

May 4, 2010

POLICY REPORT

THE WATER-ENERGY NEXUS

Linking Water and Energy in Ontario Policy

Carol Maas
Theresa McClenaghan
Glen Pleasance



THE WATER-ENERGY NEXUS

Linking Water and Energy in Ontario Policy

Carol Maas
Theresa McClenaghan
Glen Pleasance

May 4 2010



Ontario Water Conservation Alliance
c/o Rideau Institute
63 Sparks, Suite 608
Ottawa, ON K1P 5A6
tel. 613 565-9449
e. info@conserveourwater.ca
www.conserveourwater.ca

About the Water Conservation Alliance

The Ontario Water Conservation Alliance is a coalition of citizens, non-governmental organizations, businesses, municipalities and labour groups who believe an environmentally sustainable and economically secure province requires a comprehensive water conservation and efficiency strategy. The Alliance is therefore advocating for a Water Conservation and Opportunities Act for Ontario.

For more information please visit www.conserveourwater.ca

THE WATER-ENERGY NEXUS

Linking Water and Energy in Ontario Policy

Introduction

Every time we flush the toilet or turn on the tap, energy is washed down the drain. The cost of pumping, distribution and treatment of water and wastewater is a significant expense for most Ontario municipalities. Saving water saves energy by reducing pumping, treatment and heating requirements, thus reducing carbon dioxide emissions and resulting in cost savings for municipalities and taxpayers.

The Ontario Water Conservation Alliance has prepared the following report, which documents the misunderstood costs and the unrealized opportunities that would result from a better understanding of the links between water use and energy, and offers reasonable, easy-to-implement recommendations on how to benefit from this new understanding.

This paper draws on the recent report by the POLIS Project on Ecological Governance, *Ontario's Water-Energy Nexus* (released in April 2010). The report was the first of its kind in Canada to undertake a comprehensive analysis of the connection between water and energy¹ and includes a number of critical findings:

- The total energy consumed in Ontario for water-related services, including pumping, treating and heating water and generating steam (including steam used to generate electricity), was estimated to be 976 Petajoules per year (PJ/yr or 271,600,000 MWh/yr). This is enough energy to heat every home in Canada.



HEATING WATER for showers, faucets and laundry is the second largest source of greenhouse gas emissions in both the residential and commercial sectors

- Powering pumps, treatment plants, hot water heaters and boilers was found to represent 12% of Ontario's total demand for electricity and 40% of the natural gas demand, which is comparable to other major sectors in the Ontario economy, and significantly more than the power produced by the largest coal-fired plant in North America. This suggests "water services" is an energy sector in its own right.
- The energy associated with water loss in municipal infrastructure incurs an estimated \$15,000,000 every year in municipal electricity expenditures for pumping and treatment.
- Eighty percent of all energy used for water services is generated by fossil fuels, meaning it is typically dirtier than the energy used to power lights, appliances and electronics in our homes and businesses.

The report goes on to state:

“An encouraging number of studies have revealed how water conservation and efficiency can reduce energy demands and provide a myriad of co-benefits including reduced infrastructure costs, maintenance costs and greenhouse gas emissions...

By seizing water conservation and efficiency opportunities, Ontario could reduce energy consumption, free up funds for struggling municipalities and greatly contribute to Ontario’s fight against climate change. While many of these opportunities are available at minimal cost and with payback periods of less than two years, barriers remain for homeowners, business owners and municipalities alike. New thinking and action is therefore required to increase participation in conservation programs and thereby build a more resilient future for Ontarians.”²



PUMPING & TREATING water and wastewater consumes enough energy to light every home in the province

The Alliance has identified a series of specific and sensible policy options that would address some of these barriers for homeowners, businesses and municipalities to achieving greater water-energy efficiency. These policy options are divided into two parts. The first relates to policies that can be facilitated through Ontario’s Green Energy Act. The second part deals with the potential to connect water efficiency with energy efficiency through incentive and rebate programs.

