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MUNICIPAL WATER EFFICIENCY ECO-CLUSTER

Summary Report

A program of:

Toronto and Region Conservation Authority

Introduction

City of Guelph, City of Toronto, Region of Peel, Region of Waterloo, York Region, Grand River Conservation Authority, Ontario Water Works Association (OWWA), and Ontario Clean Water Agency (OCWA) interacted through a Municipal Eco-Cluster working group focused on water efficiency established by the Toronto and Region Conservation Authority (TRCA) and funded by Independent Electricity System Operator's (IESO) Education and Capacity Building Program V4.0 funding mandate.

The Eco-Cluster provided collaborative access to industry experts and municipal stakeholders, focused on water and energy, providing a unique connection driving conservation of resources and convened from February 2017 to December 2018.

The objective of the Municipal Eco-Cluster was to showcase a set of capital projects derived from the implementation of best practices along with development of case studies that could be shared with other target audience municipalities and government stakeholders.

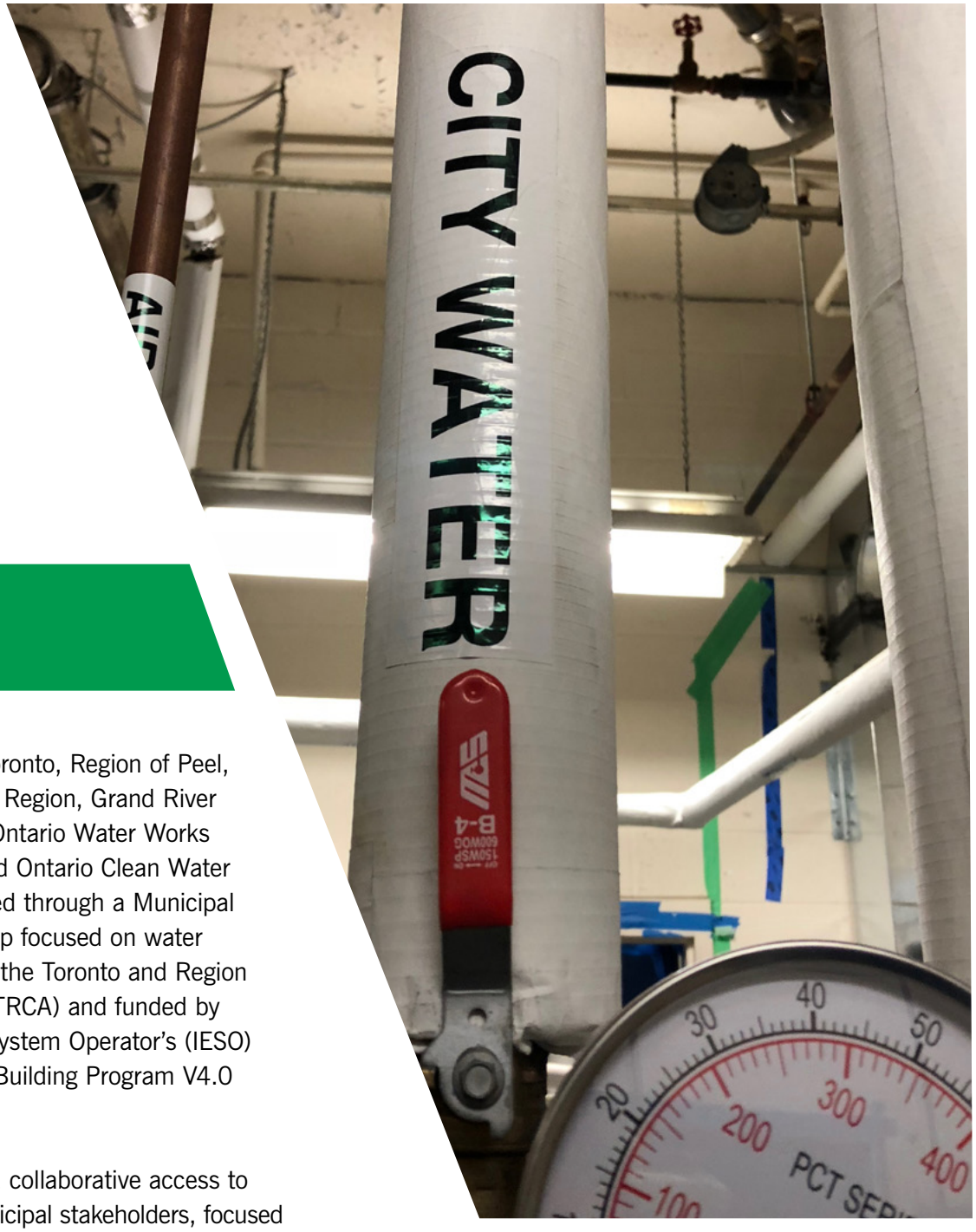

Image from Credit Valley Hospital Case Study: Municipal water line to one of the new steam sterilizers.

