

AG-GRID ENERGY LLC



Dr. Rashi Akki
Founder & CEO

"Not letting waste go to waste"



Vision & Target Markets

Ag-Grid Energy was created in March 2016

“Ag-Grid Energy has a vision to drive dairy farm sustainability by converting agricultural and organic waste to energy, enhancing nutrient management practices thereby improving farm viability and financial stability.”

- Dairy Farms

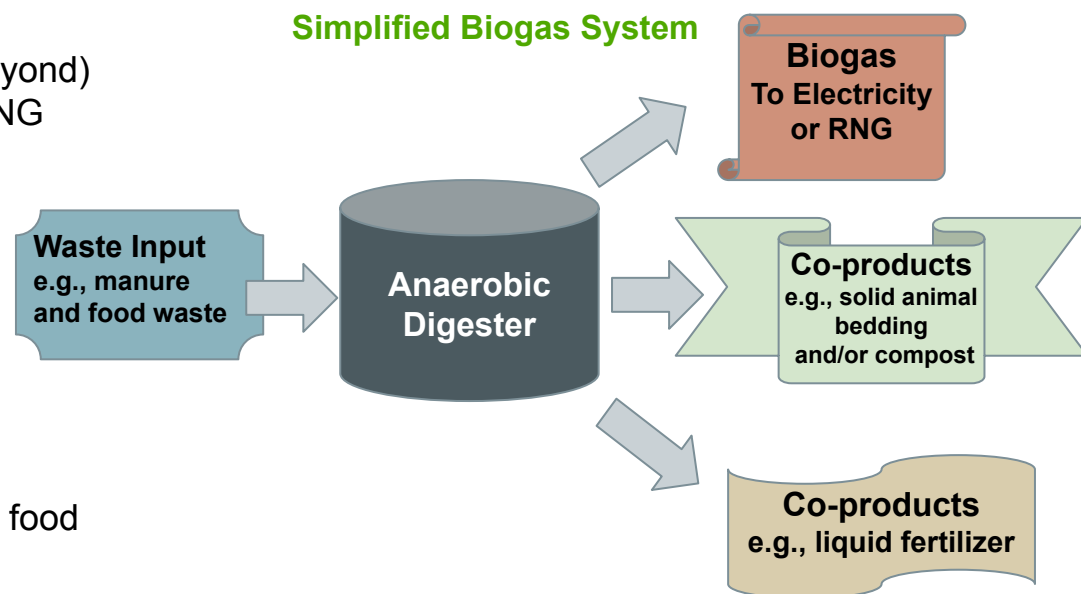
- Mid-size dairies 300 to 2500 milking cows for biogas to electricity
- Larger-sized dairies 2500 - 5000 (and beyond) milking cows for biogas to electricity or RNG

- Waste

- Dairy manure
- FOGS
- Organic Slurry
- Packaged Organics

- Geography

- Initially, New England states (aligned with food waste ban)
- Currently, expanding into Mid-Atlantic and Midwest with plans to expand in Southwest



Accelerating Waste Conversion To Renewable Energy

Ag-Grid facility in New York now operational!

Lent Hill Ag-Grid in Cohocton, NY

- Operational: Dec 2023
- Capacity: **1000 KW**
- Feedstock:
 - Manure: 100,000 gal/day (2100 milking cows)
 - Food waste: 35,000 gal/day
- 400 scfm of biogas



Ag-Grid facilities in Connecticut operating since 2021 and 2023

Fort Hill Ag-Grid in Thompson, CT

- Operational: 2021
- Capacity: **550 KW (current)**
- Feedstock:
 - Manure: 6,000 gal/day (220 milking cows)
 - Food waste: 12,000 gal/day
- 150 scfm of biogas



Hytone Ag-Grid in Coventry, CT

- Operational: 2023
- Capacity: **550 KW (current)**
- Feedstock:
 - Manure: 10,000 gal/day (330 milking cows)
 - Food waste: 12,000 gal/day
- 150 scfm of biogas



Belden Ag-Grid in Hatfield, MA

- Operational: 2019
- Capacity: **300 KW (current)**
- Feedstock:
 - Manure: 5,000 gal/day (180 milking cows)
 - Food waste: 12,000 gal/day
- 100 scfm of biogas
- Excess gas flaring currently: ~25-50 scfm
- **Planned expansion to 550 KW capacity**



Rockwood Ag-Grid in Granville, MA

- Operational: 2019
- Capacity: **450 KW (current)**
- Feedstock:
 - Manure: 12,000 gal/day (400 milking cows)
 - Food waste: 12,000 gal/day
- 150 scfm of biogas
- Excess gas flaring currently: ~100 scfm
- **Planned expansion to 850 KW capacity**



Rockwood Ag-Grid Organics in Granville, MA

- Operational: 2020
- Capacity: **50 tons/day of food waste**
- 4 full time employees
- Zero Landfill Facility
- **Planned expansion to 100 tons/day**

Depackager can produce food waste slurry while separating the packaging!

