

TO:	CHAIR AND MEMBERS WASTE MANAGEMENT WORKING GROUP MEETING ON JANUARY 19, 2017
FROM:	JAY STANFORD, M.A., M.P.A. DIRECTOR, ENVIRONMENT, FLEET & SOLID WASTE
SUBJECT:	RESOURCE RECOVERY UPDATE

RECOMMENDATION

That on the recommendation of the Director, Environment, Fleet & Solid Waste, the following report **BE RECEIVED** for information.

PREVIOUS REPORTS PERTINENT TO THIS MATTER
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Relevant reports that can be found at www.london.ca under City Hall (Meetings) include:

- Memorandum of Understanding with the Institute for Chemicals and Fuels from Alternative Resources - University of Western Ontario (December 12, 2016 meeting of the Civic Works Committee (CWC), Item #10)
- Establishment of a Waste Management Working Group (December 5, 2016 meeting of the Strategic Priorities and Policy Committee (SPPC), Item #2)
- Update and Next Steps: London Waste to Resources Innovation Centre and Green Shields Energy (October 4, 2016 meeting of the CWC, Item #10)
- Appointment of Consulting Engineer Long Term Solid Waste Resource Recovery and Disposal Plans (May 24, 2016 meeting of the CWC, Item #10)
- Individual Environmental Assessment Long Term Solid Waste Resource Recovery & Disposal Plans (October 6, 2015 meeting of the CWC, Item #14)
- Preliminary Concept for a London Waste to Resources Innovation Centre (February 3, 2015 meeting of the CWC, Item #4)
- City of London W12A Landfill Area Plan Study Meeting on Official Plan & Zoning By-Law Amendment (February 9, 2009 meeting of the Planning Committee, Item #15)

COUNCIL'S 2015-2019 STRATEGIC PLAN

Municipal Council has recognized the importance of solid waste management in its 2015-2019 - Strategic Plan for the City of London ([2015 – 2019 Strategic Plan](#)) as follows:

Building a Sustainable City

- Strong and healthy environment
- Robust infrastructure

Growing our Economy

- Local, regional, and global innovation
- Strategic, collaborative partnerships

Leading in Public Service

- Proactive financial management
- Innovative & supportive organizational practices
- Collaborative, engaged leadership
- Excellent service delivery

BACKGROUND

PURPOSE:

The purpose of this information report is to provide the Waste Management Working Group with an update on initiatives by the City on existing waste diversion programs and investigations into advanced resource recovery alternatives with a specific focus on organics management.

CONTEXT:

In October 2015 Municipal Council directed staff to proceed with the development of long term Resource Recovery Strategy and Residual Waste Disposal Strategy for the City of London.

The Resource Recovery Strategy involves the development of a plan to maximize waste reduction, reuse, recycling, resource recovery, energy recovery and/or waste conversion in an economically viable and environmentally responsible manner. Resource Recovery strategies (i.e., often known as waste diversion strategies) are developed and approved at the local government level and do not require Provincial government approval. However, these strategies do serve as input into Provincial government decision-making as related to approval of the Residual Waste Disposal component.

The Residual Waste Disposal Strategy involves the development of a long-term plan to manage residual waste (waste after resource recovery) and involves completion of an Individual Environmental Assessment (EA) as prescribed by the Ministry of Environment & Climate Change (MOECC). The Individual EA requires approval by the Minister of Environment & Climate Change and Cabinet.

DISCUSSION

This section contain details in four parts:

PART A - Background

PART B - New Senior Government Legislation & Policies (including Appendix A)

PART C - London Waste to Resources Innovation Centre (including Appendix B)

PART D - Recent Activities in Resource Recovery

PART A - Background

The City of London's current waste diversion and resource recovery system includes a mixture of provincially mandated programs, Council directed initiatives and some minor activities in the business sector that contribute to provincial waste diversion goals and objectives.

