

LP Gas

Liquefied petroleum gas (LP gas or LPG) is a hydrocarbon fuel comprising a mix of mostly propane and butane.

The quality of LPG for automotive use is controlled to ensure consistent vehicle performance under all driving conditions. The gas is liquefied under moderate pressure. When allowed to revert to vapour it expands 270 times its liquid volume.

This enables LPG to be stored as a compact liquid but burnt as a dry gaseous vapour.

- LPG is non-corrosive, free of lead and heavier than air.
- It is produced by refinery fractionation of oil or is stripped from naturally occurring Natural Gas.

Automotive LPG is not the same as the LPG used in domestic applications including BBQs. Appliances such as BBQs are designed to operate on 100 percent propane only.

What are the advantages of using LPG?

The advantage of using LPG as a motor fuel is its potential for cost savings. It can be up to 60 percent cheaper than petrol, litre for litre. Other advantages are reduced exhaust emissions and potentially longer engine life.

LPG also offers a well developed, genuine alternative to petrol.

Are there any disadvantages?

Yes. The up-front cost of conversion is probably the major point.

- In some cases the installation of the gas tank in the car's boot may take up considerable space.
- In 4WD vehicles, where the tank is fitted under the floor, there may be some loss of ground clearance.
- LPG is also not as widely available as petrol.

Will LPG supplies last?

Virtually all LPG used in Australia is produced here. Substantial quantities of LPG are exported as surplus to our requirements. LPG should remain readily available well into the future as known reserves of gas are far greater than those of crude oil from which petrol is derived.

Where is auto LPG available?

LPG can be obtained from more than 3200 retail outlets around Australia. In some country regions you may need to plan your refuelling stops in advance.

Detailed locations can be found on the [Australian LP Gas Association website](#) and on many fuel company websites. Major LPG suppliers and their service stations may also have printed lists available.

Is LPG safe in a road accident?

There is substantial practical evidence to demonstrate that LPG-fuelled vehicles are as safe as those with other fuel systems. All use of LPG in vehicles is controlled by State Government regulations and national codes, and all LPG fuel system components must meet rigid criteria set down by Standards Australia.

In Queensland mechanics must possess an additional licence (which also requires further training) to allow them to install and repair LPG components.

What effect does LPG have on economy and power?

Because LPG does not contain the same amount of energy as petrol, both fuel consumption and power will suffer. However later model vehicles are generally less affected.

An increase in fuel consumption of around 30 percent to 40 percent should be expected when operating on LPG but this is more than offset by the lower cost per litre of gas.

What is the cost of an LPG conversion?

LPG conversions typically cost between about \$3,000 and \$4,500, depending on the application. LPG injection systems, as opposed to simple mixer systems, are more complex and expensive but generally give better results due to their ability to more precisely control gas flow.

When comparing conversion quotes it's important that you compare quotes for the

same type of system in order to get a valid comparison of costs. In some applications there will also be some flexibility in the number, size and type of tanks that can be fitted. This may also affect the final cost.

What does an LPG conversion involve?

New equipment is added but very little of the existing equipment is changed or removed. All conversions will, however, include a dedicated gas fill point.

During most conversions:

1. An LPG storage tank is installed, usually in the boot but it can go under the floor in vehicles with enough clearance (e.g.; 4WDs and some commercial vehicles). The tank will be fitted with an automatic fill limiter (AFL) which ensures you cannot fill your tank past the safe fill limit of 80 percent. This is necessary as LPG requires room to expand with temperature changes.
2. A converter/regulator is added. This converts the liquid gas into a gaseous vapour, as well as regulating the process.
3. A special air/fuel mixer is installed to ensure the correct amounts of LPG and air are mixed together for proper combustion. More advanced systems may incorporate LPG injection rather than a simple mixer. Such systems provide more precise control of the gas flow but are more complex and expensive to fit.
4. A fuel lock is fitted that lets fuel flow when the engine is running but shuts off the fuel supply as soon as the engine stops.

5. If the vehicle was built after 1986 it must be fitted with an LPG Fuel Control Processor.

Dual-fuel or dedicated gas?

Dual-fuel means the vehicle can operate on either one of two fuels, usually petrol or LPG. A dedicated gas vehicle will have no petrol fuel system so it can only operate on LPG.

Dual fuel

It costs no more to have your car converted to dual-fuel than it does to have it converted to LPG only. So it makes sense to go dual-fuel and give yourself the added flexibility of being able to use two types of fuel.

A number of vehicle manufacturers offer dual fuel vehicles, or factory developed and approved dual fuel conversion kits.

Dedicated gas

There are a few dedicated gas models on the market. Dedicated gas engines are usually quite different to a conventional petrol engine as they are optimised for gas operation. This usually means that they have a higher compression ratio and an engine management system that has been specifically calibrated for LPG operation. This offsets the power losses and fuel consumption increases usually experienced with dual fuel engines.

