Response to the Ministry's Discussion Paper: Addressing Food and Organic Waste in Ontario

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Who we are:

The Southern Ontario Water Consortium (SOWC) has established a Working Group focused on "Value generation from Biosolids." The Working Group was created support from the Ministry of Research, Innovation and Science through the Business Growth Initiative to leverage SOWC's Advancing Water Technologies funding program for technology development, funded by the Federal Economic Development Agency for Southern Ontario. The Working Group believes that Ontario has the potential to be a global leader in biomass technologies; the right policy environment could create the necessary conditions for such a cluster, building on the existing technology companies and research expertise. One of the major initiatives of the Working Group is the funding of a needs assessment led by Prof. Wayne Parker to better understand current practices regarding the disposition of biosolids in Ontario and opportunities for innovation (further referenced in this submission as Jin and Parker, 2017).

Members include:

Phil Sidhwa, President, Orgatec Energy Inc. (Working Group Chair)
Youngseck Hong, New Technology Leader, GE Water & Process Technologies
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We are pleased to submit the following comments.

Signed,

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Executive Director
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Phil Sidhwa
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Summary:

The questions asked in the Discussion Paper are listed below with our key recommendations:

1. What food and organic materials should be a priority and as such addressed in the Framework?

- Biosolids should be included in the Framework.
- The province's goal should be to drive beneficial management and value generation from organics; with an integrated approach to the management of biosolids, septage and other organics.

2. In addition to the examples given, what actions do you think the ministry should consider in preventing food from becoming waste? N/A

3. What are the most important actions to take first? N/A

4. What are the barriers to reducing food waste and why is more not recovered at present? N/A

5. In addition to the examples given, what tools and actions do you think the ministry should consider to increase diversion of food and organic wastes?

- The management of biosolids should be explicitly addressed in the proposed Organics Framework, articulating a clear provincial direction for reducing the volume of, and capturing the energy and nutrient value from, biosolids.
- Consistent with the principle of using disposal bans to facilitate resource recovery and waste reduction, the province should ban landfilling (as Quebec, Nova Scotia and PEI have done) and require biosolids management that prioritizes beneficial use/reuse in support of the circular economy.
- Require and provide financial support for the development of biosolids management master plans by all municipalities. Where appropriate, help them expediently and cost-effectively develop such master plans and broader organics management master plans.
- Support regional consideration and planning for organics management capacity. This should focus on enhanced biosolids management solutions for biosolids volume minimization, energy generation, or resource recovery at wastewater treatment facilities to get the most out of current treatment capacity.
- Building on the optimized WWTP capacity, consider centralized biosolids, septage and organics storage facilities and dedicated digester capacity on a regional basis.
- Make infrastructure funding available to support this treatment and storage capacity.
- Create and execute a public education campaign regarding beneficial reuse of biosolids, to encourage public acceptance of and recognition of the benefits of reuse.

6. What are the most important tools and actions to take first?

- Explicitly address biosolids in the Organics Framework.
- Commit to a ban on landfilling of biosolids that will be phased in over a reasonable period of time (e.g. 5 years).
- Create and execute a public education campaign regarding beneficial reuse of biosolids, to encourage public acceptance of and recognition of the benefits of reuse.

- Support regional consideration and planning for organics management capacity in order to effectively develop infrastructure to process food and organic wastes, particularly anaerobic digestion (as noted in Table 4 of the Discussion Paper).

7. In addition to the examples given, what actions can the ministry take to support viable end markets for food and organic materials?

- Introduce a renewable content requirement for natural gas and investments to promote the use of renewable natural gas as proposed in the Climate Change Action Plan (and noted in Table 5 of the Discussion Paper).
- Create a comprehensive and publicly accessible database on the production and end use of biosolids and septage in Ontario.

8. What are the most important actions to take first, and who is best positioned to lead the action?

- As suggested by the ECO, "the Ontario Energy Board should set a renewable natural gas content requirement and cost recovery criteria for gas utilities." WWTPS can be an important component in meeting this requirement.

Background:

Municipal wastewater treatment plants consist of two primary treatment paths; a liquid processing path for wastewater and a solids processing path for organic solids separated from the wastewater. To date, technological and operational innovation has been focused on ensuring that the liquid effluent discharged from the treatment process meets with increasingly stringent water quality criteria. The solids processing path has received significantly less attention. However, wastewater treatment plants are increasingly being viewed as resource recovery plants, which is now possible through technological progress. New technologies are enabling biosolids management to emerge as an opportunity for municipalities rather than a burden; to fully realize this, biosolids management should be considered a key aspect of organics management.

