

Overview of the Broiler Litter and Horse Bedding Gasification Feasibility Study

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The objective of this project is to undertake a site-specific technical and economic feasibility assessment for gasification of used broiler litter and horse bedding in the Lower Mainland to produce renewable energy and ash fertilizer.

The following steps will be completed:

Feedstock analysis - to confirm the availability, cost and characteristics of used and broiler litter and horse bedding in the Lower Mainland, as well as analyze the litter and bedding to understand its chemical and physical characteristics.

Technology selection – design parameters includes the ability to gasify a feedstock mix with the chemical, moisture and ash content levels of used broiler litter and horse bedding to identify the most efficient, economic and environmentally favourable gasification technologies

Recipe development – to determine the opportune range of feedstock combinations to optimise renewable energy production and narrow the estimated range of syngas, ash production and stack emissions from possible to probable.

By-product analysis – analysis of the ash by-product from gasification to assess its potential value as a fertilizer. The stack emissions from the gasification plant will be analysed to determine if has potential uses.

Site selection - A list of potential sites for the gasification plant, such as greenhouses, industrial and agricultural heat and power users, will be assessed and ranked according to merits such as size, energy needs and proximity to infrastructure.

Regulatory Review - identify all necessary regulatory and permitting requirements for a gasification plant at the selected site in the Lower Mainland.

Economic feasibility – to include cost estimates for capital costs, including feedstock handling, gasification, energy generation, interconnection and other necessary infrastructure, soft costs for engineering and permitting, construction costs, and operation and maintenance costs.

Presentation – will be given to interested stakeholders

Background information

Due to the nutrient surplus in the Lower Mainland, BC's poultry industry is looking for cost-effective alternatives to the land application of used broiler litter in the Lower Mainland. According to the 2009 BC Horse Industry Report, there are currently over 24,000 horses in the Lower Mainland. Appropriate disposal of used horse bedding from these animals in the Lower Mainland can be challenging for those with limited pasture availability.

Gasification involves the partial combustion of feedstocks at relatively high temperatures of 900 – 1,400°C to convert the feedstock's chemical energy into a combustible gas known as 'syngas'. Syngas, composed mainly of hydrogen, methane and carbon monoxide, can be utilised in a range of applications

to produce renewable heat, or heat and electricity. The by-product of gasification is ash. The volume of ash will depend upon the ash content of the feedstock.

Gasification provides a year-round use for used broiler litter and horse bedding in the Lower Mainland. This contrasts with land application and composting, where much of the litter and bedding is stored for a significant period of time before being land applied in the spring and fall.

Gasification presents an opportunity to convert thousands of tonnes of used broiler litter and horse bedding in the Lower Mainland to renewable energy. These feedstocks are ideal for gasification as they are produced year round in close proximity, and are available at no cost. Combining used broiler litter and horse bedding for gasification also provides an interesting opportunity to reduce the moisture content of used horse bedding and chemical and ash content of used broiler litter, thereby making the feedstock mix easier to gasify.

In 2010, the BC Ministry of Agriculture evaluated the economic feasibility of building a large-scale gasification plant in the Lower Mainland. The plant was to act as a mass animal carcass disposal site in times of emergency, and would gasify a feedstock mixture of broiler litter, spent hens, specified risk material (SRM) and cow non-SRM at all other times. The results of this study were not encouraging. Due to the need for 30 days of feedstock storage to enable the gasification plant to continue receiving animal carcass when the Lehigh cement plant was down for repairs, total project costs were \$50 million; 35% higher than anticipated. Due to this cost, the gasification plant was not deemed to be financially viable.

Technological advances have been made with gasification, and today there are several examples of environmentally sound and efficient gasification plants converting used broiler litter and horse bedding to syngas.

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