Replacing Gasoline: Alternative Fuels for Light-Duty Vehicles

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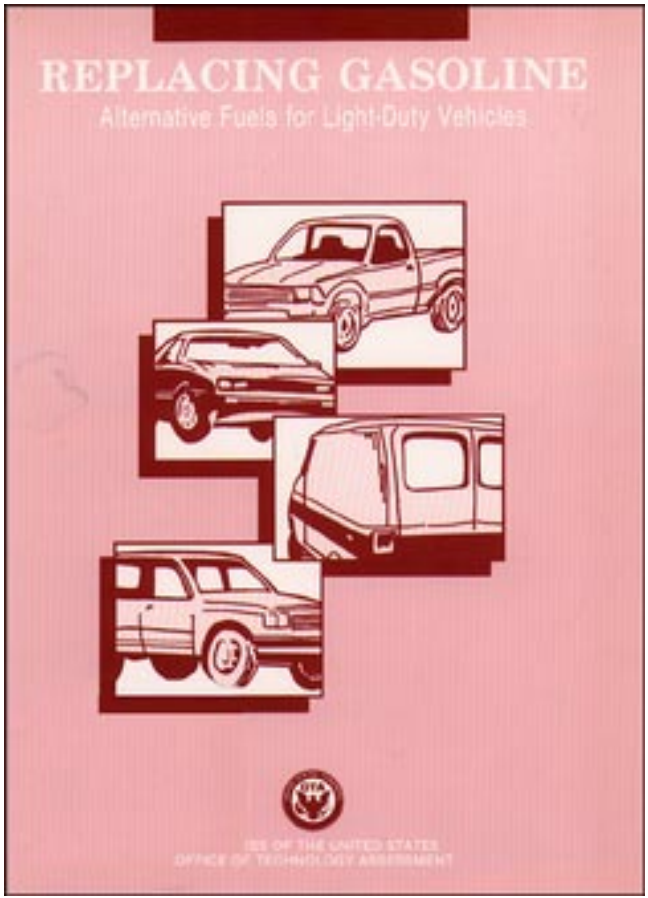

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Foreword

Among the several major issues that Congress has addressed in the process of reauthorizing the Clean Air Act, the future role of alternative highway transportation fuels in reducing urban smog is one of the more prone to argument. Past attempts to reduce pollution levels from highway vehicles have focused primarily on the vehicles themselves; adjustments to fuels were considered mainly when these were necessary to allow vehicular controls to work (eliminating lead from gasoline was necessary to avoid poisoning the catalytic converters on the vehicles). As vehicular emissions control efficiencies rose past 90 percent and further improvements became more difficult, however, attention turned to the idea that some alternatives to gasoline have combustion and/or other physical and chemical properties that might allow the achievement of ultra-low emissions levels. The fuels of interest include methanol (wood alcohol), ethanol (grain alcohol), natural gas, electricity, and hydrogen.

In this report, requested by the House Committee on Energy and Commerce and the Senate Committee on Energy and Natural Resources, which is part of OTA's ongoing assessment of *Technological Risks and Opportunities in Future U.S. Energy Supply and Demand,* OTA gives a broad overview of the qualities of the competing fuels and examines in depth some of the most contentious issues associated with the wisdom of active Federal support for introducing the fuels. Areas of uncertainty that affect the debate on Federal support include fuel cost (including costs of building new infrastructure and modifying vehicles); the air quality effects of the new fuels; effects on energy security; other environmental impacts of the fuels; and consumer acceptance of the changes in vehicle performance, refueling procedures, costs, and other facets of the transportation system that would follow a large-scale introduction of any of the fuels. The report singles out for special examination the arguments concerning the costs, energy security implications, and air quality impacts of introducing methanol fuels into the fleet. However, the other fuels have similar levels of uncertainty and contentiousness.

As this report goes to press, the oil-driven crisis in the Middle East mounts daily and could erupt at any time into major conflict. Alternative fuels will play a minor-to-negligible role in near-term responses to that situation, because the time required to make fundamental changes in our energy supply and demand require years, if not decades. In the longer term, however, if the United States desires to take advantage of the opportunities with alternative fuels to reduce the likelihood and impacts of future such events of armed conflict or to capitalize on the potential substantial environmental advantages inherent in these fuels, we must adopt a sensible, long-term national investment commitment to effect those changes.

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NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

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