

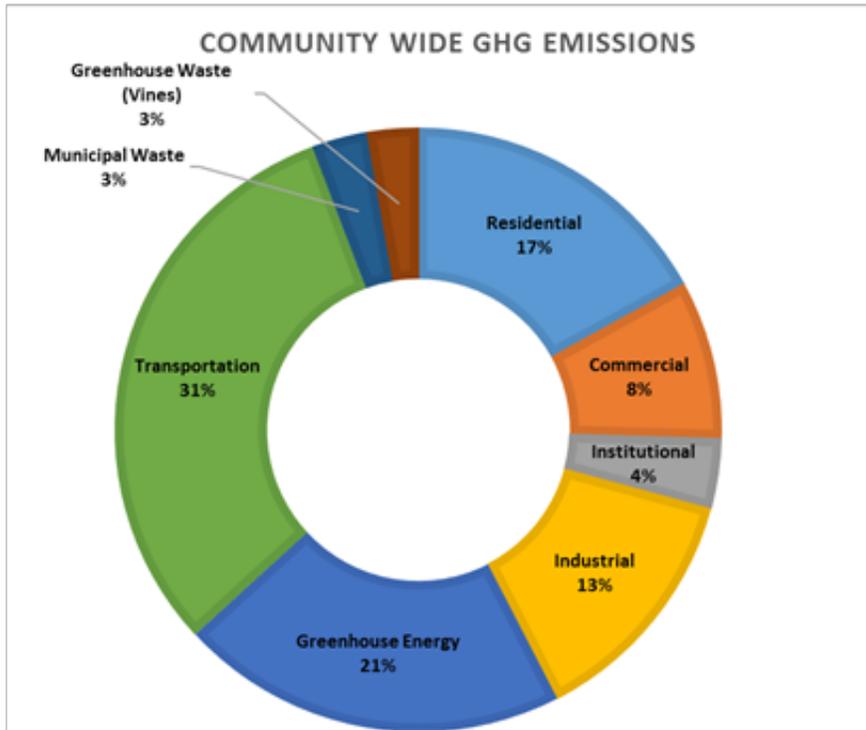


Regional Food, Organic and Biosolids Waste Processing

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City of Windsor Project Administrator

Why are we here?



- ▶ It is estimated that about 35,000 tonnes of residential food and organic waste was sent to landfill for disposal from Windsor and Essex County in 2020 alone
- ▶ In the landfill, organic waste breaks down in the absence of oxygen and creates a greenhouse gas called methane gas which contributes to climate change
- ▶ Greenhouse gas emissions from the waste sector account for approximately 5% of Ontario's total greenhouse gas emissions - not sustainable
- ▶ In 2019, the City and County of Essex declared Climate Change Emergencies

Why does this matter?

- ▶ Ontario's Ministry of the Environment and Climate Change reports that the average annual temperature could increase by 2.5°C to 3.7°C by 2050
- ▶ The impacts of climate change locally are felt through more frequent tornado warnings, extreme heat events and flooding
- ▶ All of these events have a significant impact on our health, wellbeing, infrastructure, environment and economy
- ▶ Making the right decisions now can set Windsor and Essex County on the right path to improve the local economy and quality of life of our residents



If that's not enough...

- ▶ Ontario's Food and Organic Waste Policy Statement requires some municipalities in Essex-Windsor to achieve specific reduction or recovery target rates by 2025
 - ▶ Windsor - curbside collection - 70% reduction
 - ▶ Amherstburg, LaSalle, Leamington and Tecumseh - collection - 50% reduction
 - ▶ Essex, Kingsville and Lakeshore - no reduction targets
- ▶ We have an opportunity to divert organic waste from the landfill, and to be an environmental leader by producing green energy and lowering greenhouse gas emissions

Milestones

- ▶ **August 14/20** - Expression of Interest
- ▶ **October 6/20** - EWSWA approved development and implementation of a Regional Food and Organics Waste Management Plan and working group
- ▶ **November 17/20** - Technical working group formed
- ▶ **November 24/20** - GHD hired as consultant
- ▶ **December 1/20** - EWSWA endorsed project charter
- ▶ **December 9/20** - CAO meeting
- ▶ **March 2/21** - EWSWA endorsed direction and goals
- ▶ **March 16/21** - Oversight Committee endorsed the evaluation criteria and shortlist of alternatives