Current Ag-Grid Energy's Project Portfolio

**Processing 120,000 tons of food waste/year
Producing 3 MW of renewable electricity**

Project	State	Size, KW	Stage (*)	Food Waste	Start Date
Rockwood Ag-Grid	Granville, MA	450 □ 840 KW	8	18,000 gal / day	Operational since June 2019
Belden Ag-Grid	Hatfield, MA	300 □ 550 KW	8	18,000 gal / day	Operational since June 2019
Rockwood Ag-Grid Organics	Granville, MA	-	8	50 tons / day	Operational since Oct 2020
Fort Hill Ag-Grid	Thompson, CT	550 KW	8	18,000 gal / day	Operational since Jan 2021
Hytone Ag-Grid	Coventry, CT	550 KW	8	18,000 gal / day	Operational since Mar 2023
Lent Hill Ag-Grid	Cohocton, NY	1000 KW	7	40,000 gal / day	Operational in Dec 2023
Walmoore Ag-Grid	Cochranville, PA	880 KW	5	32,000 gal / day	Q3 2024
Meadowbrook Ag-Grid	Lake Odessa, MI	95,000 MMBTUs (RNG)	5	30,000 gal / day	Q2 2024
Wil-Roc Ag-Grid	Kinderhook, NY	1600 KW	4	36,000 gal / day	Q3 2024
Wolf's Ag-Grid	Scotland, TX	880 KW	3	30,000 gal / day	Q4 2024
Cushman Ag-Grid	North Franklin, CT	880 KW	3	30,000 gal/day	Q4 2024

(*) Stage 1 – Preliminary Discussion; 2 – Proposal Development, 3 – Partnership creation, 4- Feasibility Assessment; 5 – Permit/EPC Initiated, 6 – Construction Phase, 7 – Start-up, Phase 8 - Operational

New Portfolio - PA Biogas to electricity project

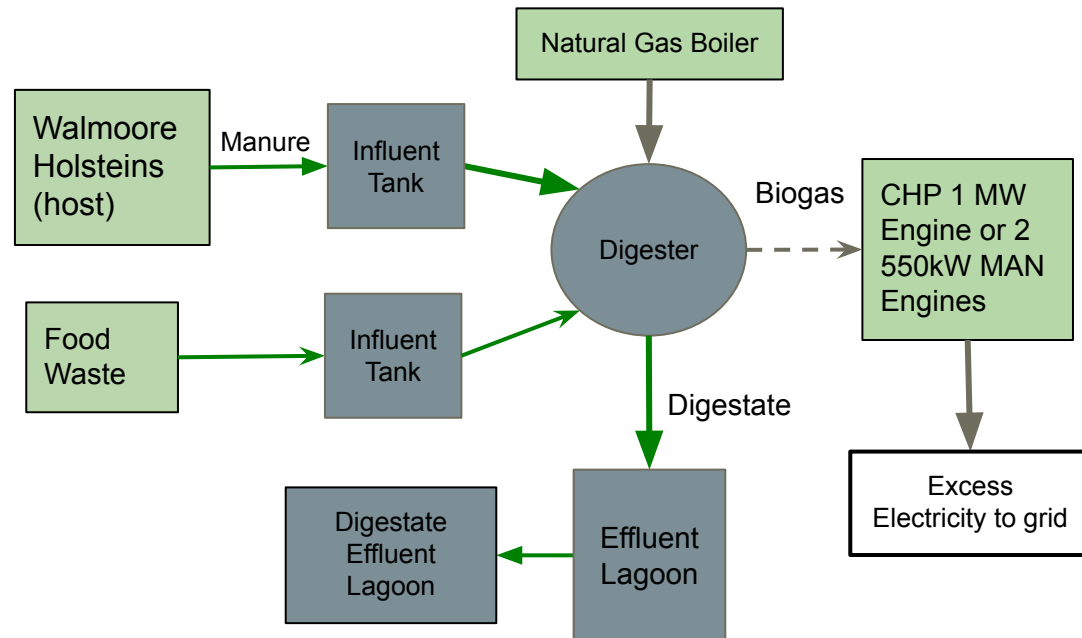
Flush Flume Sand Bedding Dairy
Project includes manure thickening system

We cannot currently pencil this project!