2015 Overview of City of London Waste Diversion Initiatives

Program/Initiative	Tonnes Managed	% of Overall Diversion
Blue Box and Blue Cart Recycling	23,500	15%
Composting (leaf and yard waste, home composting, etc.)	35,500	22%
Additional Recycling Activities (e.g., construction & renovation materials, scrap metal, electronics, household special waste, etc.)	12,200	8%
Total Tonnes Diverted	71,200	45%
Total Waste to Landfill	88,500	
Total Tonnes Managed	159,700	

LFG Flaring and Greenhouse Gas (GHG) Destruction

The W12A Landfill site has been collecting and flaring landfill gas generated from completed areas (i.e., filled to MOECC approved capacity with waste and the landfill cap is installed) of the landfill since 2004. As areas of the landfill are completed, the gas collection system is extended into these areas. The landfill gas that is collected is then

destroyed via combustion in the flare. Landfill gas by volume typically consists of approximately 50% methane and 50% carbon dioxide and other trace gases. In 2015, the capture and flaring of landfill gas resulted in the destruction of approximately 5,100 tonnes of methane which is equivalent to approximately 107,500 tonnes per year of GHG (i.e., carbon dioxide equivalent) destroyed.

The City has submitted an application to the Feed In Tariff (FIT) program administered by the Independent Electricity System Operator (IESO) for development of a 500kW power plant utilizing landfill gas as a renewable fuel source. If approved, this plant would enhance the beneficial use of approximately 20% of the landfill gas currently being collected at the W12A Landfill by generating green electricity.

2015 Overview of Industrial, Commercial & Institutional (IC&I) Waste and Construction Renovation and Demolition (CR&D) Waste Management in London

IC&I waste consists of:

- Industrial waste, which is generated by manufacturing and primary and secondary industries and is managed off-site from the manufacturing operation;
- Commercial waste generated by operations such as shopping malls, offices, etc.; and
- Institutional waste generated by institutional facilities such as schools, hospitals government facilities, universities, etc.

The vast majority of IC&I waste is handled by the private sector although a small amount of commercial and institutional waste is managed by the City primarily limited to small businesses and offices on residential garbage routes and City facilities. Unlike Ontario municipalities, there is no central reporting system whereby the IC&I or CR&D sectors would report their waste management activities. This makes obtaining information and the calculation of waste generation, disposal and diversion rates difficult to determine. In general however, much less IC&I waste is diverted compared to residential waste. Using best available information, City staff estimate that approximately 15% to 20% of IC&I waste generated in London is diverted.

CR&D waste refers to waste generated by construction, renovation and demolition activities and generally includes brick, wood, drywall, metal, asphalt singles, insulation, doors, windows, etc. CR&D waste comes from a diverse range of sources and like IC&I waste is not under municipal control. CR&D waste is not accepted for disposal the W12A Landfill as there are two local companies that offer recycling services at three separate locations. The majority of CR&D waste from London goes to one of these local CR&D recycling facilities with a small amount exported for disposal. It is estimated that approximately 50% to 60% of the material going to CR&D waste recycling facilities is diverted to beneficial uses while the remaining 40% to 50% becomes process residual waste that is sent for disposal.

2015 Total Preliminary Estimated Diversion Rate for London

As noted above, there are challenges in trying to determine a total waste diversion rate for London from the three major waste sources, (i.e. residential, IC&I and CR&D) due to data limitations. However for discussion purposes an estimate is presented below based on the above noted estimated diversion rates and industry assumed per capita generation rates.

Waste Source	Tonnes Generated	Diversion Rate	Tonnes Diverted
Residential	159,700	45%	71,200
IC&I	177,000 ⁽¹⁾	15% to 20%	26,000 to 35,000
CR&D	120,000 ⁽²⁾	50% to 60%	60,000 to 72,000
Total (rounded)	457,000	35% to 40%	157,000 to 178,000

(1) Based on an assumed per capital generation rate of 450 kg and a population of 392,500 (adjusted seasonally for students)

(2) Based on the amount of CR&D residuals disposed of at W12A and an assumed 50% diversion rate

As shown in the table above it is estimated that the total waste diversion rate for the City is approximately 35% to 40%, noting the assumptions and limitations in the data available. This may represent a significant opportunity for further resource recovery activities, specifically within the IC&I sector.

