

# Federal Financing Resources for Anaerobic Digesters

May 9, 2018

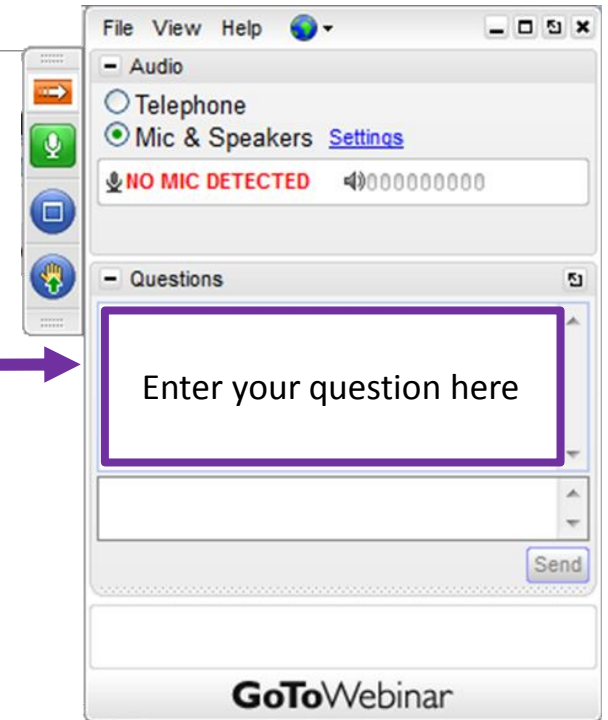
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NICK ELGER – PROGRAM MANAGER

AGSTAR PROGRAM, US EPA

# Reminders

- All participants (except speakers) are in listen-only mode
- Questions submitted during the webinar will be reviewed at the end of the webinar
  - Type a question here
- If you are experiencing technical difficulties, please let us know using the Questions pane on the right side or contact Jay Gallo at 203-687-9432
- A copy of today's presentation will be available on AgSTAR's website



# Agenda

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- Welcome and Opening Remarks
- AgSTAR Program: A Helping Hand for Sustainable Farming
  - Nick Elger, US EPA AgSTAR
- USDA Energy and Conservation Programs: Doing more by working together
  - Fred Petok, US Department of Agriculture Rural Development
- Utilizing NRCS for Anaerobic Digester Systems
  - Jeff Porter, National Animal Manure and Nutrient Management Team Leader, ENTSC, Greensboro, NC
- Questions and Answers

Mention of any company, association, or product in this presentation is for information purposes only and does not constitute a recommendation of any such company, association, or product, either express or implied, by EPA.

# AgSTAR Program

A Helping Hand  
for Sustainable Farming





# WHAT WE'LL SEE TODAY

1

## **Introduction to AgSTAR**

Who we are, what we do, and why you should care.

2

## **Overview of U.S. Biogas Industry**

What the market looks like and why that matters.

3

## **AgSTAR Resources**

Take advantage of our tools, resources and network!

4

## **Innovative Business Models**

How to build a financially sustainable biogas businesses.



# AGSTAR PROGRAM



## VOLUNTARY PROGRAM

Collaborative effort sponsored by EPA and USDA.

### 1 Promote AD

Advancing economically and environmentally sound livestock manure management.

### 2 Strong Ties

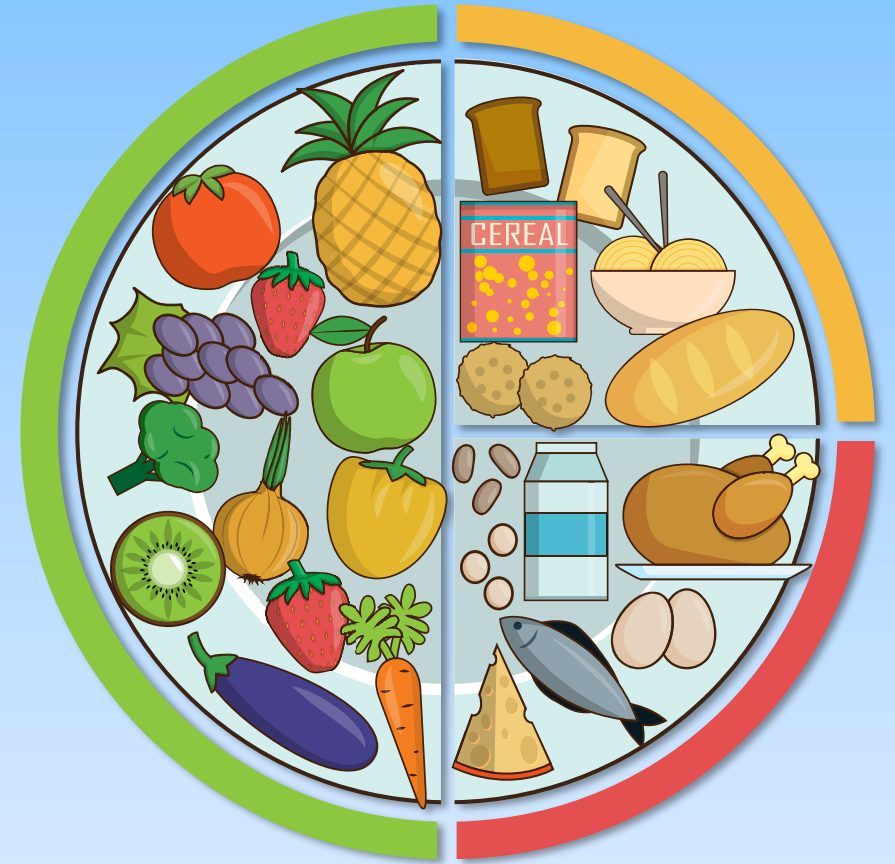
Working with industry, government, NGOs and university stakeholders.

### 3 Helping Hand

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



# **WHY BIOGAS?**



# THE POPULATION IS GROWING

and so is our consumption of food.



# MANURE AND FOOD WASTE IN THE U.S.



In the U.S. there are approximately:

- 72 million dairy cows
- 66 million pigs
- 9 billion chickens and other poultry

*USDA Census of Agriculture*



Approximately 133 billion pounds of food are wasted at the retail and consumer level

*USDA Food Waste Challenge*



# THE POPULATION IS GROWING

Our waste has to go somewhere.