Image from Waterloo Brewery Case Study.

List of Appendices

To quantify some of the above GHG impacts associated with water use, municipalities may already have calculated GHG factors. For example, by estimating the natural gas and electricity use associated with treatment, transmission, and collection of water and wastewater in their particular treatment and distribution systems, a kilowatt-hour (kWh) and natural gas (m^3) factor can be calculated per cubic meter (m^3) of water. Industry and government publications, such as Environment and Climate Change Canada's inventory reports, also provide up-to-date energy and GHG factors.

Since the mix of electricity and natural gas sources in Ontario can fluctuate, the below factors are occasionally updated by their respective sources and hence represent an estimated (not exact) measure of equivalent CO_2 emissions. Nonetheless, they are useful for providing a direct numerical link between water use in Ontario and the associated GHG emissions.

For example, Environment and Climate Change Canada's most recent (2016) published value for kilograms (kg) of carbon dioxide equivalent (CO_2e) per kWh of electricity used in Ontario is:

(1) **0.05 $kgCO_2e/kWh$**

Furthermore, the electrical water use in municipal water supply and wastewater industries per m^3 of water that Enviro-Stewards typically uses is adapted from a publication by The Water Research Foundation, which is:

(2) **1.2 kWh/m^3**

Multiplying (1) and (2) yields an estimated GHG emission, commonly expressed as carbon dioxide equivalent (CO_2e), for water use in Ontario to yield (3):

(3) **0.05 $kgCO_2e/kWh$ * 1.2 kWh/m^3 = 0.06 $kgCO_2e/m^3$**

Additionally, GHG savings associated with hot water conservation can be calculated using a CO_2 emission factor for natural gas (m^3) from Table A6-1: CO2 Emission Factors for Natural Gas from the Synthese of Emission Factors from 2018 National Inventory Report, Annexes 3 and 6:

(4) **1.89 kg CO_2e/m^3**

Program Insights

Municipal Water Conservation Programs

As communities in Ontario grow in population, there is an associated increase in water consumption and wastewater generation. One approach to meet this increasing demand is to build new (or expand existing) drinking water and wastewater treatment facilities, including the pumps, conveyance, storage facilities, etc., required to treat and deliver potable water to the consumers and convey and treat the resulting wastewater. In addition to the high capital costs associated with this approach, it also has significant impacts on greenhouse gas (GHG) generation, such as:

- The increase in electricity use to operate pumps to circulate water and treatment systems
- Increased emissions from construction vehicles and fabrication of construction materials for the new or expanded treatment facilities and conveyance systems, manufacturing and delivery of treatment chemicals, etc.
- Footprint of new facilities reduce areas of natural carbon sequestration (e.g. trees, plants, etc.)
- Any increase in hot water use will have an impact on GHG emissions associated with burning natural gas (or consuming electricity) to heat the water

Realizing the high costs associated with increasing water supply to serve its growing population, some larger municipalities have found more cost effective and environmentally sustainable alternative is to incentivize people to conserve water. The conserved water then provides the extra capacity to provide to its population. Thus, five municipal governments in particular – City of Toronto, York Region, Region of Peel, City of Guelph, and the Region of Waterloo – operate various water conservation programs aimed at residents and industrial, commercial, and institutional (ICI) facilities. For residential water conservation programs, the typical opportunities include reduced lawn watering and installation of water-efficient appliances (toilets, dishwashers, shower heads, etc.). For ICI facilities, which can be significant water users, the water-using equipment and processes can be complex and hence more challenging to find opportunities to reduce consumption without a detailed assessment. The programs described in this report fall into the latter category (ICI facilities). The conservation approach fostered by these programs avoids most or all of the GHG emissions associated with new construction of water services outlined in the bulleted list above.

The five municipal water conservation programs can be grouped into three distinct categories:

1. Free water assessment and incentive program (York, Peel's Indoor Water Assessment Program, Toronto Capacity Buyback Program)
2. Cost-share water conservation and incentive program (Guelph, Waterloo)
3. Reduced water rate program (Toronto IWR)

The following sections briefly outline the highlights of the strongest elements of each program type.

