What a gas with an RV8!

With the relentless rise of petrol and diesel prices at filling stations over the last twelve months, the idea of converting a car so you have the option of running on autogas is increasingly attractive. Autogas is a much cleaner fuel than petrol. The products of combustion of this gaseous mixture are much less aggressive than those from a petrol/air mixture so oil life is extended because the additives have less to do. Combustion is more complete so there is very little soot in the exhaust gas and the sulphur content is very low in autogas so there is less acid to deal with. Autogas (liquid petroleum gas or LPG) is much cheaper than petrol, in May around 58% less on a comparative per litre basis, so even with the reduced miles per litre performance seen with autogas, there is a very attractive economic advantage. As a guide the cost per mile of autogas running with a Rover V8 engine is just under half that of running on petrol, so it will prove attractive to some enthusiasts who use their cars on a regular basis running up moderate annual mileages. With the good coverage of filling stations with autogas pumps around the UK, it is now a practical option too as refilling is both predictable and convenient. With uncanny timing, an RV8 dual fuel conversion is now available from the MGV8 specialist Clive Wheatley mgv8parts at his workshops in rural Shropshire. So on hearing of the conversion Victor Smith wanted to learn more from Clive.

The installation is carried out by his colleague Steve Newton who is a fully accredited National Autogas dual fuel fitter with the skills and experience needed to install the equipment on an RV8. He also makes the necessary engine management adjustments so you can switch seamlessly between petrol and autogas running and back again at the touch of a button.

Both Clive and Steve have practical experience of dual fuel installations as they each run an Audi estate as their daily transport which they had converted in 2007. They decided to get them converted by one of the leading firms specialising in dual fuel auto installations using the Italian Landi equipment. The results were not only neat from an engineering viewpoint, but they have produced large savings in fuel purchases. Those savings have increased with further hikes in petrol prices on forecourts over the last six months or so. For Clive the savings were particularly attractive with his Audi as it has a 4.2 litre V8 engine which usually returns around 18 to 20 mpg on typical daily commuting use with petrol. Without the significant fuel cost improvement he has had with autogas, the economics of his continuing to run a car he really enjoys could have become an increasing burden which would have been very difficult to justify.

So with the experience of those conversions behind them, Steve went on a training course with National Autogas and used Clive's black RV8 for his first conversion. That car has been used as the firm's testbed for developing other useful products – for example the very successful bespoke Spax replacement shock absorbers launched earlier this year - so converting it to autogas was a useful practical extension of his training with the dual fuel specialist. It provided Steve with an opportunity to work out with the instructor how the installation could be applied to an RV8. The result is a very neat installation in which solutions have been worked out for locating and fitting the various components, integrating the autogas fuelling ECU with the RV8's engine management system, installing the neat operational switching and autogas fuel level display in the elm burr radio console and locating a neat autogas filler cap at the back of the car.

The installation is known as a sequential LPG multiport injection system with multiport injector blocks on each side of the V8 engine. The autogas is stored as liquid petroleum gas in a 60 litre cylindrical steel tank fitted across the width of the boot, close to the bulkhead