Fighting Climate Change with Water Conservation

TORONTO WATER, the municipal department responsible for water distribution in Toronto, uses more electricity than the Toronto Transit Commission and five times the energy consumed by all of the city’s streetlights and traffic signals. As part of Toronto’s 2007 Climate Change, Clean Air and Sustainable Energy Action Plan, the city explicitly acknowledges the need to increase water efficiency as a means of reducing the approximately 550 million kWh used every year to treat water and thus helping to attain its stated reduction in greenhouse gases by 2011.³

Water efficiency and conservation is likely to become one of the most cost-effective energy reduction strategies for municipalities. In California, for example, the Energy Commission found that implementation of all identified water conservation measures could “achieve 95 percent of the savings expected from the 2006–2008 energy efficiency programs, at 58 percent of the cost.”⁴

GREEN ENERGY ACT OPPORTUNITIES

1. WATER EFFICIENCY STANDARDS

The Province recently announced its intention to ban the sale of 13-litre toilets through the Green Energy Act. Adding minimum water-efficiency standards for other high-efficiency fixtures would further expand the market for water-efficient appliances, products and practices. In the United States, the Energy Policy Act sets minimum water efficiency standards for both new construction and all point of sale transactions.⁵ Standards for faucets, showerheads, toilets and urinals within the 1992 Energy Policy Act in the U.S. were estimated to reduce water use by 8% over 20 years. The estimated water infrastructure cost savings were over \$7 billion (this excludes wastewater infrastructure). Including hot water energy, the estimated savings were \$35 billion.⁶

The Green Energy Act has the potential to similarly mandate minimum water-efficiency standards for point of sale transactions and enable equivalent savings.

In addition, municipalities are spending millions of dollars per year on rebate programs for relatively standard water-efficient appliances. If antiquated water fixtures (13 L toilets, top-loading clothes washers, inefficient pre-rinse spray valves) were no longer available for purchase, these dollars could be reinvested to encourage consumer uptake of leading-edge water-efficient appliances such as the 3-litre toilet, as well as other new and innovative products and services.

Recommendations

a) High-Efficiency Toilets – The government should move expeditiously to implement a new regulation for prescribing the sale of toilets that use 6 litres or less. It should also commit to mandating high-efficiency residential toilets (4.8 L) and urinals by 2014, as has been done in California.⁷

b) Other Fixtures – The government should mandate standards for all other high-efficiency fixtures that meet or exceed the standards established in the U.S. Energy Policy Act (including clothes washers, faucets, showerheads, urinals and pre-rinse spray valves).⁸

2. WATER EFFICIENCY LABELLING

Another key action is to make water conservation a simple choice for Ontario consumers by both labelling water-efficient products and providing water-use information on all relevant fixtures. The Province could help Ontarians recognize water-efficient products by adopting WaterSense, the water-efficiency equivalent of the successful ENERGY STAR consumer labelling program. In addition, a mandatory labelling system would inform consumers of the comparative water use of different products.

Recommendations

a) Mandatory Labelling – The EnerGuide labelling system has provided useful information on energy use of everyday household appliances and homes. A similar mandatory labelling system for water efficiency would benefit Ontarians.

b) Voluntary Labelling – Ontario should become an official partner with the U.S. EPA's WaterSense program, the water efficiency equivalent of the successful ENERGY STAR consumer labelling program. The Province should encourage the uptake of the WaterSense label for fixtures that use 20% less water than standard models and encourage Ontario organizations (including municipalities, builders, retailers and irrigation professionals) to become WaterSense partners. Ontario should also incorporate the WaterSense standard into requirements under the Ontario Building Code and the Green Energy Act. In addition, Ontario should advocate for a national organization to administer a Canada-wide WaterSense labelling program equivalent to the U.S. EPA labelling program in the same way Canada administers the ENERGY STAR program through Natural Resources Canada's Office of Energy Efficiency.

3. CONSERVATION PLANS

Conservation plans guide various government and industry sectors in achieving targets for improved water and energy conservation and efficiency and should reflect best management practices within each sector. The Green Energy Act creates the power to implement regulations requiring energy conservation plans on a sectoral basis, and a parallel requirement for water conservation plans should be included in the Water Opportunities Act.

Recommendations

a) Integrated Water and Energy Conservation Plans – Sector-based water conservation plans should be included in the Water Opportunities Act. Ideally, integrated water and energy conservation plans should be mandated where they both apply. At a minimum, accompanying guidance materials for the regulations should encourage integrated plans.

b) Templates – Establish sector-specific templates for conservation plans to ensure permit applicants document existing and planned use of approved best management practices. The templates should be sufficiently simple to be completed by individuals without hiring a professional.

c) Plans as Criteria – To ensure that water conservation plans maximize the opportunity for long-term water and energy savings, implementation of plans should be a criterion for water infrastructure grants and for decisions to grant new or expanded permits to take water.

