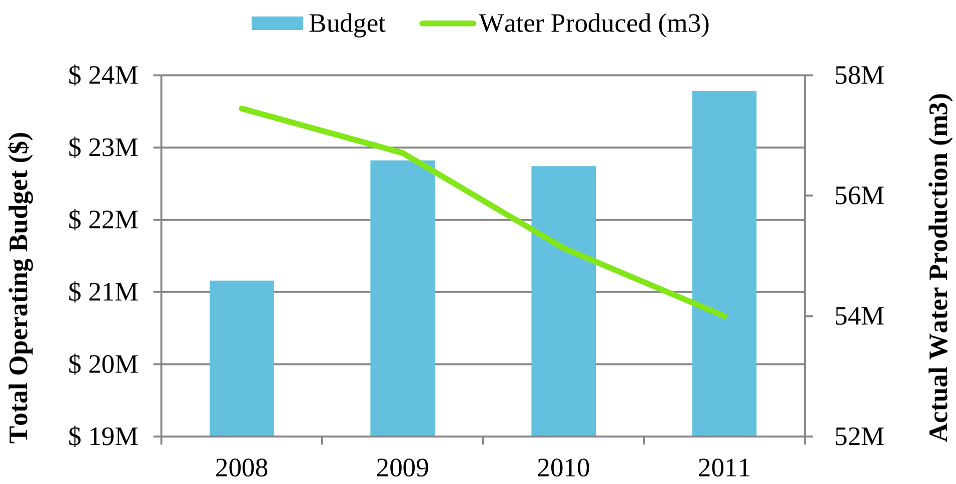


Therefore, it is not surprising that as a result of declining water consumption, the municipality experienced a 12.6% decline in its water billings over the same period as presented in **Figure 6**:

Figure 6. Sample Ontario Municipality: % Change in Water Billings from Previous Year

Figure 7 presents a good example the conundrum that water and wastewater utilities have to deal with due to being so capital intensive and having such a large percentage of its costs fixed: despite delivering 6% less water between 2008 and 2011, the operations budget of the sample Ontario municipality increased by 12% over the same period. It should be noted that the operating and capital budgets are both funded by the municipality's revenues and reserves.

Figure 7. Sample Ontario Municipality: Operations Budget vs. Water Production



Since most of the operating expenses of the utility are fixed, the capital budget was the primary tool to address the shortfall. The utility therefore implemented the following strategies:

- Deferred approximately $70M in capital projects from the first four years to the last four years of its capital budget.
- Initiated a capital project validation process to defer all capacity-related projects to the second half of its 10-year plan.
- Undertook a thorough review of all other projects to assess timing and cash flow.
- Performed a thorough assessment of growth/capacity related projects to determine appropriate timing.
- Conducted risk & condition assessments to confirm and clarify requirements for infrastructure replacement and optimization.

The utility noted that this was not a one-time exercise, but is ongoing and certainly continues to be challenging. However, the implementation of an extensive asset management program has been found to be a rewarding process that will help to improve many aspects of budgeting and planning.

HAVING A FIT-FOR-PURPOSE WATER RATE STRUCTURE

Adequate revenues require establishing and charging appropriate rates for the water sold or the services provided by the utility. Maintaining an adequate and continuing cash flow to the utility is of paramount importance and requires careful planning and execution (Bui, 2012). A properly selected rate structure should support and optimize a blend of various utility objectives and should work as a public information tool in communicating these objectives to customers (AWWA, 2000). The unpredictability of revenue streams is leading water and wastewater utilities to review their rate structures. Unfortunately it is not an easy process for a utility to revise its rate structure. It often happens that utilities are caught unawares when their revenues decline as a result of economic impacts or consumer behavioural changes, and they realize that their rate structure is inadequately designed to ensure stable revenues.

The NWWBI conducts an annual survey of water and sewer rates for the approximately 80 largest municipalities in Canada. What we have found is that there is little consistency across the sample of municipalities surveyed in the way that utility rates are structured. The following table presents a summary of the typical rate structures seen at Canadian water and wastewater utilities. A utility's rate structure could generally be a permutation of the different options related to consumption blocks, volumetric rates and fixes charges presented in **Table 2**.