behind the seats. The tank takes around half the boot floor space (front to back) and requires the removal of the spare wheel so the tank can be securely mounted to the floor. A neat circular flush plug covers the autogas filler which is mounted alongside the petrol filler cap so it easy to get to when refilling the autogas tank on a forecourt. The alternative of replacing the main petrol tank with a circular or "doughnut" gas tank (normally fitted in the spare wheel recess in modern cars) mounted on the underside of the boot floor together with a small petrol tank in the boot is not possible on an RV8 because the ground clearance on the rear lower edge of the gas tank would be insufficient. The side profile of the standard RV8 petrol tank is reduced in depth at the rear to ensure sufficient clearance but the standard doughnut gas tank cannot meet that requirement. An alternative of cutting a circular hole in the boot floor to lift the doughnut gas tank to get the necessary ground clearance was felt to be a step too far! The autogas supply is taken from the gas tank in an 8mm copper pipe in a plastic sleeve which runs forward under the car to an evaporator unit located at the front of the radiator where the LPG is converted from a liquid to gaseous state. The necessary heat input is provided by hot coolant from the engine cooling system which is circulated through the evaporator via a special set of rubber flow and return pipes which connect to the main cooling hose on the car. The gas lead then runs from the evaporator back into the engine bay and provides a gas feed to the two injector blocks located on either side of each cylinder head. From each injector block four separate feeds carry the gas to the individual inlet manifolds. The inlet manifolds are drilled (6mm tappings) to connect the feed for each cylinder so the gas is injected directly. Pressure sensors ensure the necessary flow of gas is maintained for the cylinders. The fuel map in the new dual fuel ECU determines the amount of gas injected at various engine speed levels and various levels of demand, for example when the car is under acceleration. The management of the LPG fuelling system is governed by information provided by the car's original ECU which monitors the various sensors – like water temperature and pressure. The dual fuel ECU takes readings from the car's main ECU Lambda sensor and puts those readings through the dual fuel ECU to govern the amount of gas and the timing of the injections.

When you fire up the RV8 from cold you can select autogas running by clicking a neat switch on a small display panel mounted in the elm burr of the radio console. The engine starts on petrol and as it warms up shortly after moving off and reaches 40°C, the engine seamlessly switches from running on petrol to running on gas. On my test drive I could not feel the transition. The square display unit with the switch placed centrally, has four green lights indicating the various levels of autogas in the tank and another pair of lights indicates which mode of running you have selected and which is actually operating at present.

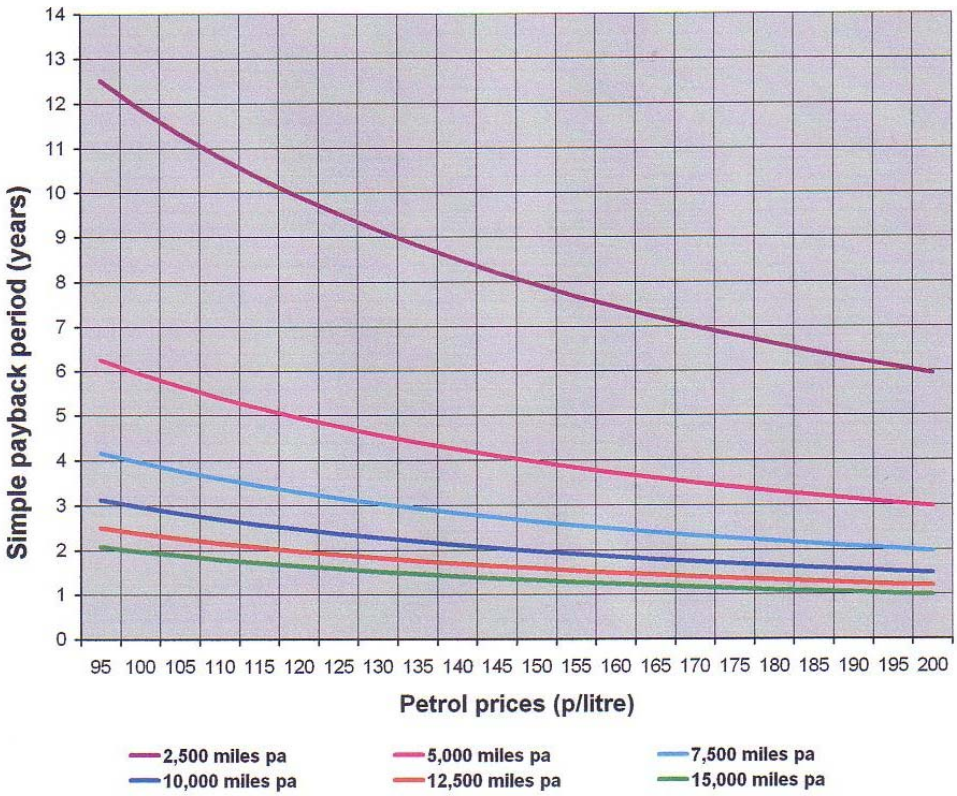
A worthwhile economic return from the investment in the conversion will inevitably depend on a moderate level of use of your RV8 each year, but the starting point for any analysis is the assumption that autogas will be your primary fuel and that only a modest amount of petrol will be consumed for cold starting or as a reserve to reach an autogas refuelling point. The original petrol tank is retained and typical fuel levels will be around three to four gallons to avoid carrying around unnecessary additional weight. For long journeys, filling both tanks will give the car an increased range before refuelling is needed. The effective capacity of the 60 litre gas tank is around 48 litres as the tank is filled to around 80% to allow for LPG expansion. When preparing this article autogas (bulk propane LP Gas UN 1978) was available at filling stations at between 45p and 47p a litre although it had been seen as high as 55p in some places and petrol was around 113p to 120p a litre in the Midlands and South of England. On a reasonable run many enthusiasts will see 30mpg on petrol from their RV8 – the equivalent figure for autogas is around 26mpg. A comparative analysis in May of the cost per mile using filling station receipts showing autogas at 47p a litre and petrol at 112.9p shows the cost of

