

# **PARTNERS IN PROJECT GREEN PEARSON ECO-BUSINESS ZONE**

## **BIOGAS PLANT FEASIBILITY STUDY**

*July 10, 2009*

*Prepared by:*

Mr. Rolfe Philip  
SVP Business Development  
YIELD Energy Inc.  
42 Industrial Road, Suite 209  
Toronto, ON M4P 1Y9

## Table of Contents

<b>Executive Summary.....</b>	<b>1</b>
1. Suitable Site Conclusions .....	2
2. Waste Characterization and Availability Conclusions .....	3
3. Financial Feasibility Conclusions .....	3
4. Recommendations:.....	3
5. Promoting the benefits of biogas plant development to the Federal and Ontario Governments .....	4
<b>Report Results .....</b>	<b>6</b>
1. Potential Biogas Plant Locations .....	6
2. Waste Characterization.....	14
3. Financial Feasibility: Pro Forma.....	20
<b>EXHIBITS .....</b>	<b>30</b>
Exhibit # 1: Suitable PEBZ Sites .....	31
Exhibit #2 : Suitable Bolton Sites.....	34
Exhibit #3 – Potential Farmland Sites.....	36
Exhibit #4 – Suitable Federal Sites.....	37
Exhibit #5 – Site Availability Survey .....	38
Exhibit #6 – PEBZ Waste Survey – Companies and Institutions.....	40
Exhibit #7 – PEBZ Waste Survey – ICI Waste Haulers .....	41
Exhibit #8 – Yield/Fitec Pre-Processing and Anaerobic Digestion System.....	42

## Executive Summary

---

### Background

Partners in Project Green is a growing community of businesses working together to green their bottom line and to create an internationally-recognized 'eco-business zone' by re-branding the industrial areas around Toronto Pearson International Airport as the Pearson Eco-Business Zone (PEBZ).

Through new forms of business-to-business collaboration, Partners in Project Green delivers programming that helps businesses reduce energy and resource costs, uncover new business opportunities, and address everyday operational challenges in a green and cost-manner.

The PEBZ currently represents:

- Over 12,000 hectares of industrial and commercial land.
- Canada's largest employment area, home to 12,500 businesses and more than 355,000 employees.
- Major sectors include automotive supply chain, logistics and warehousing, food processing, plastics and aviation.
- On a yearly basis, the PEBZ consumes approximately 5.8 million MWh of electricity, 46 million GJ of natural gas, and 109 million m<sup>3</sup> of water, resulting in 1.7 million tonnes of CO<sub>2</sub> emissions related to energy consumption.

The PEBZ and surrounding area is home to over 350 food processors, restaurants, grocery stores and entertainment facilities that generate over 200,000 tonnes of "clean" organic and co-mingled organic waste every year. Of that roughly half is either composted or sold as food for the pet and agricultural sector. The remaining 100,000 tonnes, largely co-mingled organics and packaging are disposed of in landfills either here in Ontario or in Michigan. Depending on the final landfill, this waste contributes approximately 80,000 tonnes of CO<sub>2</sub> emissions annually.

At this time the businesses in the PEBZ do not have the option of being able to recycle either the energy or nutrient content in the organic waste generated in this economic zone. Partners in Project Green's mandate is to build competitive advantages for businesses located in the PEBZ through development of sustainable business practices such as:

#### **"Waste Reutilization Projects**

*"Waste" represents resources that businesses have paid for, but have been unable to extract value from. Partners in Project Green will assist in completing sector-specific feasibility studies, and facilitate waste aggregation, to make re-utilization more feasible. Finding new uses for food processing wastes will be an early focus."*

As a result, Yield Energy Inc. and the Toronto and Region Conservation Authority (TRCA) have undertaken this feasibility study to examine and analyze the economic and environmental potential for the development of one or more biogas facilities in the PEBZ. The proposed plant(s) would pre-process regionally available clean and co-mingled organic waste materials and generate biogas through an anaerobic digestion process. The proposed plant(s) will generate either electrical and heat energy or bio-methane for direct local use or grid-based sale.

The feasibility study focused on 3 key objectives:

- i. Identification of suitable sites for the plant within the PEBZ and surrounding area;
- ii. Identification and characterization of the organic wastes being generated within the PEBZ and surrounding area to determine the availability of sustainable feed stocks for the proposed biogas plant(s).
- iii. Preparation of a pro-forma to determine financial feasibility of proposed biogas plant.
  - i) Determination of the key technical drivers
  - ii) Determination of the key financial drivers
  - iii) Sensitivity Analysis and impact on varying these key drivers

## ***1. Suitable Site Conclusions***

We identified several suitable sites within the PEBZ but supply is limited and costs are very high (average of \$695,000 per acre ) for locating either integrated or stand alone pre-processing and anaerobic digestion facilities. There are, however, a few sites in PEBZ's that might consider long-term leases (20 years) which would meet out criteria.

Several suitable locations for an integrated pre-processing and anaerobic digestion plant exist within a ½ hour drive of the PEBZ. We narrowed our investigations down to the City of Bolton which met the price (average of \$400,000 per acre) and proximity criteria.

In addition to location and financial criteria, zoning, permitting and MOE approvals will represent significant hurdles in most urban sites.

We expect, that given the current economic down turn, more properties will become available at more attractive pricing and leasing levels. As part of our on-going investigations we will continue to monitor the market for better site options.

## **2. Waste Characterization and Availability Conclusions**

Based on our waste survey, we are confident that a facility could secure a reliable supply of the necessary organic waste to ensure consistent biogas generation from a 50,000 tonne pre-processing and anaerobic digester located in the PEBZ. This would be accomplished through a couple of actions:

1. Offer competitive tipping fees to large organic waste generators in the PEBZ
2. Partner with a local/regional organics waste hauler

Monitoring/supplementing the biochemical processes in the digester tanks as well as, on-going waste composition analysis will ensure that biogas production is maximized.

## **3. Financial Feasibility Conclusions**

While none of the scenarios we analysed generated the necessary returns (20% IRR over 10 years) given the current industry conditions (eg. FIT energy pricing, carbon credit ownership, waste disposal regulations) and prices (eg. tipping fees). We feel that there are several actions that combined levels of government can take in order to create the right investment environment for the private sector to begin investing in urban/suburban biogas generation facilities.

## **4. Recommendations:**

1. MOE should consider implementing a ban or tax on the disposal of all organics both clean and co-mingled into landfills. This would have the combined effect of effectively raising the tipping fees on all organics and offering local governments and private owners increased landfill revenues.
2. The City of Toronto and the Region of Peel should provide incentives for the development of privatized local organic waste processing facilities using the latest and most energy efficient pre-processing and AD technology. This would save the TRCA's municipal partners significant money and would create a competitive market for the disposal of these waste streams. Recent issues identified with Toronto's Green Bin program have underlined the necessity for more local capacity to process the residential and commercial organics.
3. Ministry of Energy and the Ontario Power Authority (OPA) should increase the existing FIT (Feed in Tariff) for biogas generated electricity to \$.25 / kWh or allow biogas plants to retain ownership of the methane destruction carbon credits. Alternatively, some compromise combination (eg. \$.20/kWh + 50% of the methane destruction credits) would provide the necessary financial returns to stimulate private sector investment.

4. In the absence of substantial movement on any of the above recommendations, the Provincial and/or Federal governments will need to provide grants and funding to overcome the financial hurdles for the development of urban/suburban biogas facilities.

## ***5. Promoting the benefits of biogas plant development to the Federal and Ontario Governments***

### **1. Environmental Value and Benefits**

- a. In addition to generating Renewable Energy Credits (RECs), biogas facilities have the additional benefit of capturing and preventing the emission of methane into the atmosphere
  - i. Approximately 0.8 tonnes of CO<sub>2</sub>e per tonne of co-mingled organic waste
  - ii. Each 50,000 tonne facility built in Ontario will capture and destroy approximately 38,000 tonnes of carbon each year
- b. Diversion of waste from landfills
  - i. ICI and Municipal organic food waste represents approximately 20% of total solid waste being dumped in landfills
- c. Reduced transportation cost and impact of moving waste from urban centres to distant landfills
  - i. \$20/tonne to transport food waste within Ontario
  - ii. Increased congestion, as well as, "Wear and Tear" on roads
- d. Recycling of the energy and nutrient content in the organic waste that is currently being lost in landfills. Note, even with landfill gas recovery efforts, approximately 50% of the total methane content of organic waste is considered fugitive emissions that never get recovered.

### **2. Energy Value and Benefits**

- a. Biogas energy production does not suffer from the generation intermittency of solar and wind facilities. Biogas energy generation is effectively 7x24 and can be utilized as a stable, reliable, on-demand source of base-load power generation.
  - i. Wind -> 25%
  - ii. Solar -> 15%
  - iii. **Biogas -> 95%**
- b. Biogas facilities based on urban/suburban waste streams are located near large energy demand areas. This precludes the need to build new, expensive transmission facilities required by other renewable energy sources (i.e. wind, solar, hydro).
  - i. Approximate construction cost per mile of transmission line is \$2,000,000.
- c. The heat by-product of the biogas generator is a valuable source of energy that can be cost-effectively transported to local industries and district heating systems

- i. For every 1 kWh of electricity energy generated from the combustion of biogas there is 1.1 kWh of thermal energy created, recovered and available for local use.

### **3. Societal Value and Benefits**

- a. Environmental targets Create “Green Collar” Jobs and New Jobs for some of Ontario’s displaced workforce

- i. Germany’s experience

- 1. 80,000 jobs from 4,000 facilities operating today  
= 20 jobs /biogas facility

- ii. **Direct**

- 1. Construction jobs per facility
      - a. Engineering/Environmental consultants
      - b. Specialized cement fabrication
      - c. Stainless Steel pipe fabrication
      - d. Pipefitters
      - e. Biogas Generation Equipment Installation and Maintenance
    - 2. Plant operations jobs per facility
      - a. Plant Operators
      - b. Plant Maintenance personnel
      - c. Biogas technicians
      - d. Operations Manager
      - e. Business Manager

- iii. **InDirect**

- 1. Cleantech Finance
    - 2. Carbon Credit Market Development
    - 3. Digestate/Compost Business Development
    - 4. Cleantech equipment supply chain
      - a. Approx. \$10m in local equipment procurement

- b. **Education and Training**

- i. Requirement for knowledgeable workforce creates an opportunity for Ontario’s learning and training institutions
    - ii. Joint venture opportunities with those Universities and Colleges focused on agricultural and biosciences to create a hands-on biogas curriculum. Opportunity to become the Biogas education and training leaders in North America.

