

Bill No. 253
2017

By-law No. A.-_____

A by-law to authorize and approve a Memorandum of Understanding between Hawthorne Green Key Group Inc., and The Corporation of the City of London and to authorize the Mayor and the City Clerk to execute the Memorandum of Understanding.

WHEREAS section 5(3) of the *Municipal Act, 2001*, S.O. 2001, c. 25, as amended, provides that a municipal power shall be exercised by by-law;

AND WHEREAS section 9 of the *Municipal Act, 2001*, S.O. 2001, c. 25, as amended, provides that a municipality has the capacity, rights, powers and privileges of a natural person for the purpose of exercising its authority under this or any other Act;

AND WHEREAS it is deemed appropriate for The Corporation of the City of London (the "City") to enter into a Memorandum of Understanding with the Hawthorne Green Key Group Inc., to undertake testing and research; write and present reports; develop data/information; and work with industry, government and academic partners on the viability of a proprietary pyrolysis technology and processes to create resources from waste that would normally be sent to recycling and/or disposal facilities;

AND WHEREAS it is deemed appropriate to authorize the Mayor and the City Clerk to execute the Memorandum of Understanding on behalf of the City;

NOW THEREFORE the Municipal Council of The Corporation of the City of London enacts as follows:

1. The Memorandum of Understanding between The Corporation of the City of London and Hawthorne Green Key Group Inc., attached as Schedule "A" to this by-law, is hereby authorized and approved.
2. The Mayor and the City Clerk are hereby authorized to execute the Memorandum of Understanding authorized and approved under section 1 of this by-law.
3. This by-law shall come into force and effect on the day it is passed.

PASSED in Open Council June 13, 2017.

Matt Brown
Mayor

Catharine Saunders
City Clerk

Schedule “A”

Memorandum of Understanding

Between

The Corporation of the City of London (“City”)

And

Hawthorne Green Key Group Inc. (“Hawthorne”)

Whereas the City has established a special policy area in the City’s Official Plan, referred to as the Waste Management and Resource Recovery Area, that plans for the continued evolution of the W12A Landfill and nearby lands into an “Integrated Waste Management Centre” that utilizes environmentally responsible and sustainable operations and practices and achieves a high standard of compatibility with its environs and neighbours;

Whereas the remaining life expectancy of the W12A Landfill as of January 1, 2017 is approximately eight and half years or less;

Whereas the City wishes to examine, support, conduct research and/or implement projects under the broad classification(s) of resource recovery, energy recovery and/or waste conversion within the special policy area, in other locations in London, or in collaboration with others outside of London as part of its continuous improvement system for solid waste management. The continuous improvement system is described in several public documents including City of London Continuous Improvement System for Waste Management (1997), A Road Map to Maximize Waste Diversion in London (2007) and Road Map 2.0 The Road to Increased Resource Recovery and Zero Waste (2013);

Whereas the City wishes to pursue projects, relationships and partnerships for the purposes of innovation, creativity, best practices and excellence in solid waste management and is proposing to operate, subject to final Municipal Council approval, under a banner known as the London Waste to Resources Innovation Centre (LWRIC);

Whereas Hawthorne has a broad range of operational expertise in the area of waste to resource management;

Whereas Hawthorne has the Canadian rights to a proprietary pyrolysis technology that has successfully converted a range of biomass materials into energy, chemicals and/or fuels, now wants to determine the viability of this technology on solid waste materials, including mixed solid waste, commonly known as household garbage.

Whereas the City and Hawthorne recognize that the framework direction for waste management and waste diversion in Ontario has been set through the *Waste Free Ontario Act, 2016* and the Strategy for a Waste-Free Ontario: Building the Circular Economy (February 2017).

1.0 Purpose of the Memorandum

This Memorandum of Understanding (“MoU”) is intended to set out the mutual intentions of the City and Hawthorne to advance their joint waste conversion, resource and energy recovery objectives. The MoU is based upon the mutual understanding that the combined expertise, influence and commitment of the parties are better applied together to support their common goals. The MoU establishes the non-legally binding framework and set of principles for enhanced and focused coordination and collaboration to support their shared interests in waste conversion and resource and energy recovery.