<u>BTUs from Dairy</u>		<u>BTUs from Food</u>		Total
<u>Manure</u>		<u>Waste</u>		
Cows / AE	1,847	Food Waste (GPD)	30,250	
Biogas / SCFM	138	Biogas / SCFM	149	287

Digester Sizing	#	AE	Per Cow GPD	Total GPD
Milking	1,500	1,500	32	48,000
Dry	100	50	17	1,700
Heifers	900	297	12	10,800
Food		0	12	30,250
		1,847		90,750



Trends in Food Waste Diversion from Landfills

2017

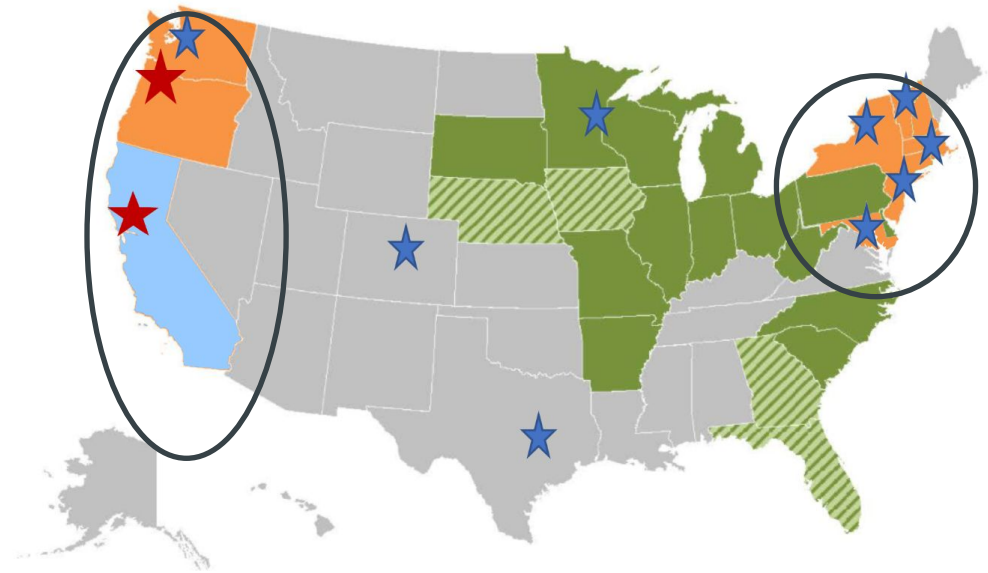
State and City Organics Bans, as of 2023

State and Local Organics and Composting Regulations

May 4, 2017



■ Legislation passed



Yard debris bans: Arkansas, Delaware, Illinois, Indiana, Maryland, Michigan, Minnesota, Missouri, New Hampshire, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, West Virginia, Wisconsin

Yard debris bans with exemptions for landfills with gas collection systems: Florida, Georgia, Iowa, Nebraska

Food scrap collection mandates or aggressive legislation for keeping out of landfills: California, Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Oregon, Vermont, Washington

State Organics Diversion Requirements: The State of California, rather than banning organics from landfills, instead requires municipalities to create organics plans, as of January 2022.

In 2016, Ag-Grid started in Massachusetts and Connecticut as the legislation was supporting food waste diversion

Connecticut: Legislative. <https://portal.ct.gov/DEEP/Waste-Management-and-Disposal/Organics-Recycling/Commercial-Organics-Recycling-Law>

Maryland: <https://legiscan.com/MD/bill/HB264/2021>

Massachusetts: Regulatory. <https://www.mass.gov/doc/310-cmr-19000-commercial-organic-material-waste-ban-amendments/download>

New Jersey: Legislative. <https://legiscan.com/NJ/bill/A2371/2020>

New York: Legislative. <https://legislation.nysenate.gov/pdf/bills/2019/S1508C#page=42>