## Report Results

---

### ***1. Potential Biogas Plant Locations***

**Objective:** Identify suitable sites in the PEBZ and surrounding area for proposed biogas plant(s).

**Scope:**

Identify suitable sites, ideally with appropriate zoning and/or permits already in place, for the following plant options:

- a) Integrated facilities incorporating organic waste pre-processing, biogas production and energy exploitation
  - i. Minimum 3 acres of useable land
  - ii. Ease of access from major arteries
  - iii. Existing building with a minimum of 2 drive-in bays
  - iv. Light to Heavy industrial zoning including out door storage (tanks)
  - v. Minimum of 1km from nearest residential area
  - vi. Price
  
- b) Stand-alone organic waste pre-processing plants from which pre-processed materials will be delivered to farm-based biogas plants.
  - i. Minimum 1 acre of land and building
  - ii. Ease of access from major arteries
  - iii. Existing building with a minimum of 2 drive-in bays
  - iv. Light industrial zoning
  - v. Minimum of 1km from nearest residential area
  - vi. Price

In addition, to addressing our criteria above and to the general requirements that pertain to all renewable energy generation facilities in Ontario, , it is critical that the site has a high likelihood of obtaining the MOE's specific approvals for non-farm based anaerobic digestion facilities identified below:

**MOE Approvals (in support of the *Green Energy and Green Economy Act, 2009, S.O. 2009*) :**

***Non-Farm Based Anaerobic Digestion Facilities***

*It is proposed that a Renewable Energy Approval would also be required for non-agriculture-based operations that are generating electricity from anaerobic digestion.*

*It is proposed that these facilities would not be subject to a setback; however, proponents of these facilities would have to satisfy the Ministry of the Environment, that operations at the facility will not cause an adverse effect.*

*These facilities would be required to complete the following:*

- **Emission Summary and Dispersion Modeling (ESDM) Report for Air Contaminants** to determine compliance with existing air quality standards at points of impingement (as defined in O. Reg. 419/05 under the Environmental Protection Act)
- **Noise Study** to determine if modeling is consistent with existing MOE noise guidelines (Guidelines NPC-232 or NPC-205)
- **Odour Study** to determine anticipated impacts of odour at points of impingement and mitigation techniques
- **Design and Operations Plan** – which would address, among other matters, a detailed description of processes at the facility, potential environmental impacts and quality and quantity of biomass at the site.
- **Surface Water Assessment** – which would address, among other matters, an assessment of surface water features, drainage, erosion and anticipated impacts on surface water features.
- **Hydro-Geologic Assessment** – which would include, among others, an assessment of subsurface features and anticipated impacts on groundwater; or the facility must demonstrate that storage and digester tanks meet the construction standards for manure storages under the Nutrient Management Act, 2002
- **Effluent Management Plan** – which would include description of effluent produced on-site and methods to manage the effluent.
- **Decommissioning Plan** – which would address, among other matters, procedures for equipment/building, dismantling and demolition, site restoration and final residue disposal.

Operationally, these facilities must have plans to ensure the following best management practices are met, or an equivalent alternative designed by an engineer is in place to address odours:

- Gas storage cover with a design permeability of  $<500 \text{ cm}_3/\text{m}_2/\text{day}/\text{bar}$
- High efficiency flare system and,

It is proposed that where these facilities are accepting, storing or processing biomass on-site that would be considered waste and regulated under Part V of the Environmental Protection Act, then the facility must provide a financial assurance estimate related to the removal and disposal of waste from the site. Financial assurance is required to ensure that sufficient funds are available for future clean-up and remediation of the site. Financial assurance must be calculated in accordance with the methodology in the Ministry of the Environment's Financial Assurance Guideline (Guideline F-15).

*It is anticipated that in appropriate circumstances, requirements related to analysis of metals for off-farm anaerobic digestion materials, on-site storage times of biomass, utilization rates of biomass and associated record keeping – including records on any environmental issues, may be addressed through conditions on the approval.*

### **Site Survey**

We engaged DTZ Barnicke, a reputable commercial real estate firm to perform a detailed survey of available sites throughout the PEBZ and surrounding area (See Exhibit #4).

The intent was to give preference to sites owned or managed by members of the feasibility study team, including the Region of Peel, City of Toronto, GTAA, TRCA and member industrial participants. After considerable investigation it was decided that private land offered greater choice and less restrictions and would be a better market indicator of land and leasing costs.

Site options were broken down into the following locations and classifications:

2. PEBZ Options
3. Bolton Options
4. Farmland Options
5. Federal Land
6. Municipal Land

### **PEBZ Options ( See Exhibit #1)**

The GTA land market, and in particular the land that surrounds the Toronto Pearson International Airport, is one of the most active in North America. Recent Provincial Legislation (The Places to Grow Act and The Greenbelt Act) have further concentrated demand within these municipalities for industrial land, and sites that will allow outside storage. However, we were able to locate three (3) suitably sized sites with-in the PEBZ that could accommodate Yield Energy's needs.

We have discussed locating the AD on Woodbine Entertainment's land. They indicated that they are doing an independent analysis regarding the feasibility of locating an AD facility on their property. If they decide not to move forward with their own project it would make sense to re-visit the option of locating the PEBZ project on their land.

### **Bolton Options (See Exhibit #2)**

Based on several key factors we expanded the search to include the Bolton (Caledon) industrial area. Bolton is a growing industrial node north-east of Toronto which has excellent infrastructure and transportation along with a very pro-business Town Council and lower cost land. This industrial node is within a ½ hour drive to the PEBZ, along good highways.

### **Farmland Options (See Exhibit #3)**

We also determined it would be worthwhile to examine farmland opportunities with good proximity to the PEBZ. While we did identify three agricultural sites (see Map 3) that may be of interest, all are significantly larger than the size required and present several significant challenges in utilizing this farmland for the purposes of a AD facility:

1. Agricultural zoned land requires a lengthy and costly re-zoning process to permit an industrial use.
2. Sites are un-serviced, requiring extension of infrastructure for sewage, water and road improvements.
3. Generally 25 to 100 acres in size and would require a severance to create a smaller parcel.
4. Usually developer owned and the servicing and related costs would be prohibitive for severing and re-zoning a 3 to 5 Acre parcel.

### **Federal Land: Downsview Option (See Exhibit #4)**

Yield Energy has also identified a potential site for the purposes of a pre-processing facility on federally owned lands in the Downsview area. Currently this land is undergoing a public Secondary Plan Planning Process. There will be “Employment Areas” but it has not been determined whether these will allow industrial and/or outside storage. Due to the mixed-use nature of the Secondary Plan area, it is somewhat unlikely that waste processing will be an approved land use. Although the Federally owned land won’t require CofA’s, the time required for zoning and development may not make this a viable option for PEBZ in the short-term.

## **Municipal Property: Disco Road Transfer Site**

The City of Toronto has an RFP out currently for Professional Services for the design and Construction of an Organic Materials Processing Facility at the Disco Rd. Waste Transfer Site. The facility will be owned and operated by the City.



**Size:** Available area TBD

**Zoning:** Industrial

**Services:** YES

**Outside Storage:** YES

**Asking Price:** not for sale

**Yearly Lease Rate:** TBD

**Zoning Details:**

- Industrial
- Waste Transfer and Processing

**Site Commentary:**

- Good access to Highway 401 and 427
- City Owned and operated Waste Transfer Facility
- RFP in process for Consulting Services to expand waste processing on the site.
- Within the PEBZ
- New facility to be owned by City
- Considering a Biogas Utilization system on site.

## **Municipal Property: Waste Water Treatment Plant (WWTP) Sites**

WWTP sites in general are located close to or near major population centres, have necessary zoning and approvals and have already invested in AD systems.

However, for the purposes of this study, WWTP Sites were not considered viable due to the following reasons:

3. Local and regional WWTPs lack experience in utilizing supplementary organics in their Anaerobic Digesters. WWTP operators are primarily interested in treating sewage waste. There are several facilities across North America that are starting to add limited amounts of clean organics into their WWTP anaerobic digesters on an experimental basis in order to increase biogas yields e.g. East Bay Municipal Utility District, Metro Milwaukee Sewage District.
4. The majority of biogas generated by these facilities is flared and therefore generating additional biogas is of little interest.
5. Introducing organic waste streams with some degree of contaminants into their digesters is not being considered due to concerns over the impact on the quality of the bio-solid output that is either land applied or blended, bagged and sold as a home fertilizer ( e.g. Milorganite).

As more WWTPs experiment and have success utilizing supplementary organics in their digesters, this site option and business model will become viable.

## **Site Ranking Criteria:**

These sites and others identified by our investigations were ranked on the following criteria in order to determine which sites represented the best opportunity for locating a biogas facility:

1. **Suitable Site Size:**
  - a. 3-4 acres of flat accessible land is ideal
2. **Logistical Access:**
  - a. Easy access to site from major arterial roadways
3. **Suitable Building and Amenities (eg. Weigh scale) on site:**
  - c. 10,000 sft or larger building with drive in bays is ideal
4. **Zoning:**
  - a. Heavy industrial with outdoor storage approval is ideal
5. **MOE Approval:**
  - a. An existing site with Certificate of Approval from MOE to locate a waste processing facility or compost plant is ideal
6. **Price:**
  - a. Lowest possible purchase or lease price is ideal

## Integrated Pre-Processing and Anaerobic Digester Site Ranking Results

Site	<u>Suitable Site Size</u>	<u>Logistical Access</u>	<u>Suitable Building Onsite</u>	<u>Potential Suitable Zoning</u>	<u>Ability to Gain MOE Approval</u>	Price	Total	Rank	
<b>Integrated Pre-Processing/Anaerobic Digester Facility (Ranking: 5= Excellent &amp; 1= Poor)</b>									
1	134 Kennedy Road, Brampton	4	3	0	1	1	4	2.2	
2	129 & 131 East Drive, Brampton	3	3	3	2	2	1	2.3	
3	75 Van Kirk Drive, Brampton	3	4	0	2	2	2	2.2	
4	22 Stafford Road, Brampton	4	3	0	2	3	3	2.5	
5	Derry Road, Brampton	4	2	0	3	2	3	2.3	
6	Sun Pac Blvd., Brampton	4	4	0	2	2	5	2.8	3rd
7	Nexus Avenue, Brampton	3	4	0	2	2	4	2.5	4th
8	10 Bramwin Court, Brampton	2	2	0	3	3	4	2.3	
9	7900 Airport Road, Brampton	3	2	0	2	2	3	2.0	
10	1660 Matheson Blvd., Mississauga	2	2	4	3	3	1	2.5	
11	Simpson Road, Bolton	4	4	2	4	4	5	3.8	1st
13	41 Simpson Road, Bolton	4	4	3	4	4	3	3.7	2nd
14	8 Trinity Drive, Mississauga	4	5	1	4	4	5	3.8	1st

## Pre-Processing Site Ranking Results

Site	<u>Suitable Site Size</u>	<u>Logistical Access</u>	<u>Suitable Building Onsite</u>	<u>Potential Suitable Zoning</u>	<u>Ability to Gain MOE Approval</u>	Price	Total	Rank	
<b>Pre-Processing Facility (Ranking: 5= Excellent &amp; 1= Poor)</b>									
14	23 Simpson Road, Bolton	3	4	3	3	4	3	3.3	2nd
15	25 Nixon Road, Bolton	3	3	2	3	3	2	2.7	
16	2 Manchester Crt., Bolton	4	3	2	3	3	1	2.7	
17	8 Trinity Drive, Mississauga	4	5	0	4	4	4	3.5	1st

**Conclusions:**

**Integrated Pre-Processing and Anaerobic Digester Facility**

Based on the ranking exercise results the top 2 sites were as follows:

1. 8 Trinity Road, Mississauga
2. 41 Simpson Road, Bolton

**Pre-Processing Only Facility**

Based on the ranking exercise results the top 2 sites were as follows:

1. 8 Trinity Drive, Mississauga
2. 23 Simpson Road, Bolton

For the purposes of the financial feasibility modeling we will use the average purchase asking price of the top 4 sites in each category.

