

Enabling Sustainability, Resilience and Innovation in Water Infrastructure

Roundtable with the
Honourable Amarjeet Sohi,
Federal Minister of
Infrastructure and
Communities

June 24, 2016

Hosted by:



Contents

Event Summary	1
Recommendation #1: Create a dedicated program to help municipalities get the most out of their existing assets.....	2
Remarks from the designated catalyst, Geoff Rae, CAO, City of Brantford	2
Written Feedback.....	3
Examples of Recommendation #1	3
Recommendation #2: Create a dedicated funding program to help municipalities implement projects to increase capacity or performance with non-traditional approaches	5
Remarks from the designated catalyst, David Henderson, XPV Water Partners	5
Written Feedback.....	5
Examples of Recommendation #2	6
Recommendation #3: All major infrastructure funding programs must include criteria that prioritize sustainability and resilience and encourage and support innovation	9
Remarks from the designated catalyst, Nancy Kodousek, Region of Waterloo.....	9
Written Feedback.....	10
Examples Recommendation #3	10
Recommendation #4: Adopt wastewater regulations that set clear expectations that support the bold vision the government puts forward.....	12
Remarks from the designated catalyst, Tim Constantine, CH2M.....	12
Written Feedback.....	12
Appendix: Event Participants.....	14

Event Summary

On Friday, June 24, 2016, the Southern Ontario Water Consortium (SOWC), Water Technology Acceleration Project (WaterTAP) and Ontario Clean Water Agency (OCWA) hosted a roundtable with the Honourable Amarjeet Sohi, Canada's Minister of Infrastructure and Communities. The event provided an opportunity for the water sector to present and discuss strategic recommendations for anticipated water infrastructure funding programs.

Participants recognized that anticipated investments in water infrastructure (drinking water, wastewater, stormwater and water reuse) by the federal government are an opportunity to invest in innovation and growth, including the adoption of new approaches and technologies that support Canadian “cleantech” solutions. They are an opportunity to minimize “spending” and maximize prudent “investments” that foster financial and environmental sustainability, resilience and new economic growth and jobs. In fact, this investment should be deliberately designed to shift Canadian communities away from a cycle of continued investment in expensive solutions and toward financial self-sustainability.

The federal government should develop and implement this major investment in critical infrastructure to position Canada as a world leader in implementing the most efficient, robust approaches to water management and resource recovery.

This will require an **ambitious vision and key principles** for public infrastructure investment that will guide policy, regulations and funding. The benefits will include creating a bridge to financially sustainable systems, ensuring that municipalities are getting the best possible performance from existing infrastructure, and reducing the need for future infrastructure spending.

A targeted investment in long-term infrastructure planning and sustainability is likely to result in cost savings, greenhouse gas emissions reductions, more resilient and affordable systems and broader adoption (and international acceptance) of made-in-Canada water technologies.

Below are the **four key recommendations** to accomplish this goal, annotated with feedback and specific examples solicited in advance from participants of the roundtable. It should be noted that support for all four recommendations among diverse participants was very strong, reinforcing that these should be considered part of a **comprehensive package of recommendations** rather than stand-alone options.

Minister Sohi remarked that he was eager to hear the input of the diverse group, that the event was timely given that consultation on “Phase 2” of infrastructure investment was just beginning. He noted that the recommendations align with his government’s goals, and that his priorities include maximizing the value of public investments in infrastructure.

Recommendation #1: Create a dedicated program to help municipalities get the most out of their existing assets.

A dedicated fund should support effective performance-based asset management planning, and programs for optimization and efficiency (including conservation and inflow/infiltration reduction and minimizing sewage bypass events). It would build upon the new dedicated national fund (through Federation of Canadian Municipalities) to support asset management planning best practices. It should also make available dedicated expertise, training and tools to support small municipalities including templates and tools to support the development of appropriate full cost rate structures.

All of the respondents indicated some level of support for this recommendation, with an average response of 8 out of 10 and ratings ranging from 6 to 10. 47% indicated that they strongly supported the recommendation.

