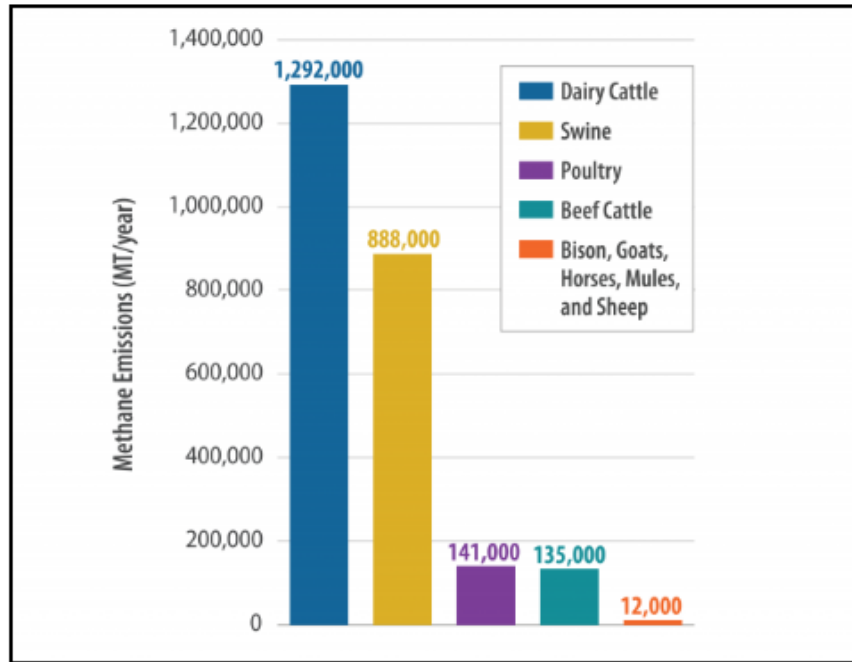


## Renewable Natural Gas from Manure

Farm animals produce millions of tons of greenhouse gasses every year in the United States.



Source data: U.S. EPA GHG Inventory of Greenhouse Gas Emissions and Sinks: 1990-2018.

Approximately 27% of the methane produced by agriculture comes from manure management. (EPA, 2018, page 5-2). Much of this methane comes from bio-chemical reactions in wastewater storage ponds (WSPs), otherwise known as manure lagoons. In the absence of oxygen, micro-organisms in WSPs convert feces and urine into methane. Other gasses produced by decaying animal waste include nitrous oxide, ammonia, hydrogen sulfide and volatile organic compounds (VOCs). These gases would not be produced if manure was not stored in WSPs.

Approximately 68% of agricultural methane comes from enteric fermentation - belching and farting. (EPA, 2018, page 5-2)

Methane is a greenhouse gas that is over 25 times more potent than carbon dioxide. Methane stays in the atmosphere for 12 years compared to 100 years for carbon dioxide, so reducing methane emissions is a very effective way to address global warming in the short term.

Natural gas is mostly methane, so entrepreneurs have studied ways to capture methane and package it as a fuel. When methane is derived from decay of organic matter it is considered a renewable natural gas (RNG).

In an effort to wean the United States from fossil fuels our government has encouraged production of RNG from sources such as food waste, landfills, and animal agriculture. Policy makers have created monetary incentives that encourage construction of anaerobic digesters to

screen, clean, and transport the emissions. Incentives originate at federal and state levels: (EPA, 2022)

The Renewable Fuel Standard program of 2005 amended the Clean Air Act (CAA) and requires a certain percentage of fuels to come from renewable sources, such as corn ethanol and now renewable natural gas. The EPA sets the price for these renewable fuels using Renewable Identification Numbers or RINs. Currently the RIN price for RNG is high, but there is no guarantee it will stay high. (EPA, 2021)

