

Biomass: Farming Your Fuel



In Germany, driving from the giant wind turbine near Hamburg to Berlin, I regularly got an odd whiff: the sort-of-appetizing scent of fast food. It was a puzzle until a tanker truck passed, emblazoned with the word "biodiesel." The scent was of burning vegetable oil. Germany uses about 450 million gallons (1,700 million liters) of biodiesel a year, about 3 percent of its total diesel consumption.

Biomass energy has ancient roots. The logs in your fire are biomass. But today biomass means ethanol, biogas, and biodiesel—fuels as easy to burn as oil or gas, but made from plants. These technologies are proven. Ethanol produced from corn goes into gasoline blends in the U.S.; ethanol from sugarcane provides 50 percent of automobile fuel in Brazil. In the U.S. and other nations, biodiesel from vegetable oil is burned, pure or mixed with regular diesel, in unmodified engines. "Biofuels are the easiest fuels to slot into the existing fuel system," says Michael Pacheco, the National Bioenergy Center director.

What limits biomass is land. Photosynthesis, the process that captures the sun's energy in plants, is far less efficient per square foot than solar panels, so catching energy in plants gobbles up even more land. Estimates suggest that powering all the world's vehicles with biofuels would mean doubling the amount of land devoted to farming.

At the National Bioenergy Center, scientists are trying to make fuel-farming more efficient. Today's biomass fuels are based on plant starches, oils, and sugars, but the center is testing organisms that can digest woody cellulose, abundant in plants, so that it too could yield liquid fuel. More productive fuel crops could help as well.

One is switchgrass, a plant native to North America's prairies that grows faster and needs less fertilizer than corn, the source of most ethanol fuel made in the U.S. It also thrives on land unfit for other crops and does double duty as a source of animal food, further reducing the pressure on farmland.

"Preliminary results look promising," says Thomas Foust, the center's technology manager. "If you increase automobile efficiency to the level of a hybrid and go with the switchgrass crop mix, you could meet two-thirds of the U.S. transportation fuel demand with no additional land."

But technically possible doesn't mean politically feasible. From corn to sugarcane, all crops have their own lobbyists. "We're looking down a lot of alleys," says Pacheco. "And every alley has its own vested interest group. Frankly, one of the biggest challenges with biomass is that there are so many options."