## **2. Waste Characterization**

**Objective:** Identify and characterize the organic wastes produced by businesses in the Industrial, Commercial and Institutional sectors in PEBZ.

**Scope:**

Waste characterization will be undertaken to identify the availability and suitability of individual organic waste streams for use in the proposed PEBZ biogas plants. Individual waste generators will be surveyed for details on their current waste management practices and the nature of their waste streams.

The characterization of available organic waste streams will be conducted for each identified waste generator and will include, wherever available,:

- i. identification of waste type,
- ii. degree and nature of contamination,
- iii. annual volumes,
- iv. current tipping fees paid,
- v. identification of current waste disposal arrangements.

The characterization of organic waste materials for the purposes of this study did not include detailed auditing and laboratory analysis of solids content, proteins, fats and carbohydrates content. Industry standard data was used to profile individual waste streams.

**Waste Producers:**

- a) Organic waste producer sectors of focus included food service, food processing, food distribution, waste management, restaurants, hotels, and grocery stores;
- b) OMAFRA and TRCA provided generator data from the OMAFRA Food Processing Waste Survey.

**Data Collection:**

Waste characterization data was collected by the following means:

1. Email Survey Responses
2. Direct Phone Survey
3. Face to Face meetings

In order to get a good assessment of the amount of organic waste generated in the PEBZ we targeted large producers ( > 10 tonnes p.a.) and waster haulers that collect organics within the PEBZ. The results of our waste survey can be found in Exhibit #2.

Note: there are many small organic waste producers in the PEBZ but very few responded to our email and phone contacts or had meaningful amounts of organic waste.

### **Organic Waste Quantity and Tipping Fees**

Our survey indicated that other than a few larger waste generators ( Molson's, Maple Leaf) the majority of food processors, restaurants and grocery stores in the PEBZ generated <1,000 tonnes per year in useable organic waste. These smaller quantities are best captured and aggregated via existing waste haulers who use specialized bin and tote collection vehicles. Larger waste generators have their waste collected in large bins and compactors and are generally charged by the tonne. In some cases, clean organics such as the "spent" grain and yeast generated by Molson's brewery operations are actually sold to animal food processors. The tipping fees can vary considerably for these smaller quantities (65 and 90 gallon totes). For example, these per tote fees can vary on average from \$5/ 95 gallon tote (\$55/tonne) to \$15 tote (\$166/tonne). This variability can be explained by the differences in total/monthly volume, negotiating strength ( McDonald's vs. Sick Kids Hospital), weight of waste ( heavier food waste vs. food and paper) and type of waste ( clean organics - <1% contaminants, varying degrees of co-mingled organics - >1% and < 30% contaminants).

Most generators and waste haulers claim that their organic waste is ultimately ending up at a composting facility. Interestingly, all of the commercial composters in Ontario process around 400,000 tonnes of organics per year from all sources including municipal SSOs and yard and garden waste. It is therefore likely that a significant amount of clean and especially the co-mingled organics from PEBZ are ending up in landfills, despite best efforts and intentions.

An organic pre-processing and anaerobic digester facility servicing the PEBZ and surrounding area could likely intercept a significant portion of the organics destined for the landfill. In order to do this the tipping fees would need to be less than current local landfill tipping fees (~\$75/tonne for co-mingled organics and less than current compost facility tipping fees (~\$30/tonne) for clean organics. Transportation costs and waste hauler profit would be a similar cost regardless of the waste's final destination and therefore are not factored into the target rates.

Waste collection is a very, fragmented and competitive business. New entrants will come into a market and offer cut rate tipping fees in order to secure a foothold. The majority of companies will want to entertain these disrupters' lower rates in order to reduce costs or at a minimum to keep their incumbent waste haulers competitive. As a result, most companies with significant waste are hesitant to sign contracts for more than 1 year.

It is therefore critical and our recommendation that the proposed biogas facility partner with an established organics waste hauler operating in the PEBZ. This will be critical to providing a reliable supply of organic waste for the facility over the long term. Potential investors in the biogas facility will want to ensure that the plant has a continuous supply over the life of the project (>10 years) in order to minimize project risk and maximize their return on investment.

## Organic Waste Characterization

As important as the quantity of organics and their associated tipping fees, the composition of the organic waste processed in the facility will greatly impact both the chemical stability and financial feasibility of such a plant. An optimal mix can generate up to 2x the amount biogas than a marginal combination of organic waste. It is therefore critical to continually assess via a rigid testing regime of the waste streams being considered for processing in the facility.

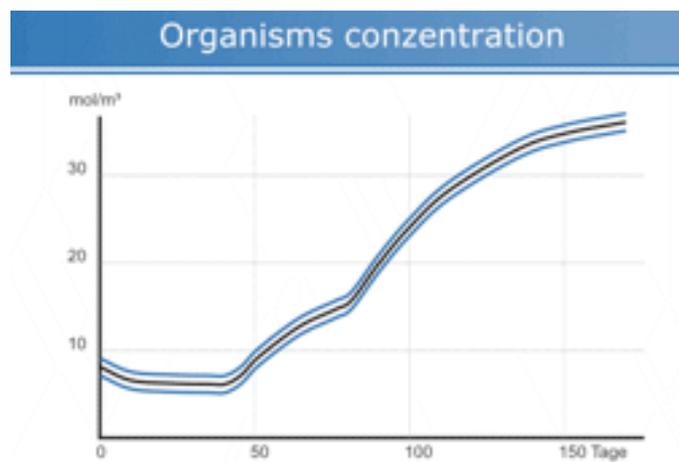
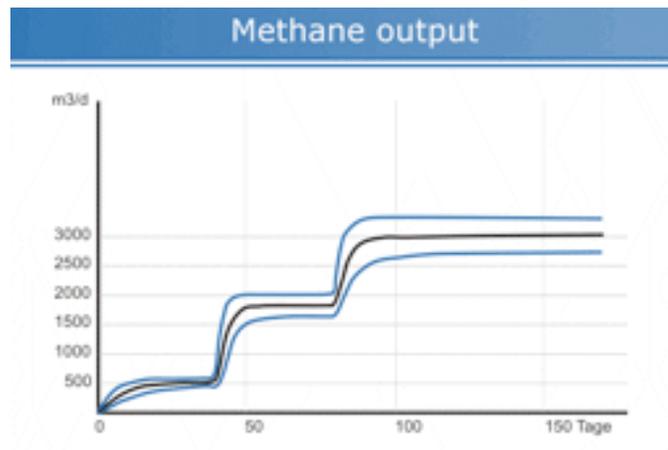
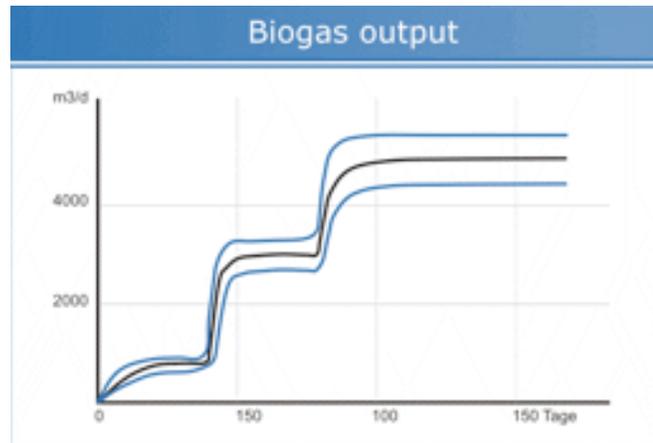
For the purposes of this study, and based on our survey finding we have compiled a doable mix of organic waste that a facility in the PEBZ would be likely capture (summarized in the chart below). Each of the available waste streams were grouped, classified and assigned chemical properties (e.g. % Total Solids, % of Fats, % Carbohydrates, % Proteins) based on the industry standard average chemical composition of similar waste stream classes.

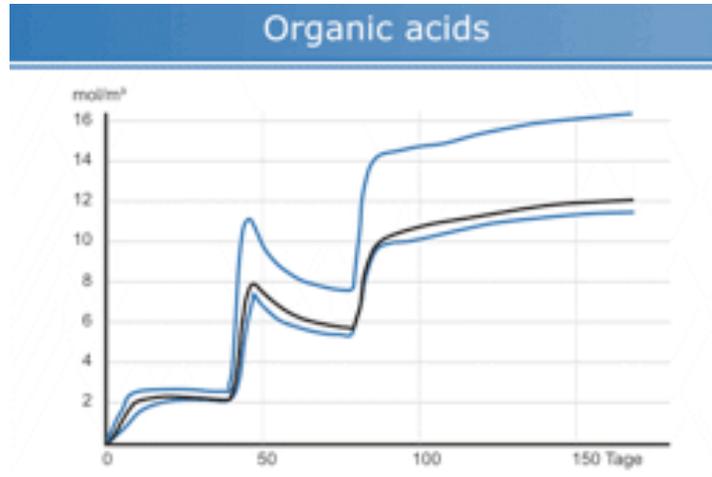
Identified FeedStocks	Tons/yr	Contaminant (%)	TS (%)	TS Tonnes	Fat (%) of TS	Fat Tonnes	Carb (%) of TS	Carb Tonnes	Pro (%) of TS	Pro Tonnes	(VS/TS)	Fats Mg/a	Carbs Mg/a	Proteins Mg/a	Total Mg/a
<b>1. Fat/Oil/Grease (decanted)</b>	2,000	1%	30%	594	80%	475	10%	59	10%	59	0.90	475	59	59	594
<b>2. Waste Milk Solids</b>	1,000	1%	65%	644	17%	109	50%	322	33%	212	0.95	109	322	212	643
<b>3. Food Processing Waste</b>	12,000	1%	20%	2,376	10%	238	75%	1782	15%	356	0.90	238	1,782	356	2,376
<b>4. Supermarket /Restaurant Food Waste</b>	35,000	15%	28%	8,330	17%	1416	56%	4665	27%	2249	0.85	1,416	4,665	2,249	8,330
<b>Total Tonnes per Year</b>	50,000	5,400		11,944		2,238		6,828		2,877		2,238	6,828	2,877	11,943
				26.7%		4.64%		12.21%		9.89%		<b>18.74%</b>	<b>57.17%</b>	<b>24.09%</b>	

The expected waste mixture, tonnage and key component compositions are entered into our simulation program “BioTip” to calculate the following key inputs into our Mass Balance calculation and Biogas Business Feasibility model:

1. Total Solids content of inputs
2. % Volatile Solids
3. Biogas Yield
4. % of Methane in biogas

Below are 4 sample output graphs from “BioTip”:





Our analysis was based on averages, not detailed organic breakdown, as noted in waste characterization phase notes. As such, results will be for discussion purposes only.

