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Methane Migraine

Are stringent air quality regulations impeding dairy digester implementation in California?

by Anna Austin

When it comes to renewable energy portfolios, California is an archetype for other states developing standards to follow. Targets increasing the use of renewable power to 20 percent by 2010 and 33 percent by 2020 have set the clean energy bar high, especially when coupled with the state's stringent air quality regulations.

Despite the benefits and incentives associated with generating renewable energy in California, complying with certain air pollution control regulations has become a major hurdle for some projects—in particular, for farmers attempting to install anaerobic digesters on their dairy operations.

California leads the nation in dairy farming, with some 2,700 farms, at which only 16 operate digesters, one-fourth of those are small in scale. While digesters significantly reduce methane, a greenhouse gas (GHG) 21 times more potent than CO₂, problematically, the combustion engine that transforms the biogas into energy releases a high amount of nitrogen oxide (NO_x), a catalyst in the breakdown of ozone.

Certain areas in California, such as the Sacramento and San Joaquin Valley regions, have been classified by the U.S. EPA as "severe non-attainment" areas for ozone, and therefore the air resource boards in those districts impose strict standards on NO_x-emitting facilities. About 75 percent of all dairy cows are housed in dairies within the boundaries of the San Joaquin Valley Air Pollution Control District and the Sacramento Municipal Air Quality Management District.

Farmers and environmentalists say Central Valley air pollution control agencies that refuse to budge on the matter are unwilling to compromise and are overlooking the positives associated with digesters. In 2009, six dairy digesters ceased operating as a result of regulatory and financial problems. Charged with controlling air quality, the boards insist the technology to meet the set NO_x requirements is available today, and say those having trouble getting permits or meeting the standards should have checked with their local air district about requirements before engaging in their projects.

Allen Dusault, program director for Sustainable Agriculture, says building new digesters in California today is "a nightmare." It all stems from a clash of interests and goals, he tells Biomass Magazine. "In California, we have the most progressive dairymen anywhere in the country who are looking to do the right thing; to capture the GHGs and reduce their emissions by hundreds of thousands of tons per year, while generating renewable electricity, another goal of the state," he says. "Even if the air district recognizes the GHG benefits, they are responsible for air quality, and that's solely what they focus on. What's been required of these dairymen is extraordinary."

Jorge DeGuzman, permitting program supervisor for the Sacramento Metropolitan Air Quality Management District, says that the regulations affecting dairy digesters have been in place for more than 10 years. "All other sectors of our economy have had to comply with these standards," he says. "If we were to relax the standards for dairies, we would have to impose even more stringent requirements on other sectors to make up for the increase in NO_x emissions."

Regulatory Red Tape

In the spring of 2001, the California legislature passed SB5X, which provided \$15 million to support the building of manure digesters for electrical generation, \$10 million of which was earmarked for on-farm dairy digesters. The program covered up to 50 percent of the capital costs of the digesters. Many dairy farmers are now wondering why the state government encourages and provides grant money for projects that are extremely difficult to get permitted.

DeGuzman says while the program was being developed, there was no communication with air pollution control districts. "The grant program was overseen by an advisory group comprised of representatives from the California dairy industry, California Department of Food and Agriculture, California Energy Commission, California State Water Resources Control Board, Sustainable Conservation (a small California nonprofit environmental group that focuses on agricultural and transportation issues), the University of California and U.S. EPA AgSTAR Program," he says. "Air pollution control agencies were not part of this advisory group nor were they aware of this advisory group."

The grants were awarded, the digester systems designed, and the equipment purchased, all before consulting the local air pollution control agencies, according to DeGuzman. "When these projects came to us, the dairy operators were pretty much expecting a simple, rubber-stamp approval. However, some discovered that the equipment they had purchased did not meet the standards that had been in place for approximately 10 years. Had they contacted the local air district before purchasing the equipment, as the law requires, we could have made them aware of the emission standards applicable and they could have designed compliant digester systems."

DeGuzman says air pollution control districts are in full support of the concept of electricity generation from the anaerobic decomposition of manure, but only if it's done correctly. "If properly designed, the dairy digesters could operate well within the required standards and permitting them would not be an issue," he says.

Any dairy in the San Joaquin Valley and Sacramento districts must meet an emission limit of 9 parts per million of NO_x, or 0.15 grams per brake horsepower-hour (the actual horsepower of an engine, measured by a brake attached to the drive shaft and recorded on a dynamometer), a difficult to achieve standard which Dusault says no dairy digester has previously been compliant. "The basis for the air district deciding that limit was achievable was based on a dairy in Atwater, Calif.," Dusault says. "We met with [the air district] and pointed out that we knew from investigating, that the dairy was not in compliance. The air district essentially didn't believe us, but went out there and checked and found out that in fact, it wasn't complying."

Dusault says the air district then recommended a different type of technology, a selective catalytic reduction (SCR) rather than a three-way catalyst. "We said that there wasn't any dairy biogas facility, or any biogas facility in the country that we've identified that's meeting that limit using SCR and they responded by telling us that they believe there are other types of facilities meeting it, so these digesters must, too. They couldn't find anyone meeting it with biogas, but yet they still required it."