The parties to this MoU acknowledge that if they wish to jointly carry out specific initiatives that may arise out of this MoU, they will have to engage in further discussion

and prepare necessary agreements to define, authorize and execute, among other things, each party's roles and responsibilities, resource allocation and other details.

The MoU is not an exclusive arrangement and does not restrict either party from pursuing their mandates either on their own or in collaboration with any other party.

2.0 Short Term Objective

The short-term objective of the collaboration between the City (Attachment A) and Hawthorne is to:

- Build on the existing foundation of traditional and innovative projects to divert waste from the landfill and create value added products from residues and waste;
- 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 into value-added materials;
- Establish partnerships and collaborations between government and businesses to synergistically build on existing strengths to create opportunities to prevent waste, to create products of value from waste, and to solve existing waste management challenges; and
- Be known as an centre of excellence with shared facilities and resources providing leadership, implementing best practices, undertaking research, providing knowledge and support to industry in the various fields of resource and waste management.

Pyrolysis Technology

The short-term objective of the collaboration between the City and Hawthorne is to undertake testing and develop data/information on the viability of Pyrolator to manage various solid waste materials, including mixed solid waste, commonly known as household garbage (Attachment B).

This will be done by constructing and operating a pilot scale facility containing an advanced pyrolysis unit designed for demonstrating the effectiveness of the process on the conversion of various wastes and waste matrices. The facility will process about 50 tonnes of material per day and is expected to significantly reduce the volume/weight of the material being processed while generating the following products: high methane content product gas for possible renewable natural gas (RNG) or renewable energy applications; and bio char suitable for carbon reinforced plastic lumber and/or soil enhancement.

Complementing the technical processes is the ongoing development of the potential role for this technology to handle non-hazardous materials from the residential, institutional, commercial and industrial sectors and to contribute towards policies and programs established by the various levels of government (Municipal Provincial and Federal) as well as and other Governmental agencies outside of Canada.

3.0 General Arrangement

The responsibilities of the City are to include:

- Assist with all approvals (e.g., Ministry of the Environment & Climate Change MOECC, City of London zoning, etc.);
- Provide land in the special policy area (Waste Management Resource Recovery Area) as a host site for three years with an option to renew for additional years subject to Council approval as part of the Formal Agreement (Section 4.0);
- Bring services (water, sanitary and hydro) to the location of the of the pilot scale facility subject to Council approval as part of the Formal Agreement (Section 4.0);
- Provide access to the boardroom room and education room in the Material Recovery Facility (MRF);
- Participate, when available, in discussions, tours and related activities;

- Provide reasonable quantities of residual waste (garbage) and biomass materials for conversion;
- Assist with reporting, being available for media interviews and related matters;
- Possible sharing of other City resources; and
- Keep London Municipal Council informed; and

4.0 Formal Agreement

The parties agree to work together to develop a Formal Agreement to undertake activities that involve capital works, contracts with funding agencies, contracts with private companies and investors. The Formal Agreement will follow the same approval processes as this General Arrangement.

5.0 Effective Date and Duration

This MoU will come into effect upon the date it has been signed by all signatories and will remain in effect until June 30, 2020. This MoU will be reviewed two months prior to the anniversary date and any agreed to changes added to the MoU. Substantive changes will trigger the approval process for the MoU and this determination is at the discretion of the City and of Hawthorne.

A participant may withdraw from this MoU by providing a sixty (60) written notice to the other parties.

This MoU is subject to approval processes required by each of the parties.

DATED this _____ day of _____.

IN WITNESS WHEREOF:

THE CORPORATION OF THE CITY OF LONDON

By:

Name: Matt Brown
Title: Mayor

By:

Name: Catharine Saunders
Title: City Clerk

I/We have authority to bind the City.

HAWTHORNE GREEN KEY GROUP INC.

By:

Name: Brian Lisk
Title: President

I/We have authority to bind the corporation.

