Energy From Agriculture:

New Technologies, Innovative Programs & Success Stories

December 14-15, 2005 *St. Louis, Missouri*

Farm Foundation

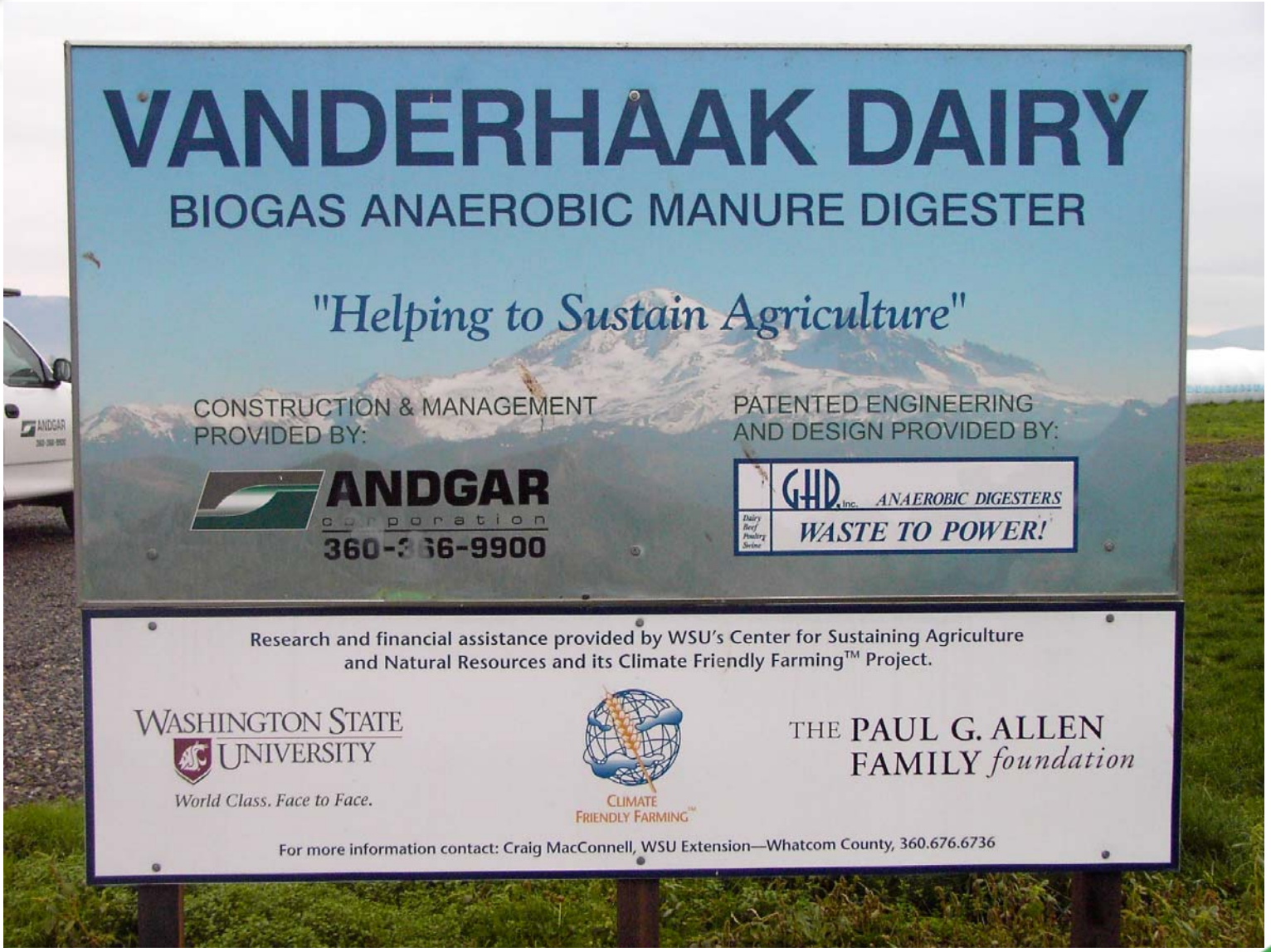
USDA's Office of Energy Policy and New Uses