Oregon: Regulatory. <https://www.oregonmetro.gov/sites/default/files/2021/01/19/food-scrap-administrative-rules-second-implementation-date-change-effective-02012021.pdf>

Rhode Island: Legislative. <http://webserver.rilin.state.ri.us/Statutes/TITLE23/23-18.9/23-18.9-17.HTM>

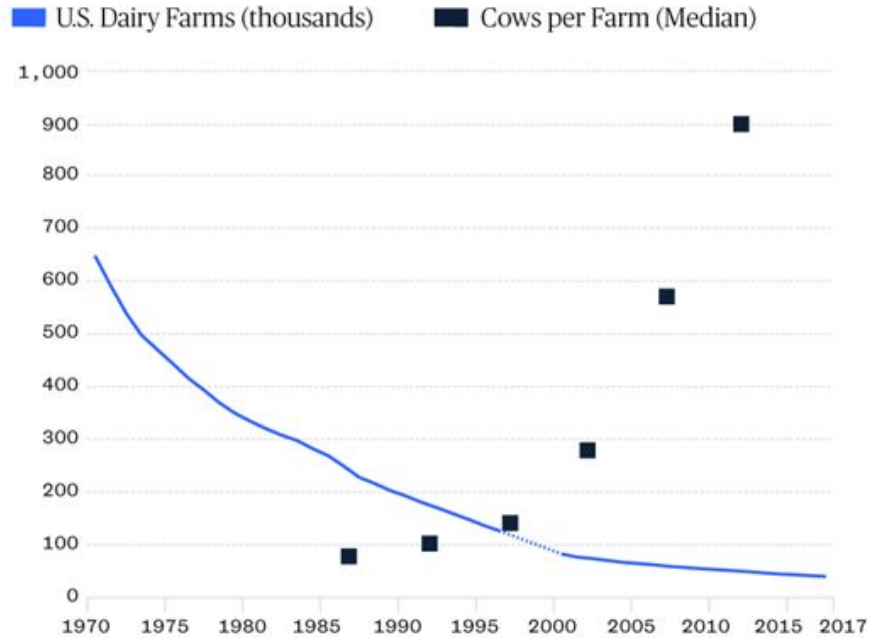
Vermont: Legislative. <http://www.leg.state.vt.us/docs/2012/Acts/ACT148.pdf>

California: https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1826 (ILSR script) <https://ilsr.org/rule/food-scrap-ban/california-organics-recycling/>

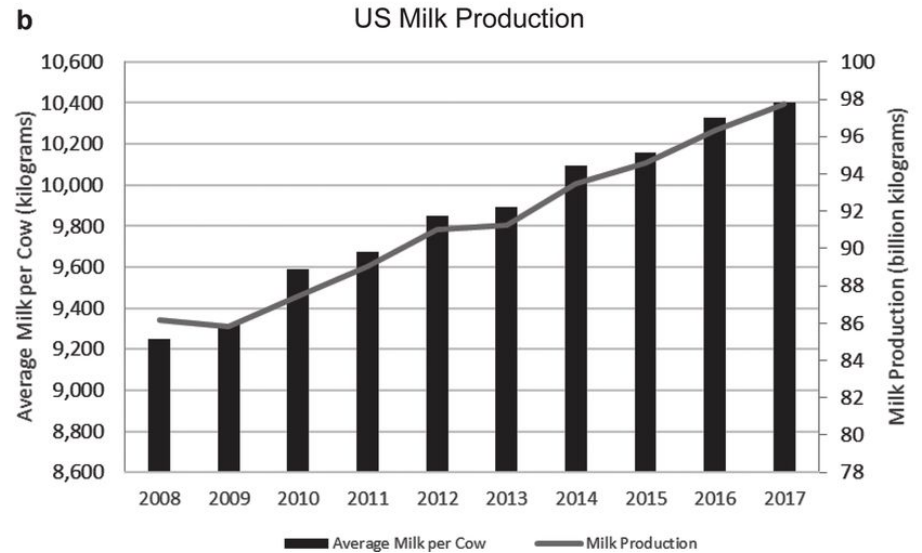
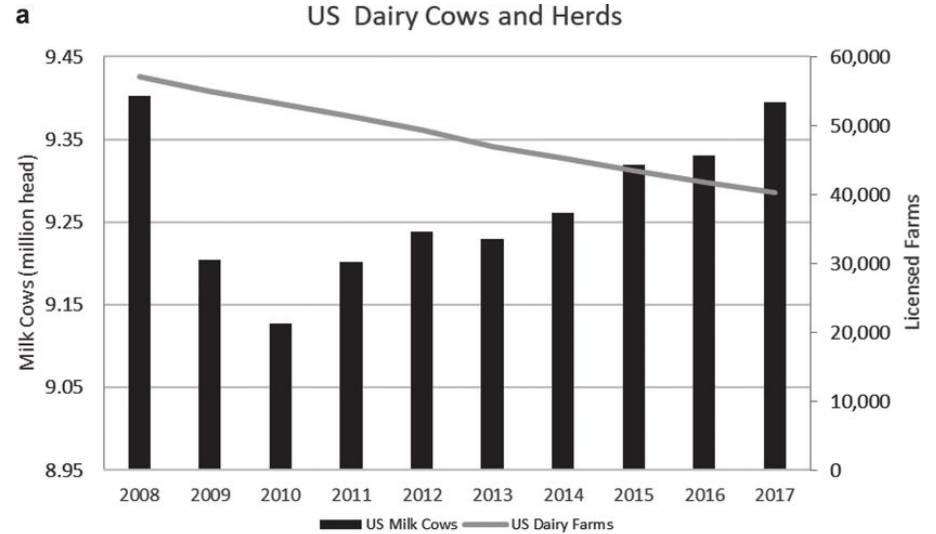
Dairy Trends