Attachment A

Overview of City of London Solid Waste Management Facilities
www.london.ca

The City contributes to the health of the environment and its citizens through appropriate collection and management of garbage, recyclables, yard materials, household special waste, and other designated waste materials. This involves providing pick-up and drop-off services within London, processing and creating products of value from compostable/recyclable/reusable materials; and disposing of garbage in an environmentally responsible manner, including the ongoing monitoring and management of closed landfills and other sites producing methane.

To support these services the City owns and operates an array of Solid Waste diversion and disposal assets valued at over \$64 Million. These range from public waste and recycling bins, to drop off depots and one active landfill (W12A) and many closed landfill sites.

The City also owns a centralized Material Recovery Facility (MRF) which provides recycling services to London and several neighbouring communities. The MRF was newly constructed in 2011 and is operated and maintained by an outside contractor.

Drop off locations (Community EnviroDepots) are provided for special wastes including household special waste, yard materials, electronics, scrap metal, tires, roofing, etc. Solid Waste is responsible for maintaining these assets in serviceable condition between replacement cycles, ensuring compliance with Provincial regulations and maintaining the continuity of solid waste services to the citizens of London and other customers.

General household waste is primarily collected by the City while recycling pick-up and processing services are contracted out. The City owns and operates a fleet of garbage truck.

The W12A Landfill consists of a number of assets including landfill cells, buildings, leachate and gas collection systems and stormwater management ponds. This facility operates within its Operation Plan, with additional disposal cells being brought online to accommodate waste in accordance with its Environmental Compliance Approval. Based on projected use, the current landfill will reach capacity in about 2023, at which point it will require an expansion (or other long term disposal solution) to provide the city with the space needed to meet its future needs.

The W12A buildings (Incl. Site Works & Equipment) includes the roads, curbs and landscaping as well as the administration, maintenance and scale house buildings. The W12A Leachate Collection System collects and conveys leachate for treatment. This system is capable of meeting the current City's needs and is expanded as new disposal cells are constructed. The Landfill Gas Collection System collects and conveys landfill gas to the on-site landfill gas flare for destruction. This system is capable of meeting current City's needs and is expanded as new disposal cells are constructed.

On-site W12A Stormwater Management Ponds and site drainage infrastructure collect and treat surface runoff from snow and rain that impact the site. Maintenance occurs on a planned basis, with investments identified through regular inspections.

Any expansion or examination of alternatives will be undertaken as per the requirements of the Environmental Assessment Act.

Buffer land is comprised of City owned land adjacent or near the W12A Landfill that has been acquired to provide an appropriate buffer from existing operations and to provide buffering for possible future landfill expansion and resource recovery facilities. It is expected that additional land will be acquired for these purposes over the next several years.

Attachment B

Primer – Tucker Advanced Pyrolysis Technology (the Pyrolator)

The Tucker Advanced Pyrolysis Technology, known as the Pyrolator, is a patented “non-burn technology” with numerous economical and environmental advantages over both traditional burn technologies, gasification, and pyrolysis technologies. The

pyrolator processes a variety of organic feedstocks including residual waste (municipal solid waste – MSW/garbage), woody biomass, agricultural waste, diapers, hospital waste, carpet, coal, and tires.

Why is most organic waste still buried in landfills or just dumped? There are five major reasons why we aren't recovering garbage as a major energy resource:

1. Historically, the capital and operating costs of waste-to-energy conversion systems have been too high.
2. The conversion processes have often created "long-chain tar deposits" and other by-products that can hamper or interfere with the effective conversion process.
3. The slag and other residual by-products of some conversion technologies include high levels of heavy metals and other environmentally dangerous materials that require expensive additional handling.
4. Existing systems require massive facilities with large (and therefore expensive) "footprints".
5. "Stack emissions" from many existing waste processing technologies include significant levels of greenhouse gases as well as hazardous pollutants that require scrubbing.

