TRANSPORTATION OF OUTSTATE NATURAL BIOGAS TO ROCK TENN

A. DEFINITION OF NATURAL BIOGAS

Natural biogas can be generally defined as a gas derived from a natural biological process such as anaerobic digestion or decay of landfill waste. This differentiates natural biogas from synthetic natural gas (syngas) produced from the pyrolysis of coal. Throughout the rest of this report the term biogas will mean natural biogas.

However, there are many definitions of biogas relating to specific attributes of biogas such as 1) its usefulness in fuel substitution, 2) its usefulness in meeting utility mandates, and 3) its usefulness in providing tax and other economic incentives.

1. Fuel (Btu) substitution

Any clean burning biogas which has a reasonable Btu value and the proper combustion characteristics may be used to offset use of another fuel commodity such as natural gas or fuel oil. To make the biogas clean burning may first require "cleanup" to remove such impurities as hydrogen sulfide and concentration to increase the percentage of methane. The economics depend on the cost of obtaining and processing the biogas compared to the alternate fuel savings as measured on a comparable Btu basis.

2. Utility mandates

Minnesota law (MN Stat. 216B.1691) requires that all Minnesota utilities install a mandated amount of renewable generation, some of which must be generated by biomass energy technologies. The law, as revised in 2008, defines renewable generation as electricity generated from an eligible energy technology as follows:

Section 1. Minnesota Statutes 2007 Supplement, section 216B.1691, subdivision 1, is amended to read:

Subdivision 1. **Definitions.** (a) Unless otherwise specified in law, "eligible energy technology" means an energy technology that generates electricity from the following renewable energy sources: (1) solar; (2) wind; (3) hydroelectric with a capacity of less than 100 megawatts; (4) hydrogen, provided that after January 1, 2010, the hydrogen must be generated from the resources listed in this clause; or (5) biomass, which includes, without limitation, landfill gas~~,~~; an anaerobic digester system~~,~~; the predominantly organic components of wastewater effluent, sludge, or related byproducts from publicly owned treatment works, but not including incineration of wastewater sludge to produce electricity; and an energy recovery facility used to capture the heat value of mixed municipal solid waste or refuse-derived fuel from mixed municipal solid waste as a primary fuel.

It is interesting to note that 2008 revisions to the definition of eligible energy technology add the generation of biogas from wastewater treatment plant byproducts.

The foregoing attributes demonstrate that in addition to fuel substitution, biogas has value in creating renewable energy certificates applicable to electricity produced from combustion or other processes using biogas as the fuel. The amount of eligible renewable generation can be quantified via renewable energy certificates registered under a system called M-RETS recently adopted in Minnesota by the MPUC.

3. Tax and Other Economic Incentives

Sec 45 of the US tax Code provides production tax credits (PTC's) applicable to electricity produced from eligible biomass sources including closed-loop biomass and open-loop biomass sources which are defined in more detail in the code. The production tax credit is applicable only if the electricity is sold to an unrelated third party, and the amount of the credit is 50% of the credit applied to wind conversion systems. The PTC's will not be available to projects placed in service after December 31, 2008, but pending legislation would continue the credits.
Municipal electric utilities and certain other governmental agencies can issue Clean Renewable Energy Bonds (CREBS) to finance natural biomass projects that generate electricity, and Renewable Energy Production Incentive (REPI) payments are available to certain non-profit organizations which cannot utilize PTC's but also utilize biogas to produce electricity.

B TRANSPORTATION OF OUTSTATE BIOGAS

1. Physical Delivery

Physical delivery must be accommodated via interstate pipeline companies and local distribution companies (LDC's) under their filed tariffs. The pipeline company is traditionally called the transporter and the agent arranging for the transportation is called the shipper. The shipper arranges for the biogas to be injected into the pipeline at a receipt point and taken out of the pipeline at a delivery point. However, the shipper must first obtain capacity and meet other pipeline tariff requirements. Upon injection into a pipeline, the biogas is co-mingled with natural gas and its physical identity is lost, but the attributes can be re-attached for contract purposes at the delivery point. This is no different from the transportation of electricity (called wheeling).

