

## Fuel-cell digesters burn cash

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The permit process makes digesters worth the expense, company says

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While a pair of companies promote fuel cells as the answer to air-quality problems associated with California methane digesters, observers say the expense of building and maintaining the technology puts it beyond reach for most dairies.

Wisconsin-based developer GHD Inc. wants to build digesters equipped with fuel cells in the state, said Melissa VanOrnum, GHD's marketing manager.

In the San Joaquin Valley, home to most of California's dairies, the state is trying to conquer abysmal air quality with stringent rules on emissions. That includes the nitrogen oxides and particulate matter emitted by the generators of conventional dairy digesters, which burn methane from cow waste to produce electricity.

In a digester design, a fuel cell first extracts hydrogen from methane, then combines it with oxygen to trigger a reaction that creates electricity.

Because it emits only small amounts of carbon dioxide and water, permitting a fuel cell-equipped digester would virtually be automatic. That means California could be where the technology finally gains momentum, VanOrnum said.

"We're hoping we can make some inroads," VanOrnum said. "The fuel cell is the ultimate solution because we're still destroying the methane, but not emitting the (nitrogen oxide)."

But fuel cells have yet to become feasible for the vast majority of the state's dairies, despite showing promise, said Allen Dusault, program director with Sustainable Conservation, a nonprofit that seeks to balance farm economics with environmentally friendly practices.

A fuel cell digester costs between \$21 million and \$30 million, compared to around \$2 million for a conventional model. The fuel cell is difficult to maintain.

"It's been making progress, it's just been very slow, and it's been overpromised," Dusault said.

But fuel cell supporters say the permitting process for a conventional digester can take as long as 18 months, and dairies must often hire consultants to help them through the process. Scrubbing emissions from

conventional generators is also expensive.

"It gets so cost-prohibitive that it essentially stops the process," VanOrnum said.

GHD says the lack of those permitting expenses alone makes fuel cells attractive. Combine that with federal subsidies, including economic-stimulus funding for green technology, and the picture improves further, said Ray Brewer, president of G3 Power Systems, a California company that designs power-generating systems around fuel cells. G3 has partnered with GHD to push the technology in California.

Current federal assistance programs can cut the system's high cost roughly in half, Brewer said. Furthermore, G3 plans to offer a range of financing options, including partial-ownership and lease-to-own models.

And the cost could continue dropping. A recent generational advance reduced the capital cost by about 15 percent, and the next few years could bring another 30-percent drop, Brewer said.

But Marlin Statema, co-owner of Ag Power Group, a developer consortium, points out that even with assistance factored in, capital costs run three to four times those of conventional digesters.

The expense could be offset by the technology's high efficiency if fuel cells were not expensive to operate and maintain, Statema said.

It all means a fuel cell remains impractical for most dairy operators, although the concept will likely become more viable in the future, Statema said. For dairies smaller than 5,000 cows, a fuel-cell digester is likely not an option, he said.

No fuel-cell dairy digesters are in operation yet, so there's no model to demonstrate the expense over several years, Statema said.

"I want to see somebody run (a fuel cell) on a digester," he said. "The concern I have is that I don't want to be the guinea pig."