Type 1 – Free Water Assessment and Incentive Program

Highlights

- Cost effective by focusing on easily identifiable opportunities
- No cost to participating facility removes potential financial barrier for participation (i.e. low economic risk to participate, aside from facility staff time)
- Municipalities retain a consultant to ensure consistent methodology, expertise, and report format
- Consistent report template affords simplified tracking of total program savings for municipal program provider
- Energy savings incorporated where applicable
- Municipal program provider reviews content and ensures quality of water assessment reports
- Program allows municipal program providers to have face-to-face time with industries, as they participate in kickoff meetings, facility walk throughs, follow-up meetings, etc., which allows the municipality to develop relationships with industry in its communities and better understand the economic and environmental challenges of its industries

Type 2 – Cost-Share Water Conservation and Incentive Program

Highlights

- Provides flexibility for determining a scope (and hence cost) appropriate for the size and complexity of a particular facility
- Facility is able to choose an appropriate consultant to conduct the water assessment (i.e. they may already have a preferred vendor they work with for other engineering work)
- Since the facility must share the cost of the assessment, there is more incentive for it to ensure the project is successful
- Concurrent energy efficiency assessment can be bundled with the water conservation assessment

Type 3 – Reduced Water Rate Program

Highlights

- Provides an attractive financial incentive for preparing a water conservation plan and implementing the measures
- Reduced water utility rate encourages industry to remain in the municipality and can attract new businesses
- Facilities must implement measures they have committed to in their Water Conservation Plan
- Annual progress reports require facilities to directly report implementation progress and allows the program provider to accurately track actual water saved
- Provides face-to-face time between the municipality and industry during water conservation plan and annual progress report verification meetings and walkthroughs, thereby strengthening relationship between industry and the municipal government and providing insight into the economic and environmental challenges of industry
- Since facilities can lose their reduced water rate if they exceed a certain amount of sewer use bylaw violations per year, the program incentivizes facilities to proactively address wastewater issues so they can remain on the reduced rate

A strength that all the above program types share is the benefit of building relationships and trust between municipal governments and the businesses in their respective communities. Each site visit, walkthrough, phone call, and email communication in the context of water assessments builds this trust and strengthens bonds between the public and private sectors.

City of Guelph

Water Smart Business Program

The City of Guelph's (Guelph's) Water Smart Business Program for industrial, commercial, and institutional (ICI) facilities provides financial incentives to ICI facilities, which includes a 50/50 cost recovery program for a detailed water audit by a third-party consultant and water efficiency upgrades may qualify for an incentive of $750 per cubic meter per day or saved municipal water. For less complex facilities with lower daily water consumption, City staff will conduct a free water use review, which is also eligible for buyback incentives. Details about the Water Smart Business Program are described below:

Current program name	Water Smart Business Program
Rationale for offering program	• Protecting source water (groundwater) by using resource responsibly • Delaying capital investments in water and waste water infrastructure
Program website	Guelph.ca/watersmartbusiness
Number of years the program has been in operation	9 years
Number of participating facilities since the program began	34
Reduction targets for program	150 m^3/ Year
Other success indicators	15 audits per year - goal
Estimated total verified savings associated with the programs	52851.15 m^3/year
Typical number of staff operating the program	1
Annual operating budget for program	$223,000/year
How is the program advertised (e.g. workshops, newsletter, magazine insert, direct mail, etc.)?	**Channel Partners:** Alectra, Guelph Hydro, Provincial Ministries, Other Municipal Governments, City of Guelph Economic Development, Equipment Suppliers, Partners in Project Green, Grand River Conservation Authority **Marketing:** Social Media, Case Studies, Web pages, Workshops, Participation in industry events, Newsletter
Detailed Program Information	Water Smart Business
Eligibility Criteria	• Be located within City of Guelph limits • Have an active City of Guelph water account and be connected to the municipal water supply • Be classified by the City as an industrial, commercial and institutional (ICI) building such as an office, retail outlet, hotel, hospital, factory, warehouse, manufacturing facility or school • Have not previously received funding under the Water Smart Business Program for the retrofit.
Main Features	• ICI customers that use less than 10 m^3 per day of municipal water are provided with a water use review • The water use review includes a site inspection, process or facility data logging, as needed, and review of facility water use conducted by City of Guelph staff • ICI customers that use more than 10 m^3 per day of municipal water and possess complex internal water systems qualify for a water use audit conducted by a qualified third-party consultant (retained by the customer) • The audit is paid for through cost recovery on a 50/50 basis with the City of Guelph to a maximum of $10,000 • The water use audit or review will recommend water efficiency upgrades for the facility **Additional benefits include:** • Reduced utility costs including water, electricity, and natural gas • Helping clients achieve corporate social responsibility targets while cutting operational costs
Incentives	• Completed water efficiency upgrades with greater than a one-year payback period may qualify for a capacity buyback incentive of $750 per m^3/day of reclaimed municipal water supply saved to a maximum of $100,000 not to exceed total cost of the project)

