

Researchers say use of switchgrass could solve energy woes

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Carnegie Mellon University researchers say the use of switchgrass could help break U.S. dependence on fossil fuels and curb costly transportation costs.

"Our report indicates the time is right for America to begin a transition to ethanol derived from switchgrass," said Scott Matthews, an assistant professor in the Civil and Environmental Engineering Department. A 25 percent hike in gas prices at the pump since December adds to the researchers' call for more ethanol derived from switchgrass, a perennial tall grass used as forage for livestock. Gasoline prices in the U.S. are approaching an average of \$3 a gallon. The Carnegie Mellon findings were published in the May 1 issue of the American Chemical Society's Journal *Environmental Science and Technology*.

Matthews, along with W. Michael Griffin, executive director of the Green Design Institute at Carnegie Mellon's Tepper School of Business, and William R. Morrow, a researcher in the university's Department of Civil and Environmental Engineering, said using switchgrass as a supplement to corn to make ethanol would help ensure the availability of large volumes of inexpensive ethanol to fuel distributors and consumers.

"We need to be thinking about how we can make and deliver ethanol once our corn and land resources are maxed out. Switchgrass can be that next step," Griffin said.

The Carnegie Mellon report also found that ethanol derived from the

dry, brown switchgrass, a cellulosic ethanol, could be made in sufficient quantities to deliver 16 percent ethanol fuel to all consumers in the U.S. Researchers said this would likely lead to significant decreases and stability in the price of gasoline.

"It's a renewable resource," Griffin said. "Rather than taking a depletable resource from the ground, switchgrass can be grown again and again."

In a recent address, President George W. Bush made a plea for increased focus on renewable energy, mentioning switchgrass by name.

Scientists have long known how to use enzymes and microorganisms to mine the carbon from carbohydrates to make industrial products. But for decades the technology didn't go very far commercially because fossil fuel – hydrocarbon – was a far cheaper carbon source.

Now that oil prices have climbed roughly 35 percent over the past year, cellulosic fermentation technology is becoming economical.

The United Nations Food and Agricultural Organization said last week that biofuels may supply 25 percent of the world's energy needs in 15 to 20 years.

"This shift from using hydrocarbons to carbohydrates could revolutionize many industries, including the nation's huge agricultural sector," Griffin said.

While the Carnegie Mellon researchers think switchgrass can be the source of large volumes of inexpensive ethanol in the future, they are concerned about the potential costs and siting concerns of using pipelines, the most cost-effective way to deliver fuels.

The U.S. has 100,000 miles of pipelines dedicated to transporting

petroleum. But Carnegie Mellon researchers say the pipelines can't be efficiently used because impurities from the petroleum would adversely mix with the ethanol. "In the long run, our goal would be to make petroleum pipelines obsolete; which raises questions about whether ethanol pipelines should ever be built," Matthews said.

To avoid potential issues with pipelines, the authors expect regional solutions to dominate, such as widespread adoption of 85 percent ethanol delivered by rail or truck in the Midwest. American automakers already sell flexible-fuel vehicles (that can run on ethanol or gasoline) that can be purchased in the U.S.

Much of the discussions today about alternatives to gasoline, such as hydrogen, have similar issues related to infrastructure. "Unfortunately, most of the research time and money is being spent on the fuels without adequate consideration to how we will get it to consumers cost-effectively," Griffin said.

Source: Carnegie Mellon University

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