Technology Fact Sheet

Liquefied Petroleum Gas (LPG) in transport[i] **/**http://climatetechwiki.org/technology/lpg/

General description

Liquefied Petrol Gas (LPG) is a widely used alternative fuel. It has substantial reserves due to its dual origins from natural gas processing and crude oil refining. Liquefied Petrol Gas (LPG) powered passenger cars have about 10% lower tailpipe CO_2 emission than comparable gasoline powered cars. When compared to a diesel car, there is no significant CO_2 emission reduction per km driven; however, LPG powered vehicles do have substantially lower NO_x emissions than diesel powered vehicles.

Liquefied Petroleum Gas (LPG) is a liquefied mixture of propane and butane. It is an inevitable side product of the crude oil refining process and of natural gas processing. LPG can be used as an alternative fuel in vehicles, and may lead to lower vehicle maintenance costs, lower emissions, and fuel costs savings compared to conventional gasoline and diesel.

An important difference between LPG and conventional vehicles is the method of fuel storage. LPG is gaseous at room temperature and a pressurized storage tank is required at the fuelling station as well as in the vehicle. In the vehicle, liquid LPG is converted to vapor in the vehicle's engine. The vapor is then mixed with filtered air before it enters the combustion chamber where it is burned to produce the energy to propel the vehicle. There are also liquid propane injection engines, which do not depend on vaporizing the LPG, but instead burn the liquid fuel (US DOE, 2010).

Implementation

LPG can be used in dedicated LPG vehicles or in vehicles converted from gasoline use. The availability of dedicated LPG models is limited, and most LPG powered passenger vehicles have a modified combustion engine. Such converted vehicles normally operate in bi-fuel mode, using either LPG or regular gasoline. The advantage of a bi-fuel vehicle is that the car owner is less dependent on a LPG refueling infrastructure with sufficient coverage. In areas, where LPG is not available, regular gasoline can be used. A drawback of the bi-fuel vehicle is that two fuelling tanks need to be available, lowering the available space in the vehicle. Usually, to save space in the trunk of the vehicle LPG tank is located where normally the spare tire is stored.

LPG also has a lower energy density than gasoline, and therefore requires more storage volume for an equivalent drive range.

The safety risks of LPG is higher than of other fuels, although LPG liquefies at moderate pressures In Europe, the number of accidents with LPG is very low, however, the effect of an accident may be large. In the past, most accidents have happened during the transport of LPG. These safety problems make it generally necessary to locate an LPG fuelling station well outside an urban location.

The use of LPG as a transport fuel is a well developed technology, and LPG is a widely used alternative fuel. According to an industry organization, the European LPG Association (AEGPL), there are more than 7 million LPG powered vehicles in Europe, and LPG accounts for about 2% of the fuel mix of passenger cars in Europe(AEGPL, 2009). AEGPL (2009) also estimates that LPG could account for 10% of Europe's passenger car fuel mix by 2020. The most developed LPG market is in South Korea, with more than 2 million LPG vehicles. In 2007, more than 13 million vehicles were powered by LPG worldwide (AEGPL, 2009s).

Implementation barriers

- Lack of a well developed LPG fuelling infrastructure.

GHG emissions reduction (megatons CO_2 equivalent) – 106 thousand tons CO_2 in 2030.

Impact on development priorities:

a) social

b) economic

- Lower maintenance costs and a longer engine life-time (the higher octane rating, the less pollution).
- Using LPG may also increase energy security as it diversifis the country's fossil fuel sources.

c) *environmental*

- Improved local air quality (lower NO_x emissions).

d) *other*

Investments

The initial infrastructure costs required to expand the sales of LPG in the transport sector, are mainly determined by the investment costs of the LPG refueling infrastructure.

In Europe the purchase cost for an LPG vehicle is estimated to be € 1.500 to € 2.500 higher than for a comparable fossil fuel powered car (Roeterdink et al, 2010). However, fuel costs are considerably lower . At present, the price of LPG in the country is 1.9 times lower than the price of gasoline or diesel oil. Much of this difference in fuel prices is due to lower taxes for LPG. Given the budgetary fiscal policy for 2012 of the Republic of Moldova, LPG will become less attractive, as the final price difference to petrol and diesel was reduced to 1.5 - 1.6 times.

Depending on the (road) tax regimes for LPG vehicles and on fuel prices, the financial breakeven point for the initial additional investment for an LPG vehicle mostly lies within several years.

An additional investment of $ 2.025 thousand (1,500 Euro × 1.35 USD / Euro) was taken into account for calculations for LPG powered car, the total cost of such a vehicle amounting to $ 22,000.

An additional investment of $ 1,000 / vehicle was considered for analysis purposes, the total price of purchasing a car increasing from $ 20 000 to 21 000. Given the application of this technology for all gasoline powered cars, by 2030 the estimated total number of cars will be 490,000, while the total investment is estimated at $ 10,792,000.

Operation and maintenance costs–were considered at 10% of annual investment costs or $ 315 / year and for the total number of cars these costs amount to $ 154 million.

GHG reduction costs– 18.275 $/ton CO_2.

Technology lifetime– 7 years.

Other

Source: http://climatetechwiki.org/technology/lpg

[i] This fact sheet has been extracted from TNA Report - Technology Needs Assessment for climate change mitigation - Republic of Moldova. You can access the complete report from the TNA project website **http://tech-action.org/**