This data was then entered into our Mass Balance spreadsheet ( See next 2 pages) which calculates the following key inputs into our Biogas Business Feasibility spreadsheet:

1. Average total solids of inputs
2. Maximum allowable total solids into digester
3. Contaminants as a % of total solids
4. Quantity of biogas
5. Quantity of methane
6. Electrical generation capacity
7. Total solids in waste
8. Retention time in digesters
9. Quantity and size of pre-processing equipment and digesters

The budgetary capital expense for constructing the facility is driven by these inputs as well.

**Mass Balance Calculation – Page 1:**

<b>Project: Biogasanlage PWBZ 2</b>		
<b>Mass Current 24.06.2009</b>		
<b>Biological stability checked and ok.</b>		
Revision: 24.06.2009 KFi		
<b>Blue: Input data</b>		
Plant size	50.000	tons/year
Number off moduls	1	
Waste in receiving bunker	50.000	tons/year
Running time receiving/shreddering/mixing	9,0	h/d
Running time separation	24,0	h/d
Running time feeding AD	24	h/d
Average availability	85%	%
Peak load	100%	%
Working days (Wd)	260	d
Calendar days (Cd)	365	d
Effective running time receiving/conditioning	7,85	h/d
Effective running time separation	20,40	h/d
Effective running time feeding AD	20,40	h/d
Average total solids of SSO	26,9%	%
Average total solids of SSO	13.450	tons/year
Average total solids of SSO (Wd)	51,73	tons/d
Average total solids of SSO	2,54	tons/h
Contaminants in % of average total solids	11,2%	%TS
Contaminants absolute	1506,48	tons/year
Contaminants absolute (Wd)	5,79	tons/d
Contaminants absolute	0,28	tons/h
digestible organics of total solids	85%	%
digestible organics of total solids	10.152	tons/year
max. allowed total solids substrate into the mixer	19,56%	%
Quantity of deluting water	18.774	m³/year
Substrate mix into shredder/mixer	68.774	tons/year
Substrate mix into shredder/mixer (Wd)	265	tons/d
Substrate mix into shredder/mixer	34,58	tons/h
Substrat mix into FITEC/PM separation	68.774	tons/year
Substrat mix into FITEC/PM separation (Wd)	265	tons/d
Substrat mix into FITEC/PM separation	12,97	tons/h
Total solids of contaminants after first squeeze	35%	%
Total solids of contaminants after second squeeze	50%	%
Quantity of substrate after first squeeze (Wd)	247,98	tons/d
Quantity of substrate after first squeeze	12,15	tons/h
Quantity of contaminants first squeeze (Wd)	16,55	tons/d
Quantity of contaminants first squeeze	0,81	tons/h
Quantity of contaminants second squeeze (Wd)	11,59	tons/d
Quantity of contaminants second squeeze	0,57	tons/h
Quantity of small contaminants into the dgester (Cd)	0,83	tons/d
Quantity of substrate after second squeeze (Wd)	4,97	tons/d
Quantity of substrate after second squeeze	0,24	tons/h
Quantity of substrat into digesters total	65.761	tons/year
Quantity of substrat into digesters total (Cd)	180,17	tons/d
Total solids after second squeeze	18,18%	%
Quantity of biogas (m³Biogas/m³ Substrate)	145,25	m³/Mg
Quantity of methan (CH4 in % Biogas)	57,7%	%
Electrical power capacity	40%	%
Gastemperatur	37	°C
Quantity of biogas (m³Biogas/m³ Substrate)	23.046	m³/d
Quantity of methan (CH4 in % Biogas)	13.297	m³/d
Electrical power capacity	2216	kW
Feuerungsleistung	5541	kW
Mass of biogas (Cd)	28,6	tons/d
Mass of biogas	10.456,1	tons/year

**Mass Balance Calculation Page 2:**

Average total solids of Substrate into digester (Cd)	32,7	tons/d
Water into digester (Cd)	147,4	m <sup>3</sup> /d
Total solids of digestate (Cd)	4,1	tons/d
Quantity of digestate (Cd)	151,5	m <sup>3</sup> /d
Quantity of Compost (Cd)	0	tons/d
Quantity of Compost	-8	tons/year
Quantity of waste water (Cd)	152	m <sup>3</sup> /d
Quantity of waste water	55.311	m <sup>3</sup> /year
Quantity of waste water (Cd)	152	m <sup>3</sup> /d
Quantity of contaminants	3.013	tons/year
Quantity of deluting water	18.774	m <sup>3</sup> /year
Quantity of deluting water (Wd)	72,21	m <sup>3</sup> /d
Quantity of deluting water	9,44	m <sup>3</sup> /h
Check quantity off ouputs (=Ww+Cont+Comp+Gas-diluting water)	50.000	tons/year
TS of digestate	3,22%	%
TS in waste water:	3,22%	%
TS in waste water:	100,10%	%
TS in Compost:	0,00%	%
TS in Compost:	-0,10%	%
<b>Sizing of machinery</b>		
Shredring/mixing	34,58	tons/h
First stage squeezing	12,97	tons/h
Heating contaminants first squeezeing	0,81	tons/h
Second step squeezing	0,81	tons/h
Substrat feeding AD	8,83	tons/h
Centrifuge	27,81	tons/h
SBR	178,28	m <sup>3</sup> /d
<b>Sizing storage capacitys inhouse</b>		
Storage time receiving bunker	1	d
Storage time Substrat	2	d
Storage time substrate after shredding/mixing	1,00	d
Storage time substrate after first stage squeezing	1,00	d
Storage time substrate outside	0,00	d
Storage time substrate after second stage squeezing	0	d
Storage time contaminants after second stage squeezing	2	d
Storage time Gärrest	180	d
Size receiving bunker	275	m <sup>3</sup>
Size storage substrate after shredding/mixing	285	m <sup>3</sup>
Size storage substrate after first stage squeezing	180	m <sup>3</sup>
Size storage substrate after second stage squeezing	0,0	m <sup>3</sup>
Size storage substrate outside	0,0	m <sup>3</sup>
Size storage for contaminants after second stage squeezing	38,6	m <sup>3</sup>
Size storage digestate	27273,7	m <sup>3</sup>
Number off Storagetanks	4,0	
time of average sojourn time	49,0	d
max. organik load	3,5	kg/m <sup>3</sup> /d
Total quantity sludge volume of FITEC Digesters mass load	8128,3	m <sup>3</sup>
Total quantity sludge volume of FITEC Digesters biological load	7.947	m <sup>3</sup>
Total quantity sludge volume of FITEC Digesters	8.126	m <sup>3</sup>
max size of digester	1.400	m <sup>3</sup>
Choose FITEC digester volume (750m <sup>3</sup> , 880m <sup>3</sup> , 1000m <sup>3</sup> , 1150m <sup>3</sup> , 1280m <sup>3</sup> , 1400m <sup>3</sup> )	1400	m <sup>3</sup>
Number of FITEC digesters	6	

**3 Financial Feasibility: Pro Forma**

**Objective:**

Develop a Pro Forma for one or more biogas plant(s) in PEBZ

**Scope:**

Detailed financial spreadsheets showing the financial performance of two biogas models for the PEBZ and Bolton areas:

- i. Fully integrated biogas plant with organic waste pre-processing, biogas production and energy exploitation;
- ii. Stand-alone pre-processing facility with material being delivered to separate biogas plant or existing WWTP anaerobic digesters;

The pro forma's are in draft format for discussion purposes with estimates on capital requirements and plant performance statistics. Embedded flexibility has been added to the pro forma model to permit what-if scenarios to assist in determining which combination of elements will "Yield" the most profitable option.

**Key Assumptions used in the Pro Forma are as follows:**

**a. Capacity of the facility**

- i. 50,000 tonnes per annum capacity is considered optimal based on equipment utilization, logistical coordination and available feedstock considerations.

**b. Target Returns and Criteria**

- i. Discussions with many institutional and private equity and debt investment groups indicate that a "fundable" project of this nature must have the following:
  1. A minimum of 20% IRR ( Internal Rate of Return) over a 10 year investment horizon
  2. Over 50% of annual feedstock requirement should be under contract for at least the first 5 years
  3. Project should have a 10 year minimum off-take agreement for the energy ( electricity, bio-methane, heat) that is generated.
  4. Demonstrable, proven technology

**c. Cost of land**

- i. 4 acre site average
- ii. The average asking purchase price for a site in the PEBZ was \$695,000 per acre or \$2,780,000 for the 4 acres.
- iii. The average asking purchase price for a site within a 30 minute drive of the PEBZ was \$400,000 per acre or \$1,600,000 for the 4 acres.

**d. Cost of equipment and construction**

- i. Capital cost per kW of net energy generation can vary significantly (from \$5000/kW for a small agricultural system to \$20,000/kW for larger contaminant separation systems) depending on the methodology of pre-processing that the

co-mingled waste streams require and the overall design of the anaerobic digestion process. For the purposes of this study we used a proven system design including pre-processing (removal of inorganic contaminants from organic material) and in-tank contaminant removal technology system. The capital cost per kW for this type of facility is in the \$9,000/kW range.

**e. Biogas yield**

- i. A function of the types of feedstock processed through the facility and the skill of the operator and methodology of how the biological processes occurring in the digester tanks are monitored and adjusted over time.
- ii. Based on the results from our AD simulation software, Bio Tip, the estimated biogas yield is 145.3 m<sup>3</sup> /tonne of feedstock with an average methane content of 57.7%.

**f. Net energy generation**

- i. Gross energy generation is a function of the efficiency of the combined heat and power unit in the case of electricity production. For the purposes of the study we will use a 46% efficiency factor. In the case of bio-methane production the efficiency of the gas clean up equipment is critical. In our modeling we used a 90% efficiency factor.
- ii. Net energy generation is a function of parasitic energy load required to operate the equipment, machinery and plant building. The parasitic load for this type of facility can range from 15% up to 60%. For the purposes of our study we will utilize the 15% factor since we have reviewed detailed studies of other facilities utilizing the FITEC technology and feel confident that we can achieve similar results.

