# Non-Revenue Water

**Introduction:**

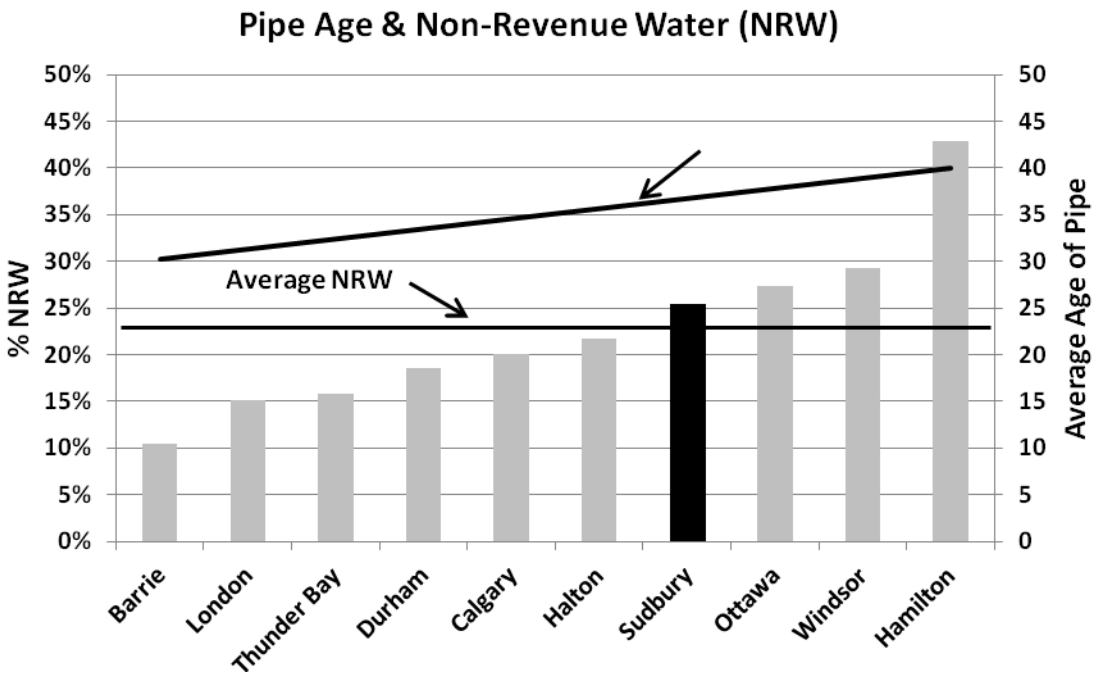
During 2010 budget discussions Council requested that an information report be prepared to identify the volume and costs of non-revenue water in City of Greater Sudbury (CGS) systems. This report provides the requested information.

**Background:**

The 2010 water billing information from Greater Sudbury Utilities and the water production data from CGS supply facilities was used to calculate the amount of non-revenue water produced in 2010.

Our production records indicate that the CGS produced a total of 20,274,332 $m^3$ of water in 2010 at all facilities and received revenue for 15,155,577$m^3$. Total production and revenue volumes include the water sold to Markstay and Atikameksheng Anishnawbek First Nations. Given this information, it is estimated that about 25 percent of the water the CGS produces is considered non-revenue water (NRW).

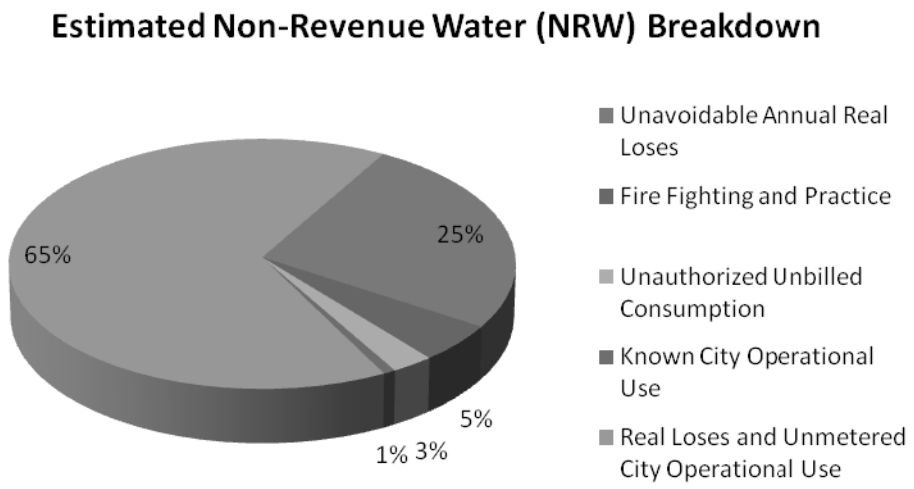
To give this number some perspective, recently published data from the Ontario Municipal Benchmarking Initiative (OMBI) shows CGS NRW is positioned slightly above the median of 23 percent in comparison to other participating municipalities. Reported OMBI data indicates a range from 10 percent as the lowest rate of NRW to about 43 percent as the high. A key determinant factor for NRW is the average age of the distribution system pipes. The graph below illustrates the relationship between the percentage of NRW and the average age of distribution system pipe noting a strong correlation between the increase of the trendline of average pipe age and the increased percent of NRW.



