Innovative Business Models for On-farm Anaerobic Digestion

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WASTE TO WORTH 2017
Overview

Introduction to AgSTAR

Overview of U.S. Biogas Industry

Innovative Business Models

- Third-Party Owned and Operated Systems
- Eco-Markets for Coproducts
- Renewable Natural Gas to Vehicle Fuel
About Me - Nick Elger

Manage the AgSTAR Program and coordinate agricultural AD projects with the Global Methane Initiative

Grew up in southeastern Wisconsin

Got started in AD world studying small scale biogas systems in Nepal

Graduated from University of Minnesota – BS Environmental Sciences, Policy and Management
AgSTAR Program

• 20+ year collaborative voluntary program of USDA and EPA.
• Promotes the use of anaerobic digestion systems to advance economically and environmentally sound livestock manure management.
• Strong ties to industry, government, NGO and university stakeholders.
• Assist those who enable, purchase or implement anaerobic digesters by identifying project benefits, risks, options and opportunities.
There is potential for about 8,000 additional livestock anaerobic digester systems in the U.S.

If fully realized, these digesters could produce 257 billion cubic feet per year of biogas.

That’s enough energy to power 1 million American homes for one year, or provide natural gas to fuel 2 million passenger cars for one year.

There are currently 244 livestock anaerobic digester systems across the U.S.

195 on dairy farms
17 on farms with poultry, beef, or a combination of animal types
32 on swine farms
Nutrient Recovery Potential for U.S. Dairies

There is potential for about 2,450 additional dairy anaerobic digester systems in the U.S.

These systems could recover:
- 330,000 tons of Nitrogen
- 110,000 tons of Phosphorus

Over the course of one year, these nutrients are valued at:
- $467 Million
- $325 Million

Currently, only 11 nutrient recovery systems are used on U.S. dairy farms with digesters.

From Informa Economics report on National Market Value of Anaerobic Digester Products.
EPA Nutrient Recycling Challenge – Phase II
What’s Happening in the U.S. Market?
Growth in Farm Digester Market is Slowing
Why
Challenges Facing Digester Development

• Low energy prices
• Low milk prices
• Interconnection hurdles
• RFS Uncertainty
What can be done?

WE'VE GOT TO THINK OUTSIDE THE BOX.

BEYOND THE LITTER BOX
Innovative Business Models

New opportunities to diversify revenue and share risks and rewards

- Third-Party Owned and Operated Systems
- Eco-Markets for Coproducts
- Renewable Natural Gas to Vehicle Fuel
Third-Party Owned and Operated Models

Bar-way Farm - Deerfield, MA

- 600-acre dairy farm
- 250 cows milked daily

Digester Facts
- Construction 2016
- 660,000-gallon capacity

Future Annual Digester Input:
- 9,200 tons of manure
- 30,000 tons of food waste

Future Annual Digester Output:
- Produces 7,700 MWh energy/year
- Offsets 5,500 lbs of CO2 emissions daily
Shared Risks and Rewards

- **Vanguard Renewables** – develops, owns, operates and invests in digester. Coordinates with food producers, waste haulers, utilities, government, supermarkets and farmers to achieve common goals with universal benefits.

- **CH Four Biogas** – designs and installs digester

- **Farmer** - invests in project, provides manure feedstock, leases land for digester
Eco-Markets for Coproducts

Magic Dirt

- Potting soil produced from digested dairy manure fibers.
- Magic Dirt partners with 19 dairy farms across the country, utilizing separated manure fibers.
- Magic Dirt plans to be on the shelves at ½ of the Walmart stores in the U.S. in 2017.
- Manure soil product has more nutrients than competitors
- Each cubic yard of Magic Dirt used avoids about one ton CO2e.
Eco-Markets for Coproducts

Freund Farm – East Canaan, CT
• Small family-owned farm
• Horizontal plug flow digester
• 300 dairy cows feeding digester

Cow Pots
• Biodegradable planter pots made from digested manure solids
• Displaces unsustainable peat moss and plastic planters
Renewable Natural Gas to Vehicle Fuel

**Fair Oaks Dairy – Fair Oaks, IN**
- 12 family-run dairies
- Attracts more than 500,000 visitors yearly to its agricultural science center

**Digester Facts**
- Operational since 2008
- 12,000 cows plus swine manure feeding digester

**Energy Production**
- Produces compressed natural gas (CNG) to fuel 42 tractor trailers that deliver milk daily to processing plants in 3 states
- Displaces about 2 million gallons of diesel fuel annually
Renewable Natural Gas to Vehicle Fuel

Hilarides Dairy – Lindsay, CA
• Family-run dairy
• 10,000 cows feeding digester

Digester Facts
• Operational since 2004
• Covered lagoon digester
• Produces 226,000 cubic feet of biogas per day

Energy Production
• Produces compressed natural gas (CNG) to fuel 2 milk trucks and 6 on-farm pickups.
• Displaces 230,000 gallons of diesel annually
Why is RNG such a big opportunity?

• RNG is carbon neutral and in some instances carbon negative
• RINs and Low Carbon Fuel Standard (LCFS) credits from California exist to help fund projects
• Producers can lock in long term fuel prices
• Natural gas burns much cleaner and quieter than diesel, making it more desirable for vehicle operators
Think Big (aspirational examples – don’t quote me 😊)

• All dairy and meat product hauling in the US will be done using bio-methane fueled trucks.
• 50% of fertilizer market will be manure-based organic products.
• Dairy fiber products will surpass peat moss use in the horticulture sector.
• 1,000 livestock farms will be energy independent based on AD-biogas based energy streams.
• 20M tons of wasted food will be managed in on-farm AD systems by 2030.
Take-Aways

Technology choices are important, but viable business model is critical.

With low energy prices in most areas, must have a diversified revenue portfolio to drive project.

Growing interest in broader eco-markets aspects of AD systems gaining traction.
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✓ Fact sheets
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