

Kansas University Researchers Turn Sewage To Fuel

MARK FAGAN Associated Press Writer — November 16, 2009

LAWRENCE, Kan. (AP) — Kansas University researchers are working to turn microbes from treated sewage into a commercially viable biofuel, fluid that one day could be used to power the nation's cars, trucks, airplanes and other modes of transportation.

But for now, the future grows in four farm tanks at Lawrence's Wastewater Treatment Plant, and inside another four at a research station northeast of the Lawrence Municipal Airport.

The project is unmistakably green, a shade that can be produced only by millions of cells of algae fattened up with treated waste from the city's sewer system, then harvested after absorbing organic pollutants and yielding oil for transformation into clean-burning biodiesel.

"From the point of view of the EPA, this should be like heaven," said Val Smith, a KU professor of ecology and evolutionary biology. "We're harnessing a waste, making it do work for America, and purifying it all at the same time.

"It's like a win-win-win-win-win."

The effort is among those worldwide looking to tap into a global thirst for alternative fuels. The U.S. Department of Energy, the U.S. military and a lengthening roster of commercial enterprises are among those investing in the promise and potential of algae-to-fuel efforts.

Earlier this year, none other than petroleum giant ExxonMobil announced it would pump more than \$600 million into research and development of biofuels generated from the floating vegetation.

"Meeting the world's growing energy demands will require a multitude of technologies and energy sources," said Emil Jacobs, vice president of research and development at ExxonMobil Research and Engineering Co. "We believe that biofuel produced by algae could be a meaningful part of the solution."

The KU effort is being financed by the university's Transportation Research Institute, using money from the U.S. Department of Transportation.

Bob Honea, the institute's director, is confident that the work of KU researchers collaborating on a "Feedstock to Tailpipe" program that includes a wide variety of biofuel efforts is on the right track. Gasoline prices eventually will return to \$4 a gallon or more, he said, and the world will continue to seek ways to lessen a

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reliance on petroleum.

Using algae to make biodiesel simply makes sense, Honea said, given the aquatic organisms' built-in advantages compared with traditional crops: higher yields on less land.

By feeding algae with essentially free inputs treated effluent from the city's sewage-treatment plant KU researchers, he said, just may be tapping into a system that one day could be considered commercially viable, environmentally desirable and eminently repeatable.

"We are on the cusp on what I would call a major breakthrough," Honea said.

For now, Smith and other researchers are working on the foundation for such a system: the algae itself. Since June, Smith has been seeding the project's fiberglass farm tanks with algae, and ensuring that the tiny organisms get plenty of effluent from the city's sewage system.

The plant pumps out about 9 million gallons of effluent each day, so sparing a few hundred gallons for KU research is no problem, said Judy Regnier, manager of the treatment plant. Besides, research shows that algae absorb nitrogen, potassium and even some pharmaceuticals that otherwise would be dumped back into the Kansas River.

The plant's effluent currently meets discharge standards set by regulators, she said, but the possibility of making the waste even cleaner especially as federal environmental regulations continue to tighten has her optimistic.

Especially if such systems can make fuel in the process.

"It's good for everybody," she said.

Smith said KU's project was among only a few in the world to include functioning, pilot-scale bioreactors connected to a municipal wastewater treatment plant. While corn can produce only 18 gallons of plant oil per acre, and soybeans can yield about 48 gallons of plant oil per acre, Smith figures that algae could provide unsurpassed performance: up to 5,000 gallons of such oil per acre.

The oil then would be used to make biodiesel, a clean-burning alternative fuel that wouldn't be reliant on food crops, high-priced fertilizers or other ingredients that could be considered barriers.

Just take the effluent from sewage, stir in some algae and then let nature with help from some focused researchers do the rest.

"We're not even calculating the economics yet," Smith said. "It could take a year or two or more of tweaking to get the system right, before we put a pencil to paper."

But Smith and others still see plenty of green in their efforts, growing right along

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with the algae in their tanks.

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