OPTION 2E
LIQUID PETROLEUM GAS

Summary

Liquid Petroleum Gas (LPG), also known as “propane” in reference to its primary constituent, has long been used as an alternative fuel in the transportation sector. Typically, commercial offerings of LPG-fueled light-duty cars and light trucks have been limited to bi-fuel vehicles, which can run on either LPG or gasoline using the same engine but separate fuel systems. Bi-fuel propane engines are convenient to the fleet operator by allowing the use of either gasoline or LPG depending on fuel availability.

Due to its dual-fuel nature, the LPG bi-fuel vehicle is not optimized to run on either fuel. Thus, the bi-fuel vehicle suffers from decreased fuel efficiency performance compared to that of a dedicated LPG vehicle or a conventional gasoline vehicle.[1] For example, a 2004 Ford F-150 Truck (bi-fuel) experiences a 1.34 miles per gallon (mpg) fuel economy loss when running on gasoline compared to the same vehicle powered by a gasoline only system.[2]

As of 2005 no new LPG light-duty cars and trucks are being produced commercially. However, a limited number of California Air Resources Board certified LPG retrofit systems are approved and may be available for 1995 and older model year light-duty vehicles[3]. These kits range in price from $2,500 to $5,000. The discontinuation of commercial production of light-duty LPG vehicles and the limitations on retrofits continue to be barriers for propane as a major light-duty vehicle transportation fuel. Also, the relative high cost of certifying new retrofit kits for use in California has discouraged companies from producing such kits.[4]

Similarly, since LPG vehicle refueling infrastructure is limited in California, it is assumed that a significant number of LPG bi-fuel vehicles are operating on gasoline. The number of these vehicles on the road in California is difficult to quantify since no new vehicles are in commercial production and the vehicle population is decreasing with age. Due to these limitations, it is unlikely that any significant California petroleum reduction will result from LPG transportation technology in the light-duty vehicle sector in the foreseeable future.

Petroleum Reduction

Near-term petroleum reduction could result if existing niche fleets of LPG bi-fuel light-duty vehicles are provided with more convenient access to LPG and their usage

rate is increased. For example, the California Department of Transportation (Caltrans) operates a fleet of over 1,300 Ford F-150 bi-fuel LPG pickups running solely on gasoline.[5]

Caltrans has joined with the Department of General Services to significantly increase the use of propane in those vehicles.[6] Under the Energy Commission's Alternative Fuel Infrastructure Program, new propane stations are being installed to help Caltrans with its LPG fueling options.[7] These vehicles would potentially displace over 1,227,960 gasoline gallons annually.

- Caltrans bi-fuel fleet: 1,300
- Vehicle miles per year: 15,000
- MPG (bi-fueled/gasoline): 15.88
- Gasoline gallons displaced yearly: 1.23 million

It could be assumed that as other bi-fueled LPG vehicle fleets start utilizing LPG similar volumes of petroleum reduction would result.

Description

Due to the discontinuation of commercially available light-duty LPG vehicles, it is not possible to evaluate future petroleum displacement from this vehicle technology in the light-duty vehicle sector. Ongoing monitoring is needed regarding commercialization of future light-duty propane-fueled vehicle and engine platforms. Strategic infrastructure support should continue, focused on fleets that have current bi-fueled vehicles.

LPG may play a larger role in the medium-duty and heavy-duty vehicle sectors, due to the current availability of original equipment manufacturer vehicles and vehicles retrofit kits. Additional information on medium-duty and heavy-duty LPG potential is addressed in the *2005 Alternative Fuels Commercialization Report*.[8]

Key Input Parameters and Values

N/A

Results

N/A

Key Drivers and Uncertainties

N/A

Endnotes

[1] California Energy Commission, "California Clean Fuels Market Assessment, 2003", pg 30.

[2] 2004 F-150 Truck (using gasoline), Bi-fuel version 15.88 mpg vs percent Gasoline version 17.22 mpg, net fuel economy savings - 1.34 2004 EPA Fuel Economy Guide.

[3] http://www.arb.ca.gov/msprog/aftermkt/altfuelsys.doc, rcastro@arb.ca.gov, (March 17, 2005).

[4] William Platz, Clean Fuel USA, presentation to the California Energy Commission, October 12, 2004.

[5] Estimated numbers supported by DMV data, Gary Occhiuzzo California Energy Commission.

[6] California Energy Commission, Volume II of draft consultant's report on State Fleet Fuel Efficiency (SB 1170), prepared by TIAX, January 2003.

[7] Details about these propane stations are described in California Alternative Fuels Infrastructure Program Evaluation, a draft Consultant's Report by TIAX for the California Energy Commission.

[8] California Energy Commission, "2005 Alternative Fuels Commercialization Report," LPG/Propane Section, CEC 600-2005-020.