

Current Research in Renewable Energy

by

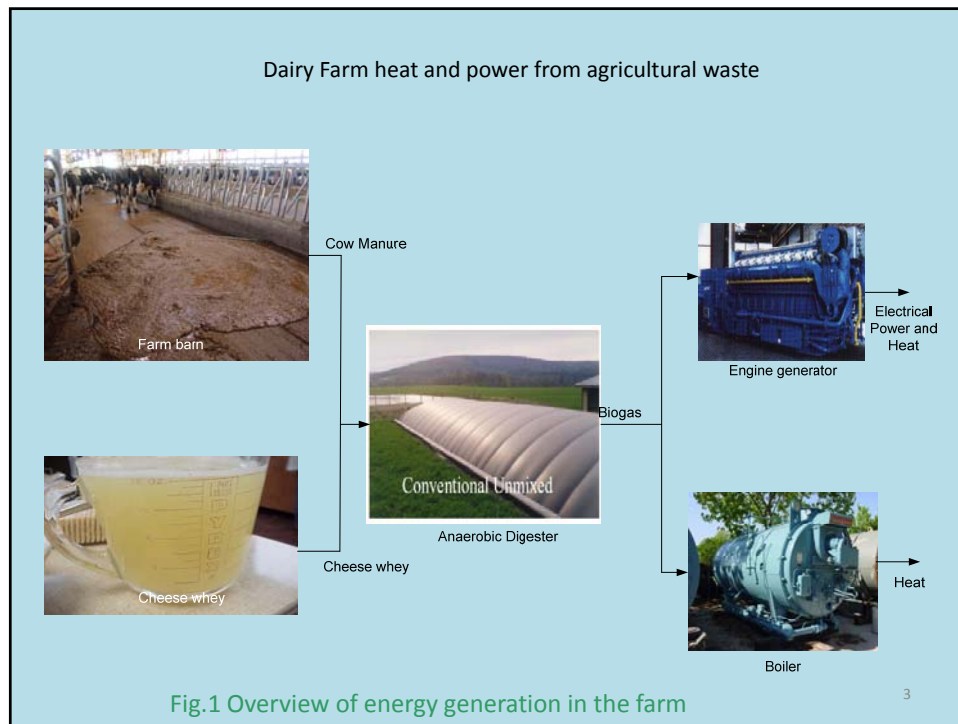
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Introduction

Biogas derived from the anaerobic digestion of manure and whey represents an important bio-fuel with economic, environmental and social benefits. However, well over 50% of the anaerobic digesters (AD) built before the mid-1980's failed to operate properly. The barriers to implementation of AD technologies include both the high capital cost and the farmers' perceptions that AD systems are hard to operate and likely to fail, especially at smaller scales and in the cold northern climates. Sand bedding is now the standard for modern and high efficiency dairy operations. The sand generates the most sanitary conditions within the stalls, however, it reduces the efficiency of AD.



Project Approach

1. Build and test a full scale AD/whey/cogeneration system at North Harbor Dairy
2. Develop and use a systems mass/energy/\$ optimization model
3. Life cycle assessment to determine environmental costs and benefits
4. Outreach and technology transfer through established partnerships between users, academia, and industries.

A triple win solution

- Increased economic viability for local farming industry
- Reduced environmental impacts
- Reduced dependence on fossil fuels

Strength Through Partnerships:

- University (engineering and social science professors)
- Industrial Development Agencies, Provincial & Local Government
- Farmers
- Local cheese producers (e.g., Kraft)
- Venture capital companies to facilitate technology commercialization and transfer

Farm Energy Optimization

- Objective:
 - To Determine the size of the engine-generator set and a boiler efficient to a farm system.
- The sizes are dependent on electricity and heat loads of the farm and their corresponding tariff rates.
- In New York state the electricity tariff is made up of several components; Basic (meter), delivery, delivery adjustment, system benefit, transmission revenue adjustment, and supply charge. Need to examine the economics in Quebec and Canada.
- All the components except the basic charge are dependent on the energy used. In addition, supply and delivery adjustment charges vary from day to day.
- Applying the exact tariff rate for each billing month has an effect on the size of the engine generator set compared to applying a yearly average tariff rate.

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Design & Implementation of Variable Speed Induction Generator Systems for Fault Studies in Wind Energy Applications

Background:

- Wind Energy Systems have received renewed interest in the past decade,
- A need exists for the reduction of operational and maintenance costs of these systems
- Continuous condition monitoring of these generators allows for early detection of degeneration and proactive responses, minimizing downtime & maximizing productivity

Project Aims:

- Design, model and implement two variable speed induction generator systems
- Implement the more common faults on the generators
- Attempt to identify them using steady state fault detection techniques
- Develop a platform for further research into the evaluation of fault detection techniques suitable for transient operation of the induction generator