Table 2 Options for Rate Structures Observed for Canadian Water and Wastewater Utilities

Consumption Blocks for Water	Volumetric Water Rates	Fixed Charges for Water	Sewer Based on % of Water Use	Consumption Blocks for Sewer (based on water consumption)	Volumetric Sewer Rates	Fixed Charges for Sewer
• None • Differing consumption blocks for residential, multi-family and ICI* • Consumption blocks applied only in summer months • Consumption blocks only for ICI • Consumption blocks only for single family residences • Same consumption blocks for all types of connections	• None • Flat volumetric charge • Flat volumetric charge plus minimum periodic (e.g., monthly) charge • Increasing volumetric charge based on consumption block • Decreasing volumetric charge based on consumption charge • Residential and multi-family with flat volumetric charge and ICI volumetric charge based on consumption block • Combined water and sewer volumetric charge	• Annual charge only for un-metered connections • Fixed charge per period (e.g., month) based on meter size • Flat fee for residential, multi-family and ICI based on meter size • Fire Line or Fire Protection charges • Additional periodic Fire Protection Charges for large commercial accounts • Flat charge per $100 of property (residential) valuation	• None • 65% • 75% • 80% • 90% • 100% • 112%	Not very common; a limited number of instances of the use of consumption blocks for ICI based on metered water consumption	• None • Flat sewer volumetric rate applied to water consumption (or % thereof) • Flat sewer volumetric rate applied to water consumption coupled with a minimum periodic (e.g., monthly) charge • Tiered sewer volumetric rate applied to water consumption & tied to sewer consumption blocks • Tiered sewer volumetric rate applied to water consumption • % of fixed and volumetric water charge	• Annual charge only for un-metered (water) connections • Annual charge based on single unit or multi-unit dwelling • Fixed monthly charge • Annual minimum charge in addition water and sewer volumetric charges • Tiered fixed charge based on water meter size (some make distinction between residential and ICI meters)

*ICI = Industrial, Commercial and Institutional

It is clear that there are many permutations possible for structuring water and sewer rates. The most commonly observed water and sewer rate structure in Canada is generally designed as follows:

Table 3 Most Commonly Observed Water and Sewer Rate Structure for Canadian Utilities

Consumption Blocks for Water	Volumetric Water Rates	Fixed Charges for Water	Sewer Based on % of Water Use	Consumption Blocks for Sewer (based on water consumption)	Volumetric Sewer Rates	Fixed Charges for Sewer
• None OR • Differing consumption blocks for residential, multi-family and ICI	• Flat volumetric charge OR • Increasing volumetric charge based on consumption block	• Fixed charge per period based on meter size	• 100%	Not very common	• Flat sewer volumetric rate applied to water consumption	• Fixed monthly charge

Quite often utilities do not take regular stock of whether their rate structure is keeping pace with current consumption patterns and whether the utility is generating a sufficient and sustainable revenue stream. In the 2013 financial survey administered to NWWBI participants, a number of strategies on how to deal with financial challenges were identified and rated, as shown in the figure below. It is worth noting that rate increases and revising the rate structure are the first and fifth-rated strategy of Canadian utilities, and is highlighted in **Figure 8**, as follows:

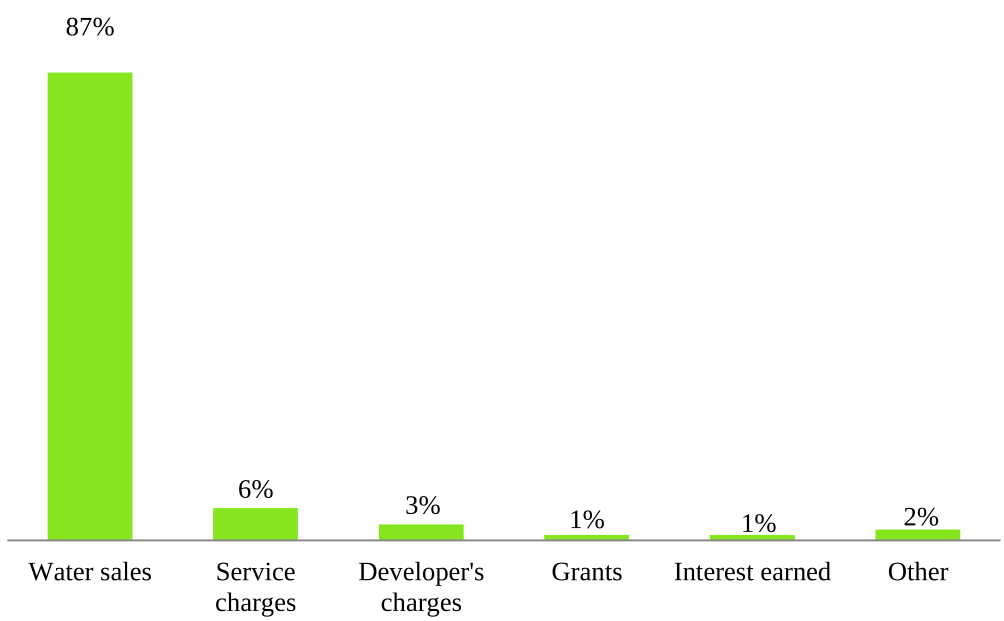
Figure 8. Top-Ranked Strategies for Dealing with Utility Financial Challenges

In an era of declining water consumption and declining revenues, Canadian water and wastewater utilities are striving to refine their rate structures to support a combination of stable / fixed revenues coupled with volumetric-based revenues (the latter may change from year-to-year, depending on water consumption). This way a utility will have a stable revenue stream while encouraging conservation through price signals embedded in the volumetric rate. While the jury is still out on what percentage of a utility's revenues should ideally be fixed, some utilities have indicated the desire to have at least 40% of their revenues fixed. The topic of what percentage of a utility's revenues should ideally be fixed will be explored further in coming iterations of the NWWBI.

