

Biofuels can replace about 30% of fuel needs

February 1 2006



Wood chips used to make bioethanol.

With world oil demand growing, supplies dwindling and the potential for weather- and conflict-related supply interruptions, other types of fuels and technologies are needed to help pick up the slack.

A group of experts in science, engineering and public policy from the Georgia Institute of Technology, the Imperial College London and the Oak Ridge National Laboratory recommend a comprehensive research and policy plan aimed at increasing the practicality of using biofuels and biomaterials as a supplement to petroleum. The review article, called

"The Path Forward for Biofuels and Biomaterials," appears in the Jan. 27 issue of *Science*.

"We can readily address, with research, 30 percent of current transportation fuel needs. But reaching that goal will require 5-10 years and significant policy and technical effort," said Dr. Arthur Ragauskas, a professor in Georgia Tech's School of Chemistry and Biochemistry and a lead on the project.

While many think of ethanol when they think of biofuels, the group recommends a much broader spectrum of possible materials including agriculture wastes such as corn stovers and wheat stalks, fast-growing trees such as poplar and willow and several perennial energy crops such as switchgrass.

In addition to including more diversity in materials, the group also recommends some changes to the plants themselves using techniques such as accelerated domestication to make them more efficient energy crops. But doubling the productivity of energy crops will mean identifying constraints and correcting them with genomic tools.

To make biofuels a truly practical alternative to petroleum, the group says there will need to be significant improvements in how biofuel is processed. Their vision is for a fully integrated biorefinery, which is designed to take advantage of advances in plant science and innovative biomass conversion processes and equipment to produce fuels, power and chemicals from biomass.

The biorefinery would work much like a petroleum refinery, which produces multiple fuels and products from petroleum.

The group based its recommendations on research studies, including studies on the development of rapid-growth, high-energy content trees

and perennials, novel environmentally friendly biomass extraction technologies, innovative catalysts for the conversion of agriculture and wood residues to bioethanol/diesel and hydrogen, bio-fuel cells and next-generation green plastics and materials prepared from sustainable sources such as plants, sunlight and wastes.

Source: Georgia Institute of Technology

Citation: Biofuels can replace about 30% of fuel needs (2006, February 1) retrieved 17 April 2024 from <https://phys.org/news/2006-02-biofuels-fuel.html>

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