City of Toronto

Industrial Water Rate Program

Toronto Water's Industrial Water Rate (IWR) Program for industrial facilities provides a reduced water rate to industrial facilities that are accepted into the program. For example, in 2018 the standard (Block 1) water rate was $3.8036/m^3, whereas the IWR program's rate (Block 2) was $2.6623/m^3. Hence, the Block 2 rate is 30% less than the Block 1 rate. For high-volume water consumers, this 30% savings is significant for their bottom line. Additionally, if the water is heated, the cost of use is increased considerably due to the natural gas required to heat the water to the required temperature. The combustion of the natural gas also increases the facility's greenhouse gas (GHG) emissions. Details about the IWR program are described below:

Current program name	Industrial Water Rate Program
Rationale for offering program	Economic development initiative to retain industrial facilities
Program website	toronto.ca/services-payment/water-environment/
Number of years the program has been in operation	9 years
Number of participating facilities since the program began	115
Reduction targets for program	No pre-determined reduction target
Other success indicators	Number of participants enrolled, number of water conservation projects completed
Estimated total verified savings associated with the programs	Approximately 9.2 million cubic meters
Typical number of staff operating the program	4
Annual operating budget for program	$120,000 per year (Capital budget only, operating budget not included)
How is the program advertised	Same as Capacity Buyback Program
Direct & indirect benefits to participants	Reduced water rate. Long term water savings. Effective tool to aid water efficiency project planning. Help achieve overall sustainability goals.
Detailed Program Information	Toronto Water Industrial Water Rate (IWR) Program
Eligibility Criteria	• Consume more than 5,000 m3 of water annually • Fall within the industrial property tax class • Be in full compliance with the Toronto's Sewers Bylaw (Municipal Code Chapter 681-Sewers) • Submit a comprehensive Water Conservation Plan (WCP) to the satisfaction of the General Manager, Toronto Water • Any water conservation measure identified in the WCP having a payback of 5 years or less must be implemented • Verification visit is conducted upon submission of the WCP between the applicant, Toronto Water, and Toronto Water's consultant • WCP is reviewed during the verification visit and a facility walkthrough is conducted to view processes mentioned in the WCP and to identify other potential water conservation opportunities • Annual Progress Reports (APRs) are submitted annually by the facility to update progress on water conservation measures • Verification visit occurs (with facility, Toronto Water, and consultant) if a measure has been implemented in the preceding year • Consultant prepares a verification report for Toronto Water based on the WCP or APR visit to confirm WCP and implementation of measures per the APR
	• Facility is entitled to receive Toronto Water's Block 2 water rate, which is approximately 30% less than the standard water rate • Once facility is on the Block 2 rate and has completed all its measures having a payback of 5 years or less, it receives a letter of completion from Toronto Water and remains on the Block 2 rate indefinitely
Incentives	• 2018 Block 2 rate: $2.6623/m^3 (2018 Block 1 rate was $3.8036/m^3) • No incentives based on litres of water saved

City of Toronto

Capacity Buyback Program

Toronto Water's Capacity Buyback Program (CBB) is available to commercial and institutional facilities located within the City of Toronto. The program consists of a free walk-through performed by City staff and a consultant retained by the City to identify water conservation opportunities. A summary report is presented highlighting the water conservation opportunities and their associated savings and business cases. Implemented permanent process changes are eligible for a buyback amount based on the quantity of water saved. Details of the CBB Program are presented below:

