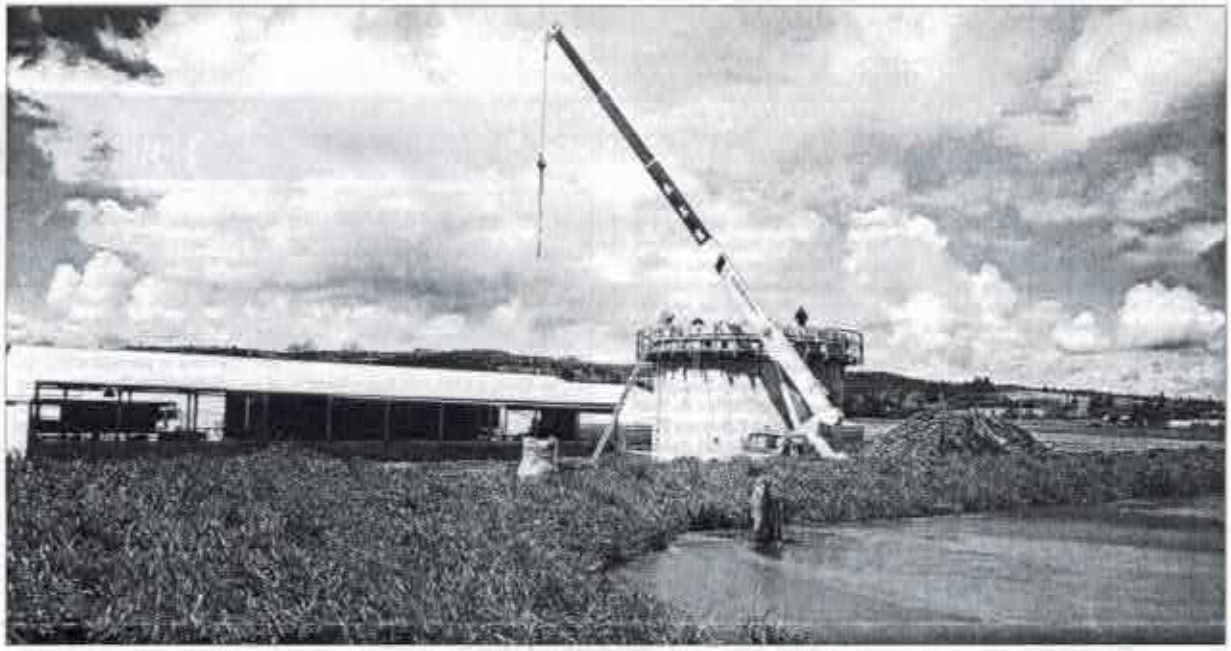

They'll make electricity from manure

Utility company is building a manure-to-methane digester at an Oregon dairy. If a consumer market for organic or "green" power develops as expected, then the company says it may build more.

by Alice Hansen

THERE'S currently a new line of thought about the old concept of generating electricity from manure and methane, and it's already powering some changes at dairies in Oregon.

Portland General Electric, an Oregon-based power utility company, is currently building a manure digester at a western Oregon dairy. If all goes as planned, the company may build several more digesters on other dairies to turn methane into "green," or organic power.

The digester at Bernie Faber's dairy is a test case, says Jeff Cole, project manager for Portland General Electric. It's expected to produce about 100 kilowatt hours per day, enough to power 12 homes. If it proves to be an economical way to produce green power, Cole says PGE may build as many as 20 more digesters on other dairies.

PGE is picking up the cost of building, operating, and maintaining the digester at the dairy in exchange for the power produced by it. PGE will also take the lion's share of the undigested manure solids which it plans to market to another company for resale as a soil amendment.

Oregon dairies won't get power from the digesters, but they're sold on the project for other reasons. Solids removal is one, says Faber.

"Our thought is not to save money but to come up with some kind of a system that will do a better job with manure and how we manage it on our dairies," he explains. "I think this is a very small gamble on our part for the possibility of a big benefit."

Jim Krahn of the Oregon Dairy Farmers Association says the digesters could help control odor, too. But he suspects they will benefit dairy producers in ways they aren't even aware of yet. For example, at a recent meeting Krahn heard a scientist talk about the potential risks of "pathogen flow."

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The concept refers to blood-borne pathogens with antibiotic-resistant genes that can get into animal manure via blood plasma. The risk of these pathogens coming into contact with humans could add a new wrinkle to animal waste management. The industry already knows about the dangers of pathogens such as *E. Coli* and salmonella, but these are entirely different bugs, Krahn said.

"Down the road, nitrogen and phosphorus, quite frankly, are going to be minuscule" in the context of waste management, he says.

What does pathogen flow have to do with digesters?

"We know that temperature and time kill bacteria," Krahn explains. "It's possible that "cooking" raw manure in a digester and composting the digested fiber could kill the bugs the researcher warned about."