**SOLUTION**

# Anaerobic Digestion



## Food Recovery Hierarchy

### Source Reduction

Reduce the volume of surplus food generated

### Feed Hungry People

Donate extra food to food banks, soup kitchens and shelters

### Feed Animals

Divert food scraps to animal feed

### Industrial Uses

Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

### Composting

Create soil conditioners and soil amendment

### Landfill/ Incineration

Last resort to disposal



# Benefits



**Diversified Farm Revenue**



**Energy Independence**



**Rural Economic Growth**



**Sustainable Food Production**



**Conservation of Agricultural Land**



**Farm-Community Relationships**



# AGSTAR SUCCESS STORIES

Stories from the farm



# Farm Profiles

## Project Profile: Fair Oaks Farms



### Highlights

- Produces compressed natural gas (CNG) to fuel tractor trailers that deliver milk
- Generates renewable energy to power the buildings and machines on the farm
- Attracts more than 500,000 visitors yearly to its agricultural science center, the Adventure Farm
- Nutrient recovery generates high-quality fertilizer for use on the farm

Powering a fleet of vehicles using biogas from cow manure is the sustainability apex for dairy farms. Fair Oaks Farms in Indiana has been doing it since 2008. The farm, made up of 12 family-run dairies with 36,000 cows, sends much of the manure produced on site to an anaerobic digester where biogas is produced and further refined to compressed CNG trucks. Fair Oaks Farm is a model for sustainable dairy farming across the country, protecting the health of the land through innovative nutrient management, and food production.

**Sustainability isn't just it's how we live.**  
- Mike and Sue McCloskey

## Powering Farm Transportation

Focused on creating a zero-carbon footprint dairy farm, the farm's owners Sue and Mike McCloskey invested in technology to convert the biogas into compressed natural gas (CNG). They partnered with RUAN Trucking to provide fuel for the farm's milk trucks. Every day, the trucks deliver milk to processing plants hundreds of miles away in Indiana, Kentucky and Tennessee. The trucks fuel up at the CNG station at the CNG station at the state border between Kentucky.

The farm has reduced its use (and associated cost) of diesel by more than 2 million gallons per year. The CNG is piped and sold to a CNG fueling station.

Photo Credit: Noblehurst Farms

## Project Profile: Noblehurst Farms



### Highlights

- Feedstock includes manure from the farm and approximately 500 tons of food waste per month from local universities, schools, restaurants, and Wegmans Food Markets
- Renewable energy generated to power the farm and nearby creamery
- Nutrient recovery produces high-quality liquid fertilizer for use on the farm

Established in 1960 in Linwood, New York, Noblehurst Farms Inc. is a seventh generation multi-family farm with an eye for sustainability and environmental stewardship. The family-run business includes: Noblehurst Farms, an 1,800-cow dairy and more than 2,500 acres of land where corn, alfalfa, and wheat are grown; Craigs Station Creamery, a milk processing facility; Noblehurst Green Energy, which produces electricity; and Natural Upcycling, a food-scrap collection business.

**Digesters are great for the environment and great for power reliability. The sun doesn't always shine and the wind doesn't always blow, but we can keep this digester and program going day and night.**  
- Chris Noble, Vice President, Noblehurst Farms

Clean renewable energy is produced by the farm's anaerobic digester, which uses manure from the farm's dairy cows as well as food waste collected from local grocery stores, restaurants, consumer food companies, universities, and schools. The family's enduring commitment to preserving the land and consistent focus on long-range planning and profitability have led them to establish innovative partnerships.



Photo Credit: Noblehurst Farms

## Project Profile: Barstow's Longview Farm



Barstow's Longview Farm is a seventh-generation, 450-acre family and community farm. The farm offers a variety of products and services. Barstow's Creamery/Agri-Mark Co-Operative has more than 1,000 family dairy farms in New York and New England. Sustainable farming practices led them to establish a partnership with Vanguard Energy and Fertilizer to install anaerobic digesters in New England.

**Our motto is "Looking Forward since 1806"**  
- We strive to consider the Earth and our community and to grow a more efficient and sustainable business.  
- Steven Barstow II, Barstow's Longview Farm

## Energy and Fertilizer

Barstow's Longview Farm, Vanguard Renewables, and Cabot Creamery/Agri-Mark Co-Operative installed the anaerobic digester, installed in 2013, was expanded in 2015. The anaerobic digester, installed in 2013, was expanded in 2015. The anaerobic digester, installed in 2013, was expanded in 2015. The anaerobic digester, installed in 2013, was expanded in 2015.





# Meet an Operator

## Meet An Anaerobic Digester Operator



## Meet An Anaerobic Digester Operator



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## Meet An Anaerobic Digester Operator



An official website of the United States government.



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## AgSTAR

AgSTAR Home

Learn about Biogas Recovery

Library of Resources

Data & Trends

Stories from the Farm

Project Profiles

Project Spotlights

Meet an Operator

Anaerobic Digestion Ombudsman

Implement Projects

Is Anaerobic Digestion Right for Your Farm?

Financing

Guidelines and Permitting

Vendor Directory

Partners

Events

AgSTAR Accomplishments

Celebrating 20 Years of Anaerobic Digestion

What EPA is Doing

Frequent Questions about Livestock Biogas Projects

## Meet An Anaerobic Digester Operator: Allen Farms

### Let's Meet...

#### Brian Langolf

Director of Biogas Systems and Research Development  
University of Wisconsin-Oshkosh  
Oshkosh, Wisconsin



#### Anaerobic Digester Type

Mixed Plug Flow

#### Operating Since

April 2015

#### Population Feeding Digester

Approximately 130 cows

Anaerobic digestion can be a great tool for farms of all sizes to consider to help improve manure management practices. When looked at holistically, they can provide cost-effective and environmentally friendly alternatives to traditional manure management practices.

—Brian Langolf

### Why did the University of Wisconsin-Oshkosh collaborate with Allen Farms to build a digester?

The University is committed to developing innovative state-of-the-art tools and training equipment to offer our students hands on experience in a living, learning laboratory. The digester also further advances the University's sustainability goals set by the campus sustainability plan and helps develop technology and solutions that can hopefully be



Welcome to Allen Farms.