**g. Net tipping fee revenue**

- i. The net tipping fee is the price that the proposed facility would receive for processing and disposal of the organic waste streams received at its location.
- ii. The price range for the disposal of clean organics has been determined to be \$0 to \$40/tonne. For the purposes of this study we will use a \$30/tonne net tipping fee for clean organics.
- iii. The price range for the disposal of ICI/co-mingled organics has been determined to be \$60 to \$80/tonne. For the purposes of this study will use a \$60/tonne net tipping fee for ICI/co-mingled organics.
- iv. Although not considered in this study, residential source-separated organics (SSO) have a net tipping fee in the range of \$100 - \$130/tonne. These contracts are long term and are generally awarded through an RFP process.

- h. Feed in tariff rate for electricity, bio-methane and heat**
  - i. The recent Feed In Tariff (FIT) program announced by the Ontario government provides a 20 year contract for the purchase of biogas generated electricity at an average rate of \$.148 / kWh.
  - ii. Current natural gas prices are in the \$4/gigajoule range
  - iii. Current pricing for heat is roughly 75% of the price of natural gas
  
- i. Off-take agreements for digestate**
  - i. The amount of digestate (liquid and solid compost material) that is available for sale or disposal is based on the type of waste streams processed in the facility.
  - ii. For the purposes of our study we have assumed that any revenue received for the digestate is offset by the cost of de-watering and transportation to its final location (compost facility or farm).
  
- j. Price for Carbon Offsets**
  - i. Carbon offset sales are currently priced in the \$5 - \$12/tonne of carbon emissions. Note: the pending passage of the carbon credit Cap and Trade legislation in the US will force Canada to harmonize and should increase the price for such credits as formal trading markets are established.
  - ii. For the purposes of this study if we choose to sell electricity through the OPA's FIT program, the facility must forfeit all of the credits to the OPA resulting in \$0 revenue to the facility operator.
  - iii. If we choose to sell bio-methane to Enbridge or directly to an end-user of natural gas, we will use the \$5/tonne CO<sub>2</sub>e revenue number.
  
- k. Cost of Debt**
  - i. There are several private sources of debt financing available to these types of facilities. Final rates would be determined upon signing an agreement, however, for the purposes of this study, we will use an approximate going interest rate of 8.5% based on a 10 year term for up to 50% of the cost to build a facility.

## Snap Shot of the Pro Forma Scenario Page – Baseline Case

Yield Energy Inc. PEBZ - Biogas Plant Proforma						
Plant Capacity (tonnes per year)	Pre-Pro & AD	50,000	Urban			
Capital Equipment		\$20,000,000				
Land		\$2,780,000	No Mortgage			
<b>Feedstock Assumptions</b>			Average	Avg TS %		
	Ratio	% Contaminants	Biogas m3/tonne	26.5%		
Clean Organics	30.0%	1.0%	143.3	TS Dilution		
Residential Organic SSD	0.0%	20.0%	0.0	18.5%		
ICI Grocery Store/Restaurant Waste	70.0%	15.0%	143.3	Avg Meth%		
				57.7%		
<b>Revenue Assumptions</b>			Index Rate p.a.			
Year 1 Landfill Rate	\$73	per tonne	2%			
Clean Organics	\$30	per tonne	2%			
Residential Organic SSD	\$120	per tonne	0%			
ICI Grocery Store/Restaurant Waste	\$60	per tonne	2%			
Electricity Revenue Rate	\$0.148	per kWh	0.23%			
GHG Credits Prices	\$0.00	per tonne	0%	Qty of Compost		
Net Compost Price	\$0.00	per tonne	0%	300		
Natural Gas/ Biomethane Price (yrs. 1-5)	\$4.00	per GJ	50%	every 5 yrs.		
Heat Price (equals ~75% of natural gas price)	\$3.00	per GJ	Sell Heat?	No		
<b>Operating Expense Assumptions</b>		Operators-1st	Operators-2nd	Plant Mgr.	Total	Index
Staff	4	0.5	1	\$464,352	2.0%	
Annual Maintenance & CAPEX Replace Expense	3.0%	\$510,000	1.0%	\$170,000		
Digester Monitor/ Test & Supplement Service	\$50,000	per year	0.0%			
Electrical Parasitic Load & Rate	15%	per year	\$0.08	per Kwh	2.0%	
Site Lease & Index Rate	\$0	per year	2.0%	per year		
Sewage Treatment & Water Charges	\$308,245	per year	\$35,747	per year		
Property Taxes & Index Rate	4.0%	\$193,630	1.0%	per year		
General Admin (Office, Insurance, Prof. fees)	\$100,000	per year	2.0%	per year		
<b>Financial Assumptions</b>		Equity	Debt	Grant/Subsidy	Tax Rate	
	100%	0%	\$0	0%		
		8.5%				
<b>Outputs</b>		Electricity	2.22	Megawatts	%	100%
		BioMethane	0	GigaJoules	%	0%
		Heat	77,184	GigaJoules		
		GHG Credits	38,838	Tonnes CO <sub>2</sub> e/yr		
					Equity	
		10 years	15 years	20 years	Payback	
Internal Rate of Return (Equity)	6.8%	11.6%	13.3%	7.2		
Sensitivity +10% Capex	4.9%	10.0%	11.9%	7.8		
-10% Capex	9.0%	13.4%	15.0%	6.5		

### Sensitivity Analysis: Variables and Scenarios

#### Case#1:

How will IRR (10 year and 20 year) vary with different combinations of the following variables?

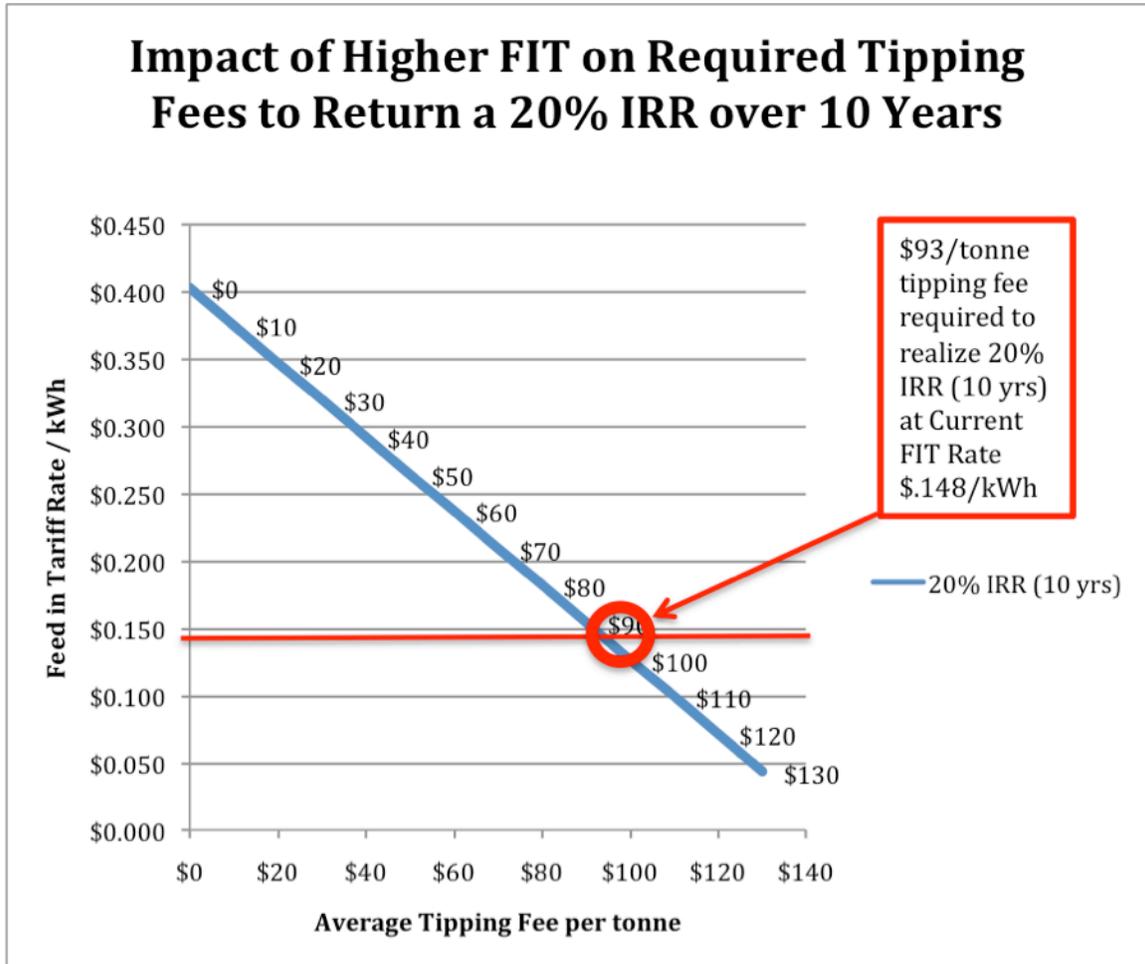
- a) Type of energy generated
  - a. Electricity

- b. Bio-methane
- b) Location of facility
  - a. PEBZ
  - b. Within 30 minute drive of PEBZ
- c) Tipping Fees
  - a. +/- 10%
- d) Financing
  - a. 100% Equity
  - b. 50% Equity / 50% Debt

Scenario	Energy		Location		Tipping Fees			Project Financing		Financial Return	
	kW	NG	PEBZ	Outside	-10%	Avg	+10%	100% E	50/50	IRR - 10 Years	IRR - 20 Years
1	X		X			X		X		6.8%	13.3%
2	X		X			X			X	5.5%	15.0%
3	X		X		X			X		5.1%	12.0%
4	X		X		X				X	2.4%	13.2%
5	X		X				X	X		9.3%	15.3%
6	X		X				X		X	10.1%	18.4%
7	X			X		X		X		8.0%	14.2%
8	X			X		X			X	7.5%	16.5%
9	X			X	X			X		6.2%	12.8%
10	X			X	X				X	4.3%	14.5%
11	X			X			X	X		9.7%	15.5%
12	X			X			X		X	10.5%	18.4%
13		X	X			X		X		-5.3%	6.5%
14		X	X			X			X	#NUM!	6.1%
15		X	X		X			X		-7.8%	5.0%
16		X	X		X				X	#NUM!	4.4%
17		X	X				X	X		-3.0%	7.9%
18		X	X				X		X	#NUM!	7.7%
19		X		X		X		X		-4.4%	7.1%
20		X		X		X			X	#NUM!	6.8%
21		X		X	X			X		-7.0%	5.6%
22		X		X	X				X	#NUM!	5.1%
23		X		X			X	X		-4.4%	7.1%
24		X		X			X		X	#NUM!	6.8%

