For years we only looked at one source of income from a cow
Now we need to take advantage of another valuable commodity from the other end of a cow
VANDERHAAK DAIRY
BIOGAS ANAEROBIC MANURE DIGESTER

"Helping to Sustain Agriculture"

CONSTRUCTION & MANAGEMENT
PROVIDED BY:

ANDGAR
360-269-9900

PATENTED ENGINEERING
AND DESIGN PROVIDED BY:

GHD, INC.
ANAEROBIC DIGESTERS
WASTE TO POWER!

Research and financial assistance provided by WSU's Center for Sustaining Agriculture and Natural Resources and its Climate Friendly Farming™ Project.

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

THE PAUL G. ALLEN FAMILY FOUNDATION

For more information contact: Craig McConnell, WSU Extension—Whatcom County, 360.676.6736
Financial Assistance Provided By:

- 25% - from USDA
- 15% - from Washington State University/Paul G. Allen Family Foundation’s Climate Friendly Farming Project
- 10% - from NRCS
System Overview

Unique Mixed Plug Flow Digester

- Optimum digestion from patented bacteria seeding design
  - Sludge recycle
  - Gas recirculation

- 21 day retention time
- Operating temperature of 100 degrees
BASIC ANAEROBIC SYSTEM FLOW CHART

CENTRAL COLLECTION PIT MANURE & OTHER ORGANIC WASTES

ANAEEROBIC DIGESTER

LIQUIDS

LAGOON STORAGE

SOLIDS PRESS

COMPOST

MARKETABLE FIBER BYPRODUCT

SOLIDS

BEDDING

ENGINE / GENERATOR

ELECTRICITY

POWER GRID

FARM HEAT

HEAT EXCHANGER

MIXING

BIOGAS

DEWATERED MANURE FROM FLUSH DAIRIES

MANURE FROM SCRAPE DAIRIES
Vander Haak Dairy
Anaerobic Digester

• Project Statistics
  – Located in Lynden, WA
  – Designed for 1,500 cows
  – Started in June 2004
  – Completed November 2004
  – Construction & Management: Andgar Corporation
  – Design & Engineering: GHD Inc.
Source of Biosolids

- Manure from 1200 cows
  - Manure is pumped from Vander Haak Dairy on Visser Rd. to a central collection pit where it is combined with manure from neighboring Dee Bee Jersey Farm and Vander Haak’s second dairy on Guide Meridian where the digester is located.
• **Digester System**
  – GHD Digesters will guarantee 90% volatile fatty acid destruction and are experiencing 35% total volatile solid destruction.

• **Solids Presses**
  – Waste stream coming in with half of solids removed from digester
    • Screw Press with a .5 screen will produce 22 lbs of fiber per cow at 65% moisture
Excavation
June 2004
Forming the Foundation & Floor
Forming the Walls
Fabrication of Heat Exchangers
Insulating Digester
Setting Roof Panels
Construction of Mechanical Bldg.
Completed Digester Roof
Electrical Switchgear
Temperature of manure inside digester is equivalent to a cow’s body temperature.
Project Complete: November 2004
Income Sources

• Power Sales
• Fiber Sales
• Carbon Credit Sales
• Tipping Fees
• Tax Credits
Power Sales
CAT G398 Genset
280kw-300kw
Puget Sound Energy
Statement of KWH Generated For
Vander Haak Dairy Digester

<table>
<thead>
<tr>
<th>Date</th>
<th>Reading</th>
<th>kWh</th>
<th>Rate</th>
<th>Amount</th>
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<tbody>
<tr>
<td>10-31-2005</td>
<td>41,533</td>
<td>41,533</td>
<td>$35.00 mills/kWh</td>
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<tr>
<td>9-30-2005</td>
<td>37,495</td>
<td></td>
<td>$15.00 mills/kWh</td>
<td>$2,422.80</td>
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<td>Total</td>
<td></td>
<td>161,520</td>
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<td>$8,076.00</td>
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</tbody>
</table>

Payments for Generation By Meter Y001918385 – Multiplier of 40
Calculation of Payment Due  11/30/05
• Fiber Processing
  – Peat moss substitute
  – Bedding
  – Soil amendments
  – Drying available from excess engine heat
99.5% Pathogen Free Solids
Treated Fiber being tested as a peat moss replacement for potted plant production
Pilot-scale phosphorous crystallizer
Carbon Credit Sales
Tipping Fees

Receiving Waste from Food Processing Companies
Tax Credits
Keys to the Success of the Project

• Having a reputable and dependable contractor and engineer heavily involved in the project.

• The overall system performance has met and exceeded expectations

• State and Federal organizations recognizing the value of such projects
WSU monitoring and research to validate performance

Environmental & economic monitoring

Trace gas emissions monitoring

Nutrient modeling and decision-support
Washington State Governor
Christine Gregoire
OPEN FOR DISCUSSION