NRCS

Rural Development

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 corporation
360-366-9900
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.
CLIMATE FRIENDLY FARMING™
THE PAUL G. ALLEN FAMILY foundation
For more information contact: Craig MacConnell, WSU Extension—Whatcom County, 360.676.6736

Financial Assistance Provided By:

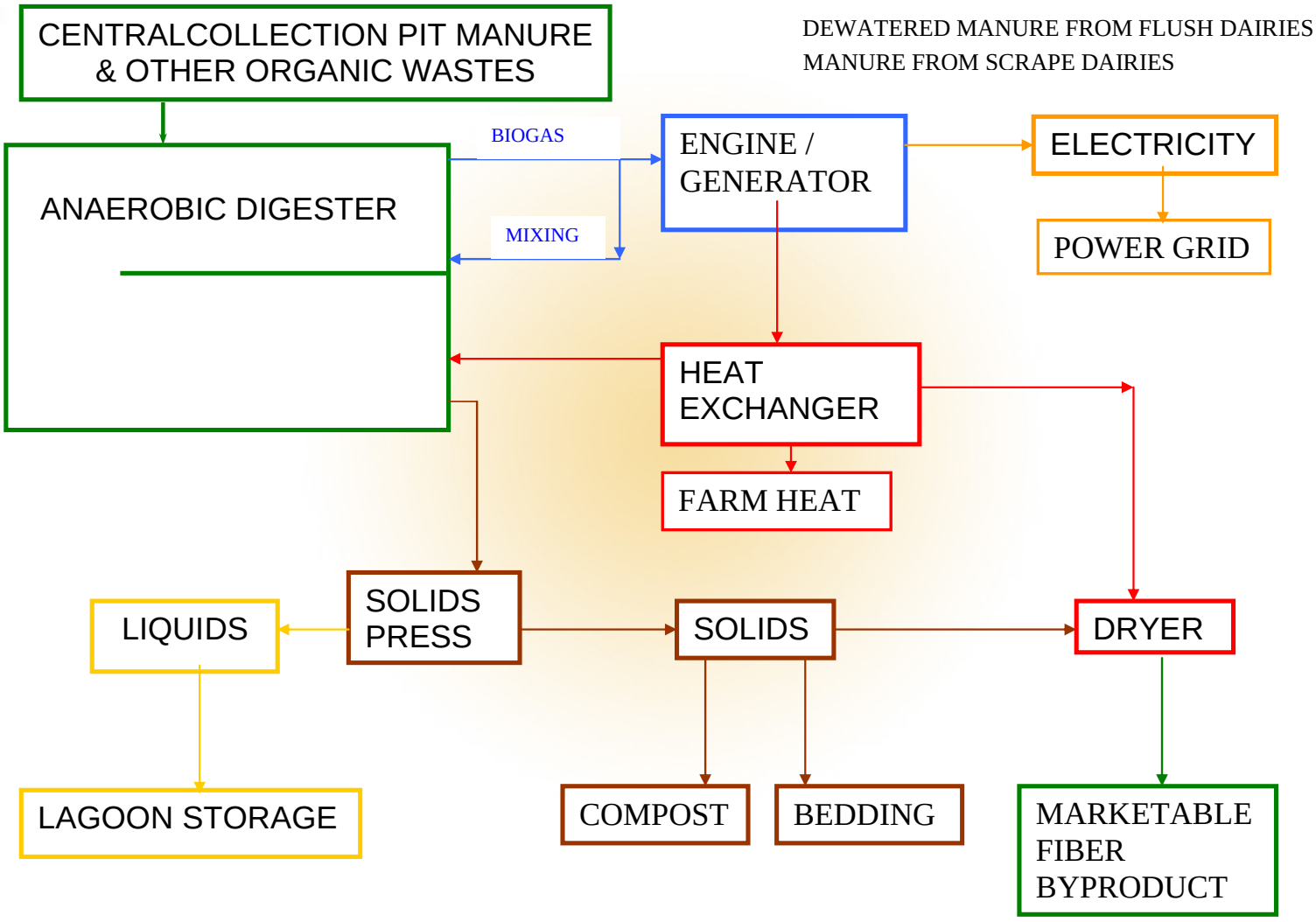
- 25% - from USDA
- 15% - from Washington State University/Paul G. Allen Family Foundation’s Climate Friendly Farming Project
- 10% - from NRCS

