New Report Estimates Anaerobic Digestion's Climate Impact Potential in New York

As key decision makers contemplate the best pathway en route to these targets, they are paying attention to methane, documented as 80 times more harmful to the environment than CO2 —and making up 40 percent of the state's total greenhouse gas footprint. But with all its aspirations, New York is missing opportunities to capture and use one of the world's top methane sources—organic waste— charges Energy Vision.

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In a new report, Putting New York's Organic Waste To Work, the nonprofit asserts that anaerobic digestion (AD) is the way to go to make real progress in cutting methane and its global warming impact, while producing renewable natural gas (RNG) as well as compost and other products from the residue.

Drawing on New York's 2022 Greenhouse Gas Inventory, Energy Vision found that methane comprises 39% of New York's GHG, and organic waste accounts for 34 percent of that.
Building 300 digesters would cut the state's methane emissions 15 percent by 2030. Even starting with 30 new facilities could reduce methane releases from landfill and exported waste by 90% and lower total emissions by 11.2 percent, according to the report.

On the economics side, developing 300 new projects would generate roughly 8,000 new jobs and about $3.4B in capital deployed, say the authors.

Making meaningful impact will require deploying these operations at scale nationwide, and there's plenty of work to do before AD could reach that maturity level. But with its ambitious policy, New York – Energy Vision's home state – can lead the charge, attests Matt Tomich, president of Energy Vision.

AD is a complex biological process, but Will Charlton, president Digester Doc and CEO Valkyrie Analytics, explains the gist of the concept simply:

"Carbon does not disappear; it just takes different forms. It exists as CO2, as carbon in soil, or in living matter. With that said, if we convert energy captured via AD to methane, we prevent emissions that would occur later when material is applied to land or elsewhere. And the more carbon that becomes methane inside the digester, the less emissions occur later."

As the technology evolves it delivers improvements, including a more proficient carbon-to-methane conversion process. Over the years the industry has pushed conversion efficiency from 30 or 35 percent up to 65 or 70 percent. An emissions capture rate now standing at 99.9 percent further boosts outcomes.

Still, given the sheer volume and diversity of organic materials, these systems can only accomplish so much alone. Another reality is that AD leaves behind post digestion residue requiring ancillary processing methods.

Compost has stepped into the limelight as a complementary backend technology. Composting digestate solids prior to field application actually further reduces methane emissions, says Lisa Schulte Moore, professor and co-director of the Bioeconomy Institute at Iowa State University.

Among her team's multiple research thrusts is assessing the effects of field applications of digestate on soil processes, crop production, and the environment.

But while compost serves well in supporting smaller systems, with larger operations pyrolysis or gasification may work better and can convert solids and carbon into various products, according to Charlton.

"So, there are different solutions depending on how you are using the program," he says.
The agriculture sector is increasingly turning to AD. Dairy farmers in particular are finding that by providing manure as feedstock they can generate extra income, manage the massive volumes of cow poop more sustainably, and ultimately reduce their carbon footprint.

In New York, bringing about 260 new ADs to dairy farms could cut methane from manure by 56.5 percent by the report's calculations.

As its potential value as a feedstock gains more recognition manure is a growing research interest with one goal being to figure out how to develop cost-effective treatments to increase its biodegradability and biogas production rate.

While many treatments have been studied, economics are hindering progress in commercializing them, says Frank Mitloehner, professor and air quality specialist, UC Davis.

Though he and his colleagues have been involved in projects showing promise; he points to work involving pelletizing composted manure for land applications.

Research is ongoing in other areas from automation to improve biogas production to potential for perennial grasses to serve as feedstock.

Along with the research and process improvements, it will take policies favoring AD for the technology to reach the scale Tomich wants to see.

He points to adopting a lifecycle carbon accounting approach measuring all fuel-related GHG, from production through end-use, as opposed to just measuring vehicle tailpipe emissions.

“Shifting to a lifecycle carbon analysis system would provide the certainty required for investments in AD infrastructure by recognizing that these projects avoid methane emissions via diversion *and* provide climate/air quality benefits by displacing fossil fuels with biogas,” Tomich says.

He also sees a place for state-level Clean Fuel Standards (CFS) where clean fuel producers sell credits to producers of high-carbon fuels.

“The beauty of a CFS is that it's technology neutral and awards low- and no-carbon transportation fuels in relation to how much each project/fuel reduces lifecycle GHG emissions from the fossil fuel baseline, including battery electric and fuel cell vehicles, plus biofuels,” Tomich says.

New York State Senator Sean M. Ryan is among politicians who wants to see what AD can do for his region.

"As New York works to remain a leader in the fight against climate change, it is critical that we remain open to all ideas that can help us meet our state's ambitious climate goals. That is especially true for policies that have already proven effective elsewhere.”