These can be pluses if the versatility of dual fuel operation isn't important to the application.

Can any vehicle be converted to run on LPG?

Most, but certainly not all, petrol-powered vehicles can be converted to either dual-fuel or dedicated gas operation. A factor that often determines if a vehicle can be converted to gas is the availability of an LPG conversion kit for that particular vehicle. As development and certification costs for such kits are very high it is usual that kits are only developed for relatively common vehicles so that development costs can be spread over a large number of vehicles.

There are also technical factors that will influence the vehicle's suitability and you should discuss these with the vehicle's manufacturer and your chosen gas system installer.

Check if the vehicle is compatible

However when discussing LPG conversions with a vehicle manufacturer be aware that there are a couple of reasons that you may be given as to why a particular vehicle isn't suitable for conversion. The first is that there is a genuine reason that the vehicle isn't compatible.

- This can range from engine durability problems to something as simple as the manufacturer believing there isn't sufficient space for the LPG cylinder.
- The second is that the vehicle manufacturer simply doesn't know and is erring on the side of caution by saying that the vehicle isn't compatible.

You'll need to determine for yourself which one of these it is.

Note also that some vehicle manufacturers that don't offer factory LPG systems

do offer specific LPG compatible models that incorporate certain improvements to better withstand LPG use. LPG compatible engines usually need to be specified when the vehicle is built.

Discuss the conversion with gas installers

We'd also strongly recommend that you discuss the conversion with a number of gas installers.

1. You'll need to ask how many of your type of vehicle they've converted and what, if any, problems they've encountered.
2. Also ask if any additional servicing or maintenance over and above the vehicle manufacturer's requirements is specified, as this could increase operating costs and will need to be factored into your payback period calculations.

Be cautious of requirements for additional tappet adjustments as this could indicate an underlying durability or ongoing service issue.

Other recommendations

It would also be wise to talk to owners of similar vehicles to get some real life feedback about the conversion.

LPG and diesel engines

Diesel engines generally cannot be converted to operate on LPG. However some organisations are developing systems that will allow a diesel engine to operate on a mixture of diesel and LPG. Such systems are claimed to increase power and reduce fuel costs.

Guidance should be sought from the vehicle's manufacturer before committing to such a system.

CNG and LNG

While compressed natural gas and liquified natural gas don't exactly fit under the heading of LPG, they are related.

In Australia, CNG and LNG are really only used in heavy vehicles. There are a few light vehicles running on CNG but they are not common.

CNG and LNG can be used as a diesel fuel extender or as prime fuel in a dedicated gas engine. Some city bus fleets use CNG, both for its cost and emission credentials.

CNG and LNG doesn't lend itself well to light vehicles due to limited refuelling facilities, difficulties in storing the fuel and the weight of the storage cylinders.

Is much of the vehicle manufacturer's equipment altered?

No. The vehicle's engine management system and emission controls must continue to operate normally.

The gas system must work with the vehicle's existing engine management system.

Vehicles must continue to comply with all relevant Australian Design Rules, including exhaust emission standards, and the installation must meet Australian Standards.

How is LPG normally stored in cars?

An LPG container, or tank, is normally mounted in the forward part of the boot for passenger cars and under the floor for 4WDs and some commercial vehicles. The tank must be manufactured to comply with Australian Standard 3509 and be installed in accordance with the stringent safety requirements of AS 1425. The installer should fully discuss the type and size of tank that best suits your vehicle when presenting the quotation.

Does LPG affect engine wear?

A reduction in overall engine wear is normal when using LPG. This is particularly applicable during cold starting, because LPG does not wash lubricating oil from cylinder walls.

Will my car's warranty be affected?

Factory fitted or factory approved systems will usually be covered by the vehicle's warranty. However any problems related to, or caused by, non-factory approved equipment will not be covered by the vehicle's warranty.

Ensure that the gas installation comes with a warranty that covers its fitment, the equipment and any related problems. Not all engines are suitable for gas conversion, so we recommend checking suitability with the vehicle's manufacturer prior to conversion to avoid possible damage or warranty issues.

Is it difficult to change from petrol to LPG?

No. In most cases it is only necessary to move a switch to change from one fuel to another.

Many late model vehicles start on petrol then automatically switch over to gas. Obviously each system is different and operating instructions should be provided.

Is it difficult to fill the gas tank?

No. Filling the gas tank is not unlike filling a petrol tank from a petrol bowser.

Does running an engine on LPG require any special treatment?

No. LPG engines should be serviced just like a normal engine.

However some vehicles will require additional servicing operations, for example more frequent tappet adjustment, that can add to maintenance costs.

There are also special engine oils available for LPG engines.

The only point to remember is that in a dual-fuel application it is still necessary to use some petrol regularly to ensure the petrol system components remain in working order.

As a guide

- Use petrol weekly with a minimum of 20 litres being used every 3,000km to prevent it becoming stale.
- A minimum of about a quarter of a tank of petrol should also be maintained at all times.