Consultations and Input

- ▶ Weekly meetings with the Technical Working Group
- ▶ Monthly meetings with the Oversight Committee
- ▶ Virtual Tours - Expression of interest respondents
- ▶ 30%, 60% & 90% report review
- ▶ Meetings with Stakeholders - Essex County municipalities, Toronto, London, Chatham-Kent, Lambton, Sarnia, Association of Municipalities of Ontario, Essex Region Conservation Authority
- ▶ Other jurisdictions - Durham, Guelph, Stratford, Surrey, Edmonton, Calgary, Halifax, Saint Hyacinthe

Neighbouring Counties

▶ Chatham-Kent

- ▶ No legislative requirement to collect organics curbside
- ▶ No plans to build a facility - 3rd party processing if necessary

▶ London

- ▶ Will be pursuing a service contract
- ▶ Implementing curbside collection of organics fall of 2021
- ▶ No plans to build a facility in the next 5-7 years because they believe a more regional (southwestern Ontario) mixed waste processing may be their long term solution

▶ Lambton County/Sarnia

- ▶ Wait and see
- ▶ Most of their lower tier municipalities will not require curbside collection
- ▶ Sarnia has been approached by potential partners and recently sold property to a 3rd party vendor for the purpose of building a private anaerobic digestion facility

Other municipalities

- ▶ Toronto - Anaerobic digester - renewable natural gas and compost
- ▶ Durham - Mixed waste processing and Anaerobic digester - renewable natural gas
- ▶ Guelph - Enclosed composting system
- ▶ Stratford - Co-digestion - biosolids for land application and renewable natural gas to pipeline
- ▶ Surrey, BC - Anaerobic digester plus enclosed compost - renewable natural gas to pipeline
- ▶ Edmonton - Network of facilities next to landfill - private waste to biofuel, biosolids/food waste co-composting, outdoor leaf and yard waste composting, mixed waste processing, anaerobic digester - maximize biogas and compost
- ▶ Calgary - Composting - organics and biosolids
- ▶ Halifax - Composting in operation for 20 years
- ▶ Saint-Hyacinthe - Co-digestion - renewable natural gas for fleet and heat for buildings with surplus to natural gas company

Evaluation Criteria

- ▶ Project Goals Workshops - Technical Working Group, Oversight Committee, Municipal Representatives
- ▶ Evaluation criteria developed based on Project Goals Workshops
 - ▶ **Economic/Operational Criteria - 55%**
 - ▶ Net present value of project lifecycle costs and revenues
 - ▶ Site expansion potential
 - ▶ Technology expansion potential
 - ▶ **Environmental Criteria - 30%**
 - ▶ Greenhouse gas benefits
 - ▶ Additional diversion from landfill
 - ▶ Recovered product quality
 - ▶ **Social Criteria - 15%**
 - ▶ Community impact - odour, traffic, pests, appearance and other nuisance

Alternatives Development

A detailed review of alternatives resulted in the following recommendations:

- ▶ Diapers and pet waste would not be considered as a mandatory feedstock option
- ▶ The County's existing leaf and yard waste program would remain separate
- ▶ Mixed Waste Processing would not be considered as a technology option
- ▶ Generation of electricity only will not be considered as a technology option
- ▶ Biodryer and Syngas technologies which convert waste to solid fuel then combust that fuel to generate renewable energy would not be considered - NOTE: this will be reevaluated if the Provincial Policy Statement changes
- ▶ The following sites were eliminated due to insufficient land space:
 - ▶ Lou Romano Water Reclamation Plant
 - ▶ Little River Pollution Control Plant
 - ▶ Regional Landfill land
- ▶ Lands at YQG were eliminated due to concerns with compatibility
- ▶ Composting options were generally not considered viable within City limits