4. REVIEW OF THE ONTARIO BUILDING CODE FOR WATER AND ENERGY EFFICIENCY

The Ontario Building Code (OBC) changes in 1996 were instrumental in improving Ontario’s water efficiency. More recently, a review of the OBC was mandated by the Green Energy Act to update the code to reflect and enable energy-efficient practices. Encouragingly, a water efficiency expert was included in this review. Modernizing the OBC by requiring water efficiency standards for fixtures and better enabling non-potable water sources will help automate the energy-saving benefits of water conservation in

new construction. Installing best available technology in all new construction is much more cost-effective than conducting retrofits later, and ensures all new demands for water are the most efficient possible.

Recommendations

Through the process of reviewing the Ontario Building Code for energy efficiency, the Code should also be updated to reflect international best practices in water efficiency, including the following:

a) WaterSense Fixtures – The Code should mandate the equivalent of WaterSense fixtures in new buildings. The California (and Australia) Green Building standards mandate a 20% reduction in water use compared to standard fixtures.⁹ This is equivalent to WaterSense approved fixtures that must also use 20% less water than standard fixtures.

b) Water Meters – Require separate indoor water meters (Smart Water Meters) and outdoor water meters to be installed, similar to requirements of the California Green Building Code.

c) Outdoor Landscaping – California has a Model Water Efficient Landscape Ordinance that communities can adopt, and the Green Building Code includes specifications for automatic irrigation.¹⁰ The Ontario Building Code should include similar measures.

d) Rough-Ins – These should be included for dual plumbing (purple pipes) and hot water circulation systems. British Columbia is planning to mandate purple pipes in all new homes.¹¹

e) Rainwater Harvesting – This should be more explicitly addressed in the Ontario Building Code. Grey water and rainwater should be explicitly discussed (they are currently addressed together as non-potable water), and the permissible end uses for rainwater should be expanded to clearly include both laundry and irrigation, as in Australia.¹²

f) Technical Guidance and Training – Guidance and training should be provided to plumbers for rainwater harvesting and grey-water reuse to help clarify the Ontario Building Code’s existing allowance of non-potable water use for toilets, similar to the guidebooks and specifications in Nova Scotia, Australia, Texas and other jurisdictions.¹³

LINKING WATER AND ENERGY REBATE PROGRAMS

The Ministry of Energy and Infrastructure and the Ontario Power Authority administer a number of funding and rebate programs intended to encourage greater energy efficiency.

Recommendations

These programs should explicitly recognize the water-energy nexus and include water efficiency provisions. In particular, they should issue the following relevant directives to natural gas and electricity utilities and the Ontario Energy Board:

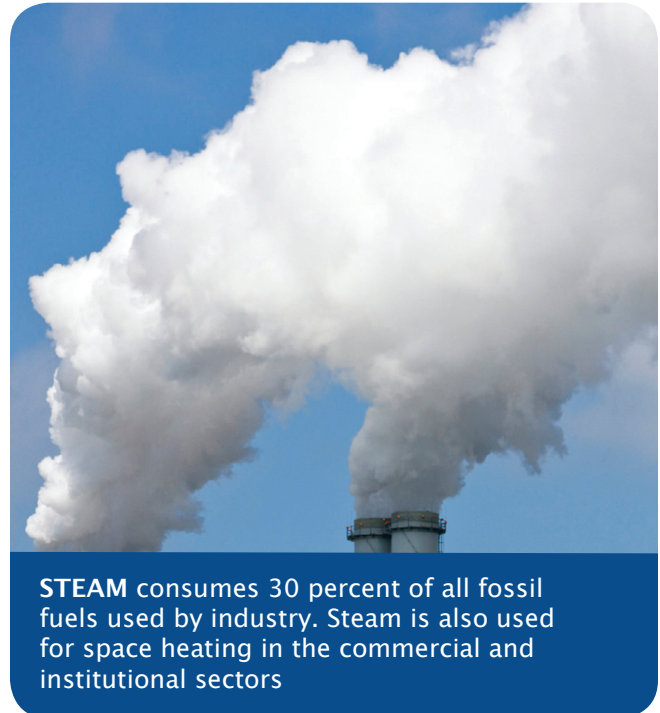
a) Water Conservation Eligibility – Water conservation measures should be explicitly eligible for funding and rebates in the Municipal Eco-Challenge fund, the Electricity Retrofit Incentive Program and the Industrial Energy Efficiency Program.

