ACEEE Forum
Energy Efficiency in Agriculture

Des Moines Iowa

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Special Issues

Working with Small Farms

CVPS Programs for Dairy Farms

- Efficiency Plus Program
- CVPS Cow Power

Dairy Farm Efficiency Plus

- Legislation in 1991 prompted electric utilities develop energy efficiency programs

- Collaborative design process with regulators, environmental organizations and State agencies

Dairy Farm Efficiency Plus

- Established partnerships with
  - Vermont Department of Public Service
  - Vermont Agency of Agriculture
  - Licensed Master Electricians
  - Licensed Milk Equipment Dealers

Dairy Farm Efficiency Plus

- Electrical Work focus National Electric Code (Article 547)
  - Wet Environment Fixtures
  - Cold weather ballasts
  - Financial help rewiring barns not up to code
- Milk Quality, Sanitary Code
  - Water temperature
  - Milk Cooling
  - Lighting

Dairy Farm Efficiency Plus

- Wet environment cold temperature lights
- Refrigeration heat recovery
- Well Water milk pre-coolers
- Ventilation and air circulation
- Scroll and Discus Refrigeration
- VFD motor controls
- Stock Waterers

Dairy Farm Efficiency Plus

- CVPS Program 1992 to 2000
  - 6.4 Million kWh annual savings
  - $1.5 Million Rebates
- Efficiency Vermont 2000 to 2005
  - 1.5 Million kWh annual savings
  - $300,000 Rebates

Dairy Farm Efficiency Plus

- Promoted New Lighting Technologies
  - Modular CFL fixtures, cold weather
  - Vaportight electronic T-8 & Reflectors
- Promoted New Milking Technology
  - Variable Speed Vacuum Pump
  - Variable Speed Milk Transfer

Dairy Farm Efficiency Plus

- Keys to Implementation Success
  - Identify Project Value to Farm
    - Milk Quality
    - Herd health/human health
    - Milk Production/Cow Comfort
  - Dedicated Project Coordinator
    - Understands dairy operation
    - Knowledgeable of farm equipment and vendors
  - Generous incentive levels
    - Focus on quick simple payback/ROI
  - Low Interest Loans
    - When milk prices are low

What Comes Next?

Renewable Energy on the Farm

Anaerobic Digesters

Farm based Wind?

CVPS Cow Power

A renewable energy program directly linking farm based renewable energy produced from cow manure with customer choice.

- Provides customers a renewable choice.
- Provides Vermont dairy farmers with a new revenue stream and manure management options.
- Provides Vermont with new tool to protect the environment.

Why focus on animal waste?

• The air and water-quality issues associated with animal waste management can be significant. The dairy industry in Vermont and the swine industry in Quebec affect Lake Champlain.

• Anaerobic treatment of waste can significantly reduce odor and certain *water quality impacts*.

• Methane from liquid manure storage is otherwise released into the atmosphere. Methane is a greenhouse gas 21 times more effective than CO2 at trapping heat.

• Farm generators are likely to raise few concerns from neighbors. These generators integrate well into the farm landscape.

CVPS Cow Power Tariff

• CVPS purchases electric output from farm generators at 95% of the Locational Marginal Price (LMP).

•CVPS retail customers purchase all Renewable Energy Attributes (RECs, carbon credits, etc.) from farm generators.

• To date, the 2,200 customers who choose Cow Power pay a $0.04/kWh premium on their electric bill for these renewable attributes.

•100% of the premium payment goes to the farm

• Customers can choose 100%, 50% or 25% of their electricity be provided under the new Tariff.

Benefits to Farmers

- Provides a new revenue stream, improving farm profitability while preserving a working landscape.

- Use of digested solids as a replacement for purchased bedding (ie. sawdust) Saves Blue Spruce $60,000 per year.

- Waste Heat offsets fuel costs for hot water needs in dairy

- Significant Grants available from USDA, State, and Utility sources.

- The $1.2 million total investment at Blue Spruce Farm will be paid back in about 4 years.

Environmental Benefits

• Increases reliance on new, local renewable energy production.

• Carbon dioxide is plant based not coal, gas or oil.

• Reduces the biochemical oxygen demand (BOD) of digested animal waste. Somewhat reducing the danger for aquatic animals in the event of unexpected runoff.

• Reduces farm release of methane, a greenhouse gas.

CVPS Cow Power

The reduced methane emissions on Blue Spruce Farm produce an annual environmental benefit equivalent to removing 3,500 metric tons of carbon dioxide from the air. Equal to 18 rail cars of coal not burned or a 2,900 acre pine forest's ability to absorb CO2.

Environmental Benefits (Continued)

• With reduced odor, farms can spread liquid manure as a fertilizer when nutrient uptake is the greatest in warm, dry weather.

• Liquid manure can even be spread onto growing crops, incorporating nutrients into the growing plants faster reducing potential nutrient run-off concerns.

• Farms located in the Lake Champlain watershed may be able to reduce their impact on the Lake's water quality by effectively removing some phosphorous with manure solids separation!

Electric System Benefits

- CVPS gained tremendous knowledge to interconnect and protect remote distributed generation on a rural distribution system.

- First time in Vermont retail customers can influence power supply choices by voting for Cow Power.

- Cow Power generation units operate at high capacity factor (90+%), adding reliability and diversity to the power supply.

CVPS Cow Power

- Current economics dictate larger farms 500+
- Different AD Technologies
  - Flex cover (RCM)
  - Concrete cover (GHD)
  - Danish design above ground tanks (Microgy)
  - German design below ground tanks (Wackerbauer)
- Future trend to smaller farms (200)
  - Incorporate crops or other waste at farm
  - Potential to use gas only for water heating/boiler