It's worth checking with the system manufacturer or gas installer for specific instructions on this point.

Can my local garage still service my car after conversion?

Yes. Normal servicing is unaffected by the conversion.

However, as Queensland has strict controls on the quality of installations, only licensed LPG installers may work on LPG systems.

LPG fuelled used cars

LPG conversions aren't only applicable to new cars. Much of this information is also applicable to used cars.

And it isn't unusual to find LPG fuelled vehicles on the used car market, which may offer a cheaper alternative to having your existing vehicle converted.

Value of the LPG system

Like any accessory, the value of the LPG system fitted to a used car is very much dependent on its value to the buyer.

According to a leading Australian vehicle valuation service the value an LPG system adds to a vehicle depends on the vehicle's age and reduces over time on a sliding scale.

- For instance, the suggested average value increase for a 10 year old car would be about \$200, and \$1,000 for a one year old car.

Obviously, the value proposition and pay-back period for an existing LPG fuelled car would be significantly more attractive than for a new conversion due to the lower capital cost.

Purchasing used LPG fuelled vehicles

If you are considering the purchase of a used LPG fuelled vehicle, the usual advice applies:

- Have it inspected prior to purchase by someone who knows what they are looking at.
- As a first step though, when test driving the vehicle ensure that it runs properly on both petrol and gas and that things like fuel gauges and controls all appear to work properly.
- Dual fuel vehicles that are continuously operated on one fuel only can develop costly problems in the other, unused fuel system.

Queensland registered vehicles

For Queensland registered vehicles a Gas Certificate is required for any vehicle fitted with any form of gas system (including stoves in caravans) to facilitate the transfer of registration.

A Gas Certificate is also required when re-registering an unregistered vehicle fitted with a gas system of any type. The gas inspection will look at the safety of the

installation as well as checking the test date of the cylinder (all gas cylinders must be inspected and re-certified every 10 years).

When buying an LPG fuelled vehicle ensure you receive a valid Gas Certificate as part of the transaction. If you fail to do this you will be responsible for the cost of obtaining the certificate as well as any necessary repairs.

Is LPG right for me?

As much as we'd like to be able to give you a yes or no answer to this question, the reality is it's a question that only you can answer as it depends on your individual circumstances.

Economic viability of conversion

1. Will depend on your vehicle's fuel consumption
2. The number of kilometres travelled each year
3. The actual difference in price between LPG and petrol (you'll need to know the average gas and petrol prices for your area)
4. The cost of the conversion and how long you plan to keep the vehicle.

Acceptable payback period

You'll also have to decide on what is an acceptable payback period i.e. how long is acceptable to wait before the fuel savings equal the cost of the conversion. Remember that it's only after you've recovered the total cost of the conversion that you start making any real savings.

- It's probably fair to say that vehicles that travel significantly higher than average distances and / or those with high fuel consumption are better candidates for conversion as the payback period will be shorter.
- Statistics indicate that average private use is about 15,000km/year.

It should also be obvious that if the payback period is greater than the time you plan to own the vehicle an LPG conversion won't be financially viable.

Consider also that from December 2011 excise on LPG will increase by 2.5 cents/litre each year until December 2015. Obviously this price increase will impact the payback period and will need to be factored into your calculations. Industry experts believe that despite the proposed phase in of excise and increased demand for LPG, it will remain cheaper than petrol.

Government Rebates

A Government rebate may also be applicable to non-business use conversions. For further information on these rebates visit [LPG Australia](#) or [Ausindustry](#) websites (see links below table).

Note that these rebates change from time to time so it's important to always get the latest information.

Calculating pay-back period

The calculation table below will help you determine how much converting to gas will save you and how long it will take to repay the cost of conversion.

The figures shown in the table below are provided as an example only. You will need to **substitute your own figures into the right-hand column**, and where necessary do the simple step-by-step calculations. You can also find a quick calculator on the [LPG Auto Gas website](#).

A	Distance travelled per year	15,000km
B	Average petrol consumption	13L / 100km
C	Annual petrol consumption (A x B divided by 100)	1950 litres
D	Petrol price	\$1.35 / litre
E	Annual petrol cost (C x D)	\$2632 / year
F	Annual LPG consumption (C x 1.3)*	2535 litres
G	LPG price	\$0.65 / litre
H	Annual LPG cost (F x G)	\$1648 / year
I	Annual savings (E - H)	\$984 / year
J	Weekly savings (I divided by 52)	\$18.92 / week
K	Cost of conversion**	\$3,500
L	Time to repay conversion (K divided by J) or (K divided by I)	185 weeks or 3.56 years

* Based on a theoretical 30 percent increase in fuel consumption when operating on LPG

** Government rebates may be applicable on conversions for non-business use. The value of any rebate should be deducted from here prior to step (L). Further information on rebates will be found on the [LPG Australia website](#) and [Ausindustry website](#).

Our thanks to LPG Australia for their assistance with preparing this advice.