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



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

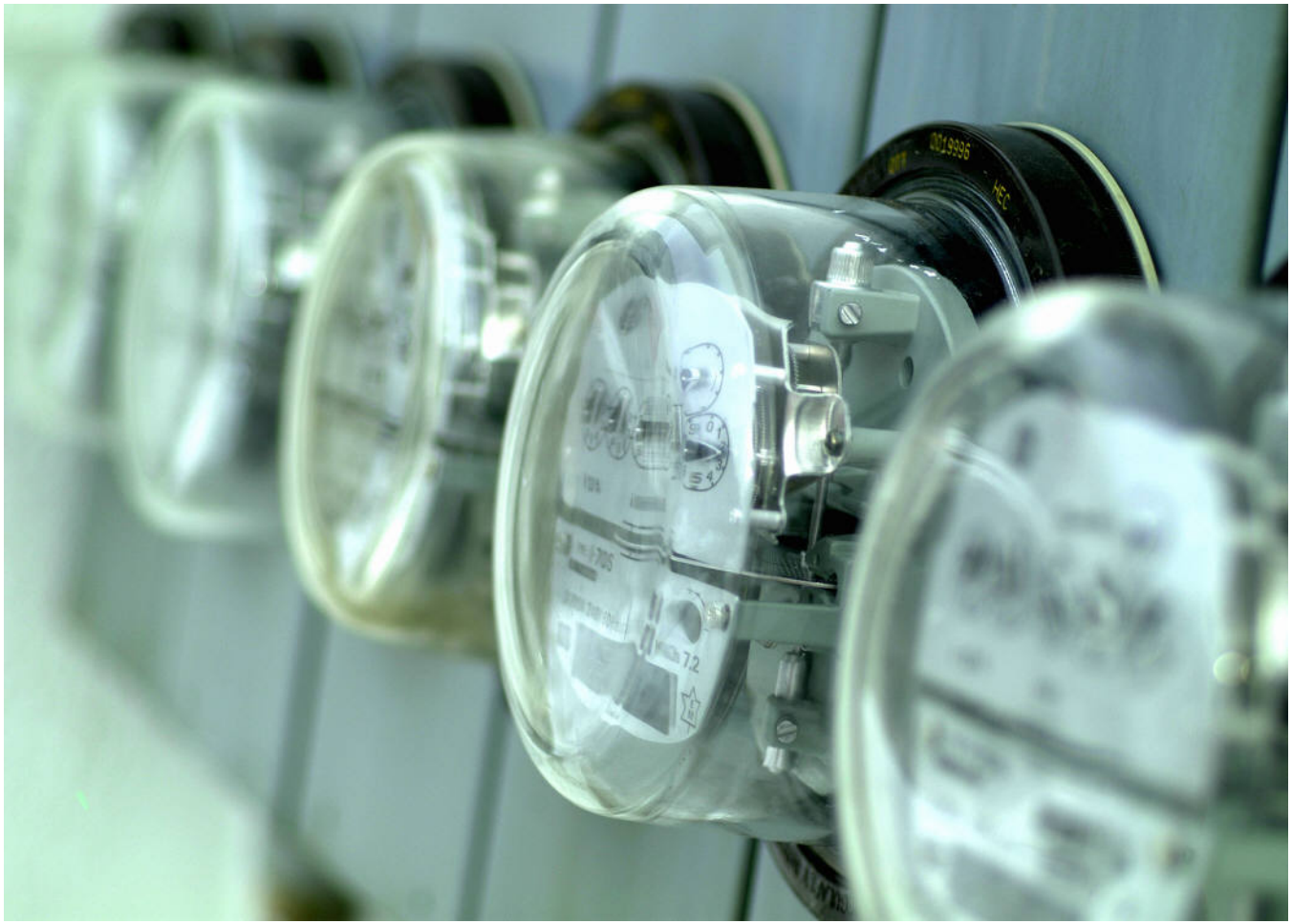
Temperature of manure inside digester is equivalent to a cow's body temperature.

