

Why GAO Did This Study

U.S. transportation relies largely on oil for fuel. Biofuels can be an alternative to oil and are produced from renewable sources, like corn. In 2005, Congress created the Renewable Fuel Standard (RFS), which requires transportation fuel to contain 36 billion gallons of biofuels by 2022. The most common U.S. biofuel is ethanol, typically produced from corn in the Midwest, transported by rail, and blended with gasoline as E10 (10 percent ethanol). Use of intermediate blends, such as E15 (15 percent ethanol), would increase the amount of ethanol used in transportation fuel to meet the RFS. The Environmental Protection Agency (EPA) recently allowed E15 for use with certain automobiles.

GAO was asked to examine (1) challenges, if any, to transporting additional ethanol to meet the RFS, (2) challenges, if any, to selling intermediate blends, and (3) studies on the effects of intermediate blends in automobiles and nonroad engines. GAO examined government, industry, and academic reports; interviewed Department of Energy (DOE), EPA, and other government and industry officials; and visited research centers.

What GAO Recommends

GAO recommends, among other things, that EPA determine what additional research is needed on the effects of intermediate blends on UST systems. EPA agreed with the recommendation after GAO revised it to clarify EPA's planned approach.

View [GAO-11-513](#) or key components. For more information, contact Frank Rusco at (202) 512-3841 or ruscof@gao.gov.

BIOFUELS

Challenges to the Transportation, Sale, and Use of Intermediate Ethanol Blends

What GAO Found

According to government and industry officials, the nation's existing rail, truck, and barge infrastructure should be able to transport an additional 2.4 billion gallons of ethanol to wholesale markets by 2015—enough to meet RFS requirements. Later in the decade, however, a number of challenges and costs are projected for transporting additional volumes of ethanol to wholesale markets to meet peak RFS requirements. According to EPA estimates, if an additional 9.4 billion gallons of ethanol are consumed domestically by 2022, several billion dollars would be needed to upgrade rail, truck, and barge infrastructure to transport ethanol to wholesale markets.

GAO identified three key challenges to the retail sale of intermediate blends:

- *Compatibility.* Federally sponsored research indicates that intermediate blends may degrade or damage some materials used in existing underground storage tank (UST) systems and dispensing equipment, potentially causing leaks. However, important gaps exist in current research efforts—none of the planned or ongoing studies on UST systems will test actual components and equipment, such as valves and tanks. While EPA officials have stated that additional research will be needed to more fully understand the effects of intermediate blends on UST systems, no such research is currently planned.
- *Cost.* Due to concerns over compatibility, new storage and dispensing equipment may be needed to sell intermediate blends at retail outlets. The cost of installing a single-tank UST system compatible with intermediate blends is more than \$100,000. In addition, the cost of installing a single compatible fuel dispenser is over \$20,000.
- *Liability.* Since EPA has only allowed E15 for use in model year 2001 and newer automobiles, many fuel retailers are concerned about potential liability issues if consumers misfuel their older automobiles or nonroad engines with E15. Among other things, EPA has issued a proposed rule on labeling to mitigate misfueling.

DOE, EPA, and a nonfederal organization have provided about \$51 million in funding for ten studies on the effects of intermediate blends on automobiles and nonroad engines—such as weed trimmers, generators, marine engines, and snowmobiles—including effects on performance, emissions, and durability. Of these studies, five will not be completed until later in 2011. Results from a completed study indicate that such blends reduce a vehicle's fuel economy (i.e., fewer miles per gallon) and may cause older automobiles to experience higher emissions of some pollutants and higher catalyst temperatures. Results from another completed study indicate that such blends may cause some nonroad engines to run at higher temperatures and experience unintentional clutch engagement, which could pose safety hazards.