# Vendors and Technologies



## Vendor Directory

### AgSTAR Vendor Directory for Manure Digester Systems

The AgSTAR Vendor Directory includes organizations that support the livestock anaerobic digester industry. The Vendor Directory classifies vendors by country, state, and the services that they provide. Use the **Filters** row below the table to select criteria for narrowing the list of vendors (rows that are displayed match all of the selected criteria). You may also use the **Search** input to search the table for a specific keyword. Please also note that you can control the number of entries displayed in the table. If applicable, links are provided below the table to page through the entries.

Note: Vendor Directory information is provided by the listed organizations. EPA does not endorse any of the listed organizations or guarantee the accuracy of the information.

[Update or add information to the Vendor Directory](#) by completing an online form.

Show  entries

Search:

Vendor	Location	Categories	Description
<input type="text" value="-select-"/>	<input type="text" value="-selec"/>	<input type="text" value="-select-"/>	
<b>2G Energy, Inc.</b>	USA   FL	Manufacturer/Distributor of Engines	2G CENERGY Power Systems Technologies Inc. is a U.S. manufacturer of advanced biogas combined heat and power (CHP) cogeneration systems. 2G CENERGY is part of the 2G ENERGY AG Group, the largest biogas energy conversion system manufactures in Germany, publically traded at the Stock Exchange. The company's CHP cogeneration power plants guarantee extreme high energy efficiency, extracted and generated from biogas, landfill gas, sewage gas, coal mine gas, and natural gas. With more than 3,500 biogas CHP systems supplied and in operation, 2G CENERGY offers integrated and commercially attractive solutions, highly efficient biogas power plants, and unmatched experience in the farm digester biogas market. As leading manufacturer 2G CENERGY provides technologically advanced and clean systems to generate electricity and heat, while reducing CO2 emissions and greenhouse gases. All plants are of modular design and manufactured "plug & play connection-ready." <a href="http://www.2g-energy.com">http://www.2g-energy.com</a>   Michael J. Turwitt ( <a href="mailto:m.turwitt@2g-usa.com">m.turwitt@2g-usa.com</a> )   (904) 579-3217   205 Commercial Drive, St. Augustine, FL 32092
<b>Acterra Group, Inc.</b>	USA   IA	Consultant	Acterra Group, Inc. provides consulting and construction services to the biogas industry. <a href="http://www.acterragroup.com/">http://www.acterragroup.com/</a>   Tad Christopher Cooper ( <a href="mailto:tad@acterragroup.com">tad@acterragroup.com</a> )   (319) 377-6357   P.O. Box 160, Marion, IA 52302

#### Related Links

- [AgSTAR's Implement Anaerobic Digestion Projects](#)
- [AgSTAR's Partner Program](#)
- Excel format: [AgSTAR Vendor Directory](#) (58 pp, 905 K, March 2018)



## Newtrient Technology Catalog

### Your Area of interests

Check the boxes to sort and access the vendor, equipment and product categories in which you are interested.



#### Vendors

- Equipment Vendor
- Project Developer
- Consultant
- Service Provider
- Others



#### Products

- Bedding
- Compost
- Concentrated Nutrients
- Energy
- Fiber
- Services
- Other



#### Equipments

- Anaerobic Digester (AD)
- AD Support System
- Solids Recovery
- Nutrient Recovery
- Thermal Processing
- Others

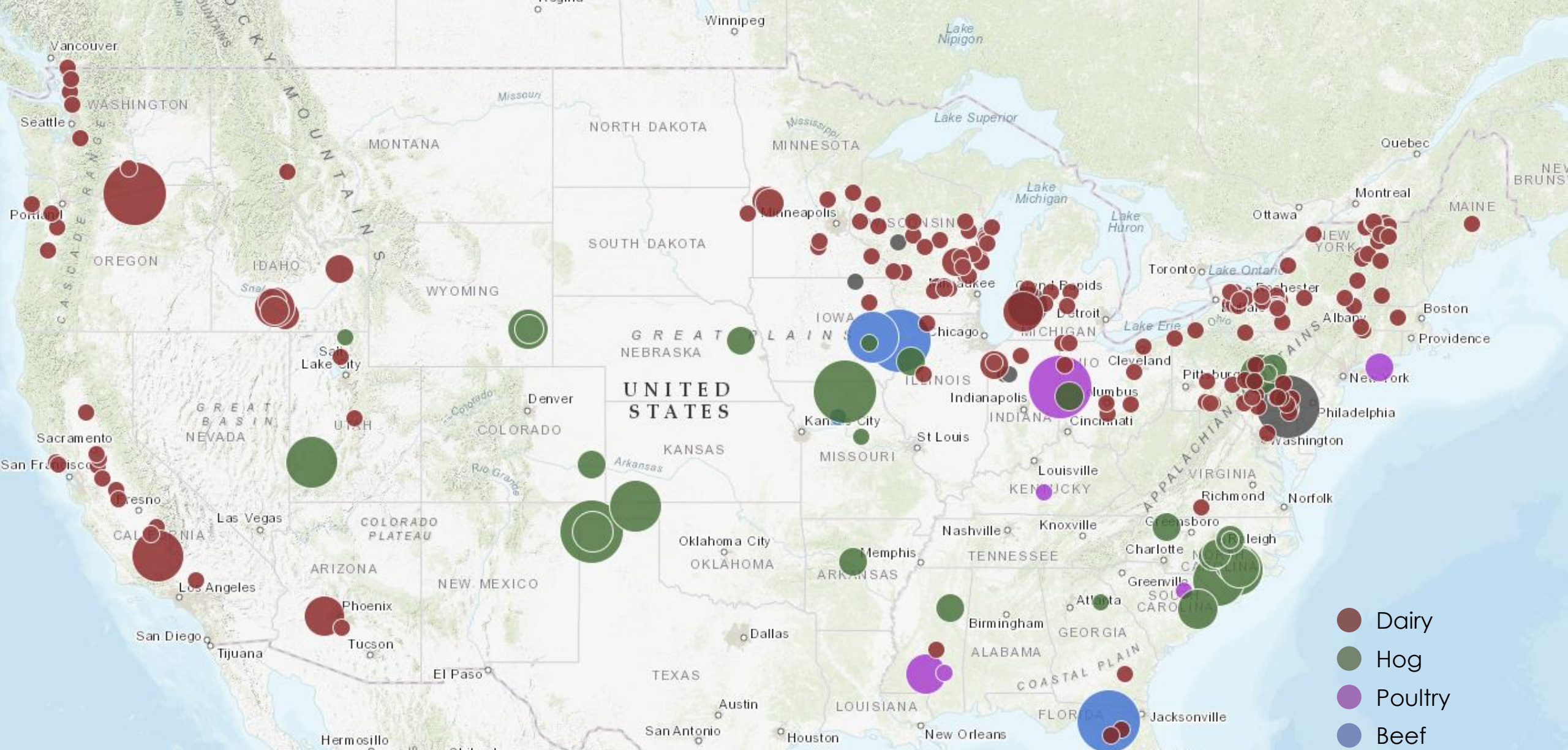
All Technologies

Emerging Technologies

Newtrient Recognized

Don't see what you are looking for?