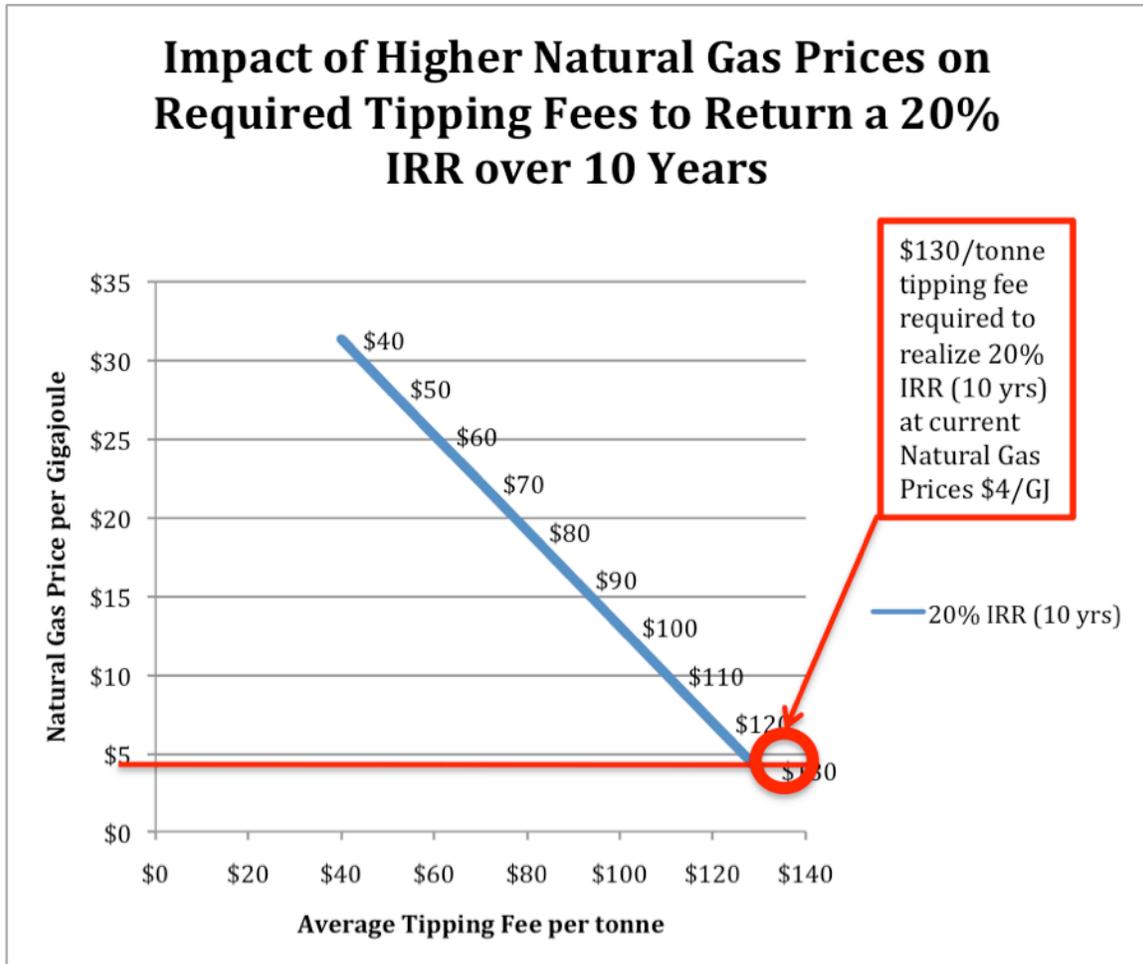
**Case #2:**

What combination of Tipping Fees and FIT rates will deliver a 20% IRR (10 years)?



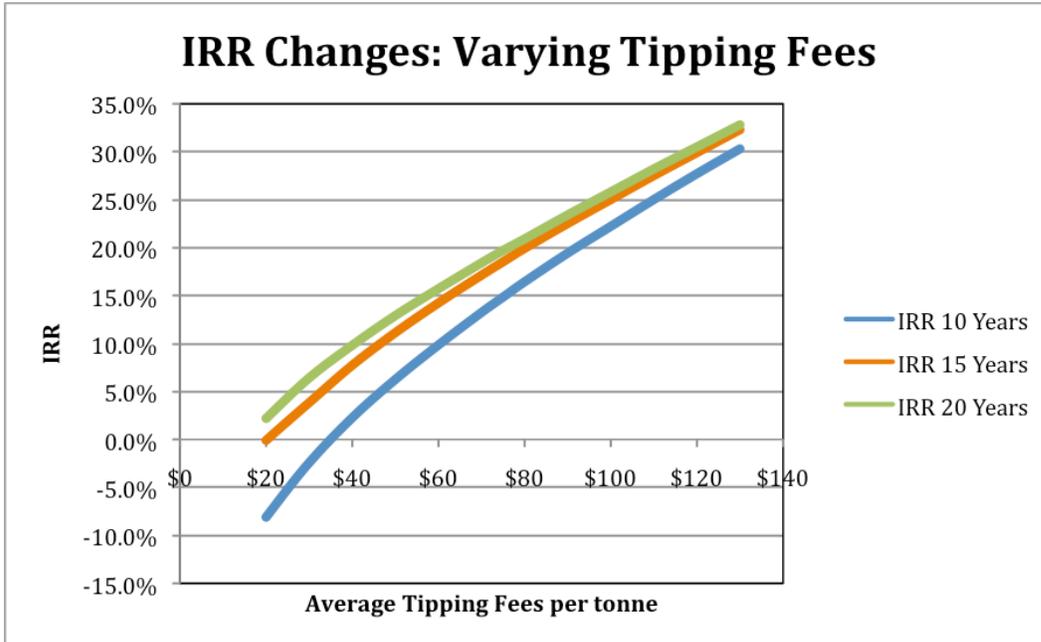
**Case 3:**

What combination of Tipping Fees and Natural Gas price will deliver a 20% IRR(10 years)?



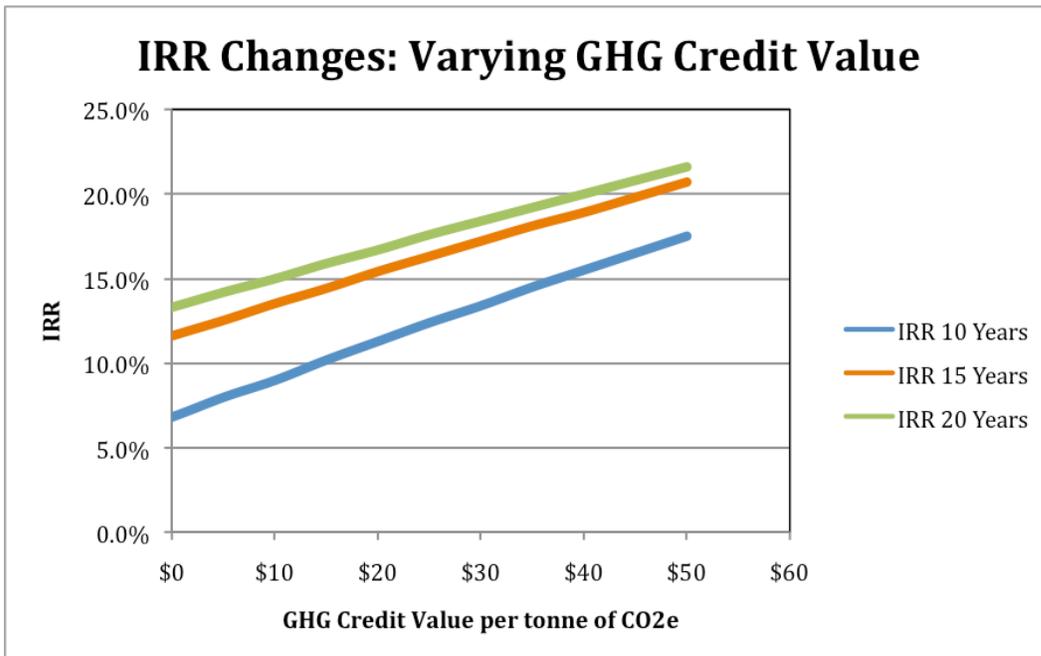
**Case 4:**

How will IRR change as Tipping Fees vary?



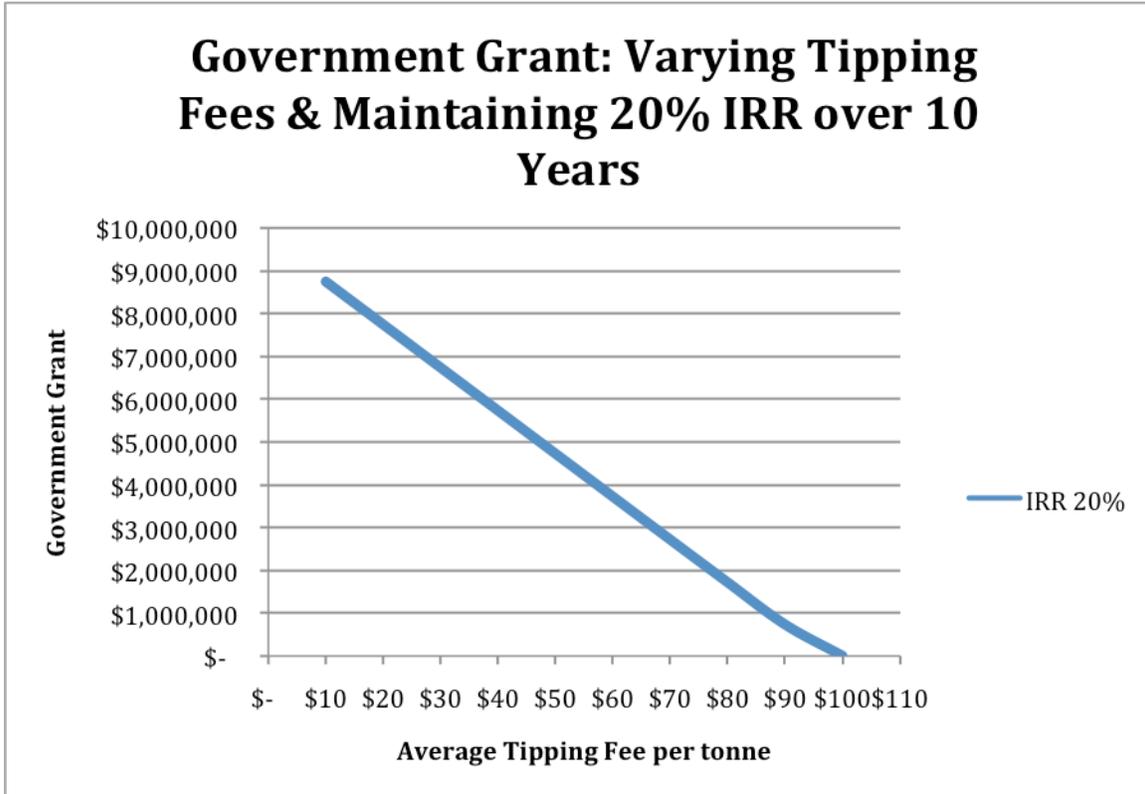
**Case 5:**

How will IRR change as GHG Credit values vary?



