

Portfolio-Wide Plumbing Retrofits Save Big on Utility Costs

PROPERTIES

OCH manages a housing portfolio made up of 164 communities, and approximately 14,800 units. OCH pays for water at all of these communities, and water costs constitute approximately 43 per cent of utility costs. The majority of water consumption is from approximately 16,000 toilets in OCH units; the remaining consumption is from showers, sinks, laundry and cooking, as well as undiagnosed leaking from fixtures.

Before the retrofit, there was little standardization in the efficiency or model of toilets and shower heads. Many units still had their original toilets, some nearly 40 years old. The original toilets included standard 12- and 13- litre per flush (LPF) models, as well as some replacement toilets using up to 20 LPF. Shower heads were not original but consisted of a variety of models installed by tenants over time.

OPPORTUNITY

Ottawa Community Housing (OCH) saw an opportunity to save water and money by retrofitting plumbing fixtures throughout its portfolio. Early analysis suggested that new water-efficient fixtures would use less water, reduce undiagnosed leaks and offer significant cost savings. OCH was also motivated to lower its water consumption to reduce its impact on the environment.

PROCESS

Between 2011 and 2013, water-efficient toilets, shower heads and faucet aerators were installed in all OCH units. OCH piloted the plumbing retrofits, tested various technologies and defined a standard to be used across the portfolio. The performance characteristics of the four toilets evaluated in the pilot, including the Maximum Performance (MaP) test rating, were as follows:

- 6.0 LPF, 600g MaP rated, Gravity-Fed
- 3.0 LPF, 600g MaP rated, Vacuum-Assist
- 3.8 LPF, 800g MaP rated, Pressure-Assist
- 4.8 LPF, 1000g MaP rated, Gravity-Fed



As part of the pilot, new toilets, shower heads and aerators were installed in two separate high-rise buildings (a 115-unit building and a 224-unit family-oriented building). Both projects saw reductions of more than 40 per cent in overall water consumption and prompted OCH to implement further replacements throughout its portfolio. The toilet manufacturers and installation locations were documented, and maintenance calls were monitored to identify possible issues associated with each option. The evaluation also involved inserting camera scopes into the wastewater lines to check flow issues and obstructions. Once the evaluation was complete, OCH decided on maximum performance by specifying a 3.8-LPF model with pressure-assist and a MaP rating of 1000g to best meet their needs. They also chose a 5.7-litre per minute (LPM) shower head that provided the highest water pressure at the lowest flow rate.

The average cost of the complete plumbing retrofit, including toilet, shower head, two faucet aerators and all the necessary hardware and labour was \$350 per unit.

The specific toilet chosen—a pressure assist model—has a unique feature that reduces water loss due to leaks. Unlike a conventional toilet, a pressure-assist model will not flush normally if it has a leak. This encourages tenants to report leaks for repair, rather than allowing a still-working toilet to run and waste water. The average cost of the complete plumbing retrofit, including toilet, shower head, two faucet aerators and all the necessary hardware and labour was \$350 per unit.

RESULTS

In the 12 months before the first water-efficient fixture retrofits were piloted, the OCH portfolio consumed 3.8 million m³ of water, at a cost of approximately \$11 million.

In the 12 months following the retrofit, the portfolio consumed 2.2 million m³ of water, a reduction of 42 per cent from the pre-retrofit consumption (figure 1). Pre- and post-retrofit flow tests conducted in 10 per cent of units showed that the new toilets, shower heads and faucet aerators were having the desired effect on reducing water consumption.

The annual portfolio water intensity (the amount of water consumed per square foot of rentable space) fell from 291 m³/ft² before the retrofit to 170 m³/ft² after the retrofit was complete. This represents a total water savings of about 1.6 million m³, or 108 m³ per unit per year. This is enough water to fill 638 Olympic-sized swimming pools or the Rideau Canal and Dow's Lake four times each year. Furthermore, it is estimated that the reduced flow from the shower heads and aerators should result in approximately 74 m³ of natural gas savings per unit each year.

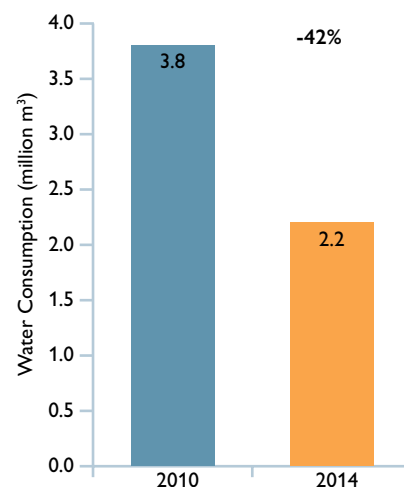


Figure 1 2010 versus 2014¹ water consumption

¹ 2014 total is based on 12 months of data from October 1, 2013, to September 30, 2014.



Since the retrofit has been completed, annual portfolio water costs have decreased by 37 per cent from \$11 million to \$7 million.

At 2014 water rates, this reduction resulted in over \$5.5 million of avoided water costs.² The substantial cost savings achieved from this water reduction can now be directed toward improving the OCH portfolio and reinvested in other building improvements to benefit tenants. OCH is also benefiting from fewer maintenance calls and increased inventory efficiency due to standardized toilet models.

LESSONS LEARNED

Tenant engagement and education were important factors in the success of this project. Plumbing retrofits required that contractors enter tenant spaces. As such, tenant awareness and comfort with the retrofit process were important. Water savings and tenant satisfaction also depended on the tenants' familiarity with and understanding of how to use the new equipment.

Information about the retrofits and new fixtures was communicated by flyers and building newsletters. The communications described the benefits of the retrofits, including the environmental effects of saving water, greening the portfolio and using the cost savings

to reinvest in other building improvements. Tenants were also given information on the retrofit process and the way to prepare their unit as well as instructions for use and maintenance of the new fixtures.

To offset the costs of the fixtures, OCH took advantage of efficiency incentives from Enbridge Gas and the City of Ottawa. Without the incentives, however, toilets, shower heads and aerators save enough water to pay for themselves in approximately one and a half years.

Buying a large volume of toilets provided OCH with additional ongoing maintenance benefits. The supplier of the chosen toilet offered a 10-year warranty, including 10 years of free parts. The supplier provided replacement parts to be stocked (in community maintenance stockrooms) and replaced during the 10 years covered by warranty. This not only saves money on future repairs during the warranty period but also means that maintenance staff always have replacement parts on hand. Given that all toilets in the OCH portfolio are from one manufacturer, staff can make repairs in one timely visit, thereby reducing tenant disruption and inconvenience. In addition to saving water, OCH was able to recycle all of the old fixtures. The porcelain toilets were recycled into road aggregate and infill for about the same cost as disposal in a landfill. Metal and plastic components from the toilets, as well as aerators and shower heads, were also recycled.

² Note that avoided costs were calculated based on a municipal 2014 water rate of \$3.48/m³.



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ALTERNATIVE TEXT AND DATA FOR FIGURES

Figure 1: 2010 versus 2014¹ water consumption

	2010	2014
Water Consumption (million m ³)	3.8	2.2

¹ 2014 total is based on 12 months of data from October 1, 2013, to September 30, 2014.