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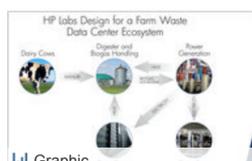
Manure from 10,000 cows could provide the power for a small computing center at a bank.

By ASHLEE VANCE

Published: May 18, 2010

Hey diddle diddle. Guess what the cow has done this time?

Multimedia



Graphic Design for Farm Waste Data Center Ecosystem

America's dairy farmers could soon find themselves in the computer business, with the manure from their cows possibly powering the vast data centers of companies like [Google](#) and [Microsoft](#). While not immediately intuitive, the idea plays on two trends: the building of computing centers in more rural locales, and dairy farmers' efforts to deal with cattle waste by turning it into fuel.

With the right skills, a dairy farmer could rent out land and power to technology companies and recoup an investment in the waste-to-fuel systems within two years, [Hewlett-Packard](#) engineers say in a research paper to be made public on Wednesday.

"Information technology and manure have a symbiotic relationship," said Chandrakant D. Patel, the director of H.P.'s sustainable information technology laboratory, which wrote the report. "And having these data centers locally will give farmers a new opportunity."

Companies have historically tended to build their large computing centers — often called server farms — in or near large cities and industries. As this practice has continued over the years, it has become difficult for companies building the largest data centers to find enough cheap electricity and real estate to meet their needs.

The rise of higher-speed data transfer networks, however, has given technology companies a chance to move farther from large populations and still be able to get information to them as quickly as they need it. So companies like Google, [Yahoo](#), [Amazon.com](#) and Microsoft have been engaged in a mad dash to find spots in the United States that have plenty of electricity and land. As a result, more data centers have been built in states like Washington, Texas, Iowa and Oklahoma. If those locations are near dairy farms, so much the better.

Rather than being an alternative energy convenience, this approach could benefit companies operating in countries like China and India that need to find an economical way to power their computing centers.

Back on the farm, dairy producers have increasingly been looking to deal with their vast collections of smelly cow waste by turning it into something called biogas.

To make biogas, a farmer needs to buy specialized equipment that runs the manure through an anaerobic digestion process, which results in a large quantity of methane that can be used as a [natural gas](#) or diesel replacement.

"The average cow makes enough waste per day to power a 100-watt light bulb," said Michael Kanellos, editor in chief at Greentech Media, a research and publishing firm.

According to H.P.'s calculations, 10,000 cows could fuel a one-megawatt data center, which would be the equivalent of a small computing center used by a bank. Mr. Kanellos has tracked both the data center and green technology industries and agreed that there was some convenient overlap. Computing equipment produces a lot of heat as a waste product, and the systems needed to create biogas require heat. So, there is a virtuous cycle of sorts possible.

"The cows will never replace the [hydroelectric](#) power used by a lot of these data centers," Mr. Kanellos said. "But there is interest in biogas, and this presents another way to make manure pay."

While many strapped farmers initially tried to create their own biogas plants, they have since found that it's more economical to sell their manure to a shared biogas producer.

"It turned out that the small projects didn't make sense," said Rocky C. Costello, the president of R. C. Costello & Associates of Redondo Beach, Calif., which provides design services for people looking to create biogas plants.

California and Texas could benefit from the manure idea, Mr. Costello said, because they have large numbers of dairy cows, ties to the technology industry and centralized biogas centers. California, Wisconsin, New York, Idaho and Pennsylvania were the top dairy producers last year; according to the Agriculture Department.

Still, Mr. Costello cautioned that this form of alternative energy faced familiar practical challenges. "This just becomes less enticing as the price of natural gas gets lower," Mr. Costello said. "Natural gas is so easy to get."

H.P. has long experimented with different ways to operate data centers more efficiently, including having robots that travel around buildings keeping tabs on the temperatures of computers.

Mr. Patel said his grandfather in India burned cow manure for fuel in his village; the hope is that a more modern take on this practice could help support the build-out of India's technology infrastructure.

It would cost a dairy farmer about \$5 million to purchase the equipment needed for the biogas system and \$30,000 to run it each year, Mr. Patel said.

H.P. has yet to construct its own manure-burning system, but may consider one for data centers in California or Texas, he said. "Stay tuned," Mr. Patel said. "We are pushing ahead."

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