

UC REPORT: MTBE FACT SHEET

November 12, 1998

Background

By federal law, gasoline refiners must add an oxygenate to California Phase II Reformulated Gasoline (CaRFG2) to reduce air pollution. MTBE (methyl tertiary-butyl ether), other ethers, and ethanol have been used for this purpose, but most refiners have chosen to use MTBE. In air basins that meet Federal National Ambient Air Quality Standards ("attainment areas"), non-oxygenated CaRFG2 may be sold.

In comparison to conventional gasoline, CaRFG2 shows significant improvement on several measures of air quality. Emissions of carbon monoxide, volatile organic compounds, and nitrogen oxides are reduced with CaRFG2. Vehicle emission control technology, especially improvements in newer cars, also significantly reduces emissions of air pollutants and their precursors.

Findings

- MTBE and other oxygenates were found to have no significant effect on exhaust emissions from advanced technology vehicles. There is no significant difference in the emissions reduction of benzene between oxygenated and non-oxygenated CaRFG2 that meets all other CaRFG2 standards. **Thus, there is no significant additional air quality benefit to the use of oxygenates such as MTBE in reformulated gasoline, relative to alternative CaRFG2 non-oxygenated formulations.**
- There are significant risks and costs associated with water contamination due to the use of MTBE. MTBE is highly soluble in water and will transfer readily to groundwater from gasoline leaking from underground storage tanks, pipelines and other components of the gasoline distribution system.
- In addition, the use of gasoline containing MTBE in motor boats, in particular those using older 2-stroke engines, results in the contamination of surface water reservoirs. We are placing our limited water resources at risk by using MTBE. If MTBE continues to be used at current levels and more sources become contaminated, the potential for regional degradation of water resources, especially groundwater basins, will increase. Severity of water shortages during drought years will be exacerbated. We believe that the use of either non-oxygenated reformulated gasoline or ethanol as an oxygenate in CaRFG2 would result in much lower risk to water supplies, lower water treatment costs in the event of a spill, and lower monitoring costs.
- Economic analysis of the benefits and costs associated with three gasoline formulations:
 1. CaRFG2 without added oxygenate
 2. CaRFG2 with ethanol
 3. **CaRFG2 with MTBE**indicates that non-oxygenated gasoline achieves air quality benefits at the least cost, followed by CaRFG2 with ethanol. CaRFG2 with MTBE has the highest net annual cost due primarily to the costs of treating contaminated water supplies, higher fuel prices, and lower fuel efficiency.

The summary and complete report will be made available on the Internet at
<http://tsrtp.ucdavis.edu/mtberpt>

RECOMMENDATIONS

Background

From a purely economic perspective, it would be best to transition to non-oxygenated CaRFG2. However, fuel oxygenate content is mandated by federal law, and this may not be a viable option. In addition, a lesson to be learned from the MTBE story is that addition of any chemical compound to the environment in quantities that constitute a significant fraction of the total content of gasoline may have unexpected environmental consequences. Therefore, we recommend a full environmental assessment of any alternative to MTBE in CaRFG2, including the components of CaRFG2 itself, before any changes are made in California State law.

Recommendations

Rather than any immediate ban on MTBE, we recommend consideration of phasing out MTBE over an interval of several years, and that refiners be given flexibility to achieve air quality objectives by modifying the caps in the CaRFG2 specifications to allow wide-scale production of non-oxygenated RFG. Using a Predictive Model as a guideline, refiners can find the most cost-effective formulation for each region and season, without assuming the liability and risks that MTBE poses to California's water supplies.

During the transition phase, a number of policies are suggested to reduce the cost of using MTBE while protecting water supplies.

1. Restrict the use of CaRFG2 with MTBE to ozone non-attainment areas during the summer months. It is recommended that the California Air Resources Board (CARB) review the length of the ozone summer season for those air basins in non-attainment to limit as much as possible the use of CaRFG2 with oxygenates.
2. Obtain a waiver of the federal requirement that reformulated gasoline sold in California have an oxygen content, via the passage of HR Bill 630 and Senate Bill 1576. This will allow the sale of non-oxygenated CaRFG2 in all areas.
3. Recommend that CARB facilitate promotion of the production and distribution of non-oxygenated CaRFG2 in all attainment areas, as well as during the non-summer season in non-attainment areas.
4. Promote the accelerated removal of older, high emitting motor vehicles through the use of industrial emissions offsets or a fund created by an appropriate tax. This program would be significantly more cost-effective than mandating the use of oxygenates in fuels in reducing air pollutant emissions. An aggressive program aimed at gross CO polluters would be a cheaper and less risky option than using oxygenates.
5. Maintain the Underground Storage Cleanup Fund Program, possibly beyond the year 2005 to cover the costs of MTBE cleanup, with a review in three years to determine the effectiveness of upgraded underground storage tank systems in reducing the rate of failures, and thus the potential to reduce the annual fees.
6. Where contamination of groundwater is known or suspected, evaluation of plume extent and potential threats to drinking-water supply wells should be carried out immediately. Plume containment, remediation, or other corrective actions should then proceed as soon as possible to reduce risk and costs.
7. Require the adoption of Best Management Practices for surface water reservoirs, following the lead of the Santa Clara Valley Water District.
8. Establish specific emissions requirements for motor boat engines, in particular with respect to emissions of unburned fuel. Promote legislation with incentives to phase out motor boat engines that do not meet emissions requirements.
9. Assess the environmental impacts of using other oxygenates such as ethanol. It must be stressed, however, that there are potential adverse health effects associated with incomplete combustion products of ethanol, and further study of combustion byproducts and potential health effects of such

products is required before substitution of ethanol for MTBE on a large scale can be recommended. If ethanol is found to provide a net energy savings and have minimal environmental impacts, then, increase the availability of ethanol as a potential oxygenate, by increasing the use of agricultural wastes such as rice straw for ethanol production. This also would reduce the emissions from burning the rice straw. The increase in this program could be funded through reductions in the cost of monitoring and enforcing the ban of rice straw burning.

10. The state should invest in a long-term research program, using the enormous base of expertise available in California's universities and professional organizations, to determine the toxicological effects of untested industrial products that will be used in large amounts. Such research should, for example, examine effective alternatives for motor vehicle fuels, and develop more cost-effective remediation and treatment technologies. The current structure of state agencies which focus on specific media (land, air, water), leads to fragmented and incomplete environmental impact assessments. Any new large scale programs in California should be preceded by an independent Environmental Impact Assessment, rather than an a posteriori evaluation of the consequences.