The fall of small dairy

And the rise of commercial farming.



- Today we are less than 30,000 dairies – a drop from 40,000 in 2017



Pennsylvania Dairies

Leading 10 U.S. states based on number of milk cows

PA is 7th largest dairy producer in US

The average herd sizes are small

The dairies lend themselves to biogas to electricity projects

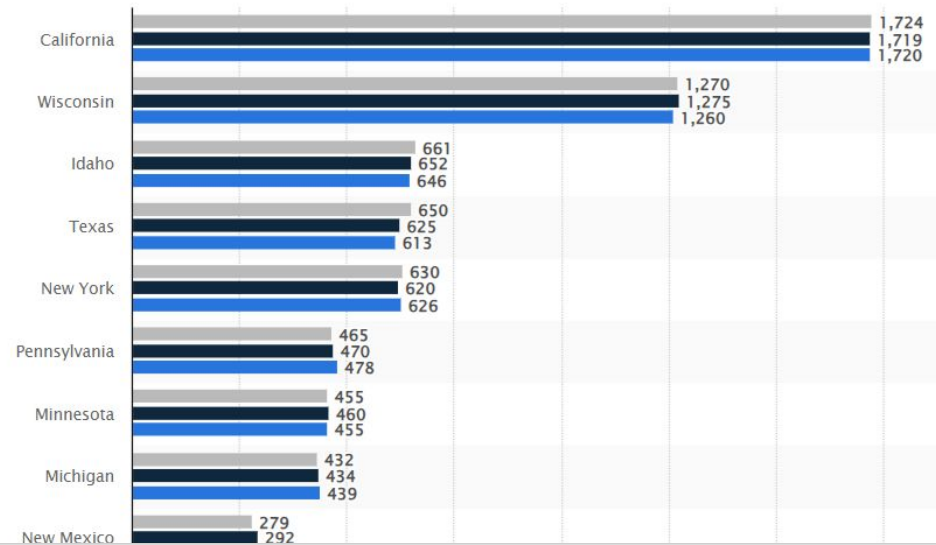
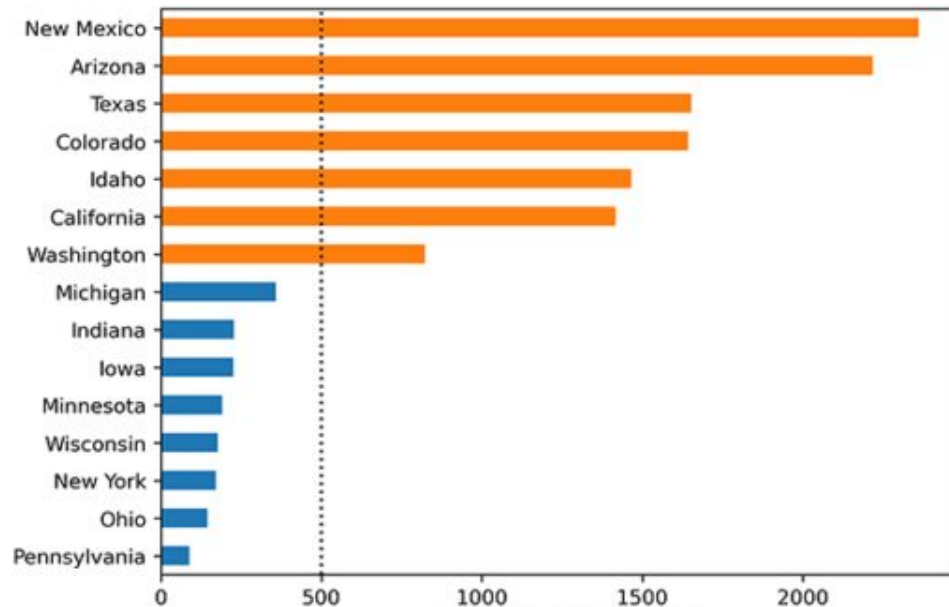
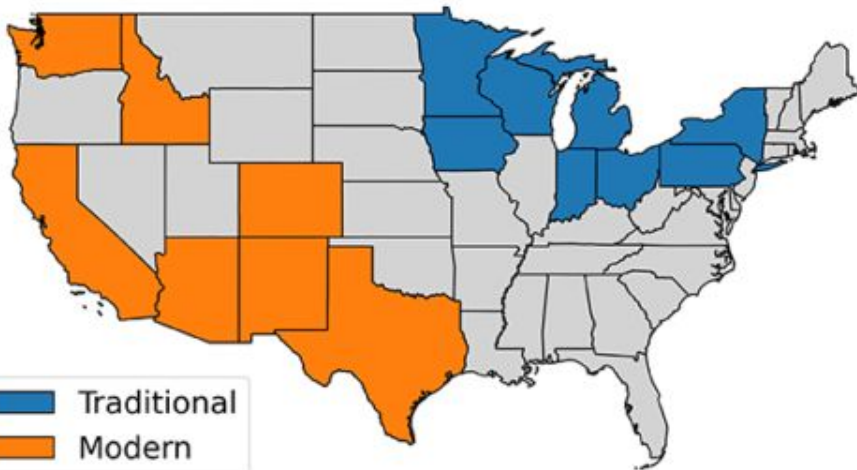
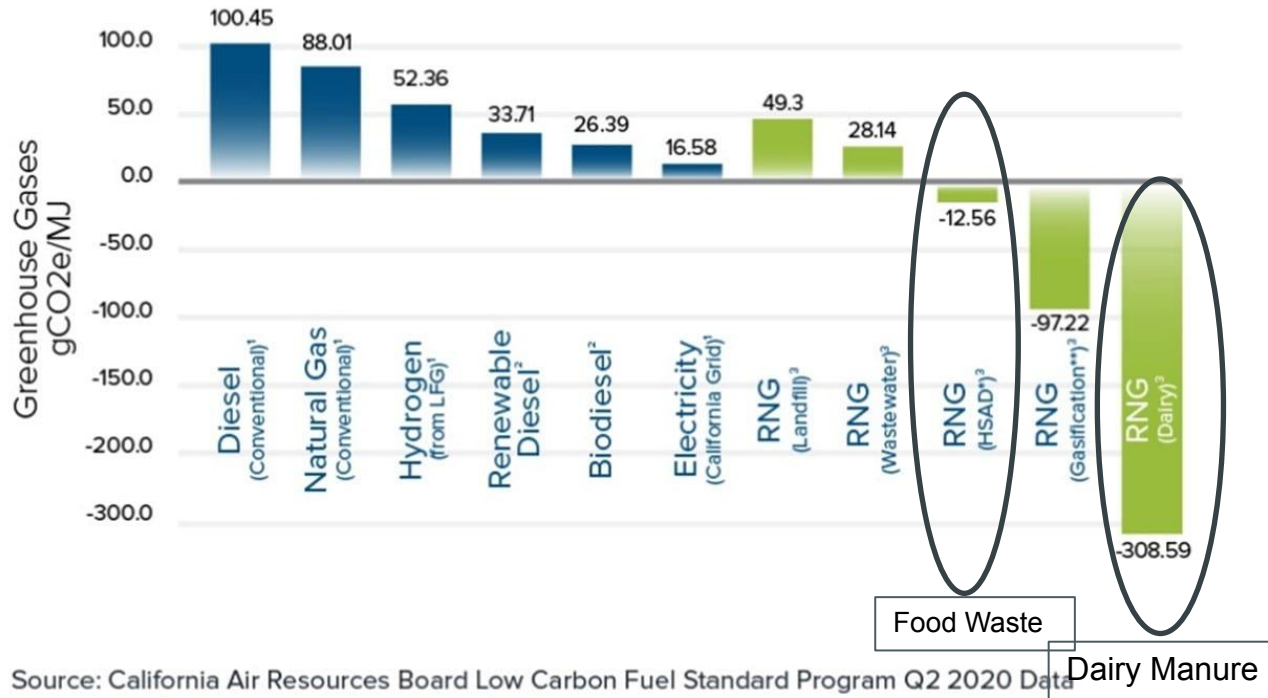