Next Steps

- 2016 City of London residential waste data will be compiled and available in February;
- Additional work is required on quantifying IC&I and CR&D waste diversion in London; and
- Additional details on how the province plans to measure and track waste diversion, resource recovery and overall waste disposal will be required and hopefully available in 2017.

PART B - New Senior Government Legislation & Policies

Federal Government

The Pan-Canadian Framework on Clean Growth and Climate Change was released by the Federal Government in late 2016. It represents a collective plan to grow the economy while reducing greenhouse gas emissions and building resilience to adapt to a changing climate. Within the Framework is a section on Forestry, Agriculture, and Waste. A key extract from this portion of the Framework is applicable to current and future resource recovery in London and includes:

“Clean technology, such as lower-carbon bioenergy, and bioproducts that use feedstock from agriculture and forestry waste and dedicated crops to replace higher-carbon fuels can also reduce emissions. Continued innovation and clean technology in agriculture will build on past GHG reduction successes of decreasing emissions per unit of production. The municipal waste sector will also be a key source of cleaner fuels such as renewable natural gas from landfills.

The approach to these sectors will include (1) enhancing carbon storage in forests and agricultural lands; (2) supporting the increased use of wood for construction; (3) generating fuel from bioenergy and bioproducts; and, (4) advancing innovation.”

A number of existing policy and guidance documents are relevant to London in addition to the work undertaken by the Federation of Canadian Municipalities (FCM) and the Green Municipal Fund.

Ontario Government

Waste Free Ontario Act

In November 2015, the Minister of the Environment and Climate Change introduced a new legislative framework for managing waste in Ontario under Bill 151, *Waste Free Ontario Act (WFOA)*. The legislation is comprised of two Acts, the *Resource Recovery and Circular Economy Act (RRCEA)*, and the *Waste Diversion Transition Act (WDTA)*. Accompanying the proposed legislation was a draft Strategy for a Waste Free Ontario: Building the Circular Economy to support Ontario in achieving its goals.

Comments on the proposed legislation and draft strategy were approved by Council and submitted to the Environmental Bill of Rights (EBR) Registry in February 2016. Bill 151 received Royal Assent in June 2016 and was proclaimed November 30, 2016.

Under the new framework funding to the City of London will increase to potentially 100% of program costs for residential recycling services. How that funding is administered and what recyclable materials it is applied to is unknown along with many other aspects such as the municipal role in recycling services. As is traditionally done, the operational aspects of legislation are contained in regulations still to be written along with future policy documents.

Final Draft Strategy for a Waste-Free Ontario: Building the Circular Economy

The Ministry of Environment & Climate Change (MOECC) has just released a Final Draft Strategy for a Waste-Free Ontario: Building the Circular Economy (43 page document), a requirement of the WFOA, which outlines a road map for resource recovery and waste reduction for Ontario. It also:

- “sets a vision and goals;
- articulates key government actions to support implementation of the vision and goals; and
- identifies performance measures to measure progress towards achieving the vision and goals.”

The Final Draft Strategy focuses on moving Ontario towards a circular economy described as “a system where nothing is wasted and valuable materials destined for landfill are put back into the economy without negative effects on the environment.” This approach – a circular economy – has the potential to reduce greenhouse gas emissions, save and better utilize scarce resources, create jobs and create financial opportunities. The Final Draft Strategy lays out a vision for Ontario “where waste is seen as a resource that can be recovered, reused and reintegrated to achieve a circular economy.” To fulfil the vision, the Final Draft Strategy has two broad goals:

- a zero waste Ontario; and
- zero greenhouse gas emissions from the waste sector.