- Dairy
- Hog
- Poultry
- Beef
- Mixed

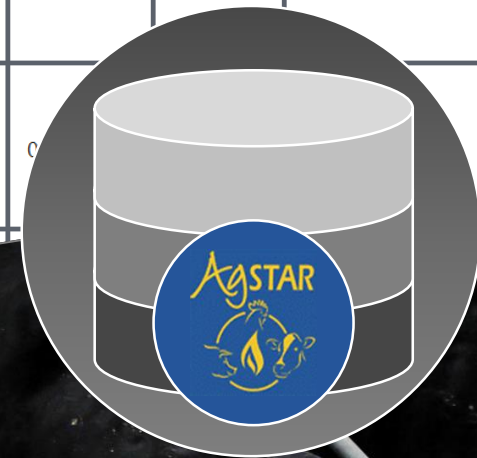
# ANAEROBIC DIGESTER PROJECTS IN THE U.S.

# LIVESTOCK ANAEROBIC DIGESTER DATABASE

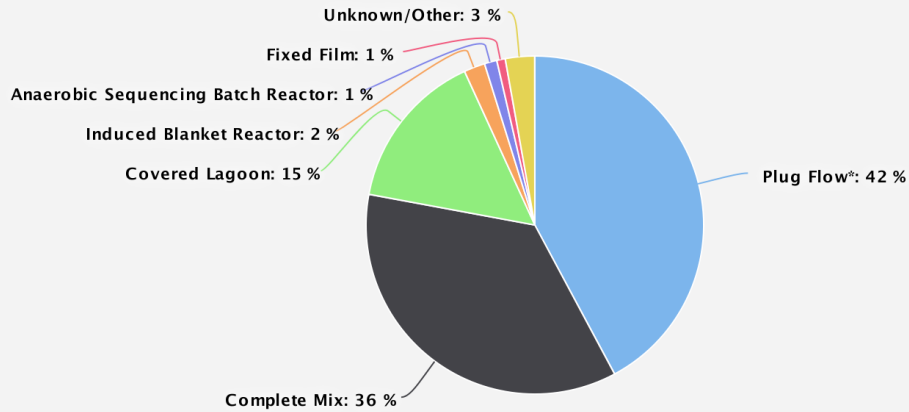
Show 10 entries

Search:

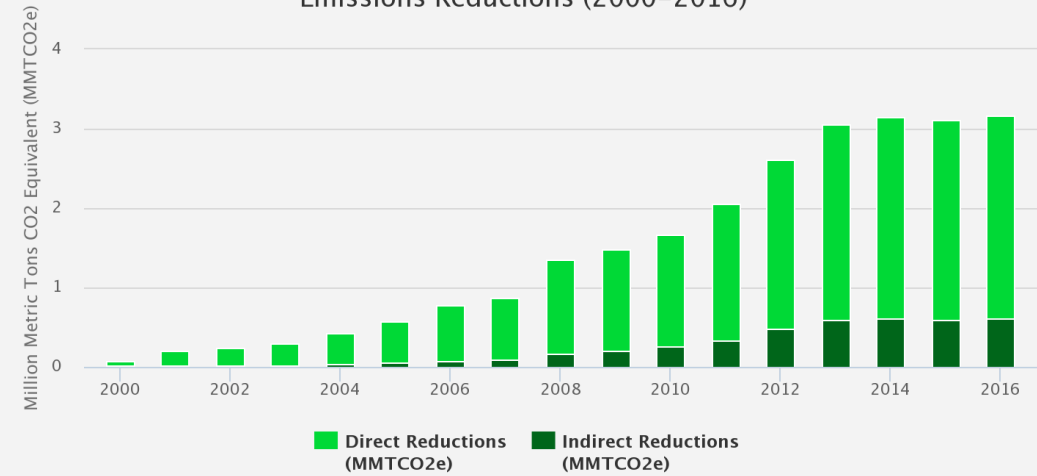
Project Name	City	State	Project Type	Digester Type	Status	Year Operational	Animal Type	Cattle	Dairy	Poultry	Swine	Co-Digestion	Biogas Generation Estimate (cu_ft/day)
<input type="text"/>		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>						
AA Dairy Digester	Candor	NY	Farm Scale	Horizontal Plug Flow	Operational	1998	Dairy	0	520	0	0		42,868
ABEC Bidart-Old River LLC Digester	Bakersfield	CA	Farm Scale	Covered Lagoon	Operational	2013	Dairy	0	15,500	0	0		600,000
ABEC Carlos Echeverria & Sons Digester	Bakersfield	CA	Farm Scale	Covered Lagoon	Construction	2017		0	0	0	0		270,000
ABEC Lakeview Farms Dairy	Bakersfield	CA	Multiple Farm/Facility	Covered Lagoon	Construction	2017	Dairy						



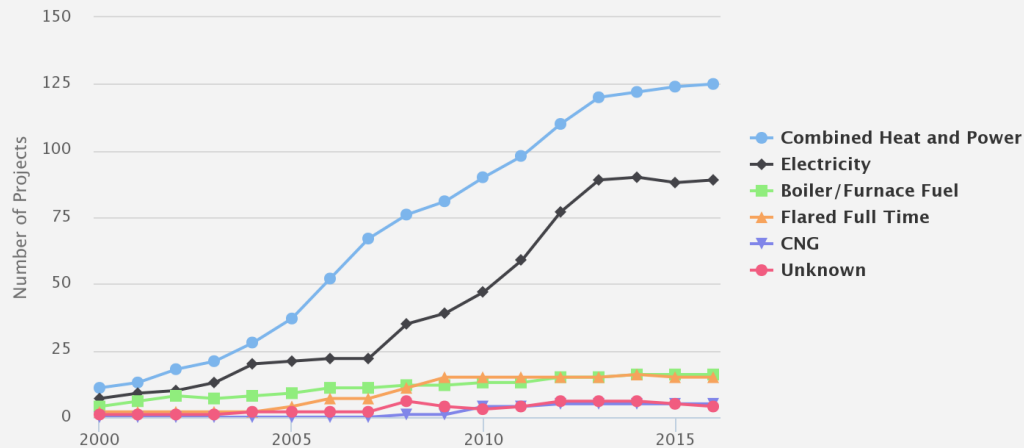
Designs for Operating Anaerobic Digesters (2016)