Remarks from the designated catalyst, Geoff Rae, CAO, City of Brantford



Optimization generally looks at the design and maintenance of facilities, with a focus on power and chemical management. Brantford went beyond this to also address a review of its administration related to plant operation. With professional facilitation, the City implemented the Composite Correction Program¹ and improved the performance of its wastewater treatment facility sufficiently that it was able to take a planned \$27.75 million expansion off the books. The facilitation cost was less than 5% of

the estimated expansion cost, and has spanned several years. The avoided capital has been redeployed into the asset management program for state-of-good-repair initiatives that are typically underfunded in municipal organizations. Often municipalities don't collect good quality data which hinders their ability to make informed decisions regarding optimal performance and asset investment. The Composite Correction Program is a proven technique that is being used in Ontario for wastewater. A program that supports this technique can be low-cost and create great benefits.

¹ The Composite Correction Program is a formal process, developed by the U.S. Environmental Protection agency, for evaluating performance-limiting factors at sewage treatment plants in order to optimize operation. Examples in Ontario have shown significant capital cost savings and improvements in performance and reliability (source: <http://www.weao.org/assets/docs/resources-links/reports/optimization-guidance-manual-for-sewage-works.pdf>).

Written Feedback

“Performance-based asset management plans and approaches that support optimization are important to help reduce water system costs and allow systems to be more financially sustainable.”

Bernadette Conant, CEO, Canadian Water Network

“Proper policy development can support economic development and serve to improve overall performance. Poor quality data that is unreliable, or in many cases not collecting data at all, promotes poor decision making, and result in missed opportunities to capitalize on innovative technology solutions or support plants to improve performance.”

Geoff Rae, CAO, City of Brantford

“Area-wide programs that support a community of practice (such as the Grand River Wastewater Optimization Program) build the technical expertise of Ontario's most important asset—its people. A more engaged, and enabled operator and wastewater manager (and water manager) will make improved infrastructure maintenance, operations and ultimately design decisions at the local level (i.e. Improved water quality).”

Sandra Cooke, Grand River Conservation Authority

“Having a rigorous program plan ensures that the thinking/planning is done and reviewed prior to approval and spending of the infrastructure dollars.”

Randy Cooper, President, Envirologics Engineering

Examples of Recommendation #1 – Ontario projects that maximize existing assets through “non-infrastructure” approaches like asset management and optimization

Collectively, the improvement of wastewater operations [through the Grand River Wastewater Optimization Program] will achieve the watershed water plan to improve water quality but also will assist with achieving the Great Lakes Water Quality Agreement (GLWQA) by reducing nutrient loads. Optimization was identified in the GLWQA as a means with which to improve effluent quality to reduce phosphorus loads to the Great Lakes. Numerous smaller municipalities in the Grand River watershed have accessed technical support through this program to more fully understand the needs of their wastewater assets and to make more informed decisions. This approach is consistent with and leverages lessons learned from USEPA Area Wide Optimization for water treatment plants.

Sandra Cooke, Grand River Conservation Authority

As a decade long resident of the Region of Waterloo, I have witnessed first-hand a community that has sought to constantly renew and refresh the water efficiency, public education and green infrastructure programs that has allowed the region to grow in population within the

constraints of locally available water supplies. Having dedicated resources from senior levels of government to support such programs – and to recognize them as a fundamental “parts” of infrastructure would help spread this experience across the country.

Tony Maas, Director, Forum for Leadership on Water

Inflow and infiltration [...] flows can result in sewer backups, system overflows, damage to the environment, and increased costs. In addition, inflow and infiltration consumes the capacity of wastewater systems, reducing the lifespan of existing infrastructure. Innovations and investments in system resilience through inflow and infiltration programs are another way to unlock capacity to accommodate future growth, while maintaining the system in a state of good repair. York Region operates an inflow and infiltration program, which has resulted in a cumulative reduction of 9.6 million litres per day of inflow and infiltration, representing approximately 25% of the Region’s long-term optimization target. This is helping to extend the capacity of our existing infrastructure to serve our growing communities.

Erin Mahoney, Commissioner of Environmental Services, York Region

Recommendation #2: Create a dedicated funding program to help municipalities implement projects to increase capacity or performance with non-traditional approaches.

