

Cellulosic ethanol may benefit human health and help slow climate change

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Filling our fuel tanks with cellulosic ethanol instead of gasoline or corn-based ethanol may be even better for our health and the environment than previously recognized, according to new research from the University of Minnesota.

The study finds that cellulosic ethanol has fewer negative effects on human health because it emits smaller amounts of fine particulate matter, an especially harmful component of air pollution. Earlier work showed that cellulosic ethanol and other next-generation biofuels also emit lower levels of greenhouse gas emissions.

The study will be published in the journal *Proceedings of the National Academy of Sciences* in February and will be posted online next week.

"Our work highlights the need to expand the biofuels debate beyond its current focus on climate change to include a wider range of effects such as their impacts on air quality," said lead author Jason Hill, a resident fellow in the University of Minnesota's Institute on the Environment.

The study is the first to estimate the economic costs to human health and well-being from gasoline, corn-based ethanol and cellulosic ethanol made from biomass. The authors found that depending on the materials and technology used in production, cellulosic ethanol's environmental and health costs are less than half the costs of gasoline, while corn-based ethanol's costs range from roughly equal to about double that of gasoline.

Total environmental and health costs of gasoline are about 71 cents per gallon, while an equivalent amount of corn-ethanol fuel costs from 72 cents to about \$1.45, depending on the technology used to produce it. An equivalent amount of cellulosic ethanol, however, costs from 19 cents to 32 cents, depending on the technology and type of cellulosic materials used.

"These costs are not paid for by those who produce, sell and buy gasoline or ethanol. The public pays these costs," said study co-author Stephen Polasky, a professor in the university's applied economics department.

The authors looked at pollutants emitted at all stages of the life cycles of the three types of fuel, including when they are produced and used. They considered three methods of producing corn-based ethanol and four methods of producing cellulosic ethanol.

"To understand the environmental and health consequences of biofuels we must look well beyond the tailpipe to how and where biofuels are produced. Clearly, upstream emissions matter," Hill said.

The paper also points out that other potential advantages of cellulosic biofuels, such as reducing the amount of fertilizer and pesticide runoff into rivers and lakes, may also add to the economic benefit of transitioning to next-generation biofuels.

Source: University of Minnesota

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