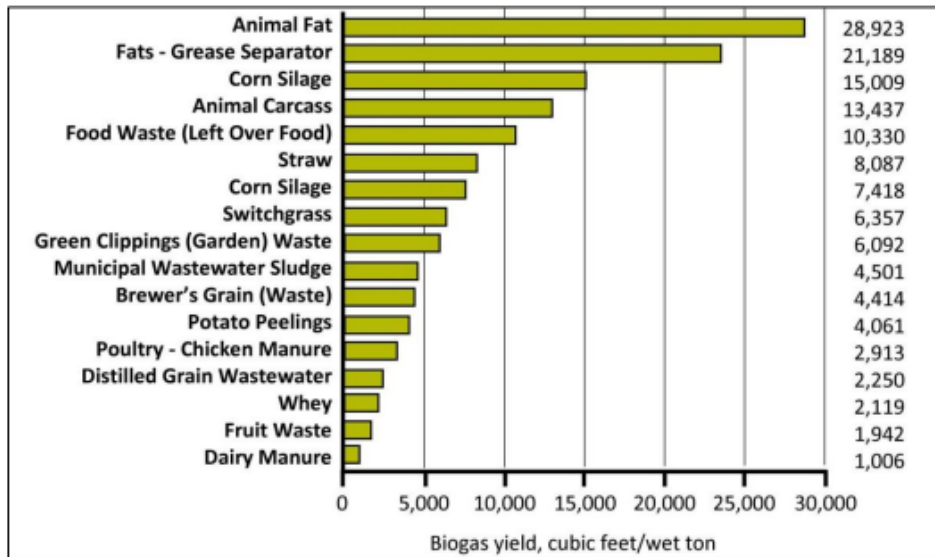
Some states have approved low carbon fuel standards (LCFS) that subsidize RNG, often at very high levels. For the state of California, according to Lee & Sumner (2018), “Of the \$2.074 million in total annual projected revenue for (a typical dairy) digester, only 7% comes from selling renewable natural gas in commercial markets. About 93% of the projected revenue comes from selling government-created environmental credits.” Hoards Dairyman (2021) notes that dairies that own their own digesters could receive as much a \$2 to \$3 in RNG profits per hundred weight of milk produced. “At that point, milk has become the by-product of manure production.”

Large conglomerates have seized the opportunity to augment income under federal and state programs. According to the EPA (2022) first among these corporations are:

- Smithfield Foods, Inc. (Smithfield, 2022), the world’s largest pork processor and hog producer. (Smithfield, 2022)
- Align Natural Gas, a joint venture between Dominion Energy and Smithfield Foods. (Align, 2022)
- Calgren Dairy, operates a digester that injects RNG into SoCal Gas pipelines
- Monarch Bioenergy, a joint venture between Smithfield Foods and Roeslein Alternative Energy. (Globe Newswire, 2019)

There are serious concerns related to utilizing manure biogas digesters for production of renewable natural gas (The Guardian, 2022):

- Dry manure management techniques and other alternative practices can prevent the creation of methane in the first place.
- There is no guarantee that subsidies and incentives will continue.
- Dairy digesters do nothing to address enteric (intestinal) methane emissions from cows, or other GHG emissions from dairies.
- This pathway provides increased profits for mega-dairies and pushes smaller dairies out of the marketplace.
- Manure has the lowest return per wet ton of input of any digester feedstock. Animal carcasses (think unwanted dairy calves) produce 13 times more biogas per wet ton than manure.



TetraTech, 2011. [Tillamook County Bioenergy Feasibility Study Report.](#)

(WA State University, 2017)

In summary, natural gas from animal manure is a greenhouse gas that would not have been produced in the first place with better manure management. Promoting RNG from animal manure encourages facilities to add more animals and this brings major negative side effects such as air pollution with other gasses, water pollution, and serious risks to public health. Given the large number of negative impacts that result from manure digestion, biogas from manure should not be considered either renewable or sustainable and should not be subsidized by taxpayer money.

Sources:

Align (2022) Farm to Energy. Available at <https://alignrng.com/>

Environmental Protection Agency (2018) Inventory of U.S. Greenhouse Gas Emissions and Sinks. Available at [https://www.epa.gov/sites/default/files/2018-01/documents/2018\\_chapter\\_5\\_agriculture.pdf](https://www.epa.gov/sites/default/files/2018-01/documents/2018_chapter_5_agriculture.pdf)

Environmental Protection Agency (2021) Renewable Fuel Standard Program. Available at <https://www.epa.gov/renewable-fuel-standard-program>

Environmental Protection Agency (2022) Renewable Natural Gas from Agricultural-Based AD/Biogas Systems. Available at <https://www.epa.gov/agstar/renewable-natural-gas-agricultural-based-adbiogas-systems>

Globe Newswire (2019) Smithfield Foods and RAE Partner to Produce Renewable Energy while Restoring Missouri's Natural Environment. Available at [Smithfield Foods and RAE Partner to Produce Renewable \(globenewswire.com\)](https://www.globenewswire.com)

Hoards Dairyman (2021) Energy revenue could be a game changer for dairy farms. Available at <https://hoards.com/article-30925-energy-revenue-could-be-a-game-changer-for-dairy-farms.html>

Lee, H., & Sumner, D. (2018). Dependence on policy revenue poses risks for investments in dairy digesters. *California Agriculture*, 72(4), 226-235. Available at <https://calag.ucanr.edu/Archive/?article=ca.2018a0037&sharebar=share>

Smithfield, Inc. (2022) Our Ownership Structure. Available at <https://www.smithfieldfoods.com/Our-Ownership-Structure>

WA State University (2017) Harnessing Renewable Natural Gas for Low-Carbon Fuel: A Roadmap for Washington State. Available at <http://www.commerce.wa.gov/wp-content/uploads/2018/02/Energy-RNG-Roadmap-for-Washington-Jan-2018.pdf>