To achieve these goals, the Final Draft Strategy identifies four objectives and 15 actions over a ten year timeframe (Appendix A). After ten years a comprehensive review of the final approved Strategy would be undertaken.

A review of the Final Draft Strategy by City staff and reported to the Civic Works Committee on January 10, 2017 suggest that the Strategy is:

- consistent with Council’s Strategic Plan 2016-2019;
- consistent with The London Plan;
- reflective of the desire to reduce taxpayer costs, increase producer responsibility, create jobs and stimulate economic activity in Ontario;
- supportive of the direction the City of London has taken over the last five to ten years with respect to waste diversion and overall integrated waste management; and
- likely to impact, to varying degrees, all aspects of waste management in London for the next five to ten years.

Numerous existing policy and guidance documents coupled with existing legislation and regulations (e.g., *Environmental Assessment Act*, *Environmental Protection Act*, *Ontario Water Resources Act*, etc.) are relevant to London. The field of waste management is a highly regulated field especially for municipalities.

PART C - London Waste to Resources Innovation Centre (LWRIC)

The concept of the London Waste to Resources Innovation Centre was approved by Council in February 2015. The primary goals of LWRIC are to:

- build on the existing foundation of traditional and innovative projects to divert waste from the landfill and create value added products from waste; noting that many of these activities have been occurring in the London area for more than 15 years;
- create a focal point (location or locations) for the ongoing examination of innovative solutions for waste reduction, resource recovery, energy recovery and/or waste conversion;
- establish partnerships and collaborations between government, academia and businesses to build on existing strengths to create opportunities to prevent waste and to solve existing waste management challenges; and

- be known as a centre of excellence with shared facilities and resources providing leadership, implementing best practices, undertaking leading edge research, providing support and/or training, and providing resources for students in the various fields of resource and waste management.

Outlined in Appendix B is a list of recent activities and accomplishments for LWRIC. In addition, a formal Memorandum of Understanding (MoU) was signed with the Institute for Chemicals and Fuels from Alternative Resources (ICFAR) - University of Western Ontario in December 2016. Two additional MoUs are in the early stages of development

PART D - Recent Activities in Resource Recovery

In addition to ongoing efforts to maintain and/or improve existing waste diversion/resource recovery programs, listed below are additional initiatives that have been underway to assist with the advancement of waste prevention and resource recovery (in 2016) and how this work will carry forward in 2017.

Initiative	Details
Organics Management	<p>2016</p> <ul style="list-style-type: none"> • See initiatives below as the majority of them have a significant focus on how we prevent, manage and/or recover the value of the organic component of garbage currently sent to landfill. • A number of advancements in Green Bin Programs were tracked in 2016, all designed to increase the quantity of food waste being captured in residential programs (e.g., biweekly garbage pickup, reduced container limits, use of clear bags, etc.). <p>2017</p> <ul style="list-style-type: none"> • A Green Bin Program update will be submitted to the Civic Works Committee (CWC) and the Waste Management Working Group in May/June 2017.
Avoiding Food Waste	<p>2016</p> <ul style="list-style-type: none"> • Two residential waste audits were undertaken which included the identification of food waste as a separate category. • One residential waste audit included a detailed focus on food waste including identification of the quantity of avoidable food waste. • Development of a food waste avoidance (management) pilot project with Western University. <p>2017</p> <ul style="list-style-type: none"> • Implementation of a food waste avoidance (management) pilot project with Western University.
Home Composting/ Community Composting	<p>2016</p> <ul style="list-style-type: none"> • Promotion of the availability of home composters for sale at the City's EnviroDepots increased the sale of these units, and the City partnered with community organizations to facilitate outreach opportunities to teach Londoners how to compost at home. • Community composting pilot projects that started in 2015 at six multi-residential buildings became self-sustaining through resident and property management support and participation. <p>2017</p> <ul style="list-style-type: none"> • Continued engagement in community efforts that support composting education, including home composting and community composting at multi-residential buildings
Mixed Waste Processing	<p>2016</p> <ul style="list-style-type: none"> • London is one of seven Ontario municipalities that is part of a Municipal Working Group for Mixed Waste Processing (led by the Region of Peel).