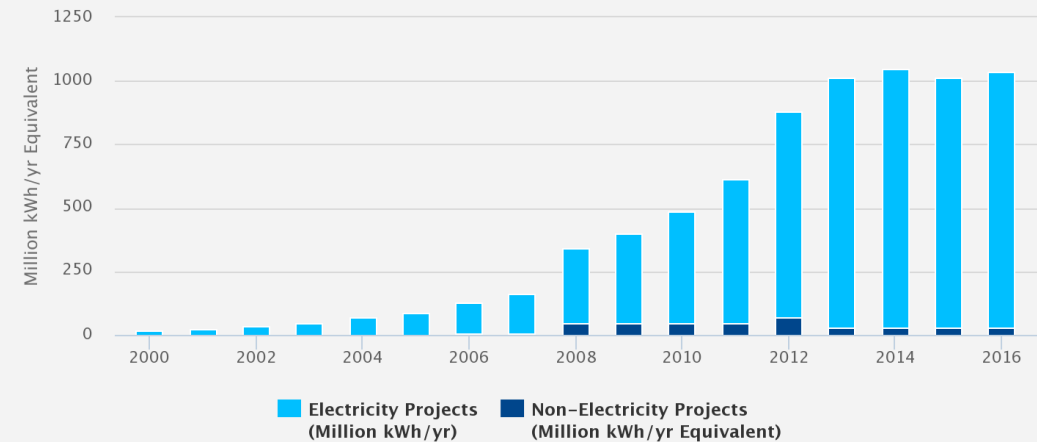
Emissions Reductions (2000–2016)



Biogas Uses (2000–2016)



Energy Output (2000–2016)



# ANAEROBIC DIGESTION DATA & TRENDS IN THE U.S.

## State-Specific Requirements

[View a summary overview](#)

California +

Idaho -

### Air

- o The [Idaho Department of Environmental Quality \(IDEQ\)](#) administers air permits.

### Solid Waste

- o Manure-only: The [Idaho State Department of Agriculture \(ISDA\)](#) regulates manure-only anaerobic digesters under a facility's nutrient management plan.
- o Codigestion: [IDEQ](#) permits facilities under the state's [Solid Waste Management Rules](#) if facilities have anaerobic digesters that codigest other feedstocks with manure.

### Water

- o The [Idaho Department of Water Resources](#) administers water permits.

## Interconnection Guidelines

Interconnection is the physical linking of a biogas recovery system to the electrical power grid. Biogas recovery systems connected to the electrical power grid generate renewable energy, which is distributed to energy consumers on the grid. The sale of electricity can generate revenue for biogas recovery system owners. Additionally, renewable energy certificates (RECs) and other environmental credits can be earned from producing and distributing the energy.



## Codigestion Guidelines

Codigestion occurs when more than one type of organic waste is fed into an anaerobic digester. Codigestion can increase methane production from low-yielding or difficult to digest farm-based feedstocks.

- [Increasing Anaerobic Digestion Performance with Codigestion fact sheet](#) answers basic technical questions about codigestion

### Codigestion Feedstocks

Codigestion feedstocks can be collected from other nearby sources including restaurant or cafeteria food wastes; food processing wastes or byproducts; fats, oil and grease from restaurant grease traps; energy crops; crop residues; and others. Codigestion feedstocks should be carefully selected to enhance—not inhibit—methane production.