A dedicated fund should support upgrades and repairs, living green infrastructure, innovative approaches and technologies including hardware and software to support maintenance management, monitoring and automation (“smart” systems and enhanced data collection). It will help municipalities identify, promote and invest public dollars in projects that can defer capital costs, quickly realize cost savings, and promote cost-effective, green and sustainable approaches and technologies before they consider new or expanded infrastructure.

All of the respondents indicated some level of support for this recommendation, with an average response of 8 out of 10 and ratings ranging from 5 to 10. 47% indicated that they strongly supported the recommendation.

Remarks from the designated catalyst, David Henderson, XPV Water Partners



David noted that from his perspective, having vetted technologies from all over the world and engaged with many water utilities, there are real opportunities for smart technology to reduce the “infrastructure deficit” by about half. He described the need for smart planning (including performance-based asset management, and enhancing performance year in and year out; noting available software tools have been shown to reduce infrastructure costs by about 30-40%; smart

systems (including “Internet of Things” enabled digital water system monitoring and management) and smart end users (empowering the consumer in order to significantly impact conservation efforts). David also encouraged flexibility in planning and funding, noting that modular treatment systems, for example, can be extremely effective and relatively low cost, but are not able to ‘break into’ the municipal procurement process. Addressing such barriers, and implementing this recommendation will also drive good cleantech jobs.

Written Feedback

“If we are serious about creating an environment where innovation flourishes and thus where Ontario/Canada can become a world leader, we need to be willing to invest with our innovators to allow them to test, pilot and showcase their technology in a way that assists them in

developing their business both locally and globally. As we have heard from many suppliers of new technology – they have better success globally than in their own backyard.”

Tim Sutherns, President, Eramosa Engineering

“The sector is very conservative, and prone to doing what is “proven”, meaning that it is change/risk averse, and this may be the biggest challenge. Yet there is certainly fiscal challenge too. Some money is needed up front, but what might be more powerful is if there were some kind of “failure insurance” so that innovations that have “risk” associated with them could be somehow managed so that the whole projects could be “made whole” in time, without the careers of engineers at municipalities being ruined by the serious trauma of “it didn’t work” or “we didn’t have money in the budget to fix it.” This mechanism needs to be implemented carefully so that such monies would not become an incentive to improper budgeting.

Linda Gowman, Chief Technologies Officer, Trojan Technologies

“Although supportive, this fund should be on funding projects that would assist with implementing improved data collection, i.e. SCADA systems, improved sampling and gathering more process control data, etc. The experience in the Grand River Wastewater Optimization Program highlighted the fundamental lack of critical data from which to make decisions. Data collection should focus on process control. I would not group ‘upgrades to basic plant features’ in this approach but rather focus on data collection, data management, information development and human capacity building (training experts).”

Sandra Cooke, Grand River Conservation Authority

Examples of Recommendation #2: Other innovative approaches to expand capacity without major capital expenditure

Non-traditional approaches can be less expensive. Depending on the scale and approach, living green infrastructure has found to reduce project delivery costs, long-term maintenance costs, and/or total life-cycle costs. They can also provide cost sharing opportunities among various levels of government, utilities, private investors, and end-use customers. Incorporating non-traditional, living green infrastructure approaches into existing infrastructure is a way to increase the resilience, flexibility, capacity and performance of existing infrastructure in the face of changing conditions such as those associated with climate change.

Chandra Sharma, Director of Watershed Strategies,
Toronto and Region Conservation Authority

It is important for federal programs to recognize solutions which promote alternatives to traditional treatment technologies to water infrastructure which may help to advance provincial or territorial endorsement of these projects.

Erin Mahoney, Commissioner of Environmental Services, York Region

Our demonstration facility at the Township of Southgate [a full scale insitu BioCord™ installation in a lagoon]: [the municipality] could experience long term significant new growth in housing and population [but] don't at this stage have a tax base to pay for a mechanical new plant. The ability to try a new technology collate data on its performance and what opportunities it may provide for extending the present zero cost option and how that relates to increase in building permits etc. allow long term planning around that. Even if the ultimate result is a mechanical plant they can extend the time until they need to fund the build out.