Assumptions

- ▶ For all anaerobic digestions scenarios renewable natural gas would be sold to utilities rather than used for self consumption
 - ▶ Financial benefit to project and actual greenhouse gas savings occurs in Ontario/Canada
 - ▶ Self consumption of renewable natural gas would offset the natural gas used Corporately for the municipality in which the facility is located, reducing corporately reported greenhouse gas emissions
- ▶ Service contract options assume a vendor in Essex County
- ▶ The following costs were not accounted for in the net cost of the alternatives as they would be subject to budgets outside this project:
 - ▶ Upgrades to the landfill gas collection systems (wells and blowers) which would form part of the EWSWA budget
 - ▶ Portion of the capital and operating expenses and revenues related to biosolids which would be borne by the City of Windsor directly

Shortlist of Alternatives

- ▶ A list of 14 most viable alternatives was developed which were anticipated to score highly based on the evaluation criteria established. The alternatives generally include:
 - ▶ Service contract or new build
 - ▶ Site - Lands adjacent to the regional landfill, transfer station 1, Windsor Biosolids Processing Facility, site provided by proponent
 - ▶ Compost and anaerobic digestion
 - ▶ Minimum vs. additional feedstock sources

Feedstock - Source Separated Organics

- ▶ Legislative requirements (based on population and population density)
- ▶ Development and growth may affect the legislative requirements
- ▶ There is discussion of a possible ban on organics in landfills in 2030
- ▶ If some municipalities don't participate initially but choose to at a later date, the costs that would be incurred by those municipalities would not be the same as if they participated today
- ▶ EWSWA Board direction is for a Regional plan
- ▶ In order to proceed with procurement it is important to define which municipalities will be part of the solution (minimum feedstock)



Feedstock - Biosolids

- ▶ The Project is further considering the inclusion of sludge from wastewater treatment for the following reasons:
 - ▶ complement wastewater capital planning for the City (expiration of existing contract, plant expansion) and provide additional options for biosolids processing in the future
 - ▶ recommendations of the City's Integrated Site Energy Master Plan - production of biogas could be used to displace natural gas consumption at the Windsor Biosolids Processing Facility which uses significant amounts of natural gas to dry Windsor's biosolids
 - ▶ potential future wastewater sludge management needs of other Essex County municipalities (Lakeshore, Essex, Kingsville, Amherstburg, Leamington)
 - ▶ Organics Provincial Policy Statement that encourages municipalities to plan for the management and beneficial use of biosolids
- ▶ The decision to include or exclude biosolids in the minimum feedstock will depend on the site:
 - ▶ Windsor Biosolids Processing Facility - Biosolids should be included
 - ▶ Other sites (landfill etc) - biosolids not likely to be included
- ▶ **NOTE:** If a solution proceeds that does not include co-digesting of biosolids then the City of Windsor will be required to move forward with a separate capital project.