The three main opportunities related to biosolids management support the goal of a waste free Ontario and are consistent with the objectives of the proposed Organics Framework. They are:

i. Minimizing volume and quantity generated,
ii. Releasing energy potential, and
iii. Freeing trapped value, typically in the form of valuable nutrients such as phosphorous and nitrogen.

Volume minimization reduces the amount of biosolids generated through the wastewater treatment [water reclamation] process or lowers the water content within the biosolids, or both; making handling, shipping, and disposal easier. Traditional dewatering technologies can be deployed as well as process control technologies and methodologies to reduce overall volumes of biosolids.

Energy recovery unleashes the untapped energy contained within a given volume of biosolids. Typically, two to four times the amount of energy is trapped within wastewater than is needed to treat the wastewater. Biogas, a source of renewable energy, can be generated from biosolids and converted to electricity using modified electrical generators, or natural gas for pipeline or transportation fuel use. Enhanced treatment of biosolids can maximize the amount of biogas generated as well as eliminating pathogens in the solid material.

Liberating valuable nutrients from biosolids is primarily focused on phosphorous and nitrogen, to be used as agricultural and non-agricultural fertilizers. These nutrient rich products can also be used as a soil amendment at degraded mining sites or forestry land. Other potentially valuable products include biochar, syngas, and bio-oil.

As recently noted by the Environment Commissioner of Ontario, "To achieve Ontario's goal of reducing greenhouse gas emissions, anaerobic digestion and energy recovery should become standard at wastewater treatment plants whenever practical. Even better, treatment plants could become "energy centres" that also produce and capture methane from a wide range of supplemental organic wastes. Keeping organic wastes out of landfills is essential to Ontario's circular economy strategy, and capturing the methane from such wastes is important for meeting climate targets."[1]

To most effectively manage organics and derive value from them, we have to integrate our management of biosolids, septage and food and other organics.

Current Context: The state of treatment and disposition of biosolids in Ontario

Unfortunately, anaerobic digestion (which is key to the generation of renewable natural gas in particular) is not yet the dominant paradigm for wastewater management.

According to the ECO survey, 30% of plants use anaerobic digestion (28 in total from their survey). Jin and Parker (2017)[2] and tracking by Ontario Clean Water Agency confirms 77 facilities in Ontario (out of 486) utilize anaerobic digestion. As noted by the ECO, with one exception, none of the facilities that do have AD currently refine the gas (mostly flared). But 17 municipalities in the ECO survey that don't currently have AD are "looking at various options to utilize biogas from their WWTP facilities more effectively."[3]

In fact, Jin and Parker (2017) shed important light on current practices in Ontario. They note that new federal requirements for secondary treatment are likely to result in increased production of biosolids, particularly in small communities. Thickening, the basic process to reduce the volume of biosolids being produced, and a process precursor to anaerobic digestion, should be a minimum expectation in all treatment plants. This common, accepted practice alone would help plants get significantly more treatment capacity out of existing infrastructure and be able to accept a greater volume of waste. Yet only 16% (78 of 486 plants) used a thickening process before stabilization.

[1] Environment Commissioner of Ontario (2017). Every Drop Counts, Chapter 8, Energy from Sewage.
[2] Jin and Parker (2017). Needs Assessment for Sludge Processing Technologies in Ontario.
[3] ECO (2017).

Driving toward a goal of value generation or net zero from plants with anaerobic digestion is important. Regional planning approaches to ensuring capacity for anaerobic digestion is one pathway to accomplish this. But thickening can and should be employed in all plants as a prerequisite, and important precursor to getting the most out of any new capacity considerations.

There is no coordinated tracking of the volume of biosolids produced in Ontario, and very little data as to its fate. Most biosolids in Ontario is land applied as a soil conditioner, which is an important way to recapture nutrients from biosolids. However, availability of land for application is decreasing, while pressure from aging infrastructure, increasing population, and expectations for management including sustainability and beneficial reuse are increasing. A significant portion ends up in landfill. Past estimates by CCME (2009) put the figure as high as 40% of biosolids in Ontario going to landfill[4]. In one recent example, the City of Hamilton reported that 11,000 of 38,500 wet tonnes produced (or almost 29%) goes to landfill.[5] But accurate data is lacking. Jin and Parker (2017) recently compiled a comprehensive dataset, including a survey of facilities that was facilitated by MOECC, but could not accurately quantify disposition of biosolids from facilities. They did identify 55 entries that indicated landfilling as at least part of the disposition practices of the plants.