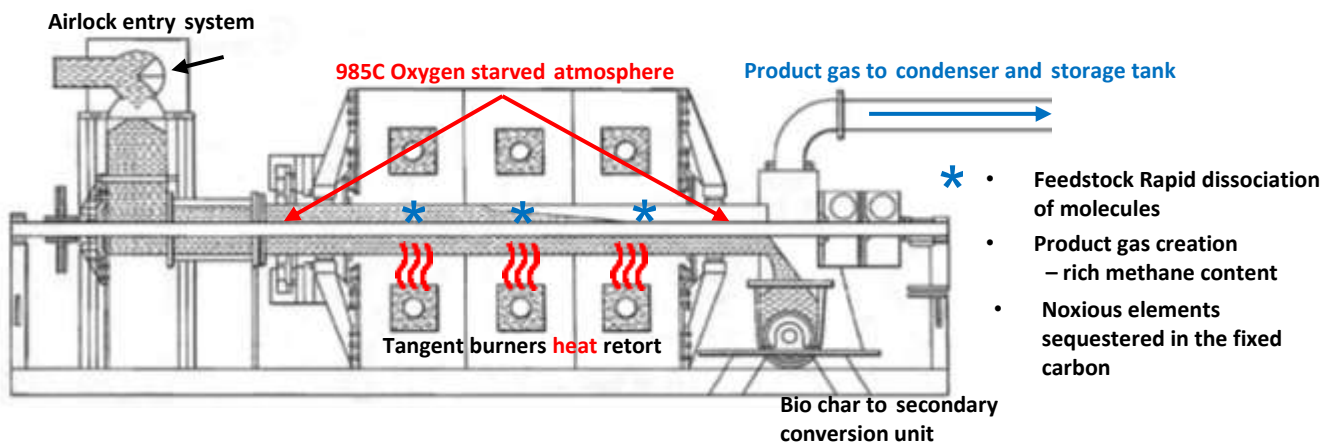
The Pyrolator advantageous design increases material recovery while reducing greenhouse gas (GHG) at the landfill. Landfills utilizing the pyrolator transform into waste conversion centres.

Under the Ontario Carbon cap and trade system, the Pyrolator is a carbon offset technology. Carbon offset is more economical than the purchase of carbon credits.

How it works:

- **Preprocess**
 - MSW is processed with all glass, metal and other inerts removed.
 - Remaining feedstock is shredded and dried to 5% moisture content using off the shelf technologies based on volume and feedstock requirements.
- **Conversion**
 - The system is initially brought to operating temperatures by an outside source such as propane or natural gas.
 - Preprocessed feedstock enters via an airlock system into the primary then secondary conversion chambers:
 - Feedstock is rapidly heated to 985°C in an oxygen-starved atmosphere, resulting in a rapid decomposition of the feedstock and disassociation of the molecular matter.
 - During this process product gas is created with a high concentration of methane up to 45 to 55% and an energy value of 750 to 800 btu/lb
 - The fixed carbon or biochar sequesters heavy metals such as mercury and sulphur eliminating the need for expensive air pollution control (APC) systems.
- **Post Conversion**
 - Product gas enters a condenser system to remove any tars which can be utilized for a variety of products (material recovery - results vary on feedstock)

- Product gas is utilized as RNG for sale to the gas utility or as fuel for fleets or for gas turbines. A portion of product gas is used to fuel tangent burners making the system a closed loop system.
- Bio char is cooled. The carbon is utilized in a variety of markets such, as a soil enhancement, or remediation, activated carbon, and carbon reinforced plastic lumber.



Benefits of the Pyrolator

- Cost effective, compact, and modular
- Closed loop system
- Reduction of GHG Emissions
 - Reduced CO₂ and cleaner methane creation
 - CO₂ avoidance through bio char component
- Noxious elements sequestered in bio char
- Supports Ontario's mandates
 - Behind the meter electricity generation
 - CO₂ Reduction- Carbon Offset technology
 - Smart grid compatible
 - Zero Waste - Material recovery
- Full genset compatibility including full CO₂ capture (carbon negative)
- Waste heat capture options
- Pyrolator can process a variety of feedstocks
- Real time monitoring
- Continuous analyzing of product gas

Operation - 3 Main Components and Value Added Revenue Streams

- Pre- process
- Conversion

- Post conversion
- Value Added Revenues