Kevin Bossy, Owner, Bishop Water Technologies

A recent review of the Galt WWTP (56 MLD) resulted in an estimated infrastructure project of \$100 million (the 2015 budget included \$20M for infrastructure). As the Region did not have the financial capacity to increase the budget to the full \$100 M estimate, a peer review-optimization study was conducted resulting in a near term program estimated at \$50M over 10 years. However, the infrastructure review also highlighted a significant issue with the existing tertiary filters which are routinely bypassing due to hydraulic and operating limitations [which resulted in a] preferred approach to maintain existing structure (which has approximately 20-30 year life) but update/upgrade technology. It is assumed that the plant will not need to be expanded for growth in the next 20-30 year period and using the existing filter structure with an upgraded filter technology will be the best approach for this project. In this case, the innovation was the peer review and optimization study which defined the best value solution for the filter issue and also prioritized the infrastructure reinvestment. There was an overall increase in the budget from \$20 M to \$50M which was included the next year's budget.

Nancy Kodousek, Director of Water Services, Region of Waterloo

We just finished a demonstration in Chicago of our innovative Membrane Aerated Biofilm Reactor (MABR) allowing municipalities to upgrade their existing wastewater treatment plant by increasing capacity up to 30%, while reducing energy consumption with 25-30% and allowing them to biologically remove phosphorous, all within their current footprint.

Henk Koops, Technology Leader, GE Water

At the Victor Valley Water Reclamation Authority (California) Anaergia's "Omnivore" technology is applied to triple the amount of solids in the digester at the wastewater treatment facility. This innovation increases the digester capacity three fold from conventional, allowing for increased volume of industrial and municipal organics to be treated within the same plant infrastructure, with the use of combined heat and power (CHP) systems. By applying this technology, more biogas and energy are produced to create energy neutrality within the plant. This solution enables more organics to be diverted from landfills, reducing greenhouse gases (GHG) and leachate generation, and increasing landfill life. It will also serve to accommodate higher flows into the plant from future population increases, without the need to build additional expensive digester infrastructure. This has realized financial savings in capital and O&M costs and presents an environmentally sustainable solution for the municipality towards a Net Zero Energy future.

Phil Sidhwa, Vice President, Anaergia Canada

York Region's proposed Upper York Sewage Solutions project incorporates industry leading treatment technology and a phosphorous off-setting program, which will result in a net reduction of total phosphorus in the Lake Simcoe watershed. In addition to using micro-filtration and reverse osmosis to treat wastewater, the project aims to address overall phosphorous loading to the Lake by upgrading stormwater treatment in parts of the watershed to achieve even greater reductions in phosphorus that are achievable and economically feasible. Stormwater and other runoff represent major sources of nutrient loading; treating these sources provides a better return on investment for phosphorous reduction as compared to increased wastewater treatment, which requires significant energy and has diminishing environmental benefits.

Erin Mahoney, Commissioner of Environmental Services, York Region

Recommendation #3: All major infrastructure funding programs must include criteria that prioritize sustainability and resilience and encourage and support innovation.

Anticipated new investment by the federal government represents, as participant Tony Maas, Director of the Forum for Leadership on Water (FLOW), describes it,

"a 'once in a century' opportunity to transform urban water management and infrastructure in ways that will prepare communities for our changing climate, allow Canada to catch up to and surpass global leaders, and build up Canada's clean water technology and services sector."

Such a transformative agenda must not only enable the activities and approaches described in the previous recommendations, but require that municipalities plan for and fully implement those approaches with clear preconditions before any major infrastructure investment will be considered. Prerequisites should include having in place a performance-based asset management plan; implementation of a recognized optimization program (such as the Composite Correction Program) which will improve performance with minimal or no capital investment; and tracking and reporting of key performance indicators including energy consumption, GHG emissions and carbon footprint.

All of the respondents indicated some level of support for this recommendation, with an average response of 9 out of 10 and ratings ranging from 7 to 10. 67% indicated that they strongly supported the recommendation.

