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PROCEEDINGS

Title: ANATOMY OF AN ANIMAL WASTE RENEWABLE BIOGAS PROJECT

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Abstract: This article provides an overview of the legal and contracting considerations involved in financing, constructing and operating a renewable biomethane ("Biogas") production facility that uses anaerobic digestion and treatment to convert dairy farm manure into pipeline quality renewable Biogas. It also addresses contracting for the sale of the renewable Biogas to end users and arranging for utility pipeline transportation.

INTRODUCTION

What is the point of a project that produces Biogas from animal waste given the prevalence of natural gas at this time? That question has several answers. Biogas is a fuel that constitutes a sustainable component of the essential mix of fuel supplies for generation of energy. Biogas has many positive attributes. It generates electricity, produces heat for many purposes, and powers vehicles. It produces minimal greenhouse gas and other pollutants. Manure is above ground, easily accessed and readily available from farms. Biogas can be produced locally for local use after treatment or treated and injected into utility gas pipelines or compressed for use elsewhere.

Biogas is composed of methane and carbon dioxide resulting from anaerobic digestion or fermentation of biomass including manure. Dairy manure is one of several sources of suitable animal waste, which also includes waste from feedlot cows, hogs, chickens, and turkeys, and is, in and of itself, sometimes referred to as "fuel." In order to make use of its energy potential as described in this article, Biogas from animal waste must be collected and processed in anaerobic digesters that produce Biogas and other useful products. The alternative for the greenhouse gases produced by untreated animal waste is that the gases must be destroyed. As a result, all too often, farmers flare (burn) the greenhouse gases without capturing its energy if the equipment and infrastructure necessary to harness Biogas is not readily available.

The infrastructure needed to accomplish production of Biogas consists of facilities to receive and, if necessary, dewater the manure. It is then processed through anaerobic digesters, tanks or lagoons that make use of proven technology and natural processes by which bacteria digest manure in an oxygen-free medium in

order to convert animal waste to methane gas. Anaerobic digesters are, typically, scalable units. Digestion in a pond or lagoon is not discussed in this article.

> Production of Biogas provides users with long-term reliability and commodity cost

control. Our vast consumption of milk products requires proportionally great numbers of dairy cows. Dairy (and other livestock) farms can predict manure production fairly accurately, and the costs of digesters and treatment facilities can also be projected with reasonable certainty.

The production of Biogas also helps to avoid the burdens and expenses that handling and disposal of manure imposes upon farmers. Methane emanating from manure raises environmental issues. As suburban areas encroach upon farm areas, there are also increasing issues with the odors from waste ponds and environmental impacts.

ANATOMY OF AN ANIMAL WASTE BIOGAS PROJECT

Project. The project discussed in this paper ("Project") is being developed in California for the purpose of serving customers primarily located in that state. It involves a complex and multifaceted effort on the part of the company that will develop and operate this project ("Company") including, among other things, the engineering, siting, financing, legal structuring and construction of Biogas equipment on farms together with gathering lines and facilities for the purpose of injecting Biogas into utility pipelines for transportation to end-use customers. Customers in California that utilize this "directed" Biogas as fuel for fuel cells will also seek benefits under the California Self-Generation Incentive Program (discussed below). Since the Project is in the development stage and there are confidentiality agreements, this article does not refer to any specific companies, dairy farms, persons, products or locations. In addition, certain facts have been modified for the same reason.

Siting the Projection Facilities. The dairy farms participating in this Project are to be located in a series of clusters in a valley or other "unified" geographical location. The proximity of numerous dairy farms enables the use of certain common facilities to digest the manure and treat the Biogas. To make the Project feasible, these clusters will be located in the vicinity of a utility gas pipeline into which the treated Biogas can be injected. In addition, a portion of the treated Biogas may be used to fuel cogeneration in the production facilities and may also be re-allocated to the dairy farmer for on-site generation purposes. The cluster of dairy farms in each geographical location will form a separate phase of the overall Project.

Project siting should not be a significant problem for these anaerobic digesters and treatment facilities in light of their environmentally beneficial aspects. The gas lines that connect the digesters processing equipment to gas utility pipelines are as unremarkable as any other gas distribution lines underground and alongside or beneath our public streets.