Current program name	Capacity Buyback Program
Rationale for offering program	To avoid costly infrastructure expansion by buying back water supply capacity from water users
Program website	toronto.ca/services-payment/water-environment/
Number of years the program has been in operation	12 years (including pilot phase)
Number of participating facilities since 2012	247
Reduction targets for program	No pre-determined water reduction target
Other success indicators (e.g. audits/year)	# of audits per year, implementation of recommended projects, amount of incentive paid Estimated total verified savings associated with the programs (since 2012): 448,343 m^3
Typical number of staff operating the program	4
Annual operating budget for program (staff, consulting, incentives)	$180,000 per year (capital budget only, operating budget not included)
How is the program advertised (e.g. workshops, newsletter, magazine insert, direct mail, etc.)?	Workshops, City of Toronto cross-departmental promotion (i.e. Economic Development), Toronto Water website, trade shows, word of mouth
Direct & indirect benefits to participants (i.e. jobs, reduced water rate, corporate reduction targets, etc.)	Reduced water rate. Long term water savings. Effective tool to aid water efficiency project planning. Help achieve overall sustainability goals.
Detailed Program Information	Toronto Water Capacity Buyback (CBB) Program
Eligibility Criteria	• Commercial or institutional facility • Facility located in the City of Toronto • Internal screening of applicants by Toronto Water for approval • Any water conservation measure identified in the Water Conservation Program (WCP) having a payback of 5 years or less must be implemented • Verification visit is conducted upon submission of the WCP between the applicant, Toronto Water, and Toronto Water's consultant
Main Features	• Free one-time walkthrough audit with a consultant retained by Toronto Water • Metering of up to 3 potential water conservation processes per audit • Audit report is prepared by the consultant, reviewed by Toronto Water, and submitted to the participating facility
Incentives	• $0.30 per litre of water saved per average day based on verified water savings • Eligible opportunities include replacement of equipment related to: - Cooling towers - Boilers - Refrigeration equipment - Food service equipment - Process equipment and other site-specific water saving measures • Incentives are not available for irrigation, non-process fixtures, fixing leaks, etc.

Region of Peel

Indoor Water Assessment Program

The Region of Peel's Indoor Water Assessment Program aims at identifying areas of potential water savings that may be achieved through a permanent process change. The program consists of a walkthrough of the facility to assess potential permanent process changes that would result in water savings. Identified opportunities are metered to quantify potential savings and cost benefit, and the recommendations and analysis are provided to the client. Once the facility completes the recommended permanent process change, they are eligible for an incentive based on metered savings or project costs. Details about the Indoor Water Assessment Program are described below:

Current program name	Indoor Water Assessment Program
Rationale for offering program	• Identify and encourage water savings through permanent process change • To reduce capital costs for new water supply and wastewater facilities over the long term by implementing water efficiency measures to reduce average annual day demands, peak day demands, and wastewater flows
Program website	peelregion.ca/watersmartpeel/businesses/indoorwater.htm
Number of years the program has been in operation	10 years
Number of participating facilities since the program began	241
Reduction targets for program	• Volumetric water reduction targets for the Indoor Assessment Program are not identified in the Region of Peel's Water Efficiency Strategy • Targets are based on number of assessments completed per year for businesses in Peel with a focus on engaging top water-consuming companies
Estimated total verified savings associated with the programs	4.21 ML/day of actual savings (savings validated through metering)
Typical number of staff operating the program	1
Annual operating budget for program	$150,000 (staff, consulting, and incentives)
How is the program advertised (e.g. workshops, newsletter, magazine insert, direct mail, etc.)?	**Partnerships** These partners have existing relationships with ICI customers in Peel and provide valuable connections to assist with sharing program details and identifying client needs: • Internal groups: Billing, Environmental Control • Conservation Authorities/ Partners in Project Green • Equipment Service Providers **Promotion** The following resources are used to promote participation in the Indoor Assessment Program: • Promotional flyers • Social media • Case studies • Webpage • Participation in industry-specific events • Mobile signage
Direct & indirect benefits to participants (i.e. jobs, reduced water rate, corporate reduction targets, etc.)	The benefits of participating in the Indoor Water Assessment Program are as follows: • Water-saving potential and return on investment are identified free of charge • Financial incentives help pay for recommended process changes or equipment upgrades • Indoor water use is reduced, resulting in lower water bills • Potential reduction of sewer surcharge bills • Potential reduction of stormwater bill (if applicable) when stormwater is collected and used onsite • Reduction of gas consumption and lower gas bills (if the water is heated) • Supports organization's sustainability goals • Improved company environmental and social image

>> continued >>

Indoor Water Assessment Program
(continued)