Remarks from the designated catalyst, Nancy Kodousek, Region of Waterloo



The Region of Waterloo initiated a comprehensive master plan for wastewater treatment plants. Historically master plans focus on growth, effluent quality and infrastructure requirements to achieve the lowest-cost solution. Sustainability, resilience, etc., are generally not considered key drivers but they can ultimately increase the cost if not taken into consideration at the outset. The region is supportive of sustainability requirements and innovation; it is interested in considering

alternatives for biomass management and co-generation, with a goal of "net zero energy". This should be eligible for federal funding support. An important challenge is the fact that such approaches (the study, design consideration and construction) can take years for each stage. So the design and delivery and funding programs has to take this into account.

Written Feedback

“This recommendation is critical to advancing sustainable and innovative water infrastructure because fiscal policy provides the greatest leverage when developing joint programming with other levels of government.”

Tony Maas, Director, Forum for Leadership on Water

“If sustainable infrastructure and life-cycle costing are the ultimate goals, governments must send a very clear messages through their programming. The design of this program (and future programs) will determine the future of infrastructure in Canada.”

WaterTAP

“Sustainability will be achieved through innovation as the vehicle, so incent it and even force the advancement through funding conditions.”

John Lucas, Director, Water and Recovered Water, City of London

“Federal programs with short timelines (<3 years) or ones seeking “shovel-ready” projects, constrain proponents to existing technologies/approaches in order to meet aggressive and arbitrary timelines. This encourages faster projects, but not necessarily smarter projects, and can result in a stifling of innovation.”

Bernadette Conant, CEO, Canadian Water Network

Examples Recommendation #3: Applying effective funding prerequisites

In Ontario, municipalities are required to develop asset management plans with a primary focus on roads, bridges, housing, and linear water and wastewater infrastructure. Many municipalities have expanded to many or all asset classes under their responsibility. Grant opportunities are dependent upon demonstrated completion of the asset management plan. Similarly in Ontario, energy management plans are required with funding opportunities linked to them. The Composite Correction Program (CCP) has a long established track record in Ontario of improving performance, and avoiding capital expansion by re-rating the existing physical infrastructure.

Geoff Rae, CAO, City of Brantford

“... all stakeholders have similar levels of service/ expectations. However, this does not necessarily mean they should expect the same technologies. Any review/due diligence should investigate a lifecycle with the same analysis as capital expenditure and outcome. To illustrate, a [] centralized mechanical treatment plant [in a small community] could prove redundant.”

Kevin Bossy, Owner, Bishop Water Technologies

A municipality had a choice of solutions to implement to improve the facilities. They only chose the solution with the minimal cost as they weren’t given any other criteria to evaluate. There

was no incentive to drive any other decision process except one based solely on their financial model.

Ontario Clean Water Agency

Recommendation #4: Adopt wastewater regulations that set clear expectations that support the bold vision the government puts forward.

Incorporate performance-based effluent targets and benchmarks into regulations for wastewater systems that are based on fully optimized treatment facilities. Work with the provinces and territories to bring in requirements that all facilities set targets for nutrient recovery, water reuse, drinking water treatment performance and minimization of energy consumption. These are becoming expectations globally, and Canada's vision and regulations need to set the country on a path to accomplish this while encouraging made-in-Canada expertise and technologies.

All of the respondents indicated some level of support for this recommendation, with an average response of 8 out of 10 and ratings ranging from 5 to 10. 40% indicated that they strongly supported the recommendation.

Remarks from the designated catalyst, Tim Constantine, CH2M



Tim noted that he has been involved in projects all over the world, and described the specific example of Denmark having been able to effectively push the water industry forward, with great technologies and great people. What sets Denmark apart? As part of the European Union, it has stringent limits on effluent discharges. On top of that, in 1997, they posed an “effluent tax” for dischargers (with proceeds redirected to water projects including groundwater protection).

Ammonia, phosphorus, carbon were all subject to the tax. If you perform better, you'll reduce the tax. It provides a direct incentive to do better, to optimize facilities. Denmark has developed a mini-economy, with new technologies, new instruments – and they've been able to export that. Operations staff have become experts in achieving performance goals (and that talent is also exported around the world). It's a concrete demonstration of the benefits of setting achievable but challenging requirements.