Optional Feedstocks

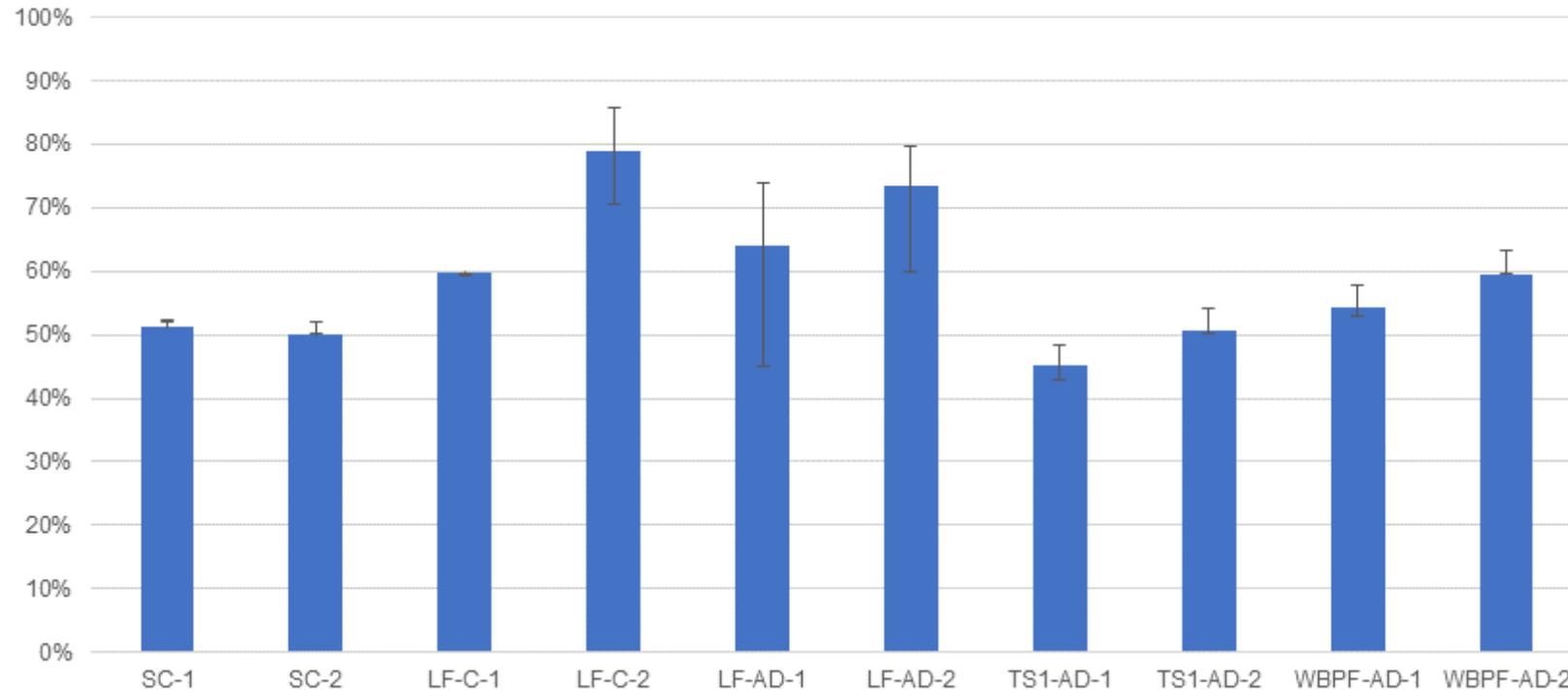
- ▶ The following additional feedstocks could be considered in addition to source separated organics and biosolids to generate further revenue:
 - ▶ Waste from the Industrial/Commercial/Institutional sectors
 - ▶ Horticultural waste - includes wire and plastics that are difficult to separate and the material is not easily digestible
 - ▶ Fats, Oils, Greases - can substantially increase biogas production
 - ▶ Multi-family residential waste
- ▶ For each, there is a risk that less revenue will be received than expected due to competition from other facilities (e.g. USA)
- ▶ This risk may be transferred to contractor as optional material under certain project delivery models



Cost Benefit Analysis

- ▶ Each of the alternatives underwent a cost benefit analysis
- ▶ Analysis includes:
 - ▶ Financial Model
 - ▶ Estimated capital, operating and transportation/transfer related expenses
 - ▶ Potential revenues from tip fees, currently available grants and energy recovery
 - ▶ Environmental benefits related to waste diversion and greenhouse gas emissions
 - ▶ Qualitative Scores
 - ▶ Recovered product quality
 - ▶ Site expansion potential
 - ▶ Technology expansion potential

Summary of Evaluation Results



LEGEND:

SC - Service Contract

LF - Lands adjacent to the regional landfill

TS1 - Transfer Station 1 (Central Ave)