**Breakdown of Non-Revenue Water (NRW):**

Non-revenue water (NRW) can be categorized as either authorized or non-authorized. Authorized non-revenue water refers to valid uses of water by CGS W/WW for flushing, and other maintenance purposes, fire fighting / fire practices, winter running service lines to prevent freezing, usage of hydrants for public events and other necessary internal uses. Staff estimate this water accounts for more than six percent of the total non-revenue water; however, it should be noted that with equipment and technology currently it is not possible to accurately account for all of the operational consumption of NRW.

Unauthorized non-revenue water is defined as water lost through leaks, watermain breaks, theft, meter inaccuracies and other uncontrolled uses. System leaks are thought to represent a significant portion of the unauthorized non-revenue water in CGS. Staff estimate that unauthorized non-revenue water accounts for approximately 90 percent of the total non-revenue water in the CGS. Of that 90 percent about 25 percent can be categorized as unavoidable annual real loses (UARL) which is defined through the use of an industry standard formula calculation which uses factors such as the length of watermains; number of service connections; average length of service connections; and average system pressure. This UARL number represents the 'best case scenario' or minimum amount of water that would still be lost if all of the current best leakage management efforts could be exerted.




**Financial Impact of Non-Revenue Water (NRW):**

The variable operating costs associated with the treatment and distribution of water are budgeted at $6.7M for 2011. These include, but are not limited to, production labour costs, energy, chemicals and the purchases of water from Vale. These costs are exclusive of the capital costs required to replace and upgrade the infrastructure. Twenty-five percent or $1.7 Million would be the potential variable cost of non-revenue water.

**NRW Reduction Programs:**

W/WW Services is continually working toward reducing unauthorized non-revenue water. Authorized non-revenue water reduction programs are already in place at CGS.

A significant source of authorized NRW that W/WW Services has targeted for reduction is running water during winter to prevent the freezing of public-side water service lines. According to our estimates, approximately one to three percent of the NRW is generated due to the practice of running water to prevent the freezing of public-side water service lines. Residents tend to exceed the recommended flow rate which effectively accounts for up to two percent extra NRW, bringing the actual value to approximately three percent of the NRW total. We continue to work with residents to lower their flow rates to the recommended levels and further explore the suitability of newer technologies in the hope of identifying lower cost effective methods of controlling NRW from frozen public-side water service lines.

To contain the NRW generated by running lines in winter each year, W/WW Services allocates a portion of capital funds toward lowering or insulating frozen water services to reduce additional NRW sources. In 2011, over 50 homes are scheduled to be removed from the frozen water list in Capreol, as well as many homes in the South and West ends of Sudbury.

Unauthorized NRW reduction programs are underway as well. Staff continually look for new ways to reduce the amount of uncontrolled water used in conjunction with our own operations. For example, Staff has developed a program to eliminate wherever possible bleeders in conjunction with capital improvement projects.

A project was completed in 2011 to identify undetected system leaks, through a leak detection study of 263 kilometres of watermains were checked to identify and locate system leaks for future repair. Identifying these leaks and repairing them will reduce NRW and also help reduce the number of future watermain breaks, further reducing NRW and controlling repair costs. This study focused on the inventory of metallic water mains within the Sudbury Water Distribution System, since CGS break records indicate the majority of the waterman breaks occur on these metallic watermains in this system which are thought to be a significant source of leaks. The study identified 11 leaks which have all been scheduled for further investigation and repair.

Another recent priority for W/WW Services has been to reduce the volume of NRW from meter tampering or theft of water. Staff resources were temporarily reallocated to this initiative and have paid dividends with Staff identifying approximately $280,000 of lost revenues to be recovered in 2010 and $365,000 to date in 2011. The meter tampering/theft in 2010 account for three percent of the total non-revenue water. Based on the success of the initiatives to date, Staff are planning to further extend the program through increasing resources targeting this source of NRW. Ultimately this problem could be significantly reduced more fully through the introduction of new technology such as smart water meters that have the capability of detecting metering issues immediately. This initiative is under consideration as well.

Despite these efforts, improving the integrity of our piping infrastructure through capital replacement of aging infrastructure is the key to a sustainable NRW reduction strategy. The ongoing investment in funding replacement and rehabilitation projects of CGS' pipe assets will result in the lowering of the overall age of the in-ground infrastructure and improve the condition and integrity of our linear infrastructure.