During the summer months land application is not generally feasible due to fields being planted in crops, and landfilling becomes the least expensive disposal option. Likewise, during winter months (December - March) Ontario regulations prohibit land application of biosolids. This leaves a very small window of opportunity for land application (4 to 6months) to beneficially reuse annual production from wastewater treatment plants. In many cases adequate storage is not available, which exacerbates the problem. Ready availability of inexpensive landfilling (mostly in the USA) is deterring additional beneficial reuse opportunities that would have environmental benefits and would encourage the adoption of innovative Ontario technologies. This not only contributes to greenhouse gas emissions (at the landfill and through trucking) it also misses a significant opportunity to derive benefits from biosolids and support this technology sector.

The technology sector related to wastewater treatment is very robust in Ontario. There are Ontario companies with technology innovation related to volume minimization, energy generation, and valuable resource recovery. Specific processes and technologies including wastewater treatment plant optimization, technologies for thickening and dewatering, anaerobic digestion, anaerobic digestion pre and post-treatment technologies, and energy recovery from biogas are represented by Ontario companies with relevant technologies.

The bottom line is, **it shouldn't be necessary to put it in landfill except as an exception.** We acknowledge that landfill utilization must be maintained as an option for exceptional or emergency situations including treatment upsets or failures that cause levels of contaminants that would be unsafe for beneficial use. However this should be for exceptional circumstances only.

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[4] Canadian Council of Ministers of the Environment, CCME (2010). A Review of the Current Canadian Legislative Framework for Wastewater Biosolids.

[5] See: http://www.thespec.com/news-story/7215098-city-signs-deal-for-biosolids-treatment/

The path forward for Ontario municipalities

Addressing municipal biosolids management practices in the proposed Organics Action Plan will support a circular economy, enabling technology development and adoption that supports the goals of the Action Plan and drives beneficial reuse.

Banning landfilling, except in emergency or exceptional circumstances, will bring Ontario in line with other progressive provinces. The least onerous and least expensive solution to a landfill ban will be storage of the biosolids during the months when it can't be land applied.

Management, storage and treatment of biosolids, septage and other organics (particularly source-separated organics) should be planned on a regional basis, maximizing the existing capacity (and opportunities for enhancement or expansion of capacity) at municipal wastewater treatment facilities.

Additional storage capacity and possibly dedicated organics treatment capacity would likely have to be created (outside of WWTPs), which could be done on a regional basis. Dedicated facilities would in turn enable cost effective and commercially viable options for additional processing onsite such as further dewatering and the addition of innovative technologies for energy and nutrient capture. The availability of such centralized storage would help municipalities run their wastewater treatment facilities more efficiently and help avoid the risk and costs of seasonal use of private contractors for storage.

Requiring the development of Biosolids Management Master Plans would facilitate implementation of the landfill ban. Enabling master planning by smaller communities would allow for the creation of long terms solutions driven by the communities, and enable the planning and development of centralized storage in a coordinated way. Most large municipalities already have a biosolids master plan in place. Prioritizing beneficial reuse and requiring a biosolids master plan would encourage larger municipalities to take advantage of new and enhanced biosolids processing technologies and co-management practices in their wastewater treatment facilities.

Financial support through infrastructure funding programs should be made available for implementing new ways to manage biosolids, in order to reduce volume, generate electricity and natural gas, and/or capture other value. This would enable the adoption of innovative technologies and operational methodologies to truly develop a municipal biosolids circular economy.

To be successful, public acceptance and engagement is critical to build support for beneficial reuse and land application of fertilizer in particular. The Ministry of Environment and Climate Change should undertake a campaign for public awareness and education dispelling the myths and preconceptions associated with biosolids, promoting the value of biosolids including resource recovery, energy recovery, and other environmental benefits such as greenhouse gas reduction from transportation.

Implementing this suite of initiatives, including an ultimate ban (with an appropriate phase-in period) would drastically improve landfill diversion of municipal biosolids and increase the adoption of Ontario technologies. It should be considered a critical component of the Organics Framework.