Figure 1. The Top 15 Dairy States and Their Average Herd Size in 2020



Anaerobic Digestion of food waste & dairy manure reduces the carbon footprint of our transportation sector

CARBON INTENSITY OF KEY TRANSPORTATION FUELS



Source: California Air Resources Board Low Carbon Fuel Standard Program Q2 2020 Data
 CI values EER adjusted for HD truck applications
 (1: Lookup table CI values; 2: Average CI values for prior 12 months; 3: Average CI values of registered pathways as of June 2020)

*HSAD, or High Solid Anaerobic Digestion, converts organics (e.g., food and green waste) into RNG.

**Gasification is a thermochemical process that converts organics (e.g., forest biomass) into RNG.

- Solar and Wind have zero Carbon Intensity !!!
- Biogas to energy has negative Carbon Intensity !!!
- We need all hands on deck and work on all technologies to achieve our GHG reduction goals!

Partnership for Electric Pathways

Our mission is to ensure the U.S. Environmental Protection Agency finalizes its [“Electric Pathways” framework proposal](#) as part of its Renewable Fuel Standard Program (RFS) as soon as possible



[About Us](#) [Contact Us](#)

Partnership for Electric Pathways

The Partnership for Electric Pathways (PEP) is working to ensure that waste and waste gases are used to produce the renewable fuel of the future – electricity – to power electric vehicles.

[Learn More](#)



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The Ask

We need additional support for waste to electricity projects to reduce greenhouse gases in Pennsylvania

Specifically,

1. Better net-metering rules that support export of electricity. The program currently pays for exported electricity on annual basis. We need it to be on monthly basis.
2. Support organics diversion laws
3. Incentivize biogas to electricity projects by supporting RFS eRINs
4. Enhance Pennsylvania's Renewable Portfolio Standards to create supportive RECs pricing (renewable energy credits)

There are 11 dairy based digesters in the state currently. We could add 25-75 digesters in PA and produce >50 MW of electricity (400 million KWH/year from biogas using manure and food waste at dairies >500 milking cows.

Cattle and Calves Inventory, by Type and Herd Size – Pennsylvania: 2012 and 2017 Census of Agriculture

Type and Herd Size	2012		2017	
	Farms <i>number</i>	Inventory <i>head</i>	Farms <i>number</i>	Inventory <i>Head</i>
Milk Cows	7,829	532,335	6,914	527,617
1 to 9	1,077	2,507	990	2,323
10 to 19	308	4,348	188	2,670
20 to 49	2,515	95,300	1,765	67,743
50 to 99	2,725	179,090	2,674	178,982
100 to 199	882	113,097	956	122,162
200 to 499	246	70,427	255	72,645
500 to 999	60	40,189	62	41,622
1,000 to 2,499	13	18,786	20	28,184
2,500 or more	3	8,591	4	11,286

<https://extension.psu.edu/on-farm-anaerobic-digestion-biogas-production-in-pennsylvania-30-years#:~:text=There%20are%20seven%20digester%20systems,design%20phase%20or%20under%20construction.>

https://www.nass.usda.gov/Statistics_by_State/Pennsylvania/Publications/Annual_Statistical_Bulletin/2019-2020/Pennsylvania%202019-2020%20Annual%20Bulletin.pdf

Ag-Grid Partnerships

Financing Partner



EPC Provider



Utility Partner



Multiple dairy farm partners



US Dept. of Agriculture



Multiple food waste partners



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