b) High-Efficiency Home Fixtures – The existing 6 L toilet rebate should be changed to offer rebates for high-efficiency (4.8 L) WaterSense-approved toilets within the Ontario Home Energy Savings program. A review of this program (with a recognized water efficiency expert) should be conducted to identify opportunities for new rebates for water audits and efficient fixtures such as humidifiers, hot water recirculation systems, rainwater harvesting systems and drip irrigation systems, etc.

c) Rebates for Clothes Washers – Partner with energy utilities and distribution companies as well as with the Ontario Power Authority to offer a jointly funded rebate program for water-efficient front-loading residential and commercial clothes washers. For example, Manitoba Hydro offers \$180 for commercial washers.

d) Small Business Rebates – Review the Canadian ecoEnergy Retrofit for Small and Medium Organizations rebate program for new opportunities to include rebates for retrofits that save both water and energy. For example, include rebates for water-efficient pre-rinse spray valves for restaurants and food retailers.

e) Awareness Campaign – The government should raise awareness of existing energy programs within the province that also save water. For example, Union Gas offers free pre-rinse spray valves to its customers.



Conclusion

The Ontario Water Conservation Alliance submits this report and its recommendations in a spirit of openness and collaboration to the Ontario government. We look forward to having an opportunity to discuss these recommendations with key stakeholders more fully while continuing to advance the notion that energy and water use are intricately connected.

Authors

Carol Maas - Innovation and Technology Director, POLIS Water Sustainability Project

Theresa McClenaghan - Executive Director, Canadian Environmental Law Association

Glen Pleasance - Treasurer, Alliance for Water Efficiency

Notes

- 1 Maas, C. (2010), *Ontario's Water-Energy Nexus: Will We Find Ourselves in Hot Water... or Tap into Opportunity?* POLIS Project on Ecological Governance, University of Victoria. Accessed at: www.poliswaterproject.org/nexus/
- 2 Ibid.
- 3 City of Toronto (2007), *Climate Change, Clean Air, and Sustainable Energy Action Plan: Moving from Framework to Action*, accessed at: <http://www.toronto.ca/changeisintheair/index.htm>
- 4 Klein, G., et al. (2005), *California's Water – Energy Relationship*, Final Staff Report, California Energy Commission, accessed at <http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF>
- 5 Alliance for Water Efficiency (2009), *Device Distribution Program Introduction*, accessed at http://www.allianceforwaterefficiency.org/Device_Distribution.aspx
- 6 Dickinson, M.A., et al. (2003), *Benefits of the United States Nationwide Plumbing Efficiency Standards*, *Water Supply* 3(3): 231–237.
- 7 Assembly Bill 715 (2007), *Laird. Water conservation: low-flush water closets and urinals*, accessed at: http://www.water.ca.gov/urbanwatermanagement/docs/ab_715-Laird_chaptered.pdf
- 8 EPA WaterSense (2008), *National Efficiency Standards and Specifications for Residential and Commercial Water-Using Fixtures and Appliances*, accessed at: <http://www.epa.gov/watersense/docs/matrix508.pdf>
- 9 Mader, R.P. (2008), *California Passes Green Statewide Building Code*, *ContractorMag.com*, published Aug 1, 2008, accessed at: http://contractormag.com/green-contracting/california_passes_green/
- 10 California Code of Regulations (2009), *Model Water Efficient Landscape Ordinance*, accessed at: <http://www.water.ca.gov/wateruseefficiency/docs/MWEL09-10-09.pdf>
- 11 British Columbia (2009), *Living Water Smart: British Columbia's Water Plan*, accessed at: http://www.livingwatersmart.ca/watersmart/at_home.html
- 12 Farahbakhsh K., Despins C., Leidl C. (2009), *Developing capacity for large-scale rainwater harvesting in Canada*, *Water Qual. Res. J. Can.* 44:92–102
- 13 Nova Scotia (2010), *The drop on water: Cisterns*, accessed at http://www.gov.ns.ca/nse/water/docs/droponwaterFAQ_Cisterns.pdf. Green Plumbers USA: <http://www.greenplumbersusa.com>