Eligibility Criteria	To be eligible for an ICI Indoor Water Assessment a Region of Peel customer must satisfy the following: • Be located in Peel (Brampton, Caledon, Mississauga) • Part of an industrial, commercial, or institutional (ICI) sector (i.e. a manufacturing facility, retail establishment, school, hotel, restaurant, or municipal building) • In compliance (12 continuous months with no violations) with Peel's Wastewater Bylaw 53-2010 (formerly known as the Sewer Use bylaw) • In good standing with the Region of Peel (e.g., all Region of Peel invoices must be paid in full with no outstanding balances) • Complete a Pre-Screening Questionnaire provide by the Region of Peel to help identify potential areas of water savings that will warrant the need for an indoor water assessment.
Main Features	The Indoor Water Assessment Program provides the customer with the following: • Free assessment and subsequent water assessment report prepared by an industry professional • Quantification of opportunities and savings • Incentives are available • Valuable insight into water-consuming operations where in-house expertise is unavailable • High level of customer care from the Region of Peel
Incentives	The Region of Peel offers a financial assessment which is calculated as the lesser of: 1. $0.25 per average daily litres of water saved or 2. 50 percent of the cost of implementing efficiency changes to a maximum of $250,000 Incentives are provided to the customer, provided that there are confirmed permanent process changes resulting in a reduction in municipal water use. Changes in operational activities that reduce water use are encouraged by the Region of Peel but are not incentivized due to the variability of their nature.

Image from Credit Valley Hospital Case Study: Front view of two new steam sterilizers.

Image from Credit Valley Hospital Case Study: View of new heat exchanger (blue object in foreground) and previous blowdown cooling system in background.

Region of Waterloo

WET (Water Efficient Technology) Program

The Region of Waterloo's (Waterloo's) Water Smart Business Program has both home and business versions for industrial, commercial, and institutional (ICI) facilities and homes located in the Region of Waterloo. For ICI facilities, the WET program provides financial incentives that include a 50/50 cost share program for a detailed water audit by a third-party consultant. The program also offers an incentive of $0.40 per litre of water saved per average day. These financial incentives are applicable to facilities that achieve water savings if payback of capital costs takes 2 years or more. Details about the WET Program are described below:

Current program name	WET (water efficient technology) Program - home and business versions
Rationale for offering program	• To defer water supply capital costs and to meet the Water Efficiency Master Plan Targets • To build supportive, mutually-beneficial relationships with business • Primary capital cost would be a potential pipeline to a Great Lake, which has been pushed out from 2035 to 2051 in the latest Master Plan • Energy / GHG reductions
Program website	regionofwaterloo.ca/en/aboutTheEnvironment/WET-Program-for-business.asp
Number of years the program has been in operation	12 years in current form, 37 years Total
Percent breakdown by industry (if available)	Industrial – 11% Commercial – 7% Institutional – 6%
Number of participating facilities since the program began	68 companies m^3 water savings, 78 companies received incentive funding, 281 companies water usage reviews
Reduction targets for program	32,300 m^3/year (88.5 m^3/day)
Other success indicators (e.g. audits/year)	• 25 water use reviews per year • 2 full audits per year • 15 funding payouts per year
Estimated total verified savings associated with the programs	1,545 m^3 per day cumulative total
Typical number of staff operating the program	1 FTE
Annual operating budget for program	$225,000
How is the program advertised?	Annual workshops, web page & social media, magazine ads & bill inserts
Direct & indirect benefits to participants	• Reduced utility costs including water, electricity, and natural gas costs • Green initiatives and reducing targets as directed by corporate requirements or government regulations
Detailed Program Information	WET Program
Eligibility Criteria	• Business located in the Region of Waterloo (City of Kitchener, City of Waterloo, City of Cambridge, Township of North Dumfries, Township of Wellesley, Township of Wilmot, Township of Woolwich) • Internal application approval procedure
Main Features	• Starts with a free water review by Region staff • Optional 50/50 cost sharing for an outside consultant to conduct a detailed indoor water-use assessment • Incentive program for water saved
Incentives	• Financial incentives are given to facilities that achieve water savings if payback of capital costs takes 2 years or more • 50/50 cost sharing up to $10,000 for an indoor water-use assessment • 50/50 cost sharing up to $10,000 for engineering design of water efficient processes • Up to $100,000 in incentives to offset capital costs for installation of water-efficiency measures at a rate of $0.40/L water saved per average day **Restaurant and Business Certification** • Specific rebates on domestic fixtures and appliances • Free restaurant efficient spray valves

York Region

Industrial, commercial, and institutional (ICI) Capacity Buyback Incentives Programs

York Region's (York's) ICI Capacity Buyback Incentives Programs for industrial, commercial, and institutional (ICI) facilities provides a no-cost water audit and incentive. The consultations are performed by a consultant retained by York to identify and quantify water conservation opportunities as well as identify ways to mitigate impacts on wastewater quality when water consumption is reduced. Capacity Buyback incentives are also available for verified permanent process changes that are implemented following the water audit. Incentives for water savings opportunities include $0.75 per litre of water saved per average day and $2 per litre saved per average day for water reuse opportunities, or up to 50% of the capital cost of the permanent process change (whichever is lower). York also offers an incentive of $200 per permanent installed sub-meter (up to $1,000). The total incentive cap per facility is $50,000. Details about the ICI Capacity Buyback Incentives Programs are described below:

