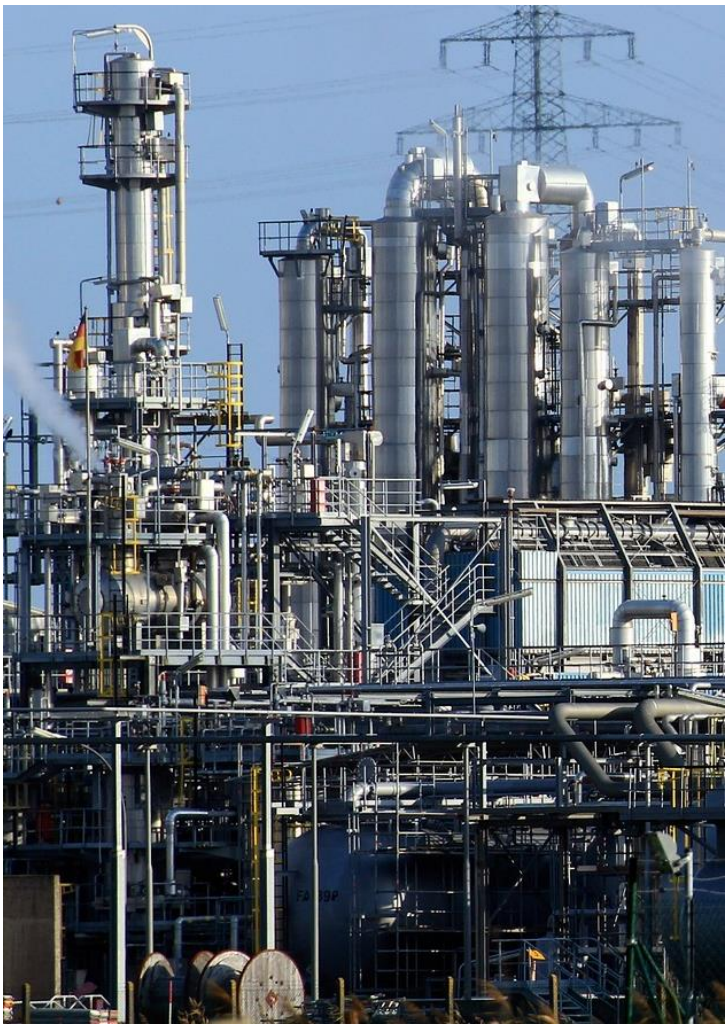
For Alternative Transportation Fuels, a Road Crowded with Possibilities

Policies to promote low-carbon fuels are providing a boost for ethanol, biodiesel, sustainable aviation fuel, and hydrogen



- **Ethanol is found in nearly 98% of the gasoline purchased in the U.S., in most cases accounting for 10% of the gasoline/ethanol blend. This high-octane biofuel has grown in popularity around the world due to regulations that require or incentivize its use.**
- **Biodiesel has long constituted a small but stable portion of the diesel fuel diet in North America. It is produced from a variety of feedstocks and offers a low "carbon intensity," or CI — a big plus in places with low-carbon fuel regulations.**
- **Sustainable aviation fuel is similar in many ways to renewable diesel, the focus of Part 1 of this report. While the blending of SAF with conventional jet fuel is not mandated in the U.S., the alternative fuel is gaining altitude, in part because it can generate layers of credits that can be utilized in various renewable-fuel trading programs.**
- **Hydrogen-fueled vehicles, while posing a number of economic and logistical challenges, could eliminate the range anxiety associated with EVs — assuming that a robust, nationwide network of hydrogen fueling stations can be developed.**

1. Introduction

Countries around the world are formulating and refining their strategies to reduce greenhouse gas (GHG) emissions. Their policies target areas such as stationary emissions, electricity production, and transportation. Within the transportation sector, one aspect that has spurred quite a bit of investment relates to reducing the carbon intensity (CI) of transportation fuels. The low-carbon fuel policies that are in place today, coupled with those being evaluated for the future, have the potential to incentivize the development of a wide range of "greener" alternatives to petroleum-based fuels in the regions where they are adopted.

From a regulatory perspective, the goal of reducing GHG emissions from the consumption of on-road transportation fuels can be addressed in a number of ways, from fuel economy standards and renewable blending requirements to zero-emission vehicle mandates and low-carbon fuel policies.

As we detailed in **Part 1** of this report, one outcome of some of these policies is that the U.S. is poised for a massive buildout in renewable diesel production capacity — a boom spurred by increasingly supportive government policies and a big push by ESG-minded refiners wanting to reduce the carbon footprint of their operations. In that report we looked at why renewable diesel has become such a hot topic, with a focus on California's Low Carbon Fuel Standard (LCFS) program.

LCFS programs such as the one in California, seen by many as a model for other states, are usually established and measured based on the CI of fuels used. CI is a measure of the lifecycle GHG emissions associated with producing, distributing, and consuming a fuel. Typically, LCFS policies establish downward-sloping CI benchmarks for the jurisdiction's total transportation fuel pool and incentivize the production and blending of lower-CI fuels to meet the benchmarks. Credits are awarded for the production and use of alternative fuels based on their CIs. The lower the CI the fuel achieves, the greater the LCFS credit.

The U.S. does not have a federal LCFS policy in place, but the federal Renewable Fuel Standard (RFS) mandates a certain volume of renewable fuels to replace or reduce petroleum-based transportation fuels. Refiners or importers of gasoline or diesel are categorized as "obligated parties" by the Environmental Protection Agency under the RFS program and must meet certain compliance standards. That is achieved by blending renewable fuels into petroleum-based ones, or by obtaining credits (called Renewable Identification Numbers, or RINs) to meet an EPA-specified Renewable Volume Obligation (RVO) that must be met each year.

In Part 2, which is again based in large part on work by our friends at Baker & O'Brien, we turn our attention to other alternative transportation fuels that could play a role in the energy transition — ethanol, biodiesel, sustainable aviation fuel, and hydrogen — and how they're affected by government policies at the federal and state levels.

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