Manure. Dairy farms produce vast amounts of manure (or fuel). A 1,400 pound dairy cow will produce as much as 120 pounds of manure in a day, which presents both a formidable waste disposal challenge and an opportunity to produce energy. The ability to dispose of this amount of waste

can require the dairy farm to own or lease significant tillable acreage over which manure must be spread. Sometimes all or a portion of the manure is put into ponds. The Biogas produced by a covered pond is too often flared to destroy the methane, which process does not make use of its energy potential.

Digesters and Treatment Facilities. The manure to be used for the production of Biogas must be free of foreign materials and have the correct water content to be used for producing Biogas. The Project is using an anaerobic digester system provided by a U.S. company and manufactured in the U.S. These digesters will use manure which may be mixed with supplemental digestate products such as sorghum. The digester and treatment facilities (collectively, "Facilities") will include processing equipment, combined heat and power and PSA (pressure swing absorption) or TSA (temperature swing absorption) Biogas upgrade systems. Some of the dairies will have smaller, on-site digesters (contiguous farms may share Facilities). The company that is providing the Facilities will also warrant Biogas production, including yields and quality.

Gathering Lines and Injection. Gathering lines to bring together the Biogas produced by the Facilities to the point of injection into the utility pipelines will be installed. Where such lines traverse private property, it will be necessary to obtain easements from the property owners. If a public road is involved, it will be necessary to obtain a right of way from the applicable governmental unit.

Contracts:

Contracts between the Company and Dairy Farmers**.** The Company will enter into a contract with each dairy farm providing, among other things:

- Each dairy farm will supply and deliver all of its manure feedstock to the Facilities for a period of 20 years;
- The manure is to be delivered to one or more supply points (a large mixing tank) facility at a rate such that the tank does not overflow or fall below a specified number of feet;
- the manure delivered must be free of all foreign materials or substances such as rocks, wood or bone including chemical compounds and antibiotics or dry lime, that in any way impair operation of the digester equipment or systems or the health/vitality of the bacteria resident in the digester and shall also be reasonably free of sand and not unduly diluted with water;
- The dairy may continue to use its existing waste gathering systems (or upgrade them);
- The Company shall own the Biogas and fiber produced by the digesters but the dairy farm shall retain ownership of the liquid;
- The Company shall own and pay all costs of the engineering, procurement, construction and operation of the Facilities;
- The dairy farm shall pay a monthly "tipping fee" to the Company based upon the number of "wet" (lactating) cows; and
- The dairy farms will also grant to the Company lease and easement rights giving the Company the rights to occupy the portion of the dairy farm on which Facilities, pipes and other equipment will be located.
- As a "backup" precaution, the Company has arranged to procure

digester feedstock from alternative sources should that become necessary.

Engineering Services. Significant professional engineering, legal and accounting services are required at the "front end." For example, engineering services are required to evaluate each site and design and specify the equipment to be installed. They are also required for the necessary technical studies, planning, and engineering, design and construction management services.

EPC Contractor. This Project requires that the Company enter into an agreement with an "investment grade" engineering, procurement, contraction ("EPC") contractor, experienced in digester projects to provide services for a fixed price, turn-key cost, with performance guarantees for completion date, throughput efficiency and demonstrated output capacity. A major part of the EPC's job is to coordinate the digester facilities in different phases of the Project's construction. The EPC contracts and contracts for suppliers must be in place prior to the financing of the project and must be made contingent upon the Company obtaining financing. The EPC contract will include:

- A guaranteed maximum price;
- Per diem liquidated damages for delays; and
- A payment and performance bond.

Subcontractors.

- An electrical contractor will construct and warrant the electrical work for the Project;
- A general contractor in systems construction will provide the Project's structural and civil work; and
- A mechanical contractor will provide and guarantee the mechanical construction for the Project.

Operations & Maintenance Services Provider. The Company will contract with an "investment grade" O&M services provider that currently operates and manages several anaerobic digesters including digesters in the vicinity of the Project. The O&M services contract will include guarantees of Biogas production. The O&M services provider will also bear certain management responsibilities in coordination with the Company.

End-users and other Customers. The Company has entered into purchase and sale contracts for sales of Biogas with end users and other customers using a NAESB (North American Energy Standards Board, Inc.) form of agreement. The NAESB form is a standardized contract for the purchase and sale of gas and use a "master" agreement and transaction confirmation form. These purchase and sale agreements provide that:

- Each contract has a term of approximately 20 years. One of the benefits of utilizing Biogas for energy generation is that it is possible to control the commodity price over such a long period of time;
- These contracts are contingent upon the Company obtaining financing. Having such contracts in place is important to obtaining financing.
- Each contract sets forth the amount of Biogas to be provided on a daily

(and monthly basis) from the applicable cluster.