Current program name	ICI Capacity Buyback Incentives Programs
Rationale for offering program	• Water audit for ICI high water user to provide them recommendations to conserve water
Program website	york.ca/waterincentives
Number of years the program has been in operation	1998 - present
Number of participating facilities since 2011	Over 100
Percent breakdown by industry	Industrial – 80% Institutional – 20%
Reduction targets for program	Ultimate saving to include water reuse opportunities if possible
Other success indicators	Minimum of 10 audits/year
Estimated total verified savings associated with the programs since 2011	Over 86 ML
Typical number of staff operating the program	1-2
Annual operating budget for program	Over $100,000
How is the program advertised	Workshop, Conferences, and York Region Website
Direct & indirect benefits to participants	• Reduce capital cost, improve their bottom line, increase operational efficiency, and achieved environmental sustainability.
Other comments	Individual promotion of the program may not be effective. Hence, Regions, municipalities, and Cities are starting to work together to collectively promote the programs to send the same message to all businesses.
Eligibility Criteria	• Located in York Region • Connected to a municipal water supply • Classified by York Region as an industrial, commercial, or institutional (ICI) building • Have a water account administered by a municipality in York Region • Submit the completed application form for each part of the program to York Region
Main Features	• Water audit at no-cost to the ICI by a consultant retained by the Region • Wastewater quality improvement plan in combination with water audit (optional) • Access to an incentive of up to $50,000 based on installed eligible retrofits
Incentives	York Region will issue a one-time incentive of up to $50,000 which will be calculated based on: • $0.75 per litre of water saved in a single average day through water saving retrofits • $2.00 per litre of water saved in a single average day through water reuse retrofits $200 per meter (to a maximum of 5 meters or $1,000) to have sub-meters installed permanently at the facility when recommended

Issues and Recommendations

Image from Supreme Egg Case Study: Eggs being processed.

Gap Analysis of Program Approaches

The strengths of each approach highlighted above reflect the thought, experience, and refinement process that each program has undergone to shape the robust and effective programs that they are today. As these programs continue to adapt to customer demands, changes in strategic goals, government input, the changing natural environment, and various other internal and external factors affecting them, there may be opportunity for further refinement. This section provides a gap analysis in the form of points to consider when municipalities are developing the next iteration of their program or for municipalities creating their first one.

The gap analysis list is not exhaustive as it is meant to help guide municipalities as they formulate (or reformulate their programs).

Gap Analysis (points to consider):

- Free assessment models potentially lower value and/or importance of project for participant (i.e. no financial investment in the project creates less urgency for the participant)
- The above point can also result in delayed (or no) submission of data required for the report, which results in longer project timelines or assumptions being made in calculations in the absence of the facility-specific information
- Once report is submitted and presented to participating facility, it is challenging to track implementation rates (and hence actual water saved) for the program provider unless subsequent applications are made for funding toward capital costs based on the rate per litre of water saved in the long term
- Limited scope of some programs (e.g. no water balance calculation, flow metering, etc.) can potentially overlook water conservation opportunities
- Some municipal program providers do not have the capacity for the high level of customer care offered by other programs with more staff and/or budget
- Potentially less face-to-face time between municipality and industry (in the case of a detailed water assessment by a consultant)
- Although in some programs the assessment report must be approved by the municipality, quality and consistency of reports may vary depending on the consultant that prepared the report
- Programs offering a lower water rate for participating facilities can potentially be seen as rewarding high water consumers
- The quality and detail of water conservation plans developed by facility staff or their outside consultant for inclusion in a water conservation program can vary significantly depending on who prepared them
- Estimation methods for creating water balance and water savings potential vary significantly in in water conservation audits provided by facilities or their outside consultant (e.g. using equipment specifications to estimate flow rates instead of conducting onsite measurements of flow rates using a clamp-on flow-meter)

>> continued >>

Image from Waterloo Brewery Case Study.

- The brief verification meeting and facility walkthrough following submission of a water assessment provided by the facility or its outside consultant may not provide adequate scope to identify potentially missed water conservation opportunities
- Once facility has implemented and verified all the measures identified in its original water conservation plan, it has no further incentive to identify and implement additional opportunities, yet still retains the reduced water rate
- Bundle an (optional) concurrent energy efficiency assessment (electrical and thermal energy) with the water audit
- Include greenhouse gas savings associated with identified water savings opportunities to reinforce the additional environmental benefits of water conservation (some programs include this already)

Barriers to Implementation

This section provides a general overview of potential barriers to facilities implementing recommended water conservation measures. The barriers discussed are drawn from experience with government programs and privately contracted work with ICI facilities. Each facility has its own unique decision-making process that outside agents (such as Enviro-Stewards and the program provider) are not aware of; therefore, there may be a myriad of other internal barriers to implementation. Some barriers to implementation are often not technology or regulation related but involve people and the internal politics of the facility.