Other Revenue Sources

In terms of other revenue sources, Canadian water and wastewater utilities generally do have options other than the sale of water and sewer services to generate revenue. These revenue options include interest on reserves or cash balances, grants from Provincial or Federal Government, developer's charges[1], service charges[2] and other sources. However, the data obtained through the NWWBI indicates that while there exists some opportunity to generate revenue from other sources, the primary source of income for a utility still resides within the sale of water and sewer services as presented in **Figure 9**.

Figure 9. Average Canadian Water Utility Revenue by Source



The above graph again underlines the importance of establishing and charging appropriate rates for water sold and fees for wastewater collection and treatment, as it constitutes approximately 90% of total utility revenues on average.

THE NWWBI FINANCIAL SUSTAINABILITY DASHBOARD

Background

Having explored as a group some of the financial issues presented in the preceding sections, the NWWBI project participants identified the need for a tool to communicate the complex relationships between financial and other key utility metrics to decision makers in a manner that is intuitively understandable. To this end, a financial sustainability dashboard was created that places the performance of the utility in context with its peers and focuses not only on current cost efficiency but also on financial sustainability. A key objective of the Financial Sustainability Dashboard

1 Developer's charges: Charges and fees typically used to pay for growth-related capital costs.

2 Service charges: Revenues obtained from providing utility services outside of water sales. Sample charges include connection, disconnection / reconnection, location, capacity, late payment, inspection and new account charges.

is to act as tool to communicate the intricacies of financial sustainability, and to get decision makers and politicians to realize that a low water or sewer rate relative to neighboring municipalities is not desirable from a financial sustainability point-of-view.

The NWWBI teamed with the University of North Carolina's Environmental Finance Center (UNC EFC) to create a financial dashboard to display the participant utilities' water and sewer rates combined with data collected through the annual benchmarking process. The pilot dashboard was developed in 2012 and represents the first of potentially many iterations to develop a tool for measuring and presenting the many facets of financial sustainability of water and wastewater utilities. As such, the pilot dashboard is structured in three separate tabs that display information related to comparing water and sewer rates, financial benchmarks and a comparison of some of the key characteristics of each system. Each dashboard tab is discussed in greater detail in the following sections:

Rates Comparison Tab

A screenshot of the Rates Comparison tab is presented in **Figure 10**. The Rates Comparison tab is divided into eight areas, as indicated by the red numbered blocks on the figure below. **Table 4** presents information on the eight areas of the tab as well as how to use the information presented in each area.

