Methane gas renewable energy

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In our eagerness to minimize climate change and shift to greener energy sources, most of our group attention has been directed toward carbon dioxide emissions. But if we want to meaningfully slow climate change, more of our attention should be paid to reducing waste methane. A potent greenhouse gas (GHG), methane is 80 times as powerful at trapping heat as CO2 in its first 20 years in the atmosphere. But although it is one of nature"s most harmful greenhouse gases, methane from animal waste can--and should--also be viewed as one of humanity"s most renewable energy sources.

The good news is that methane produced from farm waste is no different from methane produced from fossil fuels. The biogas captured from the manure (known as biomethane) must be processed to concentrate the pure methane. Once the impurities have been removed, any form of renewable natural gas (RNG) is functionally indistinguishable from conventional natural gas.

According to the EPA"s Inventory of U.S. Greenhouse Gas Emissions and Sinks, decomposing waste from animals, landfills, and wastewater treatment accounts for 26% of all U.S. methane emissions. The inventory report also states that methane from farm waste has increased 68% since 1990. This increase stems from two related-but-distinct issues. Over time, large-scale cattle and hog farming (the two species whose waste emit the most methane) have concentrated in certain areas of the country and the number of animals kept on each facility have increased. At the same time, these farms have transitioned to liquid-based systems to manage and store manure, and these liquid systems produce higher methane emissions than dry systems.

Another advantage to converting farm methane to RNG is that the technology and infrastructure is proven and readily available. The RNG Coalition reports that the U.S. currently has 239 active anaerobic digesters, with more than 12,000 other projects noted as good candidates for waste digestion. On the processing side, North America already has 157 RNG production facilities, mostly in the United States, with 76 more under construction and plans for another 79 in process. European confidence in RNG is even higher and its related infrastructure larger, with 729 active biomethane production facilities, a 51% increase since 2018.

But the bottom-line facts are these: The estimated U.S. inventory of cattle in early 2021 was 93.6 million head of cattle and 74.8 million hogs and pigs, a clearly renewable source. Given methane"s potency as a greenhouse gas and potential as a fuel source, the capture of methane from farm waste is an opportunity for a (relatively) easy and fast win in our bid to decrease carbon emissions.

The benefits from the capture of farm waste methane are extensive. On the environmental tally board, RNG scores highly on two fronts: the removal of methane gas from an existing emissions source and the offsetting of the production and use of fossil fuels. Admittedly, it"s not a perfect solution to a zero-carbon energy future,

since burning RNG produces the same amount of waste carbon dioxide as conventional natural gas. But it"s also crucial to recognize that all forms of natural gas burn vastly cleaner than coal or oil, producing 45% and 30% less CO2, respectively. When the entire life cycle of producing and consuming renewable gas from farm waste is considered, RNG is a carbon-neutral (if not carbon-negative) fuel source.

The anaerobic digestion of manure to capture waste methane produces a bounty of additional useful goods while reducing our carbon footprint. (Source: epa.gov)

RNG boasts revenue benefits to farming communities as well. Increased capture and use of RNG opens up job opportunities to construct and maintain the digesters, as well as supporting other ventures, such as agro-tourism and investment cooperatives, that can boost local (and often struggling) rural economies.

As a nation, modernizing our grid to incorporate other types of renewable energy promises a more efficient, reliable, and resilient energy future. But building that future will take time. Because RNG can be injected into our already-existing pipelines, we can use it right away to leverage our current energy infrastructure and lower our carbon footprint while we continue the process of piecing other renewables into the grid.

On the state and regional level, procurement programs for natural gas utilities would also help lay the tracks to new markets. And additional transportation credit programs or incentives for thermal and power load would provide RNG developers the confidence they need to build more projects.

Energy businesses can be influential in driving this market space as well. Several pipeline infrastructure and energy companies, such as Shell, Williams, Kinder Morgan, Enbridge, and DTE Energy, are already committed to procuring and providing low-carbon fuels and encouraging their providers to offer a greater percentage of sustainable energy. Increases in these target RNG values would encourage the waste RNG market to develop to its full potential.

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