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

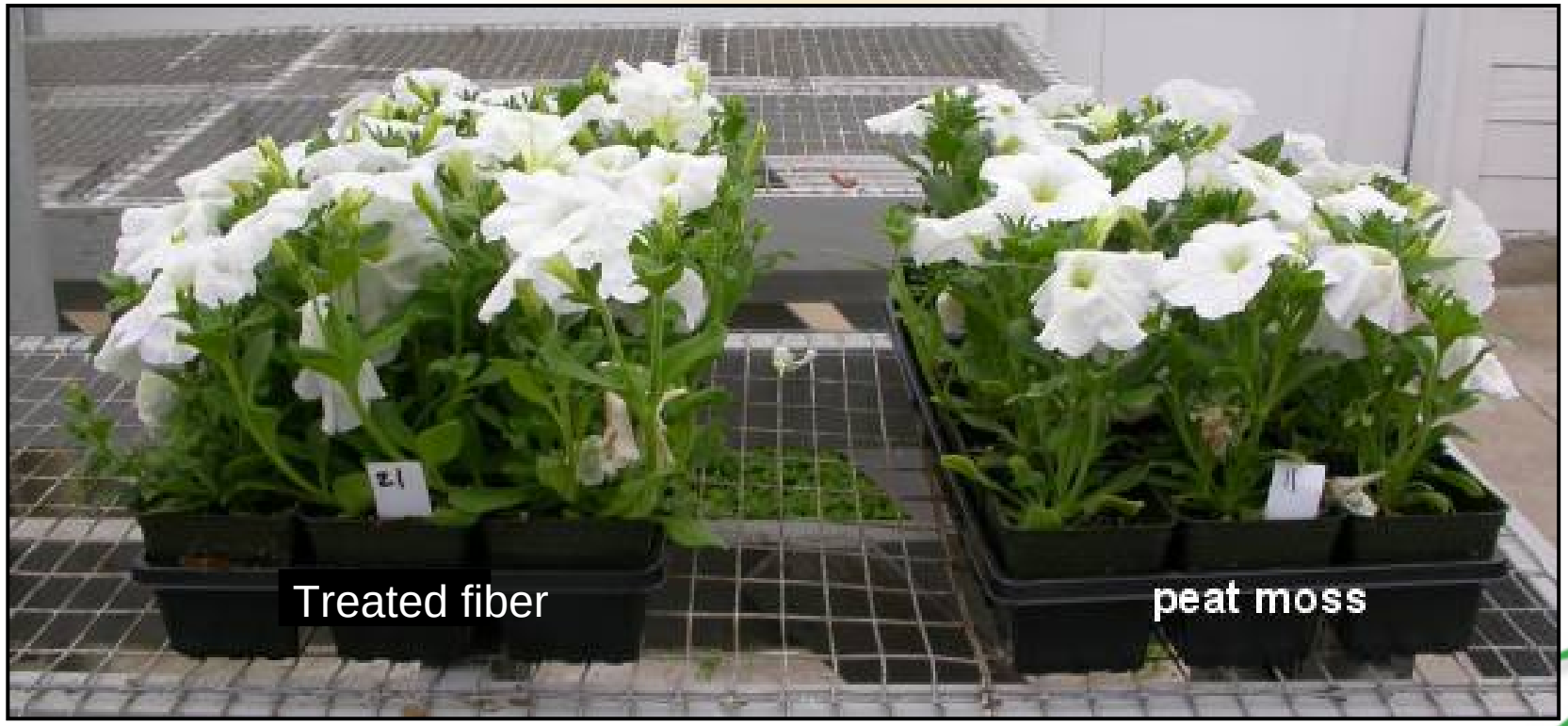
Date	Reading	kWh	Rate	Amount
10-31-2005	41,533			
9-30-2005	37,495			
Total				
Electricity		161,520	$35.00 mills/kWh	$5,653.20
Green Tag		161,520	$15.00 mills/kWh	$2,422.80
			TOTAL PAYMENT =	$8,076.00