Figure 10. Rates Comparison Tab

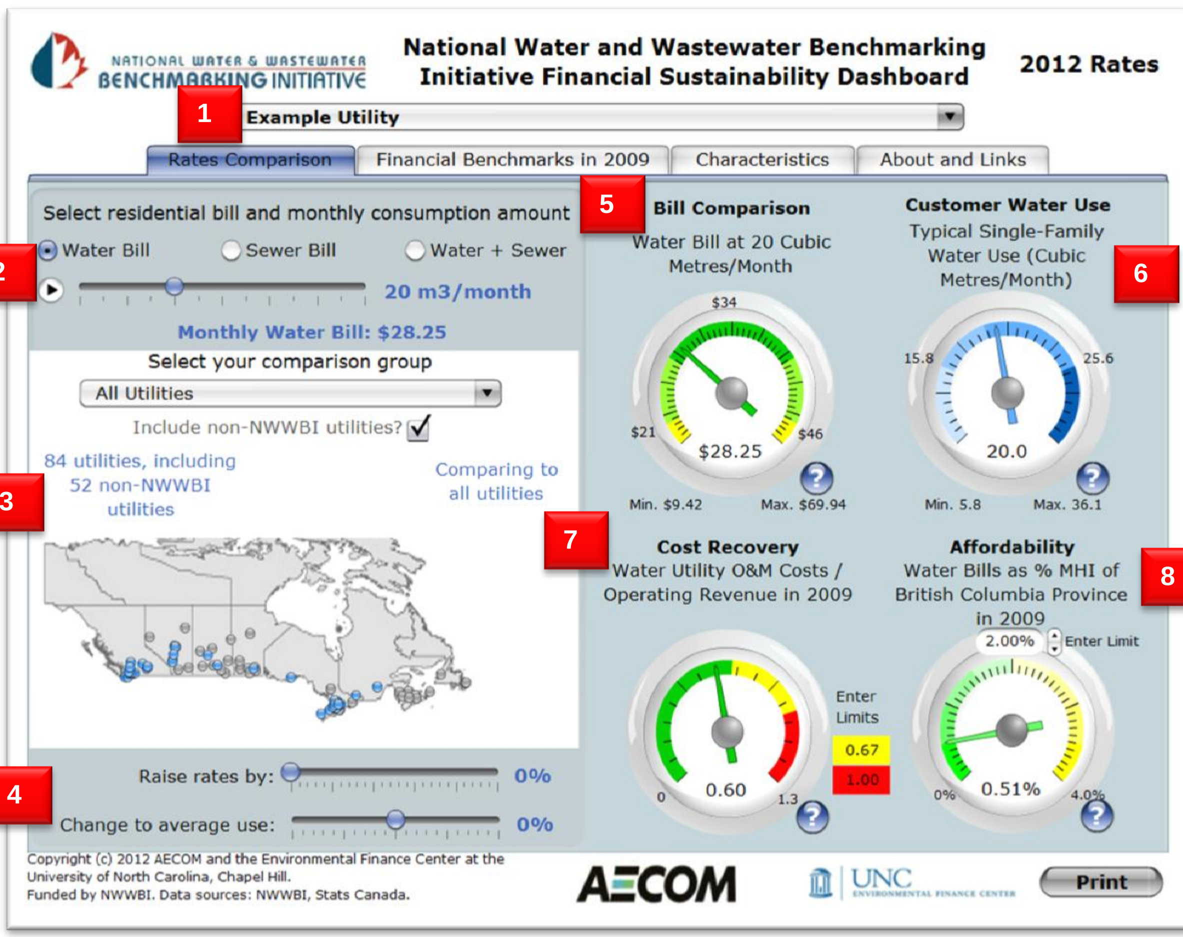


Table 4. Description of Rates Comparison Tab

Selection / Dial	Description	Use of Selection And / Or What is this Information Telling Me?
1. Utility Selection	Selection of the NWWBI utility for which data is to be displayed. Note that every time a different utility is selected, the needle on each dial points to where the selected utility's data / performance resides on the scale for the particular indicator presented by the dial.	Also included in the sample is an example utility that is deemed to be performing well from a financial sustainability point-of-view, as well as an example utility that has low rates and low operating revenues (i.e., not performing well from a financial sustainability point-of-view). The latter two choices are useful in demonstrating the linkages between the different metrics / dials and some of the broader financial sustainability aspects.
2. Bill Selection	Users can select whether to display the water, sewer or water and sewer bill in the Bill Comparison dial.	The default setting for calculating the water bill is $20m^3$/month, but users have the ability to increase or decrease the bill as needed. By varying the water / sewer bill volume one could compare the utility' performance on the Bill Comparison dial.
3. Selecting Comparison Group	In terms of the sample of utilities for comparison, users can firstly select whether to compare their utility's rates with only the NWWBI sample of utilities (32), or the greater Canadian sample (84). The next level of selection for comparison include the following options: • All utilities • Utilities with a similar number of service connections • Utilities with similar revenue generation • Utilities with the same type of water system • Utilities with the same water rate structure • Utilities in the same province • Utilities in the same region • Utilities within 200km	Users have the option to compare the selected utility with the desired sample of other utilities. Unfortunately there is a tendency with utilities to just compare their rates against their neighboring utilities to see whether their rates are "cheaper" than their neighbor's. While low rates relative to a neighboring municipality might be attractive form a political point-of-view, it does not bode well for the utility's financial sustainability. Therefore, a broad range of options for determining the sample for comparison is provided, as well as an option to compare to utilities within 200km.
4. Option To Raise Rates or Water Consumption by a Percentage	Users have the option to vary water rates and / or water consumption by a certain percentage.	This functionality provides users with an insight into e.g., the impact on how water bills compare (Bill Comparison dial) and the impact on cost recovery (Cost Recovery dial). However, the revenue impacts are based on assumptions that rate increases occur across all customer classes and are therefore somewhat speculative. This speculative assessment should not be used in place of an in-depth rate study.
5. Bill Comparison Dial	This dial shows for the selected utility what a residential customer is charged monthly for $20m^3$ (default consumption, but could be changed) on their water, sewer or water & sewer bill, relative to what is charged by other utilities in the same comparison group.	The dark green area on the dial represents the middle 50 percentile of values, while the two yellow areas on the extremities of the dial represent the bottom and top 10 percentile of values. E.g., if the needle points towards the lower yellow part of the dial then it means that the water / sewer bill for the utility under review is less than approximately 90% of the utilities in the sample.