Nonetheless, there are common barriers that have been identified when trying to facilitate implementation with customers, such as:

- Competing, higher-priority projects (e.g. building/process expansion, energy conservation projects, new process equipment, etc.)
- Staff changeover (i.e. lose internal facility champion)
- Person responsible for implementation has too many immediate responsibilities (i.e. no time to plan and execute implementation)
- Limited staff resources to begin and follow through with implementation process (many facilities increasingly operate with lean staff numbers)
- Annual capital expenditure budgets already allocated to other projects
- Water conservation assessment is Corporate driven, rather than plant driven (plants will defer implementation due to the above reasons until told to implement by Corporate)
- Interest and motivation to implement peak at follow-up meeting, and can quickly fade away after the meeting due to a combination of the above reasons
- Electrical and natural gas have traditionally overshadowed water use due to their higher priority, total cost, and GHG impacts

Below are a few suggestions that could help move facilities toward implementation and/or would at least provide a feedback mechanism for program providers to capture the water saved through its water conservation program. These suggestions can be stand-alone or combined.

Recommendations

Image from Waterloo Brewery Case Study.

- Set tentative date for verification study in-person at follow-up meeting, or at minimum present the verification assessment as a component of the program provider program from the start (instead of talking about them as two separate projects). The verification portion can always be canceled at a later date, if necessary.
- Conduct 6-month, 12-month, and 24-month (for example) check-ins with facilities, and create calendar appointments for these. These check-ins can be presented as a program feature from the beginning of the project. Check-ins can be conducted by the program provider staff and/or consultant and could potentially include a walkthrough to confirm implemented measures that were not formally verified, but the savings for which can be estimated from the original report for the program provider's savings tracking.
- Offer implementation coaching appointments to assist with implementation efforts at regular intervals after the follow-up meeting (e.g. obtaining vendor quotes, specifying equipment, troubleshooting, etc.). Potentially program provider staff and/or consultant can conduct these, and the coaching could be part of the above-mentioned check-ins.
- Set implementation expectations depending on payback of opportunity to qualify for incentive funding, such as Toronto's IWR program does:
  - If payback < 0.5 year, should be implemented within 1 year
  - If payback > 0.5 year but < 1 year, should be implemented within 2 years
  - If payback > 1 years but < 2 years, should be implemented within 3 years
  - If payback > 2 years but < 5 years, should be implemented within 5 years
  - Implementation and incentives can be extended until a maximum of 5 years following the audit
- Include a column for "estimated construction start date" and "estimated construction completion date" for each opportunity in the main opportunities table and fill in these dates at the follow-up meeting (to be included in the final PDF version of the report). The dates can also help determine the check-in schedule (6 months, 1 year, etc.).
- Include GHG reduction estimates associated with the water conservation opportunities in the report and tables, which will reinforce the impact of water conservation on GHGs and will allow facilities to tie water conservation into their overall GHG reduction strategy (if applicable).
- Program provider conducts program survey by phone after final report is issued (at a predetermined time, such as 6 months or 1 year after, etc.). The main purpose of the survey is to ask what measures have been implemented so the program provider can capture water saved, inquire about a verification assessment, and get feedback on program to improve it in the future.

Contact Us

(image on the left) from Credit Valley Hospital Case Study: Blowdown tank, municipal water line, and temperature regulating valve that previously cooled boiler blowdown water before it went to the drain. (image on the right) from Arla Foods Case Study: Component of CIP system.

Eric Meliton, BSc. | Program Manager, Water Stewardship
Partners in Project Green | Community Engagement and Outreach
Toronto and Region Conservation Authority (TRCA)
101 Exchange Avenue, Vaughan, ON L4K 5R6
T: 416.661.6600 ext. 5890 | E: emeliton@trca.on.ca

partnersinprojectgreen.com

This initiative was made possible in part through the financial support of the Independent Electricity System Operator's (IESO) Education and Capacity Building Program. Toronto and Region Conservation Authority is solely responsible for implementation of, and the content of any materials produced by, this initiative, and the IESO has no responsibility or liability whatsoever in the event that any person suffers any losses or damages of any kind as a result of the initiative.

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