	Autogas		Petrol	
Quantity of fuel (litres)	42.0		42.0	
Cost per litre	47.0p		112.9p	
Breakdown of the fuel receipt				
Excise duty	£3.46	17.5%	£21.16	44.6%
Net fuel cost	£13.34	67.6%	£19.20	40.5%
VAT	£2.94	14.9%	£7.06	14.9%
Total	£19.74	100.0%	£47.42	100.0%
Total tax	£6.40	32.4%	£28.22	59.5%
Typical consumption mpg	26		30	
Equivalent miles per litre	5.715		6.599	
Distance on 40 litres of fuel (miles)	240		277	
Cost per mile	8.22p		17.12p	

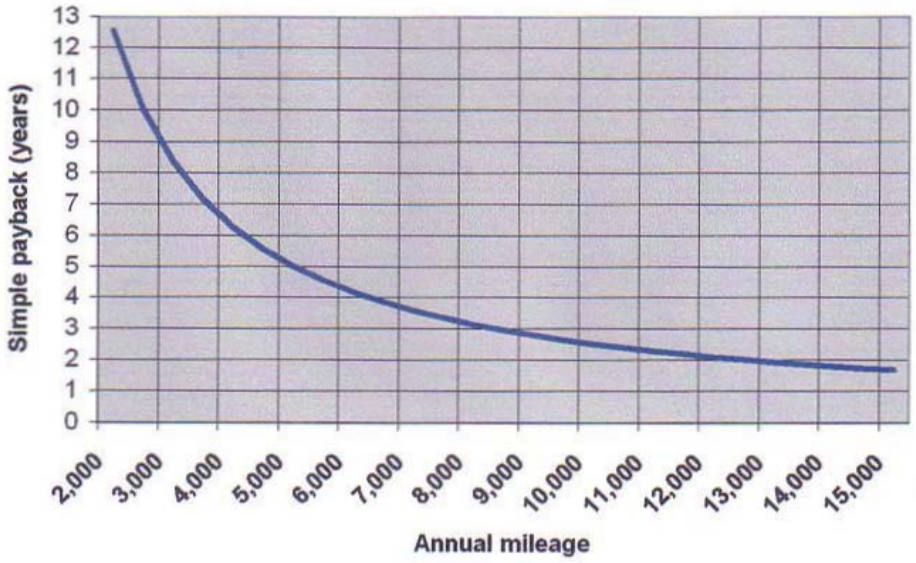
running on autogas is 8.22p/mile or 52% less than petrol at 17.12p/mile – quite a saving. At present autogas has a clear excise duty advantage so the total tax burden including VAT is only 32.4% or 15.2p a litre compared with a massive 59.5% or 67.2p a litre for petrol.