Selection / Dial	Description	Use of Selection And / Or What is this Information Telling Me?
6. Customer Water Use Dial	This dial represents for the selected utility a comparison with the NWWBI utilities' reported average monthly water consumption for a typical single family residence.	This dial provides insight into whether a utility's average residential consumption is on the high or low side. If it is on the high side for example, there is potential for it to reduce due to conservation and other impacts, thereby having a potential adverse impact on the utility's ability to generate revenue.
7. Cost Recovery Dial	This dial presents the operating ratio which is a measure whether the utility's rates are sufficient to cover the cost of operations, and is calculated by dividing the utility's O&M costs by its operating revenues in the fiscal year under review.	A ratio of more than one would be of financial concern, because it means that the utility's O&M costs exceed operating revenues. A ratio of 0.67 is desirable as it leaves some space for servicing debt and capital costs. The option exists for a utility to select the limits according to internal policy targets.
8. Affordability Dial	This dial represents the affordability of the annual water / sewer bill as a percentage of the median household income for the province where the utility under review resides.	There is no universally accepted definition of what "affordable rates" mean and other factors such as the poverty factor will affect the affordability of rates. Users have the option to adjust the mid-point of the range on the dial.

Financial Benchmarks Tab

A screenshot of the Financial Benchmarks tab is presented in **Figure 11**. The Financial Benchmarks tab is divided into eight areas, as indicated by the red numbered blocks on the figure below. **Table 5** presents information on the eight areas of the tab as well as how to use the information presented in each area.