2. Pipeline Quality Biogas

First and foremost the biogas must be cleaned up, concentrated and pressurized to meet interstate pipeline requirements. This means that the biogas must be almost all methane (with specified limits on impurities such as oxygen CO2, etc) with a heating value of no less than 950 Btu's per standard cubic foot (scf) compressed to 600 to 800 pounds per square inch gauge (psig). Certain companies such as Air Liquide are in the business of manufacturing equipment to connect to the biogas source and meet these requirements. However, it is important to note that meeting the pipeline requirements requires substantial capital investment along with operating costs for

electricity and O&M. Following is an excerpt from Northern Natural Gas Company's FERC tariff regarding gas quality

44. QUALITY

All gas to be received from Shipper into the Northern pipeline system shall conform to the following specifications:

a) The gas shall be commercially free from objectionable odors, solid matter, dust, gums and gum-forming constituents, or any other substance which might interfere with the merchantability of the gas, or cause injury to or interference with proper operation of the lines, meters, regulators, or other appliances through which it flows.

b) Oxygen - less than or equal to 0.2% by volume.

c) Hydrogen sulfide - less than or equal to 1/4 grain/Ccf.

d) Total Sulphur - less than or equal to 20 grains/Ccf.

e) Carbon Dioxide - less than or equal to 2.0% by volume.

f) Water - less than or equal to 6 pounds/MMcf.

g) Heating Value - greater than or equal to 950 Btu/Cubic Foot.

h) The temperature shall be less than or equal to 120 degrees Fahrenheit.

If any gas received by Northern shall fail at any time to conform to the specifications set forth above, Northern may refuse to accept delivery pending correction by the other party. Northern may, on a basis that is not unduly discriminatory, elect to accept gas which fails to meet specifications.

3. Transporter

The direct interstate pipeline transporter serving the Twin Cities is Northern Natural Gas Company (Northern) which transports natural gas to the St Paul via major pipelines originating from the Gulf Coast and The Texas-Oklahoma area. An alternate interstate pipeline company transporting Alberta gas to the area north of St Paul is the Viking Pipeline Company. However, in order to get gas from the Viking pipeline to St Paul also requires a back-haul on the Northern pipeline from an interconnection where the two pipelines cross near North Branch, MN. To bring gas transported by the interstate pipelines to Rock Tenn requires additional transportation across Xcel Energy's local distribution system (LDC).

The point at which a facility of Northern interconnects with a pipeline facility owned by Xcel Energy is called a town border station (TBS) or a Citygate. Xcel Energy can then transport the gas from a TBS to Rock Tenn.

4. Interstate Pipeline Capacity and Shippers

The shipper is usually an independent third party who arranges for shipment of the natural gas or biogas for the biogas owner. The shipper moves the gas under a capacity contract with the transporting interstate pipeline. Therefore, a third party is typically responsible for purchasing capacity rights in order for the gas to move from its receipt point to its delivery point. It is important to note that capacity under the interstate tariff is not always available because capacity owners often purchase all available capacity under advance contracts each time the pipeline expands. In this event, a biogas owner must find a shipper with an existing capacity contract adequate to cover shipment from the receipt point to the delivery point.

5. Interstate Tariffs and Costs

Northern's tariffs for natural gas transportation are divided into zones. The zone in which St Paul is located is called the market zone which begins at a point in northern Kansas called Demarcation. That is the point at which Northern's gas gathering system changes to its market delivery system. Moving gas anywhere within this market area is done at a postage stamp rate which varies seasonally. The winter period is November-March, and the summer period is April-October. Northern's tariff for transporting gas within the market area (applicable to a shipper having the necessary capacity) is shown at Northern's web site under tariff sheet No.51.

