



Automotive Liquefied Petroleum Gas

BP Automotive LPG (Liquefied Petroleum Gas) is mainly propane with small amounts of butane, propylene and butylene. The fuel complies with the ALPGA/AIP specification and is designed specifically for use in automotive engines.

Advantages & Disadvantages

There are several significant advantages in running a spark-ignition engine on LPG rather than petrol that include reduced exhaust emissions, longer engine life and lower maintenance costs. Fuel costs may be significantly lower, too, but the saving depends on the price and taxation structure of the market. LPG consumption on the open road can be up to 30% higher than that for petrol, although city cycle consumption is only about 10-20% higher. Overall, the cost of running on LPG is cheaper than for petrol, but the time to fully recover conversion costs will depend on individual circumstances. Vehicles that frequently travel long distances are able to recover the cost of conversion in an acceptable time.

The government's \$2000 rebate on LPG installations introduced in 2007 has now increased the recovery cost of the installation, LPG installation kits average between \$2500 - \$4000 supplied and fitted depending on vehicle and requirements.

Fuel Systems

Vehicles may run on a dual-fuel system, whereby LPG and petrol can be used, or on a single-fuel, LPG only system. In the former case a fuel selector switch is necessary and the vehicle should be run on petrol frequently to ensure that petrol in the fuel tank does not degrade.

Periodic Petrol Operation

In dual fuel vehicles fitted with fuel injection the petrol is constantly being circulated to the engine's fuel rail and back to the tank. This results in higher temperatures in the tank, which in turn accelerates the formation of gums. It is therefore necessary to run the engine on petrol at regular intervals. This should be weekly and in doing so about 20 litres of petrol should be consumed every month, or as per manufactures recommendations.

Performance

The power developed by an engine run on LPG tends to be lower than that for petrol over the whole speed range. The reason is that at full combustion more power is provided from a given volume of air-petrol mixture than from the same volume of air/LPG mixture. Although dependent on the quality of installation, and the equipment used, LPG cars generally run smoother and idle better than those running on petrol.

Exhaust Emissions

Older vehicles without emission control systems will produce significantly less carbon monoxide and hydrocarbons but levels of oxides of nitrogen will be the same. Modern cars' emission control systems must remain unmodified when converted to run on LPG, so emissions are almost the same as when running on petrol.

Engine Benefits

Where LPG is the sole fuel, service experience indicates that it has the following advantages over petrol:

- Longer engine life, particularly in respect to cylinder-bore wear during cold starting. This is because LPG, being gaseous when it enters the cylinder, does not wash oil off the walls.
- Reduce deposition on surfaces and spark plugs, owing to the cleaner combustion characteristics of the fuel. Consequently the frequency of top overhauls and plug servicing can be reduced.
- Lubricating oil will be free of soot and unburnt fuel and so will appear clean. It is still **imperative to change oil at the normal interval because additive depletion** may allow acid build up which will lead to bearing corrosion and deposit formation.

Clearly, where a dual-fuel LPG / petrol system is used, these benefits are reduced according to the proportion of petrol operation. Some leaded petrol engines are prone to exhaust valve seat wear using LPG. It is therefore recommended to run these cars on petrol with an anti valve seat recession additive occasionally to provide a deposit on the exhaust valve seats that will prevent wear.

Since LPG enters the engine in gaseous form, the mixture distribution to the cylinders is more uniform than with petrol. Consequently engines operating on LPG can utilize leaner mixtures, to give improved efficiency.

Running Costs

Financially the benefit of LPG conversion may be determined by examining the following four factors:

1. The capital cost of conversion (\$2000 rebate as of 2007)
2. Any effective differences in the fuel taxes levied on the two products
3. Fuel consumption of LPG relative to that of petrol
4. The price of LPG relative to that of petrol

Safety

LPG has been used as a motor fuel for a number of years in the US, Japan, Europe and more recently in Australia. It has proved to be at least as safe as petrol, although both of course require proper handling. Approved equipment must be installed by qualified converters and refueling performed at properly equipped filling stations. The rigidity of the LPG tanks makes them less susceptible than petrol tanks to accidental damage. Modern vehicle tanks have automotive shut-off valves to prevent filling over 80%.

Typical Characteristics

Density	0.558 kg /L
Motor Octane Number	93
Research Octane Number	100 (approx.)
Odour	Distinctive, unpleasant
Vapour Pressure @ 40°C	800-1500 kPa

**For further information, please call the BP Lubricants and Fuel
Technical Helpline 1300 139 700 local call
Or visit www.bp.com.au/fuelnews**