Figure 11. Financial Benchmarks Tab

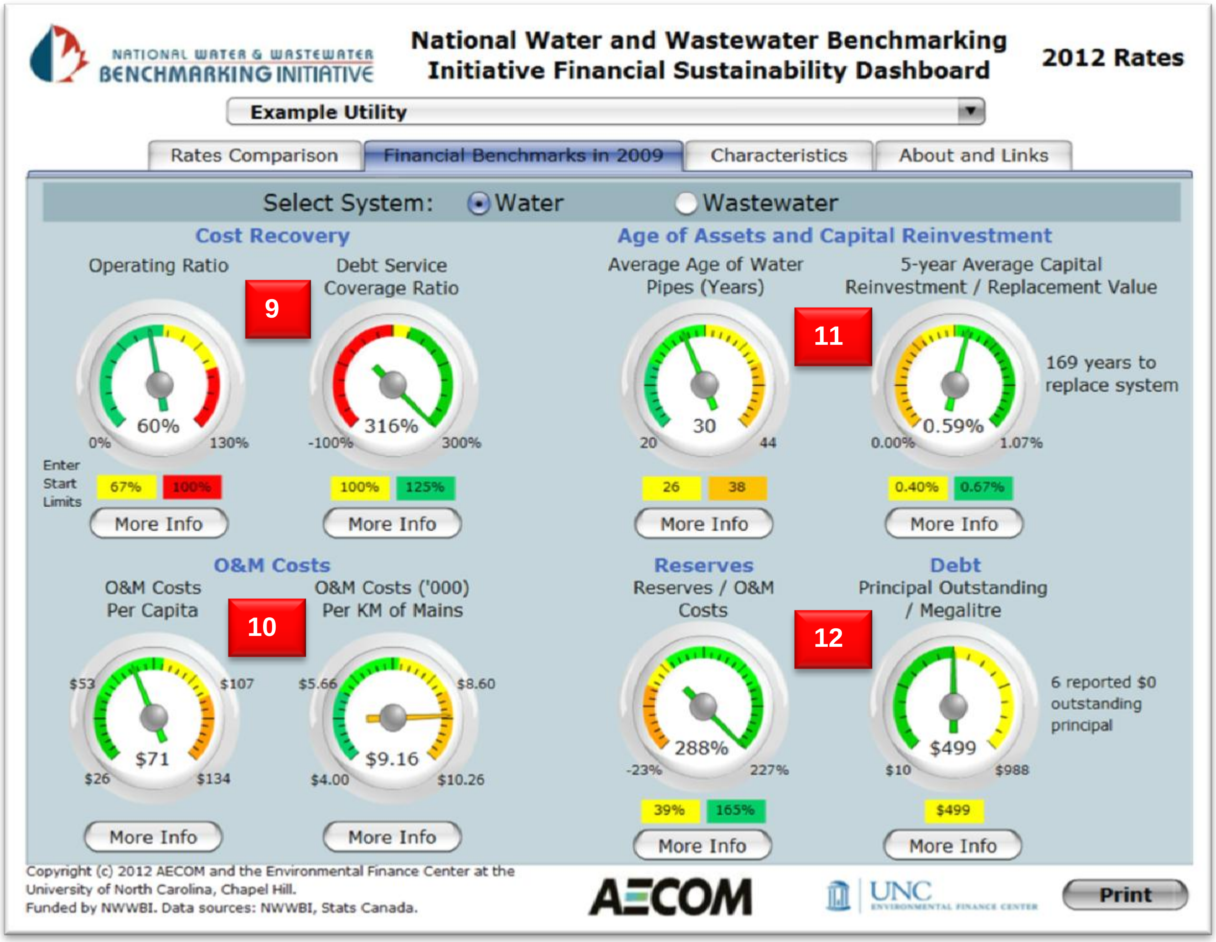


Table 5. Description of Financial Benchmarks Tab

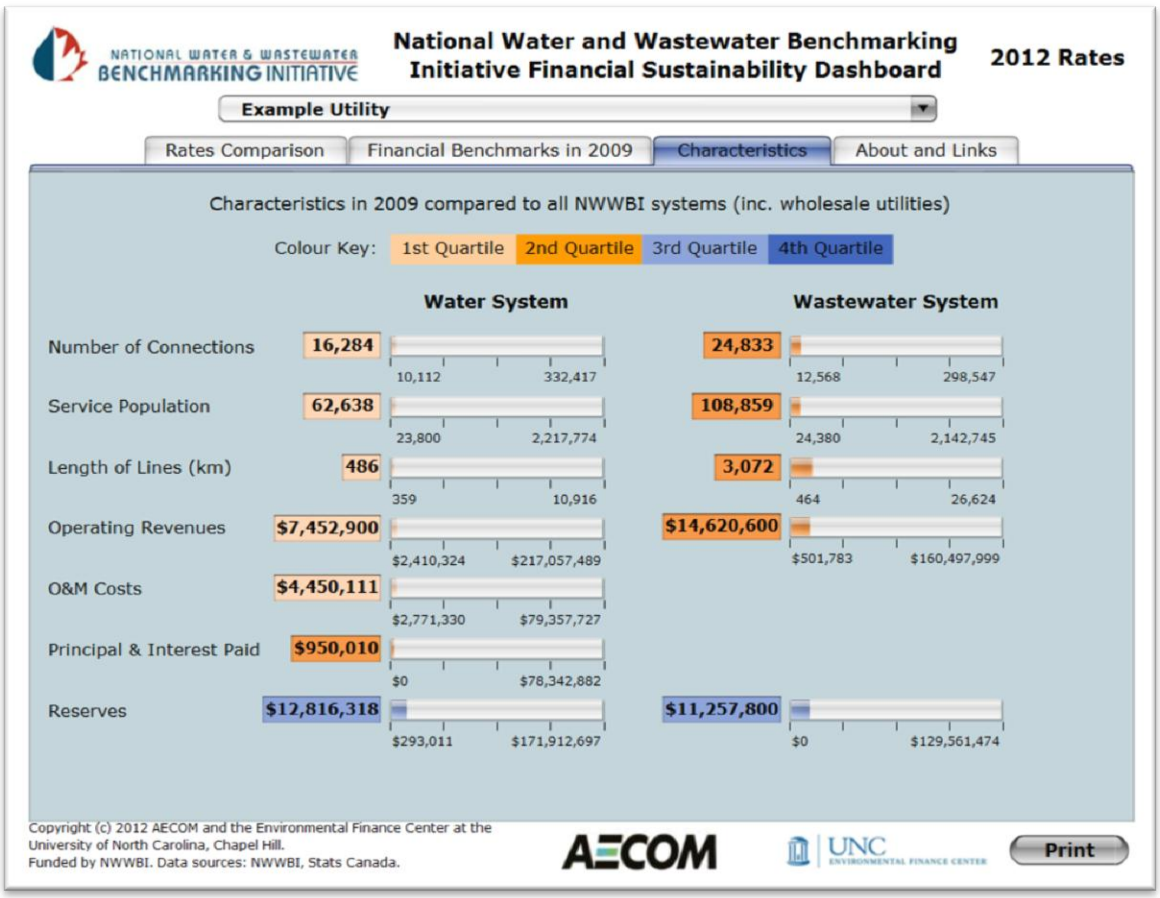
Selection / Dial	Description	Use of Selection And / Or What is this Information Telling Me?
9. Cost Recovery Dials	• The Operating Ratio dial presents the ratio of operating costs over operating revenues. Same as the Cost Recovery dial in **Table 5**. • Debt Service Coverage Ratio dial presents the ratio of (Operating Revenues – O&M Costs) / (Principal + Interest Payments on Debt). This ratio measures the ability to pay for debt service and day-to-day O&M costs using operating revenues, which are primarily charges to customers.	• For the Operating Ratio dial see the comments for the Cost Recovery dial in **Table 5**. • For the Debt Service Coverage Ratio dial the target levels can be selected based on utility policy. Utilities that make payment on existing long-term debt should at the very least collect more in revenue that what they pay through O&M costs plus principal and interest payments (i.e., a ratio of greater than 1.0). Revenues net of O&M costs should also exceed debt service payments by a comfortable margin (suggested target of at least 25%, but this target is subjective for each utility) to provide a financial buffer to reduce risk of default on debt, as well as pay for other expenditures and set aside funds for a capital reserve for future projects.

