



Olympia-based Environmental Energy and Engineering Co. designed this \$4.5 million dairy farm in Fair Oaks, Ind.

Photo courtesy Environmental Energy and Engineering Co.

## Helping dairies turn manure into money

By **DIPIKA KOHLI**  
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Civil engineer Dennis Burke said one day dairy farms in Washington state could generate power using one of his patented technologies that makes conversion of manure to natural gas up to three times more efficient.



**Burke**

Anaerobic digesters can break down manure but they waste a lot of bacteria, Burke said. His system conserves the bacteria, so they can consume more waste faster. This is done by using a gas flotation system that separates solids using charged particles and surface tension. A bacteria-rich layer rises, and is skimmed so organisms can be reused.

Burke, based in Olympia, developed the system after more than a decade of research. He has also spent 30 years designing wastewater treatment facilities for municipalities around the country.

Burke came up with the idea for a float system after thinking about how to process large volumes of waste quickly. Recalling the moment he solved a particularly difficult equation that led to a breakthrough, he said, "I almost had a heart attack. Now I've got a patent."

He set up pilot projects to show King County wastewater officials they could save money by using his technique, which reduces the size of tanks needed to hold bacteria.

Then an interesting thing happened: Farmers started calling. Burke's company, Environmental Energy and Engineering Co., or as he calls it, E3, started hearing from farmers concerned about meeting environmental standards. They wanted to know about his filtration system's byproducts, which include biosolids that meet high standards set by the U.S. Environmental Protection Agency and a high-quality effluent so clear it "looks

like tea," said E3 project manager Brian Douglas.

E3 did plans for farmers in Snohomish, Lewis and Clark counties to handle their animal waste and showed an Idaho group how to make energy from potato waste.

One day Burke's company got a call from Fair Oaks, Ind., where two veterinarians run a dairy farm.

Today Fair Oaks Dairy uses Burke's float system to turn manure from 3,500 cows into natural gas. Four anaerobic digesters at the farm generate 18,000 kilowatts of electricity each day, enough to power 360 homes.

E3's engineers designed the digesters and built two buildings through its general contracting division, Western Environmental Engineering. Together the two buildings total 10,000 square-feet.

Several other Puget Sound area consultants were involved in the project. Shannon & Wilson of Seattle did geotechnical work. Structural engineering work was done by Olympia-based MC Squared. Western Environmental Engineering was also the mechanical consultant.

The Indiana project cost \$4.5 million, \$1 million more than Burke had estimated. He said costs went up because of flooding during construction, geotechnical work to make loose soils compact, and faulty engine parts that had to be replaced.

Burke said farmers in Washington could set up renewable energy plants that power their businesses and produce surplus energy that can be sold to utilities. They can also sell the biosolids, which Burke said meet the EPA's Class A standards. This means they have virtually no pathogens, or disease-causing organisms, and can be used to fertilize crops without the buffer restrictions that apply to lower quality biosolids.

One day farmers may even be able to sell greenhouse gas credits for the energy they produce using biomass as fuel. People in other parts of the world are starting to think this way. Burke said his company is designing a project in China that calls for seven anaerobic digesters.

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