This tariff includes a reservation charge for capacity along with commodity and fuel retainage charges. Northern's winter capacity charge is now about $15.15 per peak-day dekatherm (dkt,which is the pipeline terminology for one million Btu's) of capacity reserved per winter season month. For example, if a shipper has a capacity entitlement of 1000 dkt per day and ships this amount of gas each day for one 30-day month (called 100% capacity factor) the shipper would pay $15,150 that month for capacity to ship 30,000 dkt, or 50.5 cents per dkt only for capacity. Additionally, the shipper must pay a commodity charge of approximately 5 cents per dkt plus a fuel retainage charge of about 1.8% during a winter season month. This results in an all-in winter charge of about 63 cents per dkt. Seee Northern Natural Gas company web site: (www.northernnaturalgas.com). During the summer period the reservation fee drops to $5.68 per dkt.

Keep in mind that if more than one interstate pipeline is required to transport the gas, such as Viking, then another transport charge would be added by that pipeline.

6. Xcel Energy Tariffs and Costs

Xcel Energy's LDC tariffs for transporting customer-owned biogas are included at Xcel's web site, www.Xcelenergy.com . The applicable rate for firm service is a per therm rate under Rate Code 104, Large Firm Transportation Service. Keep in mind that a therm is 1/10 th of a dekatherm (dkt) The rate includes a demand reservation fee of $0.79 per

therm ($7.90 per dkt) per month of maximum daily capacity and a fixed distribution charge (commodity) of $.045 per therm ($0.45 per dkt). Using the foregoing example as applied to price interstate transportation, the LDC cost to transport 1000 dkt per day would be $7900 for capacity reservation and $13,500 for commodity for a total of $0.71 per dkt for that month.

7. Daily Gas Management

In addition to paying tariff rates for gas transportation, a shipper must notify each pipeline prospectively on a daily basis the amount of gas it intends to ship the following day. This is called the nomination process and is typically managed on a 24/7 basis by an independent daily gas management firm or by the shipper. Differences between nominations and actuals incur an imbalance charge which can sometimes be substantial, especially when a shipper ships more gas than their capacity contract allows during a pipeline curtailment. Therefore, the biogas owner must also arrange for daily gas. management.

8. Interruptible and Negotiated Rates

Both Northern and Xcel offer lower-priced interruptible rates if the customer can switch to an alternate fuel or shut down a manufacturing process during cold weather curtailment periods. These utilities can also offer special negotiated rates under some circumstances such as the threat of a bypass pipeline.

C. TRACKING ATTRIBUTES

A key issue is whether the biogas attributes follow the biogas. There seems to be consensus by the transporters that attributes will follow physical delivery. However, it is our understanding that the IRS has made no tax ruling whether the Feds will allow a PTC on electric generation produced from biogas with attributes transferred along with physical gas from a remote source. We also understand that a letter ruling is forthcoming.

D. NEW INCENTIVES FOR USEFUL THERMAL ENERGY FROM BIOGAS

> The recently passed Energy Independence and Security Act of 2007 includes important incentives for capturing useful thermal energy. Under the Act, useful thermal energy is defines as:***Useful Thermal Energy:*** (a) Energy in the form of direct heat, steam, hot water, or other thermal form that is used in production and beneficial measures for heating, cooling, humidity control, process use, or other valid thermal end use energy requirements, and
> (b) for which fuel or electricity would otherwise be consumed.
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> The Act also states: “In the case of waste energy recovery that produces useful thermal energy that is used for a purpose different from that for which the project is principally designed , a grant under this section shall be made to the owner or

operator of the waste energy recovery project at the rate of $10 for each 3,412,000 Btu's of the excess thermal energy used for the different purpose.

E.. M-RETS TRACKING

The M-RETS system adopted in Minnesota for tracking REC's does not track biogas, but it does register and track REC's associated with electricity produced from biogas.

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