**Case 6:**

What amount of combined Government Grants would be required for the project to return a 20% IRR over 10 years while varying tipping fees?



## **EXHIBITS**

---

## **Exhibit # 1: Suitable PEBZ Sites**

### **Example #1: 8 Trinity Drive, Mississauga**



**Size:** 1 Acre

**Zoning:** E3

**Services** Sanitary, Storm, Sewer, Water and Electrical

**Outside Storage:** YES

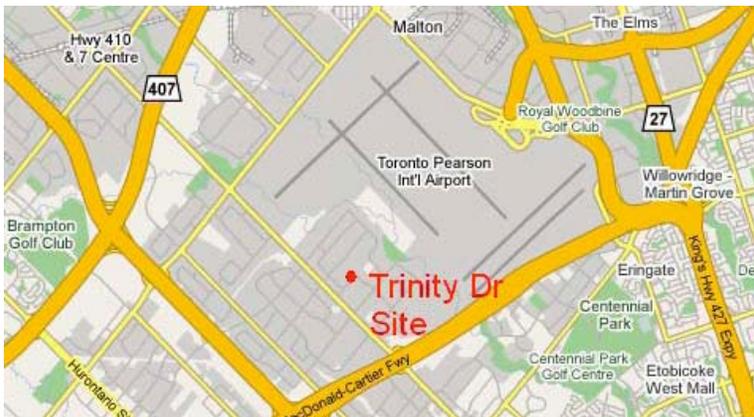
**Asking Rate:** \$5,500.00 per month

**Realty Taxes:** 8,763.33 (2008)

**Zoning Details:** Zoning Allows for Various types of outside storage

**Site Commentary:**

- Excellent Highway Access to 401
- Within PEBZ
- Landlord will fence off area



**Example #2 : Sun Pac Blvd, Brampton**



**Size:** +/- 4 Acres

**Zoning:** SC-1638

**Services:** YES

**Outside Storage:** YES

**Asking Price:** not for sale

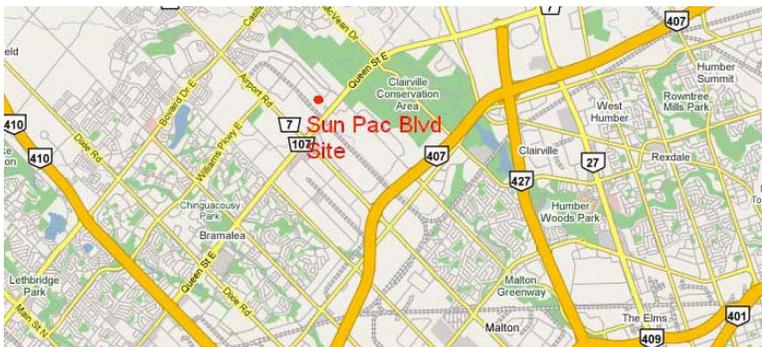
**Yearly Lease Rate:** \$5,000 per Acre per month

**Zoning Details:**

- Service Commercial
- Manufacturing and Processing allowing within fully enclosed building
- Outside storage dependent on a Committee of Adjustment Variance

**Site Commentary:**

- Good access to Highway 7 and Highway 50
- Fully serviced and permit available
- Within the PEBZ
- Owner will consider a long term lease
- Owner will also build to suit for lease



**Example #3: Nexus Avenue, Brampton**



**Size:** 3.42 Acres

**Zoning:** M4-1669

**Services:** Yes

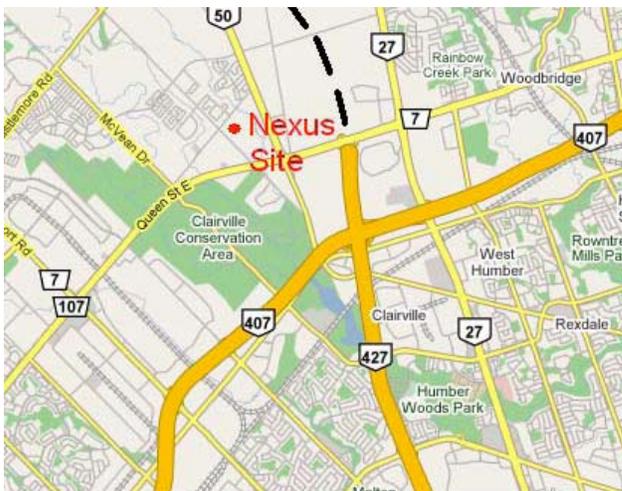
**Outside Storage:** No

**Asking Price:** \$2,376,900.00

**Price Per Ac:** \$695,000.00

**Zoning Details:**

- Industrial Uses permitted
- No outside storage permitted
- No obnoxious uses permitted
- Fully serviced (Sanitary Storm, Sewer, Water and Electrical)
- Building permit available
- Good access to Highway 7 and Highway 50



## ***Exhibit #2 : Suitable Bolton Sites***

### **Example #1: Simpson Road, Bolton**



**Size:** 4 Acres

**Zoning:** MP 309

**Services:** Yes

**Outside Storage:** Yes

**Asking Price:** \$1,600,000.00

**Price per Ac:** \$400,000.00

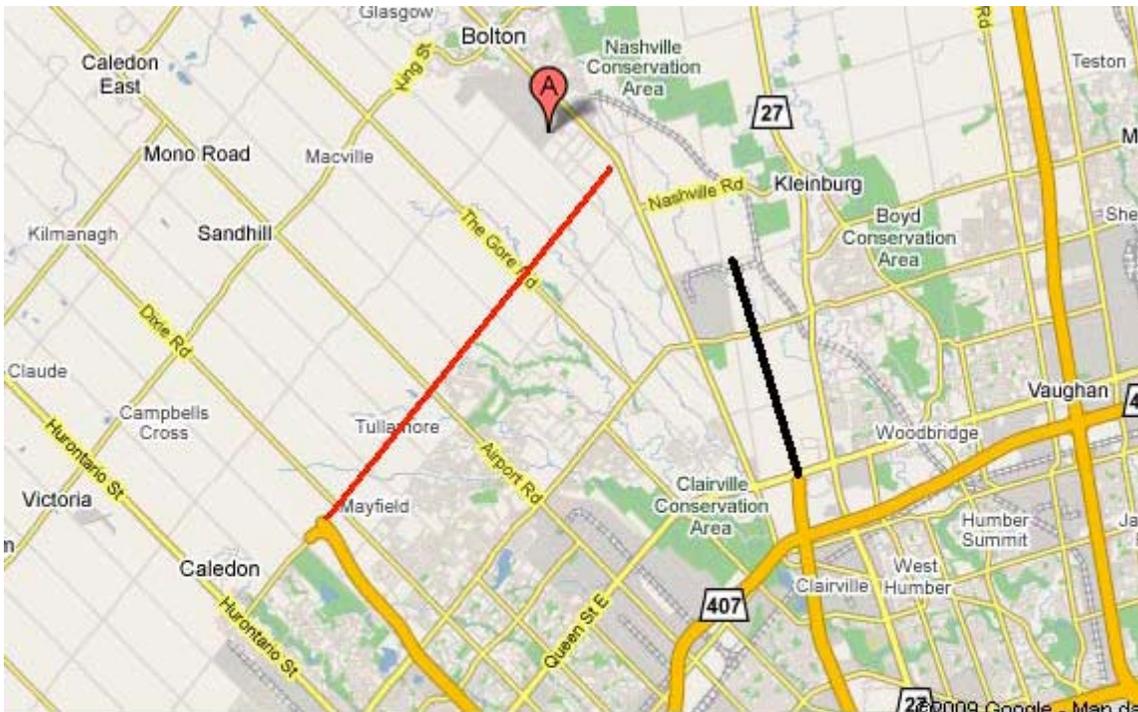
**Design Build Lease:** \$5.00 psf range

**Zoning Details:**

- Industrial Uses Permitted
- Bulk Storage permitted
- 50% of lot permitted as open storage

**Site Commentary:**

- Within an established industrial area
- Fully serviced (Water, sanitary, storm and electrical)
- Flat land, fully useable
- Building permit available
- Good access to Highway 50 and Coleraine Drive
- Vendor will also provide a design/build/lease service



-  Future Hwy 427 Extension
-  Future Expansion of Mayfield Rd. to 6 Lanes

### ***Exhibit #3 – Potential Farmland Sites***

#### **1. MAYFIELD WEST (Caledon)**

- Un-serviced, Services expected in 2010
- Designated Industrial (approximately 300 acres)
- Currently Zoned Agricultural
- Developer owned

#### **2. BOLTON (Caledon)**

- Services in the Area
- Designated Industrial
- Currently Zoned Agricultural
- Generally sites are over 25 Acres
- Predominantly Developer owned

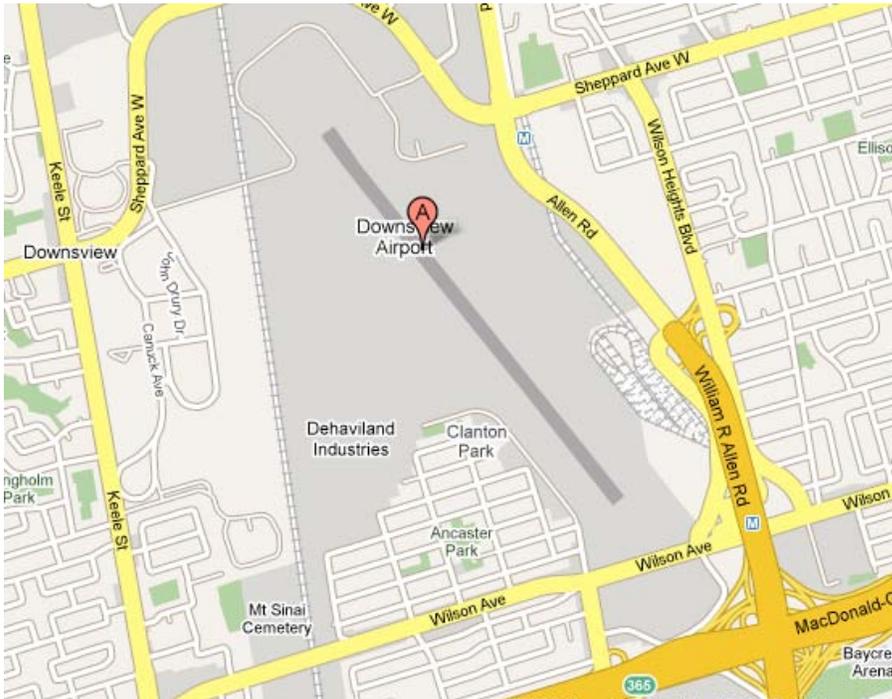
#### **3. BRAMPTON EAST SPA 47 (Brampton)**