Initiative	Details
	<p>2017</p> <ul style="list-style-type: none"> • Ongoing discussions and information sharing with Working Group. • Additional documentation and analysis being prepared by City staff (with support from technical experts) for City of London Resource Recovery Strategy for 2017.
<p>New/Emerging/ Next Generation Technology (Gas Phase Reduction)</p>	<p>2016</p> <ul style="list-style-type: none"> • City signed a Memorandum of Understanding (MoU) with Green Shields Energy (GSE), in effect to December 31, 2017, to explore the viability of gas phase reduction (GPR) technology in managing municipal garbage. • GSE will look at the establishment of a pilot demonstration project proposed to convert household garbage and related materials into an energy source (e.g., syngas, renewable natural gas, etc.) using GPR technology at the City's Waste Management and Resource Recovery Area. <p>2017</p> <ul style="list-style-type: none"> • Anticipate GSE preparing applications for government approvals and technology demonstration requirements. • Update report to CWC will occur at the same time.
<p>Biogas and Renewable Natural Gas (RNG) Production from Waste</p>	<p>2016</p> <ul style="list-style-type: none"> • Maximizing Resource Recovery from Waste Through Biogas and RNG Production, a project partially funded by the Federation of Canadian Municipalities (FCM) Green Municipal Fund with support from the Canadian Biogas Association. • This research project assesses the economic feasibility and environmental benefits of producing biogas by anaerobically digesting the organic fraction of the City's residential waste stream (both source separated organics and facility separated organics), and subsequently converting the biogas to renewable natural gas (RNG) for use in compressed natural gas (CNG) vehicles. <p>2017</p> <ul style="list-style-type: none"> • Final report will be ready in February/March. Results to be incorporated in Resource Recovery Strategy documentation.
<p>New/Emerging/ Next Generation Technology (General)</p>	<p>2016</p> <ul style="list-style-type: none"> • City signed a MoU with the ICFAR and Western University. • In brief, the MoU sets out the mutual intentions of the City and ICFAR/Western to advance their joint waste to resources (waste management, waste conversion, resource and energy recovery) objectives. <p>2017</p> <ul style="list-style-type: none"> • Work plan to be finalized according to the MoU and initial actions started.
<p>Energy Recovery from Material Recovery Facility Residuals</p>	<p>2016</p> <ul style="list-style-type: none"> • City is assessing the possibility of shipping residuals from its Manning Drive Material Recovery Facility to a Cement Kiln to be used as a low carbon fuel (reduce greenhouse gas emissions). Residuals are currently taken to the W12A Landfill for disposal. <p>2017</p> <ul style="list-style-type: none"> • Develop capital and operating cost estimates to process MRF residuals at a Cement Kiln.

Initiative	Details
Landfill Gas Recovery to Energy	2016 <ul style="list-style-type: none"> Submission of an application to the IESO administered FIT program for the development of a 500kW power plant using approximately 20% of the landfill gas currently captured at the W12A Landfill to produce green electricity. If the application is successful, the project will be developed in 2017/2018. 2017 <ul style="list-style-type: none"> Completion of a business case to evaluate the feasibility of converting all (in the event FIT application not accepted) or the remaining portion of captured landfill gas at W12A to renewable natural gas (RNG) for either direct City fleet use or pipeline injection. It should be noted this would be done in conjunction with other evaluations involving RNG and potential fleet use that the City is planning to undertake.

ACKNOWLEDGEMENTS

This report was prepared with assistance from Mike Losee, Division Manager, Solid Waste Management and Anne Boyd, Manager, Waste Diversion.

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APPENDIX A

Key Elements of the Final Draft Strategy

The four objectives outlined in the Final Draft Strategy, re-printed below from the Final Draft Strategy, are critical to achieving these two goals; a zero waste Ontario; and zero greenhouse gas emissions from the waste sector, over a long period of time leading to 2050 (see next page for timeline).

