



Highlights of [GAO-09-446](#), a report to congressional requesters

Why GAO Did This Study

In December 2007, the Congress expanded the renewable fuel standard (RFS), which requires rising use of ethanol and other biofuels, from 9 billion gallons in 2008 to 36 billion gallons in 2022. To meet the RFS, the Departments of Agriculture (USDA) and Energy (DOE) are developing advanced biofuels that use cellulosic feedstocks, such as corn stover and switchgrass. The Environmental Protection Agency (EPA) administers the RFS.

This report examines, among other things, (1) the effects of increased biofuels production on U.S. agriculture, environment, and greenhouse gas emissions; (2) federal support for domestic biofuels production; and (3) key challenges in meeting the RFS. GAO extensively reviewed scientific studies, interviewed experts and agency officials, and visited five DOE and USDA laboratories.

What GAO Recommends

GAO suggests that the Congress consider requiring EPA to develop a strategy to assess lifecycle environmental effects of increased biofuels production and whether revisions are needed to the VEETC. GAO also recommends that EPA, DOE, and USDA develop a coordinated approach for addressing uncertainties in lifecycle greenhouse gas analysis and give priority to R&D that addresses future blend wall issues. DOE, USDA, and EPA generally agreed with the recommendations.

View [GAO-09-446](#) or [key components](#). For more information, contact Patricia Dalton at (202) 512-3841 or daltonp@gao.gov.

BIOFUELS

Potential Effects and Challenges of Required Increases in Production and Use

What GAO Found

To meet the RFS, domestic biofuels production must increase significantly, with uncertain effects for agriculture and the environment. For agriculture, many experts said that biofuels production has contributed to crop price increases as well as increases in prices of livestock and poultry feed and, to a lesser extent, food. They believe that this trend may continue as the RFS expands. For the environment, many experts believe that increased biofuels production could impair water quality—by increasing fertilizer runoff and soil erosion—and also reduce water availability, degrade air and soil quality, and adversely affect wildlife habitat; however, the extent of these effects is uncertain and could be mitigated by such factors as improved crop yields, feedstock selection, use of conservation techniques, and improvements in biorefinery processing. Except for lifecycle greenhouse gas emissions, EPA is currently not required by statute to assess environmental effects to determine what biofuels are eligible for inclusion in the RFS. Many researchers told GAO there is general agreement on the approach for measuring the direct effects of biofuels production on lifecycle greenhouse gas emissions but disagreement about how to estimate the indirect effects on global land use change, which EPA is required to assess in determining RFS compliance. In particular, researchers disagree about what nonagricultural lands will be converted to sustain world food production to replace land used to grow biofuels crops.

The Volumetric Ethanol Excise Tax Credit (VEETC), a 45-cent per gallon federal tax credit, was established to support the domestic ethanol industry. Unless crude oil prices rise significantly, the VEETC is not expected to stimulate ethanol consumption beyond the level the RFS specifies this year. The VEETC also may no longer be needed to stimulate conventional corn ethanol production because the domestic industry has matured, its processing is well understood, and its capacity is already near the effective RFS limit of 15 billion gallons per year for conventional ethanol. A separate \$1.01 tax credit is available for producing advanced cellulosic biofuels.

The nation faces several key challenges in expanding biofuels production to achieve the RFS's 36-billion-gallon requirement in 2022. For example, farmers face risks in transitioning to cellulosic biofuels production and are uncertain whether growing switchgrass will eventually be profitable. USDA's new Biomass Crop Assistance Program may help mitigate these risks by providing payments to farmers through multi-year contracts. In addition, U.S. ethanol use is approaching the so-called blend wall—the amount of ethanol that most U.S. vehicles can use, given EPA's 10 percent limit on the ethanol content in gasoline. Research has been initiated on the long-term effects of using 15 percent or 20 percent ethanol blends, but expanding the use of 85 percent ethanol blends will require substantial new investment because ethanol is too corrosive for the petroleum distribution infrastructure and most vehicles. Alternatively, further R&D on biorefinery processing technologies might lead to price-competitive biofuels that are compatible with the existing petroleum distribution and storage infrastructure and the current fleet of U.S. vehicles.