WBPF - Windsor Biosolids Processing Facility

AD - Anaerobic Digestion

C - Composting

1 - Minimum feedstock

2 - Maximized feedstock

Leading Alternatives

- ▶ The following offer some explanation as to what drives the performance of the leading alternatives:
 - ▶ Composting generally has a much lower cost and may be more profitable from tipping fees compared to anaerobic digestion
 - ▶ Greater volumes of renewable natural gas can be realized from anaerobic digestion projects with the addition of wastewater sludge or from the substantial amounts of methane from the landfill gas collection system
 - ▶ Landfill anaerobic digestion options have a much higher capital and operating cost, but these are expected to be offset by renewable natural gas sales
 - ▶ Projects accepting organic waste from the Industrial/Commercial/Institutional sectors and multi-family organics scored higher for better waste diversion and environmental performance
 - ▶ Anaerobic digestion has better odour control than composting
 - ▶ Anaerobic digestion offers a higher level of environmental benefits related to greenhouse gas reduction and renewable energy generation
- ▶ Note: Both composting and anaerobic digestion at the landfill are competitive even under a sensitivity analysis where evaluation criteria are weighted differently

Trailing Alternatives

- ▶ Service contract options score lower because:
 - ▶ Tonnage options are limited to municipal waste only - less diversion and greenhouse gas reduction
 - ▶ Renewable energy, if any, would be owned and sold by the vendor
- ▶ Transfer Station 1 options ranked low due to space constraints
- ▶ Options where a new site was provided by the proponent are not pictured in the summary but generally fell somewhere in the mid range due to uncertainties about the site

Net Present Value

Below is a range (minimum feedstock to high feedstock) of estimated net cost of the top alternatives in 2021\$ over a project life of 20 years

(Net Cost = Capital Expenditures + Operating Expenditures - Revenues)

Option	Cap Ex	Op Ex	Revenues	Net Cost
Service Contract	\$2M - \$3M	\$60M - \$85M	\$0	\$62M - \$88M
Landfill - Anaerobic Digestion	\$140M - \$175M	\$160M - \$225M	\$270M - \$310M	\$30M - \$90M
Landfill - Composting	\$13M - \$25M	\$25M - \$60M	\$175K - \$35M	\$38M - \$50M
Windsor Biosolids Processing Facility - Anaerobic Digestion	\$50M - \$100M	\$45M - \$115M	\$15M - \$65M	\$80M - \$150M

Financial Considerations



- ▶ Anaerobic digestion projects may be eligible for future Federal and Provincial grant and financial incentive programs
- ▶ With the anticipated price on carbon, evolving low carbon fuel standards and self-imposed greenhouse gas reduction targets, there is now a stronger market to buy the renewable natural gas that is produced by an anaerobic digestion project
- ▶ The construction industry is experiencing material shortages, tight supply and frequent price increases

Financial Considerations - Landfill

- ▶ Diversion from landfill will result in loss of landfill tipping fees
- ▶ Regardless of waste diversion from the landfill, landfill costs will not change materially (e.g. debentures, staffing and equipment). As a result, the existing landfill costs may increase for municipalities.
- ▶ For the Landfill anaerobic digestion options, upgrades are required to the wells and blowers in addition to the anaerobic digestion project at an estimated cost in the order of \$10M spread over 20 years
- ▶ There is a business case to be made to proceed with upgrading the landfill gas collection system to allow for the gases to be injected into the pipeline, regardless whether the organics project is located at the landfill. The estimated cost of the landfill gas system upgrades is in the order of \$100M including renewable pipeline expansion and operating costs with projected revenues from the sale of the renewable natural gas expected to result in a 10 year payback period



Windsor's Environmental Plans

- ▶ Corporate Climate Action Plan
 - ▶ Targets:
 - ▶ Energy use 11% below 2014 by 2030 and 25% by 2041
 - ▶ Greenhouse gas emissions 20% below 2014 by 2030 and 40% by 2041
 - ▶ Opportunities for greenhouse gas emissions reductions within the control of the City
 - ▶ Renewable natural gas from wastewater sludge
 - ▶ Expansion of the district energy system
 - ▶ Use of energy for new/retrofitted buildings
 - ▶ Renewable natural gas to power fleet
- ▶ Community Energy Plan - reduction of per capita energy usage and greenhouse gas emission reductions by 40% from 2014 to 2041
- ▶ Corporate Energy Management Plan - 10% energy use reduction across the City by 2023 - includes renewable energy generation