1. Enhance Provincial Direction and Oversight

Striving for a waste-free Ontario will require transformation and sustained leadership through broad, cross-cutting direction. This direction is critical for communicating requirements, priorities, goals, principles, best practices and desired outcomes. We will also need to enhance oversight in resource recovery and waste reduction systems.

To provide strong leadership, the government will also need to better understand how we can build a circular economy in Ontario. Data gathering, analysis and communication will help us understand how far we have come and what else is needed to achieve our goals in order to make better evidence-based decisions.

2. Enable Efficient and Effective Recovery Systems

As we move towards full producer responsibility and a zero-waste future, we need to make sure that we have the necessary building blocks in place for an efficient and effective resource recovery system that will save taxpayers money, reduce emissions from waste and reduce costs for companies and consumers, all while protecting environmental and human health. We also need to strengthen generator responsibility as set out under the Environmental Protection Act.

3. Increase Waste Reduction and Resource Productivity

Resource recovery and waste reduction contribute to economic development and job creation in a variety of ways. If we are to build a circular economy and reap its benefits, it is critical that we minimize raw materials use, maximize reuse of products and packaging and recycle a wider range of materials. Ontario will also use a variety of tools and take actions to incent businesses to show leadership and demonstrate efforts to increase resource productivity by reducing the use of raw materials and avoiding waste to maximize the recovery of materials at their end-of-life.

4. Create Conditions to Support Sustainable End-Markets

Given the right conditions, materials can be recovered and re-integrated into the economy. For this to happen, the cost to recycle must be more viable than the low cost of sending materials to landfill. More emphasis needs to be placed on stimulating the development of markets for these products to help close the resource loop. Taking action to foster a supportive business environment for companies that utilize recovered resources within Ontario will help drive additional recycling, create more jobs, reduce greenhouse gases and extend the life of existing landfills.”

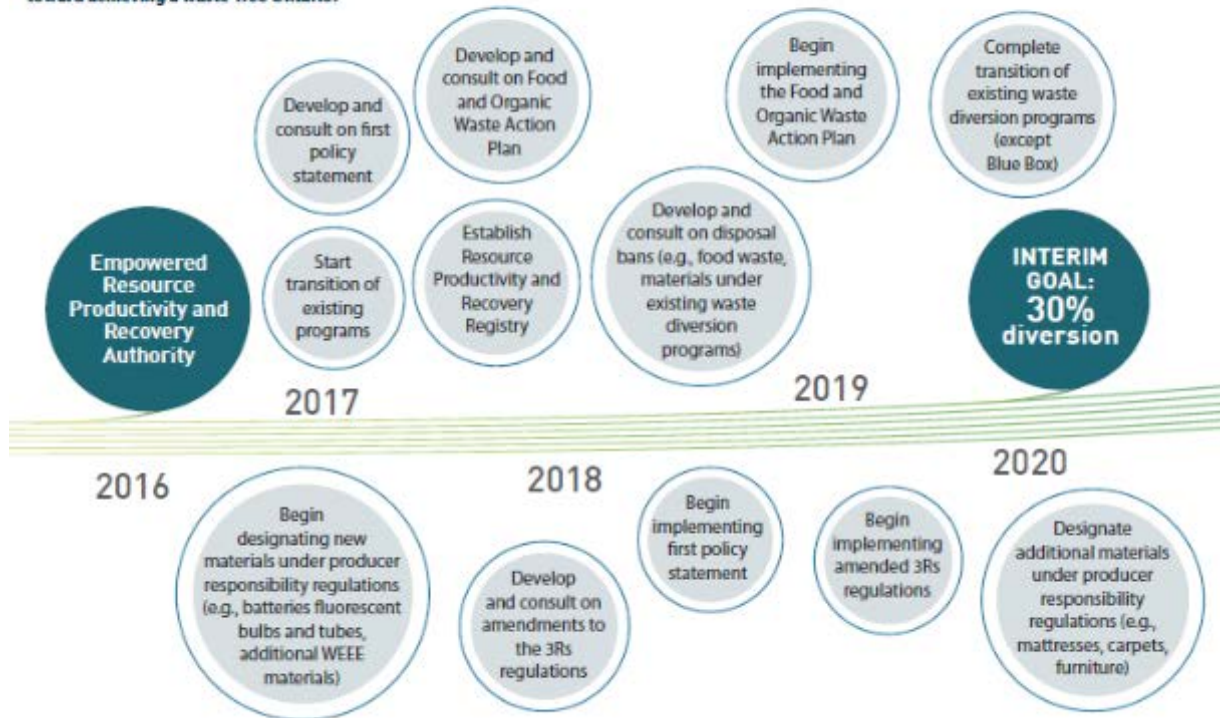
To meet these objectives, the following actions are identified in the Final Draft Strategy:

