

Biogas Greatest Hits Summary

Biogas On Farm Rural and Urban Distributed Energy from Waste Electrical Generation (0.1 - 5MW generating capacity)

Province Wide Economic Diversification and Job Creation

| | |
|--|---------------------------|
| Based on 2 operational facilities in Southern Alberta (1 urban, 1 rural) | |
| Direct Investment | \$35,721,718 |
| Employment | 10 FTE |
| 2 facilities | > 3MW generating capacity |

Alberta Opportunity: Over 1250 farms produce manure that could be utilized as a feedstock in a biogas system.

- Distributed base load power. Benefit to farmers and the Alberta electricity grid
 - **See letter of support from Fortis AB**
- Base power provides micro-gen and behind the fence opportunities for Bio-clusters and further agriculture value add opportunities (rural diversification and economic development) to utilize on-site resources – i.e. greenhouses using free heat, fertilizer and power.

There are significant opportunities to build out biogas based distributed generation project across rural Alberta in the agriculture sector with access to manure sources and organic waste diversion from Landfill. Organic waste generated by over 3,000 food and beverage processing facilities, grocery stores, catering operations etc. located throughout Alberta (primarily Edmonton, Red Deer, Calgary, Lethbridge and other large centers). Distributed biogas facilities throughout the province could utilize these organics and return the value nutrient back to the land, save landfill space and contribute to the provinces CLP objectives. **See attached EDL Letter of Support**

At just 10% uptake of biogas opportunities per producer of the included farmers with easy access to manure based on average on-farm scale facilities (~0.5MW) the near term potential is:

- Over 125 on-farm biogas facilities to be built
- 75MW renewable base load generation from organic waste diversion
- Capital investment of approximately \$625,000,000 – (\$5,000,000 per 0.5MW biogas build)
- 415 FTE jobs created
 - *These are on farm jobs, promoting responsible production while attracting / keeping progressive youth involved in agriculture (Alberta's backbone industry) due to the innovative nature of biogas renewable energy production.* – Chris Perry – GrowTEC

Waste Diversion and Management

Based on 2 operational facilities in Southern Alberta

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|---|---------------|
| Organics diverted from landfill in 2015 | 6,000 tonnes |
| Manure diversion in 2015 | 37,000 tonnes |
| Other waste organic resources in 2015 | 30,000 tonnes |

Alberta population: worst in country at over 1,000KG per capita waste disposal.

Greater than 35% of this is considered organic waste = ~1,400,000tonnes of organic waste. Direct benefit is extended life of landfills.

Alberta Rural Manure source opportunity:

- Over 500 dairies spread across the province - **see letter of support from Alberta Milk**
- Over 400 Hog producers
- Over 150 cattle feedlots (over 1,000 head each) – *over 4,000,000 head of cattle in Alberta*
- Over 200 Chicken producers
- Alberta highest per capita waste in country - >35% organics
 - **See attached Lethbridge Chamber Bioenergy Advocacy Letter**

“Permolex intends to co-locate an anaerobic biodigester on their bio industrial plant site in Red Deer. Use of this process will result in approximately 50,000t of tangible CO₂e reductions from transportation of our waste water stream which is currently trucked away as animal feed, reuse of the biogas created to produce power on the plant site resulting in reduced emissions from natural gas use and the ability to sell green power to the grid enabling resilient community generation from industrial, farm and municipal waste”. Permolex

Environment and Health Impacts:

The BIOGAS industry improves air quality where manure is spread in communities (i.e. Southern Alberta Feedlot Alley, Central Alberta concentrated dairy farm industry) and stabilizes nutrients in manure to create a pathogen free, odour reduced organic amendment that can be applied to land.

“Generation of electricity from biogas is aiming at organic waste diversion (away from landfill) and qualitative improvement of ‘waste’ (manure) for re-use rather than ‘avoidance’ of waste. Value lies in replenishing the land with organically derived nutrients (vs. chemically derived fertilizer) such as nitrogen, phosphorous etc. that are more balanced and environmentally friendly to use on land with less impact on air, ground- and surface water contamination.” – Stefan Michelski - Lethbridge Biogas

Consider articles:

http://www.canadiangeographic.ca/magazine/jun11/lake_winnipeg_algae.asp

- negative media on manure run-off to groundwater and algae blooms

And: <http://www.theglobeandmail.com/news/national/alberta-soft-peddaling-pollution/article4166811/>

A new public-health report strongly criticizes the Alberta government for omitting key facts and playing down health risks in a recent study of air pollution in Feedlot Alley -- home to Canada's largest concentration of livestock. The report by Chinook Health Region, which will be released today, also re-examined data and found that the residents of Feedlot Alley breathe some of the worst air in the province.

Reduction in GHG's

Alberta Grid Electricity Grid = 0.59 tCO₂e/ MWhr – By definition renewables are 0.64 tCO₂e/MWhr in Alberta. These are very conservative numbers and Biogas is on the high efficiency end.

- Organic diversion from Landfill equates to 0.74 tCO₂e per tonne diverted
 - GrowTEC and Lethbridge Biogas diverted over 6,000tonnes in 2015
 - Exponential reductions could be recognized if biogas become profitable in rural Alberta with over 1,400,000 tonnes of organics going to landfill each year, and millions of tonnes of available manure which could be diverted

Many organic waste sources are not presently recognized by the Alberta GHG Protocol

- manure lagoons diversion - approximately 0.25 tCO₂e per tonne manure
- diverting baseline stockpiling of organics - manure piles and onions for example
 - over 4000 tonnes to the GrowTEC facility in 2015

All-in Cost Effective Source of Renewable Energy

Biogas-based power generation is base load renewable electricity. 24/7. There is **no need for back-up** as there is for wind and solar renewables. This distributed 24/7 renewable energy helps balance the Alberta electricity grid with **no required additional transmission infrastructure**. There also is a

GHG cost to transmission. Furthermore, wind and solar generation facilities do not create added benefits of landfill and organic waste diversion.

In other words:



Alberta Biogas Cost <



Wind or Solar Farm

+



Gas Peaking
Plant

+



New Transmission
Lines

+



Organics to Landfill

Market Access - 2 parts:

1. Market access to grid is onerous and extremely expensive for smaller scale (biogas). Biogas is agriculture based and should be agriculture in policy. This would entice more agriculture producers to consider building on farm biogas facilities.
2. Market access for agriculture Products internationally. Alberta exports most of its agricultural products, many to developed nations including Europe, Asia and America. Climate change and emission reduction issues are high on these customer's agenda's. Promoting and investing in the biogas industry in agriculture is an excellent opportunity for Alberta to recycle carbon tax dollars and help improve our resiliency and access internationally as an export country.

Chris Perry of GrowTEC was personally invited as PepsiCo's most progressive and sustainable farmer in North America to attend a COP21 side event that highlighted current climate progress and future opportunities across many of the most important commodities in global agriculture. This event showcased opportunities for positive climate action by companies and growers internationally to support governments' carbon reduction targets while fostering productivity and global competitiveness. The topic most prevalent was that big processing companies were strategically aligning with progressive and sustainable producers which in turn helped them market their products to the world. Alberta is well positioned to be a leader in food production and GHG reduction which will enable access to niche markets demanding action moving forward.

Let us Help you make this a GREAT Story! If you have any questions on the above material or outstanding questions, please feel free to reach back to me.

Chris Perry

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