ANAEROBIC DIGESTION TRENDS AND SUCCESSES IN THE U.S.

Chris Voell, Program Manager, U.S. EPA AgSTAR
AGSTAR PROGRAM

Promote AD
Advancing economically and environmentally sound livestock manure management.

Strong Ties
Working with industry, government, NGOs and university stakeholders.

Helping Hand
Assisting those who enable, purchase, or implement farm anaerobic digestion projects.

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Collaborative effort sponsored by EPA and USDA.
Our waste has to go somewhere.

The population is growing.
BIOGAS POTENTIAL

253
Existing biogas systems

That could produce enough ELECTRICITY to power 1,000,000 homes or RENEWABLE NATURAL GAS to fuel 2,000,000 cars

~8,100
Potential biogas systems
ANAEROBIC DIGESTER PROJECTS IN THE U.S.
U.S. Renewable Generation by Technology, Non-Hydropower (TWh/year)

Sources: 2017 Bloomberg Sustainable Energy in America Factbook, AgSTAR Data
WHAT’S HAPPENING IN THE U.S. MARKET?
GROWTH IN FARM DIGESTER MARKET IS SLOWING

cumulative projects


Sources: AgSTAR Digester Database
Low milk prices.

Low energy prices and interconnection hurdles.

Market and policy uncertainties.
THIS CALLS FOR SOME INNOVATION
POLICIES
State-level policies create new market incentives.

1. Food waste bans
   Creating new incentives and opportunities in the Northeast for food waste co-digestion.

2. Renewable natural gas incentives
   Developing low-carbon fuel standard in California for vehicle fuel.

BUSINESS MODELS
Innovative models help diversify revenue, spread risks, and share rewards.

1. Third-party owned and operated systems
   Sharing risks and rewards.

2. Eco-markets for coproducts
   Replacing unsustainable peat moss and plastics.

3. Renewable natural gas to vehicle fuel
   Taking advantage of economies of scale.
BAR-WAY FARM

Deerfield, MA

7700 MWh
Annual energy output.

5,500 lbs
Daily offset of CO2 emissions.

Farm Facts
- 600-acres
- 250 cows milked daily

Digester Facts
- Built in 2016
- 660,000-gallon capacity
- Owned, operated and maintained by Vanguard Renewables

Annual Digester Input
- 9,200 tons of manure
- 30,000 tons of food waste
CLOSED LOOP SYSTEM / SHARED RISKS AND REWARDS

- **Renewable Energy**
- **Waste**
- **Food**
- **Electricity + Heat + Fertilizer**
- **Manure**
- **85% GHG Capture**

- **Milk**
- **Waste**
- **Organic Waste**
- **Renewable Energy**

Innovative AD Business Models

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MAGIC DIRT

Potting soil produced from digested dairy manure.

PARTNERSHIPS

Magic Dirt sources separated manure fibers from 19 dairy farms across the country.

AVAILABILITY

By the end of 2017, Magic Dirt plans to be on the shelves of half the Walmart stores in the U.S.

NUTRITIOUS

Manure soil product has more nutrients than most of its competitors.

ENVIRONMENTAL

Each cubic yard of Magic Dirt offsets about one ton of CO2.
ECO-MARKETS FOR COPRODUCTS

FREUND FARM
East Canaan, Connecticut

- Small Family-owned farm
- Horizontal plug flow digester
- 300 dairy cows feeding digester

Displace unsustainable peat moss and plastic planters.

Biodegradable planter pots made from digested manure solids.

Innovative AD Business Models
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WHY IS RNG SUCH A BIG OPPORTUNITY?

**CLEAN**
Renewable natural gas is a low carbon-emitting fuel source.

**CREDITS**
RINs and Low Carbon Fuel Standard (LCFS) credits from California help fund projects.

**CERTAINTY**
Steady supply means that producers can lock in long-term fuel rates.

**QUIET**
Natural gas burns cleaner and quieter, making vehicle operation more pleasant.

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RENEWABLE NATURAL GAS TO VEHICLE FUEL

PRAIRIE'S EDGE DAIRY
Fair Oaks, Indiana

Displaces about 2 million gallons of diesel fuel annually

Feeding digester with manure from 12,000 dairy cows

Agricultural science center hosts 500,000 annual visitors

Digester operational since 2008

12 family-run dairies

Produces compressed natural gas to fuel 42 tractor-trailers
RENEWABLE NATURAL GAS TO VEHICLE FUEL

CALIFORNIA BIOENERGY’S KERN CLUSTER
Kern County, California

- Capacity for 5 million gallons diesel equivalent per year
- Combines compressed natural gas and electricity production
- 15 large dairies participating in the cluster
- 15 MW base load (30 MW peak) electricity production
- Leverages CA Dept. of Food and Ag grant incentives for digesters
Gemidan SSO Processing
Orsted Industrial Organics Processing (NovoNordisk / Novozymes)
Get Involved

VISIT US!
Join our mailing list, discuss partnership opportunities, find links to great AD-related planning guides and tools, or just tell us about how you’re using AD on your farm.

- AD 101
- Fact Sheets
- Tools
- Projects…and much more

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

Low energy prices necessitate a diversified revenue portfolio.

Eco-markets for coproducts are driving force for successful AD projects.

**Did you know?** AgSTAR offers dozens of free tools to help you calculate the economic feasibility of AD projects.
THINK BIG FOR BIOGAS POTENTIAL

BIO-METHANE TRUCKS
Haul all the dairy and meat products in the U.S.

FERTILIZER MARKET
Is at least 50% manure-based organic products.

DAIRY FIBER PRODUCTS
Surpass peat moss use in the horticulture sector.

ENERGY INDEPENDENCE
Is reality for 1,000 livestock farms thanks to AD biogas systems.

WASTED FOOD
Is managed (to the tune of 20M tons) in on-farm AD systems by 2030.
QUESTIONS?

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