1. Empower the Resource Productivity and Recovery Authority
2. Issue policy statements to provide clear direction on the provincial interest
3. Establish a data clearinghouse and build data capacity to provide for evidence based decisions
4. Transition existing waste diversion programs smoothly to new producer responsibility framework without disruption of services
5. Amend the 3Rs regulations to increase resource recovery across all sectors
6. Establish service provider requirements to protect the environment while promoting resource recovery
7. Ensure landfills are well planned and well managed to minimize their need and reduce greenhouse gas emissions
8. Establish promotion and education requirements to support public participation in resource recovery
9. Designate new materials to ensure producers are fully responsible for recovering more materials associated with their products and packaging

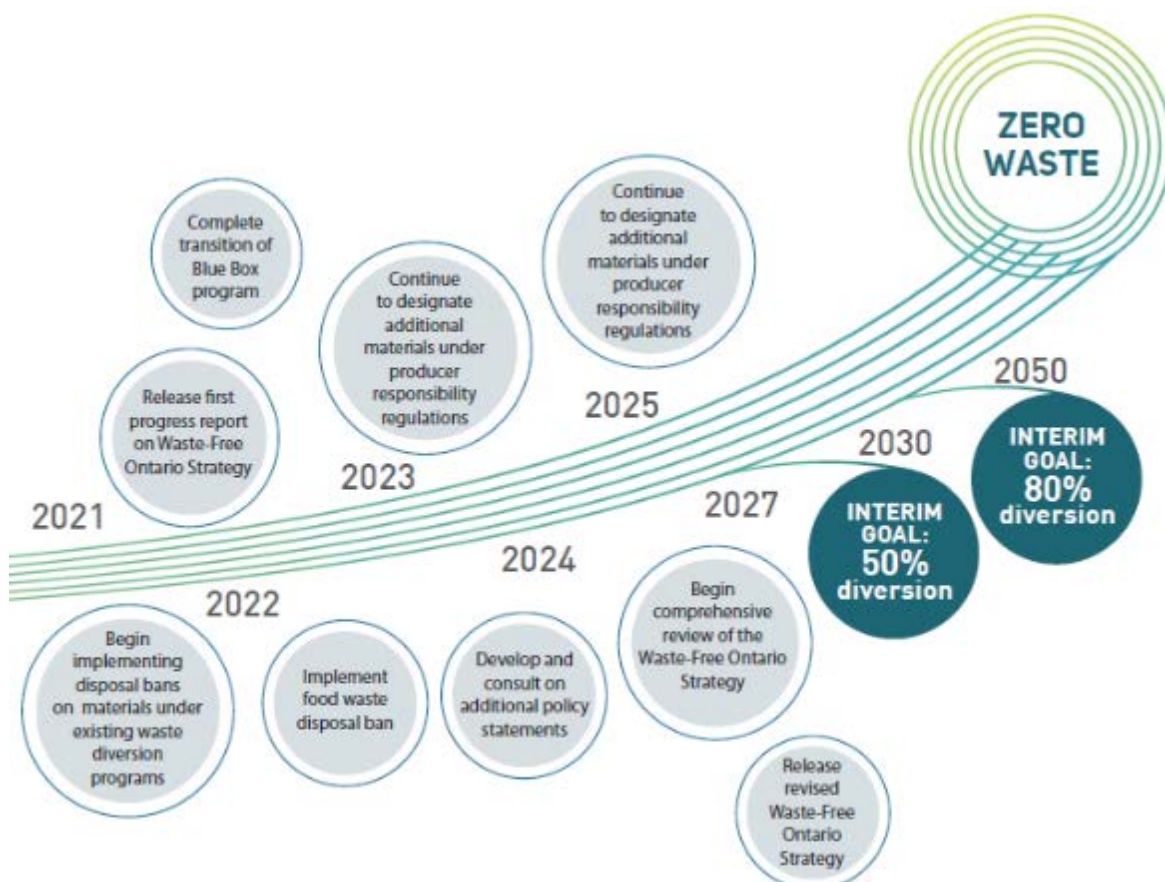
10. Implement a framework to reduce the volume of food and organic waste going into landfill
11. Implement an excess soil management framework to increase the re-use of excess soil, while protecting human health and the environment
12. Adopt and implement modern regulatory approaches to build on and promote innovative best practices
13. Improve and establish environmental standards to provide for a level playing field and a strong foundation for markets
14. Use green procurement practices to build market demand for recovered materials
15. Implement disposal bans to direct materials to end-markets”