Whether an investment of £1,900 plus VAT for an RV8 dual fuel conversion will be worthwhile will depend on the level of annual use your car clocks up, but as a guide the simple payback period for an RV8 covering 10,000 miles a year using the fuel costs for May 2008 in the table above is 2.5 years. The payback is sensitive to mileage – at 5,000 miles it is 5.0 years, 7,500 is 3.3 and 12,500 is 2.0. So unless you cover at least 10,000 miles a year it is unlikely to prove an attractive investment, but there are a couple of other considerations – where are petrol prices going over the next few years and how secure is the present LPG/autogas tax break in the UK if dual fuel conversions grow rapidly in the UK? Chancellors can rarely resist an opportunity of taxing anything that becomes popular!

The recent dramatic rise in oil prices has certainly been a shock and the increasing demands on a range of resources from the developing economies in China and India are major contributory factors, but what is less clear is the extent to which the activities of speculators in the commodities and futures markets have had a hand in ramping up oil prices. If their positions reduce from additional cash margin requirements imposed by various commodity and market exchanges, then it is possible oil prices might fall back, but the underlying global supply and demand



realities for oil will still be there. So an additional analysis projecting rising petrol pump and autogas prices is needed, assuming a continuation of both the recent price relationship between petrol and autogas along with the UK autogas excise duty tax break. That analysis indicates that if petrol were to rise to 150p a litre, or an astonishing £6.82 a gallon, even at 5,000 miles pa the simple payback would then be just under 4 years and for 10,000 miles pa it would be 1.98 years. So if you do cover 10,000 miles or more and you do not feel petrol prices will settle or fall back, the investment begins to make sense for many people. Of course many RV8 enthusiasts will not want to "damage" their car with the autogas installation.



Another concern is the dual fuel conversion does take up some space particularly with an RV8, so in using your car you would have to imagine you were young again and could live out of a modest sized holdall because with a 60 litre gas tank in an RV8 boot there would be no room in there for suitcases for holidays or even overnight trips! Without a spare wheel, unless you carry it on a boot rack, you will also need to carry a can of tyre mousse for dealing with punctures.

For MG enthusiasts with moderately thirsty modern models like the MGZT190 and the MGZT260V8, the indicative dual fuel conversion costs are £1,900 and £2,100 plus VAT, so the economic analysis would lead you to a similar conclusion, particularly as many modern MGs are used as principal transport so higher mileages will be common.

A natural concern for many people contemplating an autogas conversion is the availability of autogas around the UK. A typical comment is "how easy it is to obtain autogas, particularly in the more

remote areas?" Well currently there is reported to be more than 1,300 LPG refuelling stations in the UK and this number is constantly increasing. Even in the Scottish Highlands there is reasonable autogas coverage at filling stations. You can obtain a map of the autogas stations around the UK at www.go-autogas.com where you can also search for an autogas station near you.

Finally if you do decide to go ahead with an autogas conversion, you must remember the need to notify your broker or insurer beforehand. You will need check whether the installation will be accepted for cover under their motor insurance policy and that a conformity certificate issued on completion of the installation by the proposed installer will be sufficient evidence that an acceptable system has been satisfactorily installed by a qualified specialist installer. Steve Newton is an approved National Autogas installer using Landi equipment with experience of conversions for the RV8 model. He can issue certificates for insurers on completion of his installations. You also have to notify the DVLA that your car has been converted to run on LPG as it is a mechanical change from when the vehicle was first registered.

^^ Autogas filler is convenient to use on forecourts.
<< Evaporator unit is installed at the front of the RV8.
Photos: Steve Newton

For more details of the RV8 dual fuel conversion contact Clive Wheatley on 01746 710810
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