Selection / Dial	Description	Use of Selection And / Or What is this Information Telling Me?
10. O&M Costs Dials	• The O&M Costs per Capita dial presents the ratio of the utility's day-to-day O&M costs relative to the service population size. • The O&M Costs ($'000s) per km of Mains dial measures the utility's day-today O&M costs relative to the water distribution or wastewater collection system.	• The O&M Costs per Capita dial target levels are based on benchmarking the quartiles of 33 water & wastewater utilities in the sample. The first quadrant (dark green section) reflects what the per-capita O&M costs are for the lowest 25% of utility values. • The O&M Costs ($'000s) per km of Mains dial target levels are based on benchmarking the quartiles of 33 water & wastewater utilities in the sample. . The first quadrant (dark green section) reflects what the per-km O&M costs are for the lowest 25% of utility values. • It is generally fair to say that although larger utilities spend more on O&M, these costs are shared among more customers, and due to economies of scale, usually yield lower per-capita cost ratios than smaller municipalities. However, relative population densities also factor into per-unit cost efficiencies. That is why O&M cost efficiency is measured both in terms of population and per-km length.
11. Age of Assets and Capital Reinvestment Dials	• The Average Age of Pipes dial measures the weighted average age of the pipe system (water or wastewater), as per data provided by the NWWBI participants. • The Five-Year Average Capital Reinvestment / Replacement Value dial measures utilities' annual capital reinvestments, averaged out over five years, relative to the replacement value of the total system's assets.	• The expected service life (ESL) of individual pipes my vary based on material, soil condition, installation, pressure, water quality and other factors, but generally varies from 50 to 125 years. Keep in mind that by definition fifty percent of the inventory is older than the average age. The average age of pipes in the NWWBI sample is 32 years. • The greater the reinvestment is, the faster the utility is moving with renewal and replacement of existing assets, thereby improving service and reducing risk to customers. This indicator ties with the data presented in **Figure 2**. This indicator should be evaluated in the context of the average age of the system, as younger systems generally do not require the level of reinvestment that older systems require. • The number of years to replace the system is useful in placing the reinvestment rate in context of the number of years that it would take to replace the system based on the current average reinvestment rate.
12. Reserves and Debt Dials	• The Reserves per O&M Costs dial presents the ratio of current reserves to the annual O&M costs of the utility. • The Principal Outstanding per Megaliter dial presents the existing debt (principal), normalized by the volume of water treated or conveyed by the system.	• The Reserves per O&M Costs dial reflects how much of the annual O&M costs could be paid out of reserves. Utilities should maintain sufficient cash in reserve to meet any sudden, unanticipated costs, as well as to buffer against lower-than-projected revenues that may occur due to changing customer patterns. As a minimum, utilities should have sufficient cash reserves to maintain two billing cycles, but should certainly strive to maintain greater levels of reserves. • The Principal Outstanding per Megaliter dial does not include future capital costs or the related debt the utility is planning to incur. The Principal Outstanding per Megaliter measure is an indicator of the current level of indebtedness of the utility. Oftentimes a utility would have a relatively high level of indebtedness if it had incurred a major expense in recent years such as a treatment plant upgrade and / or a main replacement program. Therefore this indicator should be evaluated in conjunction with indicators such as the average system age and the debt service coverage ratio to get a more holistic picture of relative indebtedness.

Characteristics Tab

A screenshot of the Characteristics tab is presented in **Figure 12**. This tab presents a summary of some of the key characteristics of the water and wastewater systems within the NWWBI sample, in terms of 1st, 2nd, 3rd and 4th quartile values. The information presented on this tab is useful in placing the relative size of the utility under review in the context with the other utilities in the sample.

Figure 12. Characteristics Tab



Concluding Remarks on the NWWBI Financial Sustainability Dashboard

The pilot NWWBI Financial Sustainability Dashboard was presented at the National Benchmarking Workshop in May 2012 in Quebec City, with participants being given the opportunity to review and comment on the structure and layout of the dashboard, metrics and the ranges on the dashboard dials. All suggested changes to the dashboard were incorporated and the first version of the financial sustainability dashboard is currently available for use to participants in the Benchmarking Initiative.