Transforming Ontario into a Leader

The following timeline will guide our path toward achieving a waste-free Ontario:



12 Proposed Strategy for a Waste-Free Ontario



APPENDIX B

London Waste to Resources Innovation Centre - Activities and Accomplishments Between April 2015 and October 2016

The table below summarizes the progress made in a number of key areas. City staff would like to recognize the ongoing work and support received from Dr. Franco Berruti, Institute for Chemicals and Fuels from Alternative Resources (ICFAR), Western University.

Area of Activity	#	Details
Academic Research Projects and Presentations	15	Students from the Faculties of Engineering, Science and Social Sciences
Projects/initiatives completed or in progress	5	<ul style="list-style-type: none"> • Maximizing Resource Recovery from Waste Through Biogas and RNG Production, a project partially funded by the Federation of Canadian Municipalities (FCM) Green Municipal Fund with support from the Canadian Biogas Association • Two audits/assessments of packaging materials at the City's Material Recovery Facility (MRF) • Establishment of an internal network of 19 internationally recognized experts from Western's Faculties of Engineering, Science, Social Science, and the Schulich School of Medicine & Dentistry, coordinated by Dr. Berruti • Establishment of a Municipal Working Group for Mixed Waste Processing (7 Ontario municipalities) • Avoiding food waste, an emerging collaboration with Western University and potentially input for the local Food Policy Council
Presentations promoting LWRIC	4++	<ul style="list-style-type: none"> • FCM Sustainable Communities Conference (Feb. 2015) • Several internal presentations by ICFAR staff to other faculties at Western University (2015/2016) and at various conferences around the world • Converting Wastes to Resources Through Sustainable Engineering Workshop, Western University (April 2016) • Resource Recovery Partnership Workshop, University of Waterloo (June 2016)
Businesses and Associations expressing interest in the LWRIC	10+	Includes several local business, Ontario based businesses and 1 European company
Memorandum of Understanding approved	1	Green Shields Energy (February 2015)
Memorandum of Understanding under development	1	Institute for Chemicals and Fuels from Alternative Resources (ICFAR), Western University
Funding opportunities being examined	4	<ul style="list-style-type: none"> • Sustainable Development Technology Canada • Federation of Canadian Municipalities • Ontario Research Fund Research Excellence Program • Natural Sciences and Engineering Research Council (NSERC) Collaborative Research and Development (CRD) Fund • Industrial Contracts