

For dairy farms, flaring methane offers mitigation option

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As New York's dairy farms get larger and store more manure – rather than spread it – methane emissions have doubled in the last two decades. To reduce this potent greenhouse gas in the atmosphere, Cornell researchers advocate an economical, viable solution: combustion.

"Methane can easily be destroyed by flaring, so we developed scenarios where [manure](#) storage units could capture and flare [methane](#)," wrote co-authors Jenifer Wightman and Peter B. Woodbury, researchers in the Section of Soil and Crop Science in the School of Integrative Plant Science, in a study, "New York Dairy Manure Management Greenhouse Gas Emissions and Mitigation Costs," which was published in the *Journal of Environmental Quality* earlier this year.

"It's an ambitious but feasible mitigation strategy that responds to a trend of larger farms generating methane from stored manure," they wrote.

Methane emissions from stored liquid manure on New York [dairy farms](#) have jumped from 487,907 metric tons of [carbon dioxide](#) equivalent per year in 1992 to 1.3 million metric tons in 2012. (Methane is 34 times as potent as carbon dioxide on a 100-year time scale, the common unit of measure comparing potency between greenhouse gases.) The researchers suggest simply covering manure storage units and then flaring the captured methane to destroy it.

Installing covers with flares could mitigate 1.8 million metric tons of carbon dioxide equivalent per year from agricultural methane in the

state, at an estimated price of \$224 million.

"While a seemingly large total cost, the cost of capture and flaring adds a half-penny cost to a liter of milk," the researchers found. At this time, this cost is borne by the farmer. The New York State Department of Agriculture and Markets offered grants in December 2015 to help support installation of covers and flares.

When dairy farms were smaller, farmers spread manure daily, an aerobic method that produces no methane. But as dairy farms grew, farmers needed to store manure in an anaerobic setting, which produces methane. Wightman and Woodbury write that on a 20-year time scale, methane is 86 times as potent as carbon dioxide, but on a 100-year time scale, methane has 34 times the potency. "For near-term greenhouse gas mitigation efforts, this is an important target," the paper said.

Agriculture accounted for approximately 9 percent of total U.S. [greenhouse gas](#) emissions in 2014, according to the U.S. Environmental Protection Agency. This percentage climbs higher due to combined methane and nitrous oxide emissions "from livestock manure management systems, reflecting the increased use of emission-intensive liquid systems" for the past quarter-century, according to the EPA.

In New York, some large farms are capturing methane to use for energy, but those systems are expensive and a large percentage of the infrastructure must be replaced within five years due to corrosive elements in the gases. Capture-and-combustion systems are more economically viable, providing farmers a cost-effective option for mitigating greenhouse gases on farm, wrote Wightman and Woodbury. Covers and flares have other benefits, too, including odor control, reduced hauling costs and reduced overflow from extreme weather events.

Provided by Cornell University

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