- Un-serviced, Services depend on secondary plan
- Secondary Plan no yet commenced (predicted to commence in 2010)
- Zoned Agricultural
- Ownership is a mix of Developers, Speculators and Farmers
- Sites range from 25 to 100 Acres

#### **4. VAUGHAN WEST (Vaughan/York)**

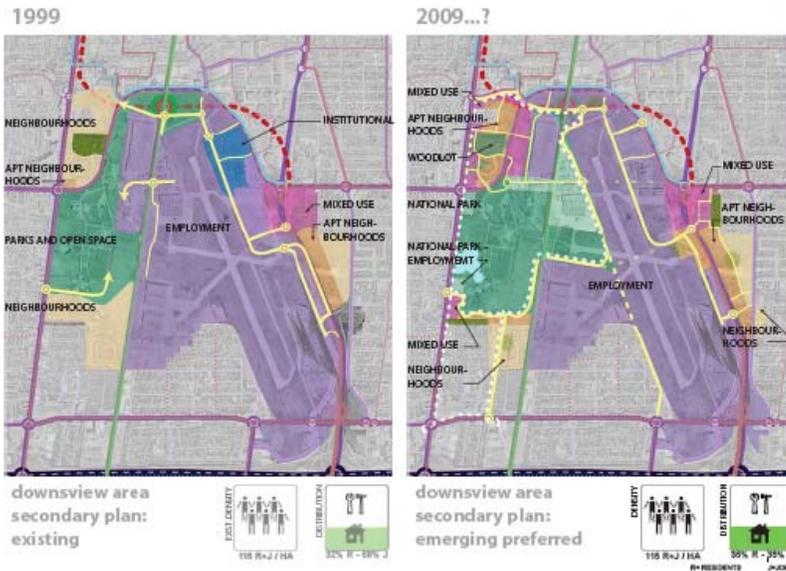
- Un-serviced
- No Secondary Plan
- Zoned Agricultural
- Ownership is a mix of Developers, Speculators and Farmers

**Exhibit #4 – Suitable Federal Sites**



**NEXT STEPS ...**

Over the next few months, we will continue to analyze and refine the emerging preferred plan. We will update the website to add comments and feedback that we receive following tonight's meeting. We will also issue a newsletter over the winter to update on the status of the review. In Spring 2009, we will hold another meeting to present our recommendations to update the Secondary Plan.



**Exhibit #5 – Site Availability Survey**

	<u>Address</u>	<u>Municipality</u>	<u>Lot Size (acres)</u>	<u>Existing Building Size ( sf)</u>	<u>Current Zoning</u>	<u>Asking Price</u>	<u>Price per Acre</u>	<u>Comment</u>
<b>1</b>	134 Kennedy Road	Brampton	5	N/A	TBC	\$2,948,562	\$589,712	Land to be severed from larger site, zoning permits open storage
<b>2</b>	129 & 131 East Drive	Brampton	6.19	80,530	M2	\$7,350,000	\$1,187,399	Two Freestanding buildings, can be sold separately, outside storage permitted.
<b>3</b>	75 Van Kirk Drive	Brampton	6.99	N/A	M4A	\$5,172,600	\$740,000	Rail service available. High power available, Outside storage permitted
<b>4</b>	22 Stafford Road	Brampton	4.52	N/A	M2	\$4,407,000	\$975,000	Gravelled and Fully fenced. Environmental Audit completed in 2006
<b>5</b>	Derry Road	Mississauga	5.52	N/A	OS3	\$4,140,000	\$750,000	Full services available. City is willing to rezone to E2 (Employment)
<b>6</b>	Sun Pac Blvd.	Brampton	6.2	N/A	SC-1638	Lease	Lease	Land lease for \$5,000 per acre per month (\$372,000.00 annual)

7	Nexus Avenue	Brampton	3.42	N/A	M4-1669	\$2,376,900	\$695,000	Development land Outside storage permitted
8	10 Bramwin Court	Brampton	3.26	N/A	M3A	\$2,250,000	\$690,184	
9	7900 Airport Road	Brampton	5.86	N/A	Industrial	\$5,567,000	\$950,000	
10	1660 Matheson Blvd.	Mississauga	3	40,000	C3-1	\$4,700,000	\$1,566,667	
11	Simpson Road	Bolton	4	N/A	Industrial	\$1,600,000	\$400,000	Upto 7 acres available. Also available as design/build/lease in the \$5.00 psf range
13	41 Simpson Road	Bolton	4.73	24,227	Industrial	Lease	Lease	Asking \$3.95 net, with \$2.45 TMI = \$6.40 Gross or \$155,052.80 Annually
14	23 Simpson Road	Bolton	TBD	21,073	Industrial	Lease	Lease	Asking \$4.95 net, with \$2.50 TMI = \$7.45 Gross or \$156,993.85 Annually
15	25 Nixon Road	Bolton	1.86	32,140	Mp	Lease	Lease	Asking \$6.15 net, with \$TMI to be determined
16	2 Manchester Crt.	Bolton	TBD	53,100	Ms-E (125)	\$5,100,000	N/A	3 extra acres of outside storage, excellent power, rail and cranes. \$5,500 per acre per month plus realty taxes. Fully fenced vacant lot
17	8 Trinity Drive	Mississauga	1.4-3.8	1,000	E3	Lease	Lease	

### Exhibit #6 – PEBZ Waste Survey – Companies and Institutions

		<u>Organic Waste Characterization</u>	<u>Pre-Processing Requirements</u>	<u>Qty/ year in Tonnes</u>	<u>Current Destination</u>	<u>Current Fees (Net/Net)</u>	<u>Premium for Co-mingled Organics</u>	<u>Barriers to Expand</u>
	<u>Companies &amp; Institutions</u>							
1	<b>Credit Valley Hospital</b>	In-patient meal & Kitchen waste	Separation & Pasteurization	80	Composting	\$9/65 gal tote = \$166/tonne	Yes, expand program & save of de-packaging labour	Increased labour costs, Need commitment from Food Vendors, Odour/cleanliness, storage
2	<b>York University</b>	Packaged & Non-packaged Cafeteria food	Separation & Pasteurization	300	Composting	\$6/tote= \$100/tonne	Possibly	Cost
3	<b>Gaylea Foods</b>	Waste Milk solids	None	516	Animal Feed	\$95/tonne	No	None
4	<b>Molson</b>	Spent grain & yeast	Extrusion	51,000	Sold for Animal feed	Paid ~\$10/tonne	No	None
5	<b>Nestle Sick Kids Hospital</b>	FOGs - ORMI, Batter Waste & Dry Chocolate/ biscuit - U-Pak In-patient meal & Kitchen waste	De-Water - FOGS Separation & Pasteurization	FOGS - 118 Solid - 790 23	FOGS - Farm AD, Solids - Pig Food Composting	FOGS - \$380/tonne, Solids - \$50/tonne \$14/ tote = \$185/tonne	No	Currently in discussions with a biogas company, need to show cost savings Cost & Resources
6	<b>Woodbine Race Track</b>	Non-packaged Food Waste	Separation & Pasteurization	313	Composting	\$223/tonne	Yes, but overall costs should go down	Cost & labour savings
7	<b>International Centre</b>	Kitchen Food Waste, Public food waste not separated	Separation & Pasteurization	8	Composting	\$14/tote - \$185/tonne	No	Education & marketing to increase public awareness for separation
8	<b>Cara Foods</b>	Restaurant	Separation & Pasteurization	~50 /location 500 total	Compost /Landfill	\$60/tonne	No	Don't believe it is cost effective to collect
9	<b>Maple Leaf</b>	Slaughterhouse		11,000	Rendering	~\$40/tonne	No	None
10	<b>GTAA</b>	Restaurant	Separation & Pasteurization	540	Composting	\$67/tonne	No	Labour and cost
11	<b>Costco</b>	Grocery Food waste	Separation & Pasteurization	300 /Store - 5 stores	Compost/ Landfill	\$12- \$13.50/95 gal. Tote	No	Storage Space in coolers/freezers w/o bugs, rodents
12	<b>Walmart</b>	Grocery Food waste	Separation & Pasteurization	300-500 /store - 20 stores in GTA	U-Pak & Turtle Island - Landfill	~\$65/tonne	No	Few cost comparable environmental alternatives
13	<b>McDonald's Embassy Flavours</b>	Restaurant Food Processor	Separation & Pasteurization Clean	One - 95 gal* tote /day = 32.4 tonnes/ year 12 tonnes	BFI /Composting Landfill	\$100/mos - ~\$5/tote \$1000/tonne	No Yes	Need customer to separate Lack of Service
14	<b>Bacardi Rum</b>	Distillers Grain	Clean	NA	3rd Party for alcohol recovery	Just pay shipping	NA	Time & People
		<b>Sub-Total</b>		<b>~75,000 tonnes per year</b>				
		* 90 gal tote=90kgs						

### Exhibit #7 - PEBZ Waste Survey - ICI Waste Haulers

		<u>Organic Waste Characterization</u>	<u>Pre-Processing Requirements</u>	<u>Qty/ year in Tonnes</u>	<u>Current Destination</u>	<u>Current Fees (Net/Net)</u>	<u>Premium for Co-mingled Organics</u>	<u>Barriers to Expand</u>	<u>Current Hauler</u>
1	<b>Turtle Island Recycling</b>	Mixed organics	Separation & Pasteurization	30,000	Compost/ NewMarket AD	\$45/tonne	Yes, if they could charge more	Cost effective separation of organics from non-organics,	Self
2	<b>Waste Co</b>	Grocery, Restaurants, Food Processors	Separation & Pasteurization	5,200	N/A	N/A	N/A	N/A	Self
3	<b>MegaCity Waste</b>	Grocery, Restaurants, Food Processors	Separation & Pasteurization	10,000	N/A	N/A	N/A	N/A	Self
4	<b>Metro Waste</b>	Food Processors	Extrusion	8,000	N/A	N/A	N/A	N/A	Self
5	<b>Mamone Waste</b>	Food Processors	Extrusions	4,000	N/A	N/A	N/A	N/A	Self
6	<b>U-Pak Disposal</b>	Grocery, Restaurants, Food Processors	Separation & Pasteurization	35,000	Composter	N/A	N/A	N/A	Self
7	<b>ORMI</b>	FOGS	Filter / De-watered	30,000	Farm Based Ads	N/A	N/A	Not enough end-point	Self
8	<b>Waste Management</b>								
9	<b>York Disposal</b>	Grocery, Restaurants, Food Processors	Separation & Pasteurization	5,200	N/A	N/A	N/A	N/A	Self
		<b>Total</b>		<b>127,400</b>	<b>tonnes per year</b>				

**Exhibit #8 – Yield/Fitec Pre-Processing and Anaerobic Digestion System**

