



Northwest CHP Application Center

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Fact Sheet CHP Biopower/Anaerobic Digestion: Have you asked all the right questions?

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CHP BIOPOWER/ANAEROBIC DIGESTION FACTSHEET

HAVE YOU ASKED ALL THE RIGHT QUESTIONS?

Introduction

There are a number of questions that need to be asked at an early stage when considering the installation of a biopower/anaerobic digestion system at your dairy or feedlot. It is the purpose of this factsheet to help ensure upfront communication regarding a proposed biopower/anaerobic digestion system. Categories of questions include type of digester technology, digester experience of project developer, economics and financing, co-product revenues, management and operations, power equipment, energy production, permits, utility sales and interconnection, and technology specific questions. The following list of questions and related comments are intended as examples of key questions. This list is not intended to be comprehensive. Different types of manure (dairy, beef, swine, and poultry) produce different volumes of methane. This factsheet is principally targeted to the dairy industry. However, much of the factsheet is more broadly applicable.

Type of digester technology

What type of digester is proposed? There are a number of digester technologies. As a general rule, simpler technology is better for dairy and feedlot operations (there is less chance for problems). In addition, digesters can operate at a variety of temperatures with different methane bacteria being used to create the biogas. A mesophilic system operates at 95 to 105 degrees F, while a thermophilic operates at a higher 125-135 degrees. An ambient system operates at outside air temperature and slows down or stops in the winter.

A list of digester technologies includes:

- Completely mixed mesophilic
- Completely mixed thermophilic
- Contact and anoxic gas floatation
- Plug Flow/mesophilic - simple
- Fixed film
- Covered lagoon/ambient - simple
- Vacuum

What makes the proposed technology/design different/better than any other? What is the basis of the claims? Has any third party (university, USDA, or EPA) verified these claims? If so, who specifically has made that verification? What is their contact information?

How is digester efficiency measured? What is the efficiency range of the design? What factors influence that efficiency?

How concentrated does the waste have to be for the process?

Does the process digest parlor wastewater? If so, what is its proportion of the waste stream? Does the process digest flush wastewater?

Digester experience of project developer

How many commercial digesters have you designed/built? How many are currently operating? What age and size are they? How long does it take to go from contract signing to operation?

Please provide references of the people you have done work for, or you are currently under biopower contract with?

Economics and financing

What is the cost range per dairy cow for the complete facility (\$/cow)? What factors affect the range in costs?

Does the cost estimate include electrical generation equipment with electrical switch gear and interconnection to the utility? If not, what is that cost?

What outside sources of funds are available to help fund the construction of a digester? What experience have you had in securing outside funds for digesters including, bank financing?

Will a bank treat a digester system as an asset of the dairy?

Co-product revenues

Economic and financial success often requires revenue streams in addition to power sales. This is especially true in areas of the U.S where the cost of power is relatively low. A variety of other products can be sold including green power, carbon credits and digested fiber. Additional products, such as a crystallized phosphorous fertilizer from the digested liquid, are also under development by Washington State University. It is important to resolve at an early stage of discussions the availability and ownership of co-products and the degree of reliance upon them for financial success.

What will be the revenue components from the facility? Upon what factors are these estimates based? What assistance is provided in accessing those markets?

Management and operations

What changes in dairy or feedlot operations are recommended or required? What will be the operational labor and management requirements for this digester? What training and support is provided for operating the digester?

Sand is a commonly used bedding material. What happens to the sand that is mixed with the manure?

How may this digester change or limit current or future dairy management decisions?

Power equipment

What type of generator set is recommended for digesters on dairies and feedlots? Which manufacturers are chosen and why?

What are the maintenance requirements for the “genset”? What are the warranties for each of the major components? Who specifically will offer those warranties?

Energy production

What is the typical and range of energy output for the particular type of digester technology? (kWh/cow/day)

How many kWh/cow/day does the proposed system produce? (*Normal is 2 to 3*)

What will the generator size per cow be? (*a normal generator size is $kWh / 24 = 0.2$ kWh/cow*)

Permits

What are the required regulatory permits for my location? Who deals with securing the required permits (building, air quality, health, solid waste, etc?)

Utility sales and interconnection

How much will the utility pay for the power? The answer is in \$/kWh and varies from utility to utility and state to state. What rate do you project for my location? Who will negotiate the sale of power?

What does a typical power sale contract look like? (length of contract, selling rate basis, other sales costs (wheeling, etc.).)

Is the utility supportive of this project and of interconnection to its electrical system?

Does the utility pay extra for the green power or carbon credits?

Technology specific questions**Thermophilic Processes**

How is sufficient energy obtained to heat up the waste to 125-135° F for the thermophilic process?

How many are in operation in the U.S. Are they teamed with a mesophilic secondary digestion?

How is the odor reduced? What are the dewatering costs associated with thermophilic digestion?

Canada has thermophilic digestion facilities for sewage sludge. What percent of volatile solids conversion to gas do they get? (50 percent)

Plug Flow Digester

What percent of volatile solids conversion to gas does a conventional plug flow digester produce? The answer should be 35 to 40 percent.

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