# ANAEROBIC DIGESTION GUIDELINES AND PERMITTING

# WHAT'S HAPPENING IN THE U.S. MARKET?





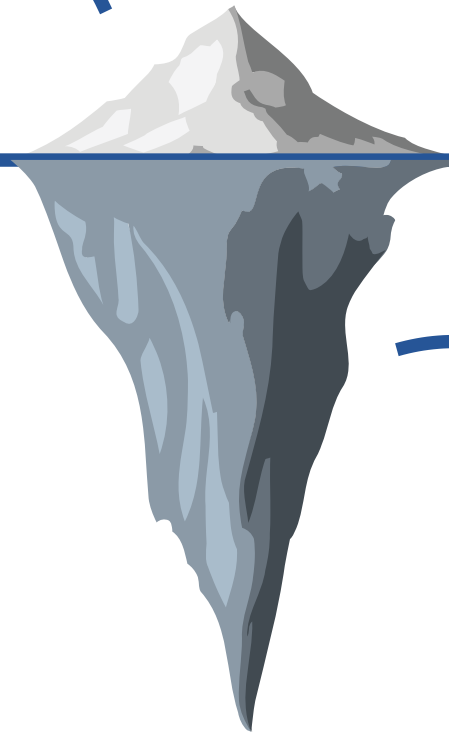
# BIOGAS POTENTIAL

**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



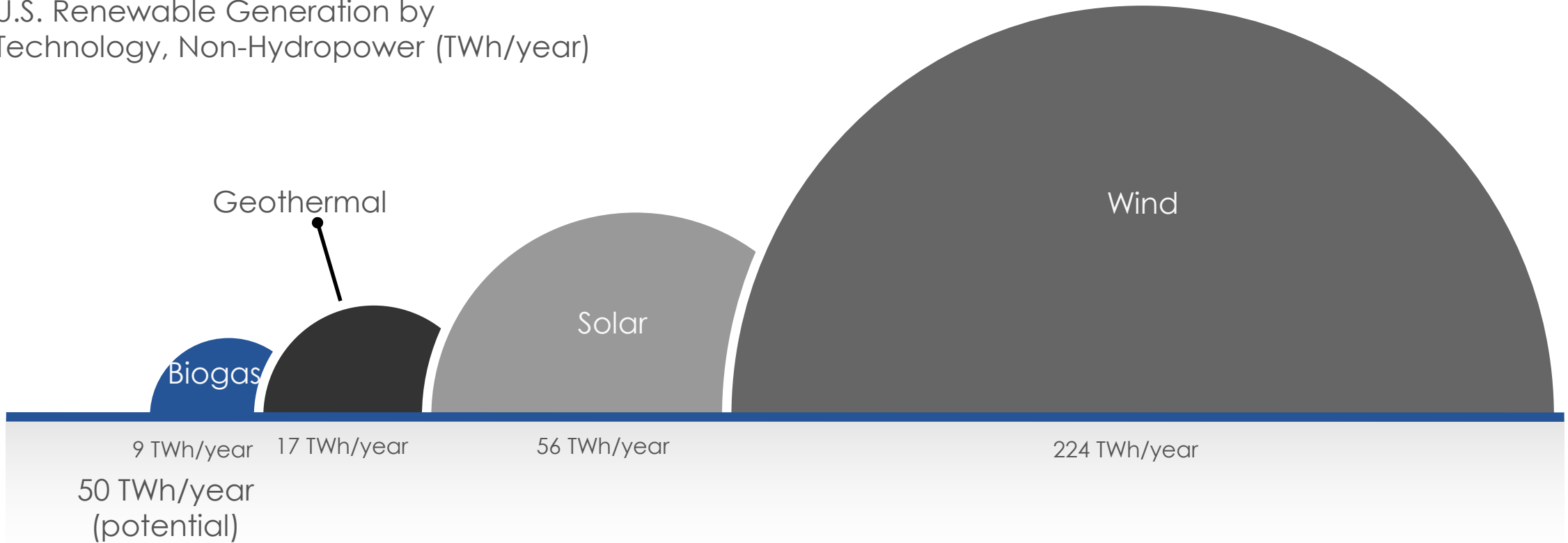
**~8,100**

Potential biogas systems



# BIOGAS AND RENEWABLE ENERGY

U.S. Renewable Generation by  
Technology, Non-Hydropower (TWh/year)



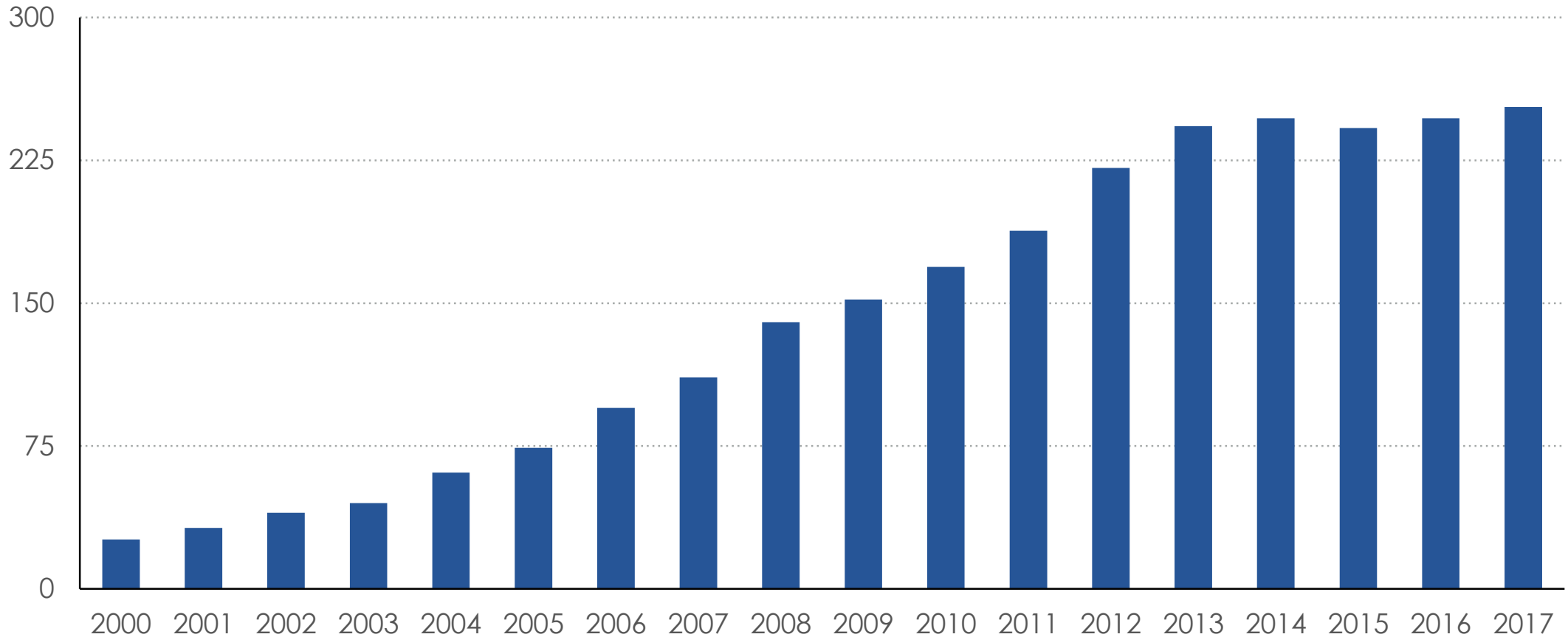
Sources: 2017 Bloomberg Sustainable Energy in America Factbook, AgSTAR Data





