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# **General Resource Assessment**

## **for Community-Owned Biogas in the Kawartha Region**

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### **Executive Summary**

**May 2011**

## Executive Summary

This study was developed to identify the farms most suitable for the development of community-owned biogas plants in Peterborough County and the City of Kawartha Lakes, together comprising the Kawartha region.

The goal of this study was to uncover the source and quantity of organic waste production around the region, which would allow for the development of biogas plants at individual farms, or clusters of farms working together.

Each of these farms would combine their manure and silage with off-farm waste streams like food waste, fats, oils and greases, and yard waste to make **up to 499 kilowatt (kW) of generating capacity** – allowing them to meet their energy needs independently through on-farm generation of heat and power, or the sale of electricity to the provincial grid through Ontario’s Feed-in Tariff (FIT) program.

Preliminary research identified **12 locations with potential to host a community-owned biogas plant**. These are the ‘low-hanging fruit’: each has enough manure production on-site or within a 5 km radius to host a 100 kW, 249 kW or 499 kW plant, and most are located in close enough proximity to an appropriate electrical distribution line to make the connection costs feasible.

## Regional Characteristics and Biogas Resources

The municipalities of Peterborough County and the City of Kawartha Lakes were assessed in terms of population size and projected growth, agricultural activity, and waste management programs. It was calculated that, as a conservative estimate, **approximately 3,100 tonnes of organics annually** could be available for processing in biogas plants from the region.

The farm types most amenable for biogas production are dairy, poultry, and hog farms. There are a total of **218 of these farms in Peterborough County and the City of Kawartha Lakes combined; 151 dairy, 54 poultry and 17 hog farms.**

In order to comply with the Nutrient Management Act, on-farm biogas systems must be taking in a maximum of 25% off-farm waste, and half of the 75% agricultural waste must be manure. This means the availability and use of crop silage from corn and grasses is an essential part of making many projects viable. There are currently about 500 producers of suitable crops around the region, some of which are also dairy operations.

## Community-owned Biogas

For smaller farms, creating clusters of manure and crop silage producers is an attractive option for biogas production. All of the identified projects could be developed by the individual farmers themselves or by the numerous commercial developers who are now operating in the Ontario market. However, if the farmer or the community do it on their own, they are eligible to receive a bonus 0.4¢ per kilowatt hour (kWh) called a ‘community ad-

der'. Commercial projects are not eligible to receive this adder. A number of other benefits to the community and the farmer were identified and quantified.

A targeted financial structure of **60% debt, 40% equity** was identified, with grants funding the early development costs and equity provided by the farmer, his neighbours and/or a community financing group. Farm Credit Canada, the Green Municipal Fund, Infrastructure Ontario, or local credit unions and commercial banks could provide the debt.

**Another option for small and medium-sized operators**, or those located at larger distances from the electrical grid, is to develop an on-farm micro-digester project at a smaller scale. This micro-digester supplies gas to meet on-farm energy needs, but does not generate electricity for sale to the grid. The benefits in this case are greater energy independence, and avoided heating and power costs.

### Financial Projections

At current prices offered and the regulatory structure of the market, the most feasible projects are either 249 kW or 499 kW.

Generator Size (kW)	FIT Rate (¢/kWh)	Grid	Capacity Exempt
100	19.9	1-phase or 3-phase	Yes
249	18.9	3-phase	Yes
499	16.4	3-phase	Yes*

\*only capacity exempt on line voltages larger than 15kV

	100 kW	249 kW	499 kW	On-farm micro-digester
<b>Power Sales</b>	\$165,000	\$390,000	\$650,000	n/a
<b>Tipping fees</b>	\$26,000	\$45,000	\$102,000	n/a
<b>Energy savings</b>				\$28,000
<b>Operating Expenses</b>	\$65,000	\$130,000	\$230,000	\$3,000
<b>Lease Paid to Farmer</b>	\$5,000	\$12,000	\$20,000	n/a
<b>Net Income</b>	\$120,000	\$290,000	\$500,000	\$25,000
<b>Capital Cost</b>	\$850,000	\$1,650,000	\$2,500,000	\$200,000
<b>Simple Payback</b>	7 years	5.6 years	5 years	8 years

The above estimates are based on a generator availability of 90%, and a FIT Rate that includes the 0.4 ¢/kWh community adder. Lease payments to the farmer for a community-owned plant are estimated at 3% of annual revenue.

## Potential Projects

A number of farms and clusters of farms that may potentially be good candidates for biogas plants were identified. The image below shows an overview of the rural areas of Peterborough County and the Kawartha Lakes, with points colour coded according to farm type and size.

The electrical distribution grid layout in the area was determined and used to determine distances of candidate sites from suitable electrical connection points.

The descriptions of the candidate sites and their electrical connection potential are contained in the full report.



## About ReGenerate

ReGenerate Biogas Inc. was founded by Daniel Bida, in order to pursue a solution to both the energy and environmental crises society is facing. ReGenerate provides communities around Ontario with the tools and assistance they need to own and operate their own biogas systems. ReGenerate works with farmers and co-operatives to: assess project feasibility; obtain funding via grants and low-interest loans; procure technology; secure off-farm feedstock supplies; apply for permits and FIT contract; and manage the project's development.

This report was co-authored by Daniel Bida, CFA and Marty Climenhaga, PhD.

Full report available from [connect@regeneratebiogas.com](mailto:connect@regeneratebiogas.com)