



# Cellulosic Crops Face Challenges

Fuels produced from biomass face hurdles before farmers can cash in.

BY KURT LAWTON

**C**orn cobs and leaf residue, once called trash, are being formulated into the next generation of biofuel called cellulosic ethanol. And depending on where you live, you may one day grow dedicated energy crops like switchgrass, miscanthus, high-biomass sorghum and other cellulosic feedstocks.

How will corn growers benefit? If you farm within 30 to 50 miles of an ethanol plant that gears up for cellulosic production, you could add more revenue per acre by harvesting loose cobs or bales of corn stover.

Poet, the largest ethanol and dried distillers grains producer, recently told members of the U.S. House Ag Committee that its Project Liberty facility will pay out \$12 million annually to buy corn residue from 450 farmers.

When fully operational, the first commercial-scale 25-million-gallon-per-year cellulosic ethanol plant under construction in Emmetsburg, Iowa, will process 770 dry tons per day.

To succeed as a sustainable crop for farmers, numerous hurdles remain for cellulosic biomass. Government financial support for ethanol makers,

marketers and farmers is needed to create a viable infrastructure.

Research into best fuel formulations for agricultural and woody biomass materials must be finalized. Numerous supply-chain logistics (collection, transportation, storage) must be coordinated and agreed upon. Greater consumer understanding of ethanol is needed to spur demand. And more investment in ethanol plants is necessary to foster cellulosic production.

**BUILDING A CELLULOSIC INDUSTRY.** Driving this Department of Energy (DOE)-mandated growth of biofuels are four key government initiatives: dramatically reduce dependence on foreign oil, promote use of domestic sustainable energy resources, reduce carbon emissions from energy production and consumption, and establish a domestic biofuels industry.

“It’s all about the RFS2 [Renewable Fuel Standard]. We wouldn’t have a biofuels industry without blender mandates,” says Sam Nejame, CEO of Promotum, a green technology management consulting firm.

The RFS2 mandates 36 billion gallons of renewable



fuels produced by 2022, with 16 billion gallons of that total being cellulosic biofuels. These are high-reaching goals in a total biofuel market that could produce 85 to 90 billion gallons of biofuels, or 60% of our nation's gasoline supply, according to a joint DOE/USDA report, "Billion Ton Study."

But first, to reach the 16-billion-gallon goal in the next 12 years, this country will need the equivalent production of 640 facilities the size of Poet's first 25-million-gallon biorefinery. There are currently close to 200 ethanol refineries in 26 states that could add or retool to make cellulosic ethanol, but more localized facilities are needed to meet mandates.

**CORN NEEDED.** "It's important to realize that corn feedstock isn't going away anytime soon. We're very successful making corn ethanol at scale," Nejame says. "On the other hand, converting cellulose to ethanol is very tough. We haven't done it before and it's taking longer than expected."

Current U.S. corn ethanol production capacity is 12 to 13 billion gallons, which is nearing the total capacity of the allowable 10% ethanol (E10) maximum in gasoline. The ethanol industry pushed for an increase to 15% (E15) to help meet mandates and to improve the cellulosic ethanol investment climate. The EPA approved the higher blend this fall for newer vehicles manufactured since 2007.

**RENEWABLE FUEL TYPES.** The National Renewable Energy Laboratory in Golden, Colo., conducts research on renewable energy technologies. Andy Aden, who heads up the group that examines the process design and economic analysis of biofuel conversion processes, says agricultural and woody residues will be tapped into first.

"Abundant ag residues—corn stover and wheat straw—are the primary feedstocks that will be used, along with woody feedstocks that consist of byproducts from the forest, logging and lumber industries," Aden says. "After that will come some dedicated energy crops such as perennial grasses like switchgrass and miscanthus, high-biomass sorghum, even willow or poplar trees.

"The challenge with new crops is the chicken-and-egg dilemma. Who's going to grow a new crop without a market versus who's going to design their bioprocess around a new crop if not a lot of people have experience growing it," he adds.

The good thing about cellulosic biofuel is you can produce it anywhere in the U.S.—not just using corn stover in the Midwest. "We don't see one crop as being the best on a national basis, so biorefineries will utilize the best local biomass material," Aden says.

"What we'll see with biomass facilities [those

processing corn stover and other cellulosic materials] are smaller plants of 50 million gallons per year or fewer. All of them will be co-located with their feedstock, and some will be co-located with existing grain ethanol plants," Nejame adds.

**CHALLENGES.** Some say without government incentives and mandates (from production goals to clean air regulations), biofuels will not survive. Critics argue government incentives should not be needed if ethanol is truly better than gasoline.

In reality, many experts say that—like it or not—subsidies, taxes, tariffs and incentives have been used to build many critical components of our infrastructure. This includes roads and dams to nuclear power and our domestic oil exploration and refineries.

Other industry challenges from current opponents of higher ethanol blends run the gamut from environmentalists (land-use issues due to need for more energy, not food crops), food producers (higher ingredient costs) and livestock producers (higher feed costs) to auto and engine manufacturers—who say they need more time to ensure there's little to no mechanical harm to their products.

**NEXT STEPS?** According to Poet's statement to the House Ag Committee, they cite several needs to create a thriving cellulosic ethanol market:

- ▶ Increase the base blend of ethanol in standard vehicles from 10 to 15%.
- ▶ Build an infrastructure to deliver higher ethanol blends; mandate that all vehicles be flex-fuel vehicles and incentivize stations to install blender pumps to give consumers a choice.
- ▶ Support cellulosic development with loan guarantees to facilities, long-term extensions of a cellulosic ethanol tax credit, and provide longer-term assistance and incentives for farmers who want to produce biomass for cellulosic ethanol production.

"There's a lot of promise in these biofuels, and a lot of challenges yet," says the National Renewable Energy Laboratory's Aden.

"We will continue to evolve as we go along. Industry, government and everyone else are working together toward a sustainable future." ●

## More info

**DOE Biomass Multi-Year Program Plan—March 2010**  
[www1.eere.energy.gov/biomass/pdfs/mypp.pdf](http://www1.eere.energy.gov/biomass/pdfs/mypp.pdf)

**Renewable Fuel Standard**  
[www.epa.gov/otaq/fuels/renewablefuels/index.htm](http://www.epa.gov/otaq/fuels/renewablefuels/index.htm)

**2010 Ethanol Industry Outlook—Renewable Fuels Association**  
[www.ethanolrfa.org/pages/annual-industry-outlook](http://www.ethanolrfa.org/pages/annual-industry-outlook)