# GROWTH IN FARM DIGESTER MARKET HAS LEVELLED OFF

cumulative projects



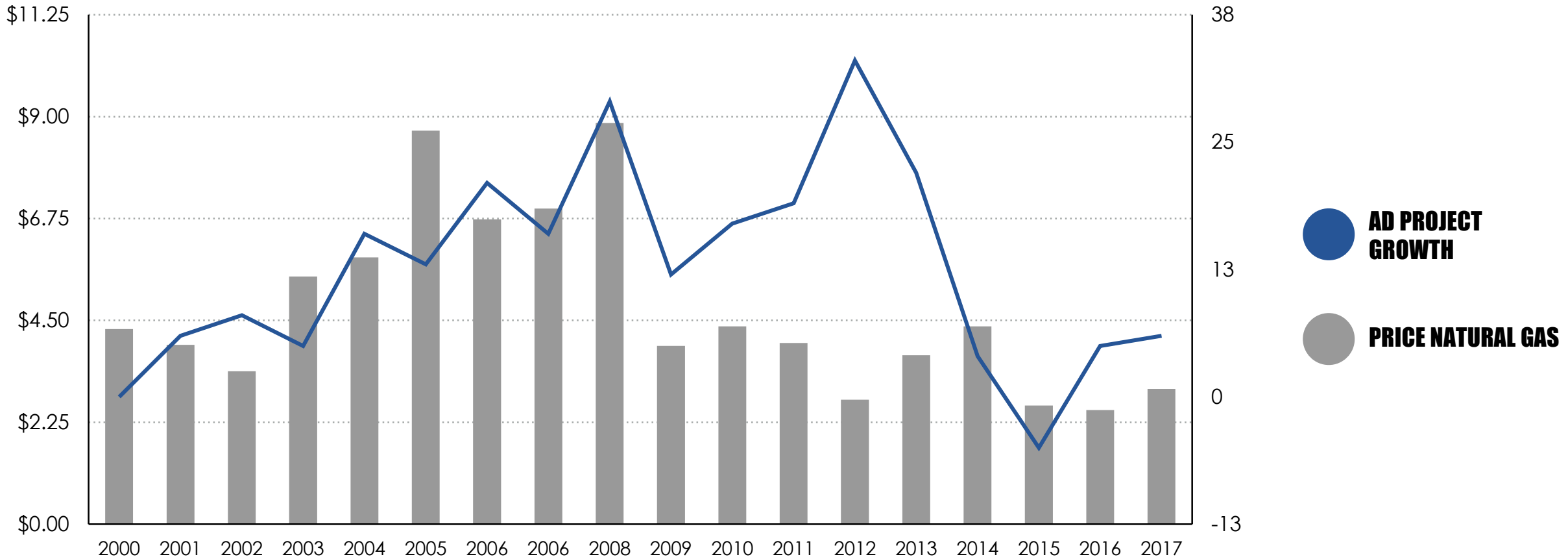
Sources: AgSTAR Digester Database



# GROWTH IN FARM DIGESTER MARKET HAS LEVELED OFF

per million BTU

new projects



Sources: U.S. Energy Information Administration, Henry Hub Natural Gas Spot Price; AgSTAR Digester Database



Renewable Fuel Standard  
& Low Carbon Fuel  
Standards driving projects



17 projects in California received  
California Department of Food and  
Agriculture grant funding in 2017



Four new projects online in first quarter 2018

**NEW GROWTH IS HAPPENING**



# INNOVATIVE BUSINESS MODELS

Models to 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.



# THIRD-PARTY MODELS

## 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

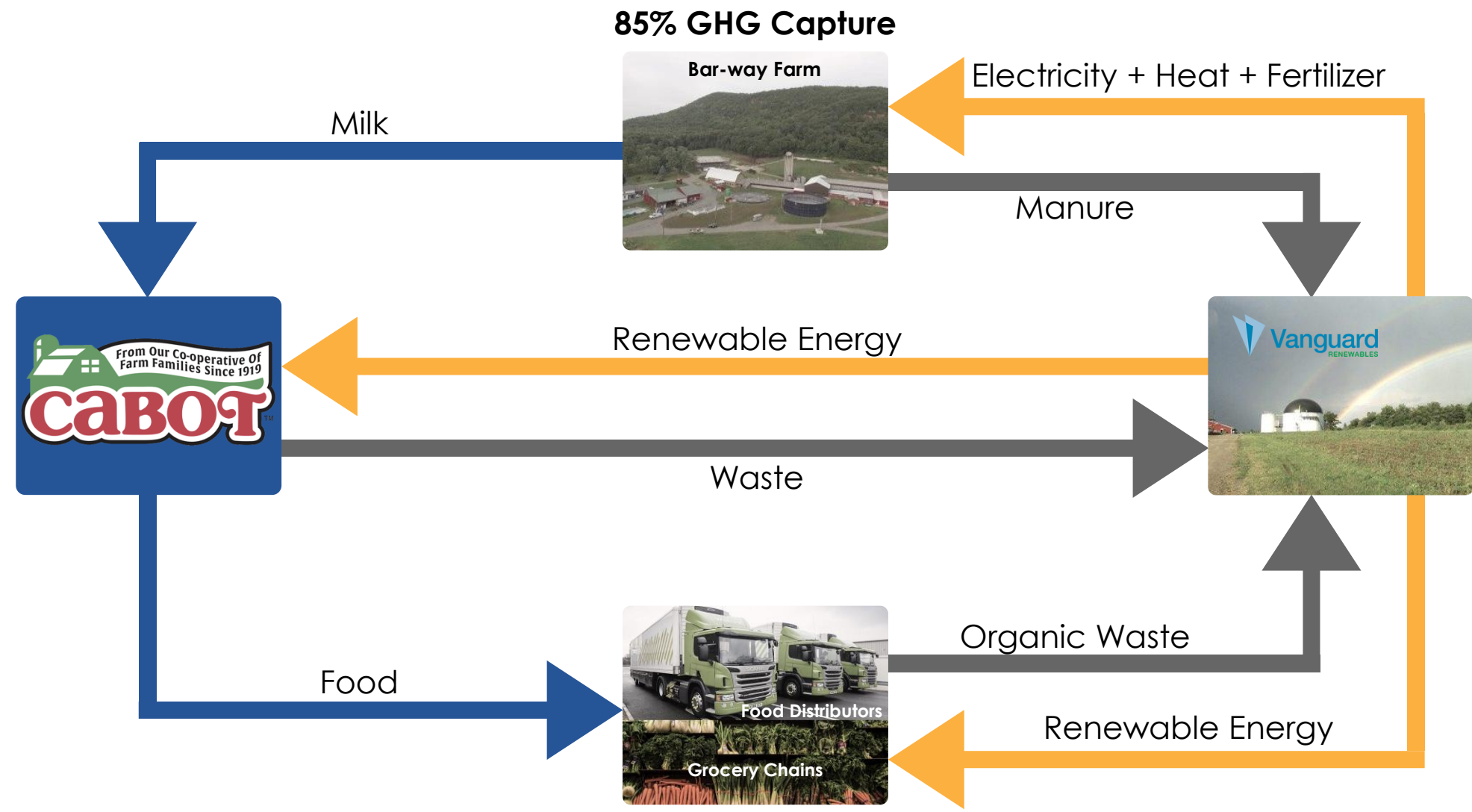
- Built in 2016
- 660,000-gallon capacity
- Owned, operated and maintained by Vanguard Renewables