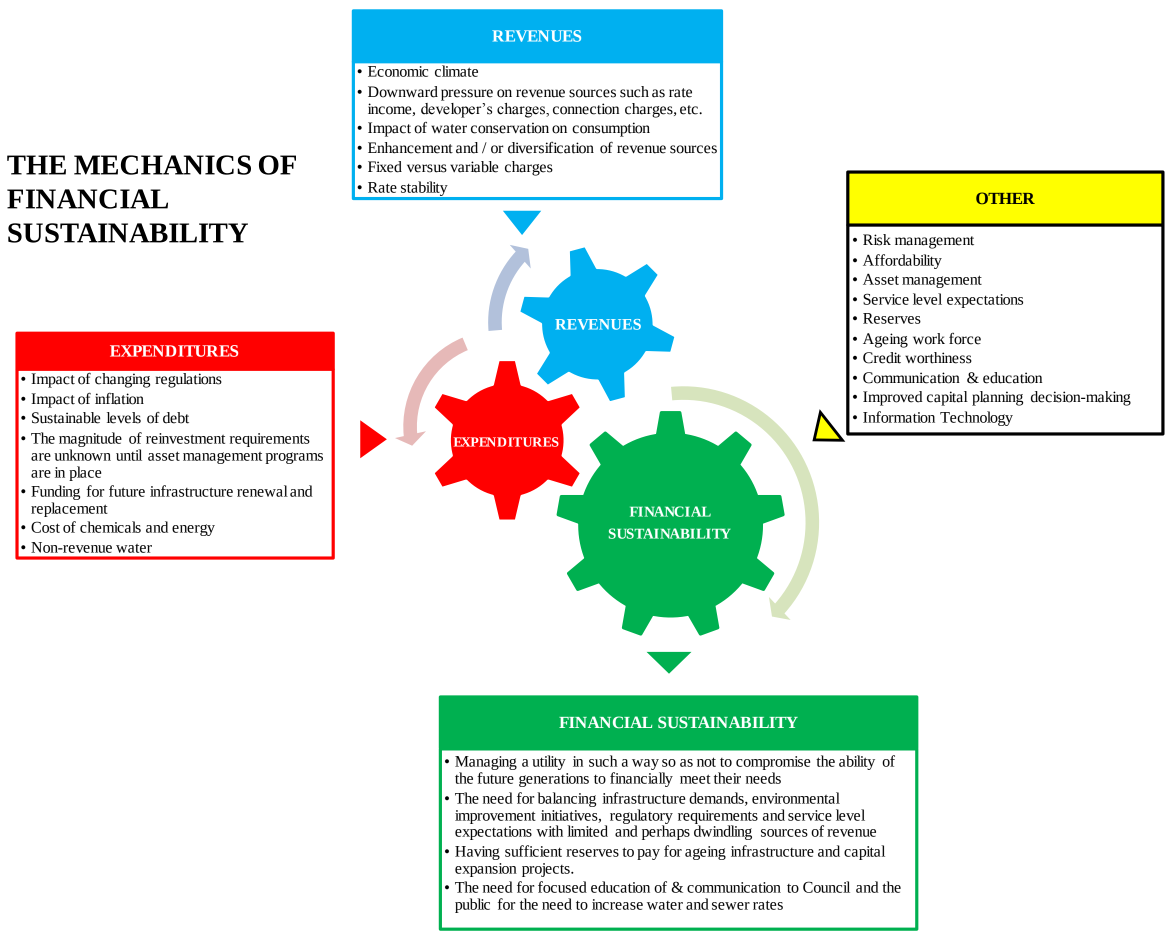
The Financial Sustainability dashboard is primarily a communication tool designed to help NWWBI participants communicate aspects related to the financial situation of a utility in terms of water and sewer rates, revenues, debt, affordability, cost efficiency and renewal / replacement of infrastructure. The dashboard will keep on evolving as the NWWBI's understanding of financial sustainability matures and as refinements to the indicators are proposed and tested. For example, a future refinement to the reserves dial will see a separation of reserves into capital and operating reserves, and the debt dial will see the incorporation of provincial and corporate debt threshold ratios. Another improvement to the Financial Sustainability dashboard in 2013 will be the addition of a tab with financial metrics for the storm water systems being benchmarked in the NWWBI.

CONCLUSION

This paper has outlined some of the ways to measure a utility's financial sustainability and some of the aspects that a utility should focus on to be financially sustainable, which includes the following:

1. Having adequate funding for renewal and replacement of infrastructure.
2. Having adequate funding for infrastructure maintenance.
3. Understanding the key drivers for utility revenues.
4. Charging appropriate rates for the water sold or the services provided by the utility.
5. Understanding the overall "mechanics" of financial sustainability and having a tool to communicate this to stakeholders such as the public and council in a manner that is intuitively understandable. **Figure 13** presents the mechanics of financial sustainability.

Figure 13. The Mechanics of Financial Sustainability



The NWWBI is an excellent forum for sharing the experiences of Canadian water, wastewater and storm water utilities in ensuring the financial sustainability of their operations and assets. We have learned that a multi-pronged approach is necessary to ensure financial sustainability and that there is no one-size-fits-all solution to the challenge, but that it is possible for utilities to become financially sustainable by applying the right strategies.

REFERENCES

Bui A. T. (2012). *Financial Management for Water Utilities – Principles of Finance, Accounting and Management Controls.* American Water Works Association. Denver CO.

Core Attributes of Effectively Managed Wastewater Collection Systems (2010). American Public Works Association. Washington DC.

Improving Water Utility Capital Efficiency (2009). Water Research Foundation and US Environmental Protection Agency. Denver, CO.

Principles of Water Rates, Fees and Charges (2000). American Water Works Association. Denver, CO.