Written Feedback

“This recommendation introduces opportunities to be forward-thinking and reduce the energy/environmental footprint and will assist governments in meeting greenhouse gas reductions, concepts of being energy neutral and promoting reuse in the water/wastewater industry. There is a need for targets or guidance as these programs often fail on the financials or business case when presented to municipal councils as the payback period is too long and there is no current way to benchmark the environmental performance. Again this approach

would need to be developed and administered at the provincial level to avoid confusion between government agencies.”

Nancy Kodousek, Director of Water Services, Region of Waterloo

“Setting performance based wastewater effluent targets will encourage operators and managers to optimize existing infrastructure to achieve the targets if funding programs were structured in a way to reward good performance. If performance ‘benchmarks’ were regulated, then there would be no drive to be innovative and improve but rather just meet what the regulation states.”

Sandra Cooke, Grand River Conservation Authority

“The federal government can demonstrate leadership both by reducing the regulatory/policy barriers for the implementation of new technologies, as well as building in the flexibility for spending timelines that enable sufficient process for procurement, testing and implementation of new technologies. Federal support for this can be initiated with the establishment of an interdepartmental/intergovernmental working group that can identify barriers to innovation and can support actions that amend or accommodate innovation into existing regulatory/policy frameworks.”

Bernadette Conant, CEO, Canadian Water Network

“It is difficult to pilot new technologies that may impact effluent quality while Municipalities are being held to strict compliance targets. We need partnerships and tools to allow technology and innovation to be implemented at our treatment plants.”

Nancy Kodousek, Director of Water Services, Region of Waterloo

“If the targets in the regulations are set ambitiously it will force the municipalities to look for new and innovative technologies to meet these targets.”

Henk Koops, Technology Leader, GE Water

Appendix: Event Participants

Guests:

The Honourable Amarjeet Sohi, Minister of Infrastructure and Communities

Julie Savard-Shaw, Policy Advisor, Office of the Minister

Minister of Infrastructure and Communities, Government of Canada

Sonya Read, Director, Strategic Policy and Priority Initiatives

Ministry of Infrastructure and Communities, Government of Canada

Hosts:

Alicia Fraser, VP Engineering, Capital Delivery and Support Services, OCWA

Kerry Freek, Manager of Communications, WaterTAP

Peter Gallant, President and CEO, WaterTAP

Rahim Kanji, Manager, Industry Partnerships, SOWC

John Kingsbury, Director, Sales and Marketing, OCWA

Brenda Lucas, Executive Director, SOWC

Ken Morrison, Board Chair, WaterTAP

Rebecca Sutherns, Principal, Sage Solutions (Facilitator)

Participants:

Kevin Bossy, Owner, Bishop Water Technologies

Marc Bracken, Vice President & General Manager, Echologics Engineering Inc.

Bernadette Conant, Chief Executive Officer, Canadian Water Network

Tim Constantine, Global Technology Leader, CH2M HILL

Sandra Cooke, Senior Water Quality Supervisor, Grand River Conservation Authority

Rajeev Goel, President & CEO, Hydromantis Environmental Software Solutions, Inc.

Linda Gowman, Chief Technologies Officer, Trojan Technologies

Robert Haller, Executive Director, Canadian Water and Wastewater Association

David Henderson, Founder and Managing Director, XPV Water Partners

Nancy Kodousek, Director, Water Services, Region of Waterloo

Henk Koops, Director, Research & Development, GE Water

Robyn Kurtes, Senior Strategy Consultant, Regional Municipality of York

Todd Latham, President, Blue Events Inc. and Actual Media

John Lucas, Director, Water and Recovered Water, City of London

Tony Maas, Director of the Forum for Leadership on Water, FLOW Canada

Deborah Martin-Downs, Chief Administrative Officer, Credit Valley Conservation Authority

Geoff Rae, Chief Administrative Officer, City of Brantford

Geoff Riggs, Smarter Planet Project Manager, Business Development, IBM Canada

Chandra Sharma, Director of Watershed Strategies, Toronto and Region Conservation Authority

Phil Sidhwa, Vice President, Canada, Anaergia Inc.

Kiran Suresh, Plant Manager, Wastewater Services Division, City of Guelph

Tim Sutherns, President and CEO, Eramosa Engineering

David Szeptycki, Head of Strategy and Policy Implementation, Regional Municipality of York

Rick VanSant, President and CEO, UV Pure Technologies