- The customers may be end users that plan to utilize the Biogas to provide fuel for fuel cells or intermediaries selling to end users planning to utilize Biogas for the same purpose.

Financing

Financier. To this point, the Project has received funding from an investor and interim financing is being arranged. Once it is necessary to commence the procurement and construction process, financing will be provided by a major financier. The financier may be providing financing by means of an equipment lease and a membership interest in the total Project.

Incentives

Self-Generation Incentive Program (SGIP)**.** The key incentive for this project is provided by SGIP which provides a dollar amount refund for every kilowatt of energy produced. Generally, for fuel cell renewable energy projects over 30 kW, 50% of the incentive will be paid up front and the rest of the incentive payment will be based on actual kilowatt hour production over the first five (5) years of the project. For smaller projects, the entire incentive is paid up front. The receipt of such benefits is subject to compliance and reporting requirements.

Incentives for Developers. Governmental incentives are often available to Biogas developers, as is the ability to sell certified emission reduction credits or renewable energy credits related to verified emission reductions of greenhouse gases, which includes any of the atmospheric gases such as carbon dioxide and methane that trap solar radiation and warm the earth's surface.

Renewable energy projects typically rely on these incentives to make these projects financially feasible and attractive to lenders and investors. However, each of these programs has specific requirements in terms of the ownership and structure of the project that must be met for the project to be eligible for these incentives. Providers of Biogas do not necessarily qualify for the credits – which can create a barrier to project development – but the electrical generation facility fueled by Biogas may meet the requirements for those incentives.

Tax Benefits. There also may be available investment tax credits. The investment tax credit provides the producer with a tax credit of 30 percent in the year that the equipment is placed in service rather than over a ten-year production period.

Insurance. The Company is considering the use of a captive risk mitigation instrument to provide a performance remedy for financial or operational non-performance incidents and/or business interruptions or cessations. Performance remedies would be handled by the insurance carrier. This policy has been approved by state regulators and is currently waiting to be underwritten. The underwriter will issue a policy to the Company. An insurance services provider will handle certificates, claims and claim payments.

Utility considerations. The injection of Biogas into the utility pipelines takes place subject to each utility's tariff. The initial cluster of the Project will inject fuel into the pipelines of Pacific Gas & Electric. The Biogas produced will have to

satisfy the applicable requirements for pipeline quality gas. Its injection will be metered and its operation will be subject to the nomination, balancing and other requirements of PG&E. The Company also plans to secure storage for the Biogas in order to make sure that a sufficient supply of Biogas is available on a day to day basis.

Permitting. In an effort to encourage the implementation of anaerobic digestion as a more environmentally acceptable method of treatment and disposal of dairy manure as opposed to land application, the applicable governmental authority certified a comprehensive Environmental Impact Study for dairy operations throughout the region in which the clusters would be located and later promulgated new regulations that greatly reduced the number of applications and requirements for all certified dairies to permit the construction and operation of anaerobic digestion systems. As a result, the time required to obtain permits and implement operations of dairy digester projects is substantially reduced.

AUTHOR

Peter Funk is a partner in the law firm of Funk & Zeifer LLP. His renewable, alternative and conservation energy practice includes solar power, landfill gas or animal waste renewable biomethane to power\gas off-take, cogeneration, energy efficiency, conservation projects and demand site management and energy-related financings. He has been involved with many energy conservation, on-site solar and CHP generation projects. Among many other representations throughout the energy industry, he has served as outside general counsel to an energy services company.

A member of the American and New York State bar associations and the Association of the Bar of the City of New York, he is a graduate of Boston University School of Law.

He often writes and speaks on topics in the energy and sustainability sectors. He is a member of the Energy Committee of the NYC Bar and an Associate Member of AEE, and a member of the Technical Advisory Board of *Mission Critical* Magazine for which he writes a regular column "Legal Perspectives."

He was president of the multi-family cooperative apartment building that became the first real- time price electricity customer of Con Ed as a NYSERDA demonstration project. That project also included participation in an emergency electric curtailment program with NYISO and an energy efficiency retrofit of the building. He has received a "Green Team" award from the New York Association of Realty Managers.