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John Fiscalini, owner of Fiscalini Farms, Fiscalini Cheese Co. and a 1,500-head dairy, knows first-hand the strife a dairy farmer can face when taking on a digester project. Fiscalini has a complete-mix digester system consisting of two 860,000 gallon tanks installed at his farm, a project originally estimated to cost \$2 million, but in the end cost about \$4 million. He received a \$1.5 million grant from the California Air Resources Board and the California Energy Commission, but the remainder came out of his own pocket.

Fiscalini says initially, the biggest incentive for him to install a digester was to stay ahead of legislators who may pass laws requiring dairies to have them. He had anticipated the project would take eight to 10 months, but it ended up taking two years because of permitting issues with the San Joaquin Valley Air Pollution Control District and the California Regional Water Control Board.

Aside from being prepared to handle mountains of paperwork from regulatory agencies, grant providers and power utilities, any dairy farmer in California considering installing a digester should "do a lot of homework," Fiscalini says. "Hire a consultant who knows the digester arena, get as many bids as possible, look for grant money, and be really careful about permits and which agencies have the power to impose regulations."

Now that his digester has been up and running for the better part of the year, Fiscalini believes he is well-equipped to help other dairy farmers who might be facing the same problems. He and his project manager have formed a consulting firm called Ag Power Development. "Because of what we went through with this project, we believe we are among the most knowledgeable people in the state of California about how to get through the regulatory process," he says. "Our experiences, although painful at the time, have educated us and also the regulators, about the process."

Recognizing Trade-Offs

Though each regulatory agency involved in the digester permitting process serves a sole purpose, environmental trade-offs should be kept in mind, says Steve Weismann, at the Center for Law, Energy & the Environment at Berkeley Law.

"Most importantly, state government at the top levels needs to recognize the assistance of these trade-offs," Weismann says. "Not every solution that would benefit the reduction of carbon emissions will necessarily uniformly benefit all of their environmental concerns."

Weismann points out that it will be necessary, in some instances, to recognize certain needs and set priorities. "The other major component is to assure that when agencies analyze projects, they are free and equipped to look at the full range of life-cycle impacts of the project, instead of first-level impacts that may relate to the particular thing that an individual agency regulates," he says. "For instance, if a concern is NOx emissions, there may be some NOx emissions directly related to the operation of a methane-based power generator, but there might be other NOx emissions that might come, for instance, from taking that same manure and transporting it to some other place to be processed. It's really going to be important for agencies to look at the full range of impacts."

The air district's stake isn't in GHG benefits, even if they recognize them," Dusault says. "Their charge is for air quality, and that's what they focus on—but there is an opportunity to come in with new technology to get that permit, and that's where [Sustainable Conservation is] at right now."

Dusault admits that while there are other uses for biogas, all of which have barriers, electricity generation has turned out to be the most economically attractive—one incentive being that power providers are willing to pay more for renewable electricity to meet state mandates—yet most daunting from a regulatory point of view. "The air district is very powerful," he adds. "Ultimately, we've focused on looking at new technology that might help meet the requirements. Dairymen and the project developers can't afford to challenge the air district in legal proceedings; it's just too costly. So separately, we've begun developing technology on our own."

In the meantime, those who are in the midst of, or might soon be launching new digester projects, should pay close attention to significant air regulatory issues.

Taking Notes

"Based on experience, those taking on new digester projects should be aware of two major issues when designing their systems," DeGuzman says—biogas sulfur content limits and Best Available Control Technology for NOx.

BACT is a pollution control standard under the U.S. EPA's New Source Review program. BACT standards vary in each district, but are at least as stringent as federal new source review standards. BACT requires an applicant to adopt the most stringent control technology that has been achieved in practice for a similar source, is technologically feasible and cost-effective, or is contained in a State Implementation Plan or New Source Performance Standard. In Sacramento and San Joaquin Valley, NOx BACT for internal combustion engines being used to produce power is 0.15 grams NOx per horsepower-hour (9 parts per million)—a standard that Dusault reiterates is difficult to achieve.

The opportunity for digester expansion in the state is not lost, however. His advice to dairy farmers pursuing new digester projects is simple. "If they're not in California, I say go for it," he says. "Nationally, there are lot of other states such as Wisconsin and New York, where digesters are proving to be viable and cost effective. It's worthwhile to look at the technology to see if your state and your location make economic sense."

Digester projects will become much more important with federal GHG legislation, as well as national efforts to reward renewable electricity production, according to Dusault. "Over the long term, this will be more of a common solution," he says. "For California dairymen, we say come talk to us. We're developing some new technologies, which we think will be cost-effective, allow compliance with the stringent requirements, and allow them to make a profit on electricity production. [Sustainable Conservation] should have some demonstration projects starting early next year. So watch and see what we can do." BIO

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