Essex County Regional Energy Plan



- ▶ The County of Essex and ERCA are currently developing a Regional Energy Plan, scheduled to be presented to Essex County Council on May 19, 2021
- ▶ The plan will establish sustainability goals and a plan for the County to obtain those goals. Bioenergy from waste, greenhouses, farms, forestry, and landfill gas are all considered under the Regional Energy Plan to help increase renewable energy production and reduce greenhouse gas emissions. A priority action is the completion of a bioenergy master plan.
- ▶ While the details of the plan are still being finalized, the greenhouse gas reductions targets have been approved at a 60% reduction from 2019 levels by 2041 with a goal of net zero by 2050

Other Environmental Considerations

- ▶ For an idea of scale, the technological potential of organic waste from all sources within Windsor-Essex through anaerobic digestion contains enough renewable natural gas potential to supply the City's corporate natural gas needs and effectively eliminate its net greenhouse gas emissions
- ▶ On Earth Day, the Canadian Federal government announced plans for a new, more aggressive target of a 40-45% reduction in greenhouse gas emissions by 2030 and a goal of net zero by 2050. On the same day, the US set a target to achieve a 50-52% reduction from 2005 by 2030
- ▶ The majority of greenhouse gas savings from the project are a direct result of diverting organics from the landfill which will occur regardless of technology, however anaerobic digestion provides additional greenhouse gas reductions and produces renewable energy
- ▶ Anaerobic digestion, while good on its own, has better greenhouse gas performance if coupled with biosolids from wastewater treatment and even better if coupled with landfill gas
- ▶ Renewable natural gas is a clean, low carbon energy source
- ▶ There is a significant missed opportunity if food and organic waste is not used to help the City and County reach their greenhouse gas reduction levels and energy goals. For example, the current mode split target of 25% would have to double to make up the loss from this opportunity.

Risks



Construction of a new facility may require a bridge service contract



The anaerobic digestion options with higher cost carry a greater magnitude of investment and in return introduce risk, although there are strategies to manage these risks



Options that depend on revenues to offset capital and operating expenditures carry the risk that the anticipated revenues will not be realized



There is a risk that less source separated organics may be collected than anticipated - phased implementation can help to mitigate this risk



If composting is chosen the City and County will have to find other ways to achieve their energy targets



If anaerobic digestion and composting are carried forward to procurement, with a similar evaluation criteria weighting, the result will likely be a compost-based solution by virtue of the significant cost savings

Opportunities

- ▶ A landfill gas utilization project would be of significant greenhouse gas and financial benefit to EWSWA regardless of the presence of an anaerobic digestion facility, but co-locating them would streamline permitting and pipeline construction
- ▶ The anaerobic digestion options would provide more local economic stimulus over the project life - creating jobs and bringing in outside fees
- ▶ Anaerobic digestion projects create a renewable natural gas that will displace non-renewable natural gas. Anaerobic digestion allows the creation of an energy source from waste, that is not obtainable from composting.



Dilemma



- ▶ Composting is the cheaper option but an anaerobic digestion project helps the City and County meet additional goals of greenhouse gas reduction and renewable energy generation
- ▶ Some municipalities have no current obligations under the Organics Provincial Policy Statement but this may change in the future and a regional approach now may provide the most benefit overall
- ▶ So what is important?
- ▶ We need to know:
 - ▶ Who is in?
 - ▶ Do we want this project to contribute to the City and County's energy plans
- ▶ Timing and next steps

Thank you

- ▶ The following additional people are available for questions:
 - ▶ GHD Limited (Environmental Consultant)
 - ▶ Mike Muffels, Rob Reid
 - ▶ City of Windsor
 - ▶ Manager of Environmental Services - Anne Marie Albidone
 - ▶ Supervisor of Environmental Sustainability & Climate Change - Karina Richters
 - ▶ Executive Director of Operations - Dwayne Dawson
 - ▶ Senior Manager of Pollution Control - Jake Renaud
 - ▶ EWSWA
 - ▶ General Manager - Michelle Bishop
 - ▶ County of Essex
 - ▶ Director of Financial Services - Sandra Zwiers