The Path Toward Sustainability

Mike McCloskey, Select Milk Producers & Fair Oaks Dairy
GHG Initiative Structure

Innovation Center (Board of Directors)

Sustainability (Operating Committee)

Carbon Council

Sustainability Council

GHG Projects

Stakeholder Engagement/Alignment

- Dairy Farmers, Cooperatives & Processors
- Suppliers / Vendors
- Government
- Non-Governmental Organizations
- Retailers

Launched In July 2008

Formed In January 2008

Created at Sustainability Summit in June 2008
Manure Management goal of 30% GHG reduction by 2020

Dairy Power Challenge

Industrywide goal of 25% GHG reduction by 2020

Digesters current projections, is a potential 12% GHG reduction, without the proven impact on fuel and electricity.
Feed Production
- Dairy Farm Smart

Milk Production
- Cow of the Future
- Dairy Power
- Farm Energy Efficiency
- Biogas Capture and Transport

Processing
- Dairy Plant Smart
- Next Generation Clean-In-Place
- Next Generation Processing – UV

Packaging
- Processing and Packaging Life Cycle Assessment (LCA)

Transportation
- Dairy Fleet Smart

Retail
GOALS OF AN IDEAL MANURE TREATMENT SYSTEM

1. EFFICIENT ODOR CONTROL
2. EFFICIENT CONTROL OF N & P & K (CLEAN WATER ACT)
3. IMPROVE FLY CONTROL
4. ABILITY TO CONTROL PATHOGENIC BACTERIA
5. REDUCED AIR EMISSIONS (CLEAN AIR ACT)
   - METHANE
   - AMMONIA
   - HYDROGEN SULFIDE
   - NOx
6. RETURN ON CAPITAL THROUGH BY-PRODUCTS
   - FERTILIZER
   - ELECTRICITY
   - HEAT
   - EMISSIONS CREDITS
7. EASE OF OPERATION / LOW OPERATING COSTS
Digester Basics

Front End ➔ Digesters ➔ Back End ➔ Renewable Energy
Sand Separation—Needed for Sand Bedding and High Sand Entrainment Areas
Macerators and Grinders – Reduce large particles of feedstock
Heat Exchangers – Heats digester influent stream with digester effluent
Substrate Feed Equipment – Specialized for the substrate if needed
Complete Mix or Plug Flow Digester Design

**Complete Mix Digester**

- Collection tank
- Anaerobic digester with heat exchanger
- Generator
- Solids separator
- Liquid effluent holding tank or lagoon
- Manure input
- Gas line to generator
- Pre heat chamber
- Engine & generator
- Separated solids

**Plug Flow Digester**

- U-shaped concrete tank
- Tank insulation
- Screw press separator
- MANURE IN
Mixing Systems

Pump Mixing

Gas Mixing

Mechanical Mixing
Gas Collection & Safety Equipment

- Pressure Relief
- Flame Arrester
- H2S Removal
- Regulator
- Candlestick Flare
Electrical Generation Equipment

ICE Generator

Gas Turbine Generator

Microturbine Generator

Fuel Cells
Biogas-derived power is constant, reliable baseload renewable energy.

“We want our dairy to be an example of agriculture contributing positively to the community. We have developed strong links in our community economically, environmentally and socially.”

-Kenn Buelow, Holsum Dairies, LLC
Digester Biogas-to-Transportation Fuel – Reduced Emissions & Renewable Energy
Integrated Production

Waste Products Converted to Value Added Products

- Industrial Food Processing Waste
- Retail Store Solid Waste
- Farm Waste
- Natural Gas Production
- Cellulosic Ethanol
- Electrical Production

- Greenhouse Products (Heat & CO₂)
- Algae Based Biofuels & High Protein Feed
- Fertilizer & Peat Moss Replacement

Integrated Production

- Electrical Production
- Natural Gas Production
- Cellulosic Ethanol
- Farm Waste
- Industrial Food Processing Waste
- Retail Store Solid Waste

Fertilizer & Peat Moss Replacement

Greenhouse Products (Heat & CO₂)

Algae Based Biofuels & High Protein Feed
The Path Toward Sustainability

Mike McCloskey, Select Milk Producers & Fair Oaks Dairy