### Annual Digester Input

- 9,200 tons of manure
- 30,000 tons of food waste



# CLOSED LOOP SYSTEM / SHARED RISKS AND REWARDS





# 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.



# RENEWABLE NATURAL GAS TO VEHICLE FUEL

## CALIFORNIA BIOENERGY'S KERN CLUSTER

Kern County, California

Leverages CA  
Dept. of Food  
and Ag grant  
incentives for  
digesters

15 large  
dairies  
participating in  
the cluster



Capacity for 5  
million gallons  
diesel  
equivalent per  
year

Combines  
compressed  
natural gas  
and electricity  
production

15 MW base  
load (30 MW  
peak)  
electricity  
production



# JOIN AGSTAR PARTNER PROGRAM!



Universities



Non-profit Organizations

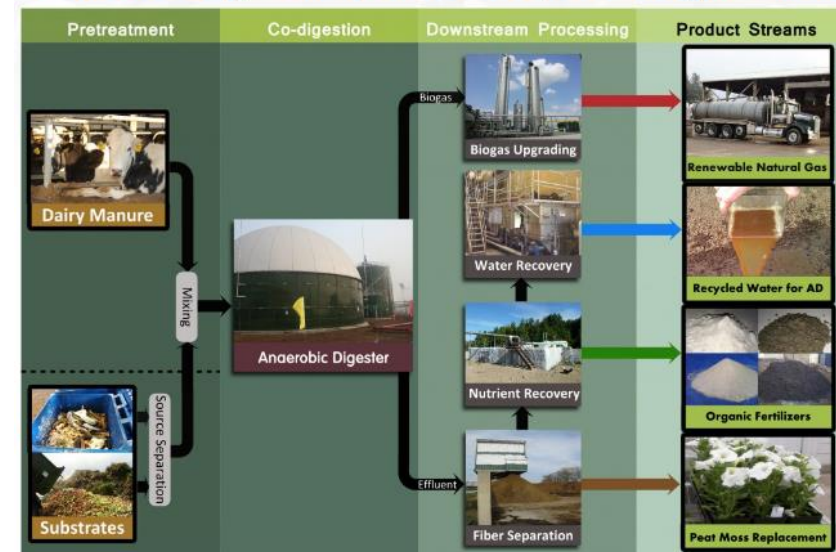


State Governments

## 33 Partners and Growing!

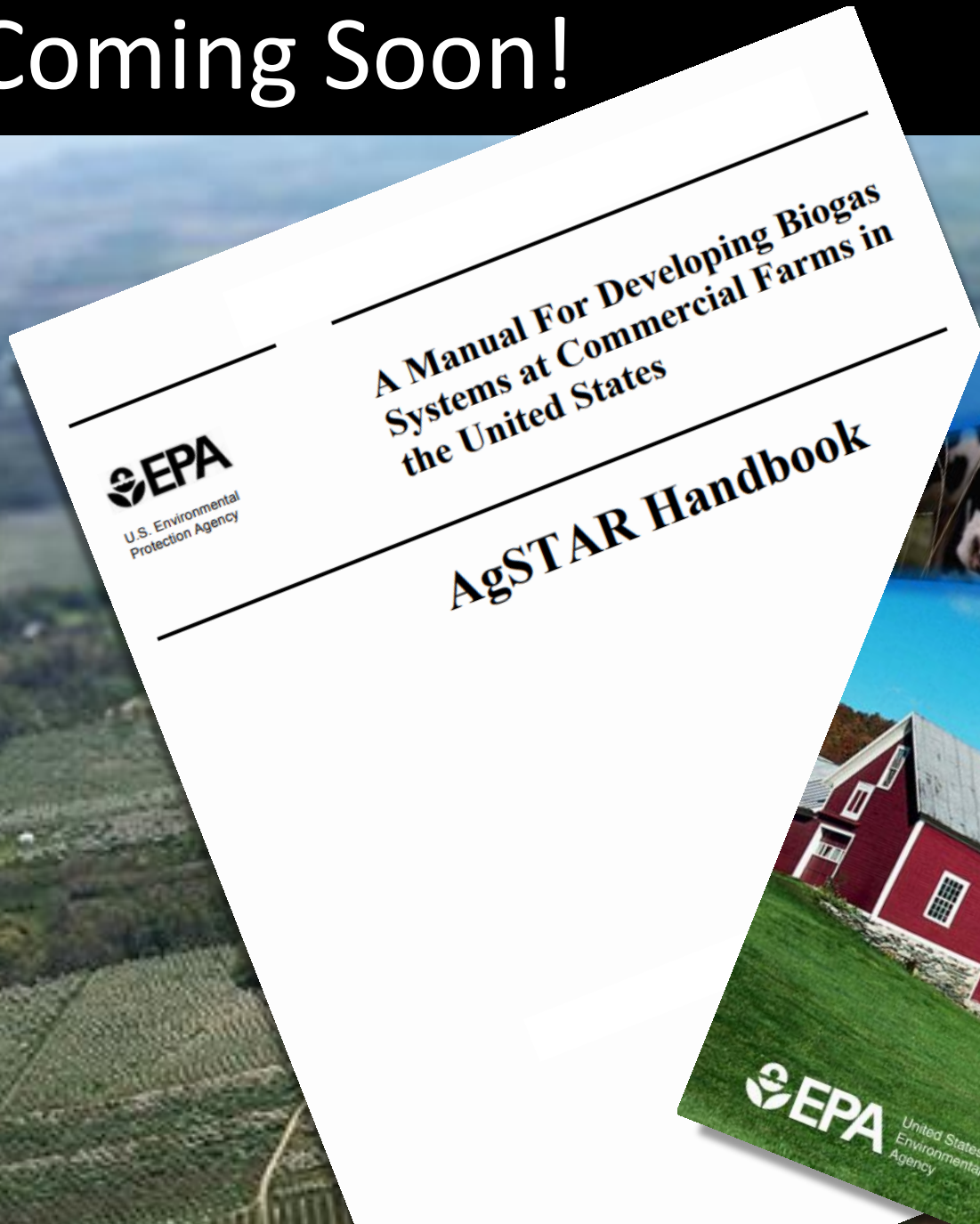
- Share News and Resources
- Connect with industry leaders
- Receive public recognition
- Help shape national priorities
- Learn about trends and new developments

### Washington State University Anaerobic Digester System Enterprise Budget Calculator





# Coming Soon!





# 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

www.epa.gov/agstar





THANK YOU

[www.epa.gov/agstar](http://www.epa.gov/agstar)

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