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

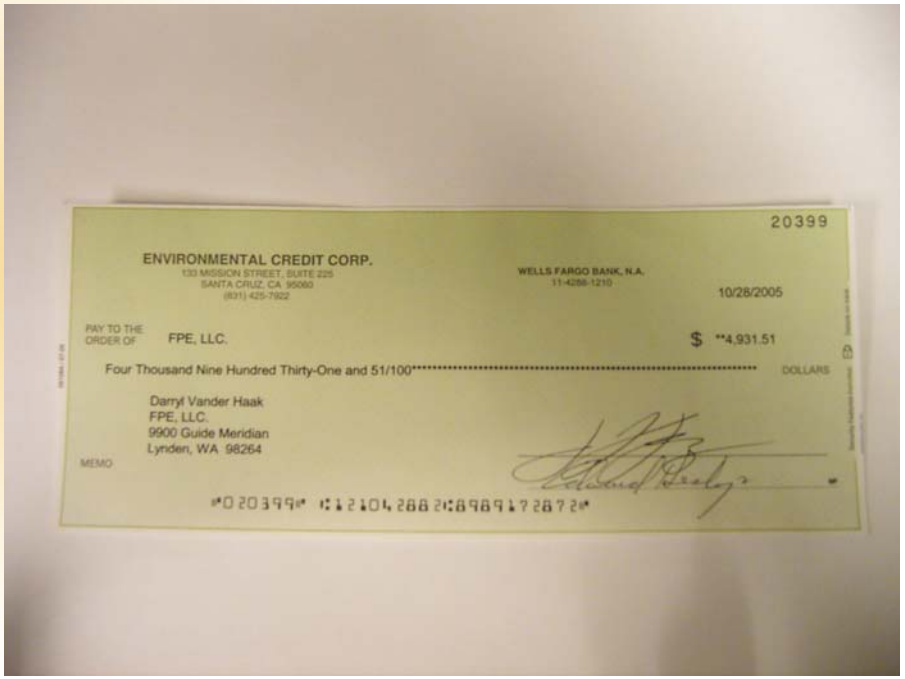
99.5% Pathogen Free Solids

Treated Fiber being tested as a peat moss replacement for potted plant production



Pilot-scale phosphorous crystallizer

Carbon Credit Sales



20399

ENVIRONMENTAL CREDIT CORP.
133 MISSION STREET, SUITE 225
SANTA CRUZ, CA 95060
(831) 425-7922

WELLS FARGO BANK, N.A.
11-4288-1210

10/28/2005

PAY TO THE ORDER OF FPE, LLC. $ **4,931.51

Four Thousand Nine Hundred Thirty-One and 51/100********** DOLLARS

Darryl Vander Haak
FPE, LLC.
9900 Guide Meridian
Lynden, WA 98264

MEMO

⑈020399⑈ ⑆121104288⑆898917287 2⑈

Tipping Fees

Receiving Waste from
Food Processing Companies

Tax Credits

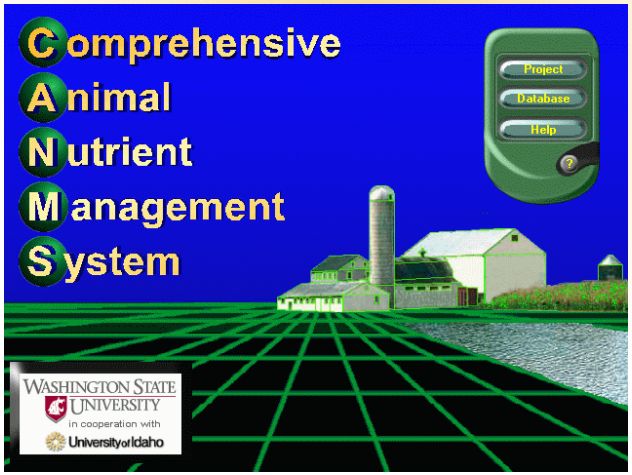
Keys to the Success of the Project

- 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 University

Climate Friendly Farming™

Washington State Governor

Christine Gregoire

OPEN FOR DISCUSSION