PGE's digester project is timely for two reasons. Not only are energy costs at a premium, but the U.S. Environmental Protection Agency is beginning to regulate phosphorus buildup on farmland. In the past, nitrogen has been the chief concern. Depending on soil phosphorus levels on individual farms, the regulation may force some dairies to either cut cow numbers or find additional outlets for manure.

"There's a lot more phosphorus created by the cows than most dairies can handle," says Faber.

Since phosphorus tends to stay with manure solids, PGE's removal of fiber from the digester is essentially a no-cost way to help dairy producers comply with the tougher regulation.

If the project is cost-effective, it will create another renewable energy source for PGE at a time when power is selling at a premium. But, even in times of low energy prices, some consumers are willing to pay more for renewable energy such as that pro-

Could digesters be a must-have for large dairies in the future?

PGE is building another digester at Threemile Canyon Farms, a 15,000-cow dairy under construction in eastern Oregon. That digester will generate about 4,000 kilowatt hours per day.

Farm developers view the digester as a necessity for removing solids and controlling odor. But they also see it as a public relations tool. The digester will produce salmon-friendly, non-hydro "green power" at a time when saving endangered salmon is a key concern of many Northwest residents.

The dairy is billing itself as a modern, sustainable farm and the green power-producing digester fits nicely with that image. Jim Krahn of the Oregon Dairy Farmers Association says more large dairies are likely to build digesters for the same reasons.

At a time when dairies are being shut down in California for odor-related reasons, and other Western states are considering tightening their odor regulations, building a digester for odor control alone makes sense for dairymen investing in large, new dairies. It's a good move from the public relations standpoint, too. But Krahn said involving a power company in any digester project is key.

Digesters take time to manage, and to be profitable the power must be marketed as organic. Although it costs more to produce than hydropower, some consumers are willing to buy it because it's organic. Electric companies are in the catbird seat when it comes to these kind of marketing issues.

duced by anaerobic manure digesters. PGE already provides customers the option of buying "Salmon-Friendly Power," or power generated from renewable resources. Customers can also purchase wind-generated power in the same manner.

"There's a particular market for "green" power," says Cole.

The beauty of producing power from cow manure is that the raw material is always available. In contrast, power generated by wind can only be made if the wind is blowing.

The technology is not new . . .

Digesters – which use bacteria that produce methane after digesting manure – have been around for some time, but dairies that have tried them have had mixed results. The technology has been proven, but for many "they just haven't been cost-effective," says Faber.

Indeed, a mid-1990s survey led by University of California-Davis researcher Deanne Meyer found that digesters fail for several reasons, including poor design and low returns for electricity sold.

Cole says the chief reason digesters have failed in the past is, most dairies can't afford to take time away from producing their most important product, milk, to manage them.

"It's a distraction from their main business," he says.

THE MANURE-TO-METHANE digester at Faber's dairy will be 35 to 40 feet in diameter and 28 feet deep – part of which which will be buried in the ground.

Producers are enthusiastic about the project with PGE, particularly because the utility pledged to manage them. If the units prove cost-effective, Cole says a number of them could be built, enabling the company to maximize efficiency and create a management unit specifically for the digesters.

"Our hope is that the economics will prove out so that we can do that," he explains.

The digester at Faber's dairy will be 35 to 40 feet in diameter and about 28 feet deep, part of which will be partially buried. Methane gas emitted by the bacteria will rise to the top into a dome. A generator will convert the gas into electricity.

Among the most challenging aspects of running a digester is keeping its contents between 95 to 100 degrees for 12 to 14 days. If manure entering the digester is too cold, energy that could be sold must be sacrificed to heat the manure in order to keep it running smoothly. The digester at Faber's is being designed to enable operators to test different operations methods, including alternative methods for heating manure on its way in.

Initially, it looked as if the digester would only be practical for dairies that scraped manure rather than flushed. Engineers thought it wouldn't be cost-effective to heat excessive water. But Cole says PGE may not have to rule out dairies with flush systems if a flexible enough design can be found. "We're going to need a certain amount of flexibility," he says.

Dairies fined $78,700 for runoff violations

TWO dairies in southern California were recently fined a total of $78,700 by the U.S. Environmental Protection Agency, for illegal waste water discharges.

In April, a $137,000 fine – later reduced to $48,000 – was levied against a Chino dairy for failing to contain manure water on its property last winter. That discharge ultimately made its way into the Santa Ana River. The dairy has since relocated to Idaho.

In February, EPA fined another nearby Chino dairy $30,700 for the same runoff violation.

In recent years, producer groups have become extremely proactive working with local, state, and federal agencies to prevent additional runoff violations from occurring in the dairy-dense Chino Valley area. In addition to increasing waste water storage and diverting "clean" water away from lagoons, many dairies have hermed their facilities to prevent runoff.