ECO-GAS H2

What if **Your Company** could

reduce harmful vehicle exhaust emissions

&

save 10% on fuel costs

at the same time **?**

HOW IT WORKS

The Eco-Gas System uses a safe & proven technology that combines Hydrogen (H_2) with the engine's standard consumable fuel to reduce harmful exhaust emissions whilst at the same time provides savings in overall fuel costs.

The ECO-GAS Duel Fuel System operates alongside the existing engine & emission systems which remain unchanged, apart from two fittings inserted in the air intake, one to measure manifold pressure the other to inject the hydrogen gas.

Hydrogen is produced on-the-fly whilst the vehicle's engine is running. All of the hydrogen produced is used at time of production. Thus, no hydrogen is EVER stored. This eliminates any chance of explosions due to hydrogen leaking or in case of a collision. The computer controlled ready-made hydrogen gas is piped into the engine's intake where it is mixed with engine's airstream before being ingested by the cylinders.

Hydrogen, combined with the normal operating fuel, whether, diesel, gasoline or LPG, results in more efficient energy release and burn giving more power & torque. This extra fuel, produced at virtually **ZERO COST**, increases power & torque & allows a fuel substitution throughout the rev range providing a more fuel efficient engine. The ECO-GAS System is fitted with its own ECU that controls the amount of hydrogen produced at various RPM's so that over-production of hydrogen is never of consideration.

The ECO-GAS Hydrogen System can be completely switched off at any time from inside the cabin & the normal operation of the vehicle engine continues. The unchanged operation of the engine fuel or electrical system is constantly evidenced at idle speeds & under braking where minimal hydrogen is produced and injected into the system & the engine effectively operates with its standard fuel only.

ECO-GAS H2 System works with most engine types.

FUEL SAVINGS

The amount of standard fuel that is substituted by hydrogen in the dual fuel ECO-GAS System is around 10%. The total calorific value of the two fuels is higher and thus the driver & cruise control computers pull back on the throttle to maintain speed limits. I.E. 65% throttle position with diesel only running could equate to 55% throttle position when diesel is combined with generated hydrogen.

The expected reductions in overall fuel costs of 10%-12% from the ECO-GAS System come about from the significant price offset when cost of distilled water is compared to substituted fuel. Noting that 2 litres of distilled water, at today's price of $2.00 per litre, will last for approximately 1000 kms, with the possibility of refilling everywhere makes the System fitment very attractive in anybody's language.

As an example, for every 1,000 litres of fuel used :-

DIESEL ONLY SYSTEM

1000 litres diesel @ $1.05 per litre = **$1,050.00**

H2/DIESEL DUAL SYSTEM (expected hydrogen / diesel ratio approx 500:1)

900 litres diesel @ $1.05 per litre = $945.00

2 litres distilled water @ $1.0 per litre = $2.00

Total = **$947** Saving = **10%** for Hydrogen/Diesel system

- A truck consuming 46 litres of diesel per 100 kms would now consume 42 litres.
- A Sydney to Melbourne run for a line-haul truck using 450 litres of fuel, the savings based on 10% for this single run would be $47.25.

REDUCED EMISSIONS OF ENVIRONMENTALLY DESTRUCTIVE GASES

Because of the more efficient combustion properties of hydrogen, the amount of carbon dioxide produced is reduced. Carbon dioxide is one of the main greenhouse gases leading to global warming.

The reduction of black soot (particulate matter) is clearly visible from viewing the much cleaner emissions from the truck exhaust stack. Particulate matter is a major contributor to pollution haze visible in so many major cities & has been clearly linked to health problems in people, particularly asthmatics.

Because a small amount of air (mainly composed of nitrogen & oxygen) is displaced by hydrogen in the combustion process, there is also a reduction in nitrous oxides. Nitrous oxides are also greenhouse gas emitters.

"Because of the more efficient combustion properties of hydrogen, the amount of carbon dioxide produced is reduced"

HYDROGEN, due to its chemical properties, does not lead to an increase in some hydrocarbon emissions as with some other dual fuel gas systems. I.E. LPG. To further reduce hydrocarbons ECO-GAS can recommend the installation of a Catalytic convertor. The Catalytic technology is now possible with the diesel engine because its particulate matter has been reduced significantly. The Catalytic process will improve not only the hydrocarbon emissions but will further reduce emissions of carbon dioxide, particulates & nitrous oxides.

The signing of the Kyoto Agreement by Australia will see greater focus on road transport to reduce its' heavy carbon footprint. The ECO-GAS H2 System assists companies to meet their social obligations by proactively taking steps the reduce greenhouse gases.

Our future cities?

“There is medium confidence that approximately 20 to 30 per cent of species assessed so far are likely to be at increased risk of extinction if increases in global average warming exceed 1.5 to 2.5 degrees C”

UN Intergovernmental Panel on Climate

The Intergovernmental Panel on Climate Change (IPCC) said in its report that evidence of climate change is "unequivocal" and could lead to "abrupt" changes to the planet.

"Slowing and reversing these threats is the defining challenge of our age."

UN Secretary-General Ban Ki-moon.

“By 2030, production from agriculture and forestry is projected to decline over much of southern and eastern Australia”

UN Intergovernmental Panel on Climate

“A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortions and self-deceptions… Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.

Dr R K Pachauri Chairman UN Intergovernmental Panel on Climate Change

SAFETY

HYDROGEN is a colourless, non-toxic gas & very safe fuel. This is especially true since no storage occurs. Dual Hydrogen/Diesel systems have an extremely high safety record both here in Australia & overseas. No vehicle running this system has ever been recorded as having an incident due to hydrogen!

In any case, safety is of paramount importance to all. The ECO-GAS System has safety features fitted throughout the System, including a System override switch inside the cabin for operator control to switch off the System if needed.

The ECO-GAS components meet or exceed Australian design standards & are fitted by qualified technicians.

FEATURES

1. ECU Module controlled hydrogen production.

2. ECO-GAS Fuel Substitution Systems are easy & quick to install & can be fitted to any diesel engine without any engine modifications or tampering of the OEM management systems.

3. The ECO-GAS Hydrogen System is programmable as per the individual engine's requirements. ie. Torque Limiting, High & Low throttle position On / Off, Roll On / Ramp Up hydrogen calibration (which maintains drive line integrity)

4. The ECO-GAS Hydrogen System has: Zero Injection at Idle, Auto Start & Auto Shut Down features, & Over Temp Protection.

5. ECO-GAS kits are fully water proof so as not to hamper the vehicle's ability to transverse water crossings or mining areas.

6. Since hydrogen production is made ON-THE-FLY, no expensive storage tank or bracket fabrication & the labour associated with the fitment of these is needed. Thus, the customer invests in only that which produces benefits & no longer is "weighed down" by the extra fuel needed to be carried as with other dual fuel systems.

7. Furthermore, it is expected that with exhaust emissions reduction, the fitted vehicle will achieve the at least one progressive step up the EURO emissions standards. For example, as long as the diesel pump & injectors are serviced to manufacturer's specs, a EURO 3 vehicle would pass the EURO 4 emissions standard.

8. Lastly, each Hydrogen Fuel System allows easy removal & re-fitment onto the incoming fleet vehicles when current vehicles reach the fleet owner's end of life period.

OPERATIONAL TRIAL

It is recommended to all potential customers of the ECO-GAS System to run an operational trial with one truck fitted to verify the major benefits exist, namely;

- The System will save on fuel costs of between 8-12%
- The System will reduce overall greenhouse emissions
- The System is safe both from an operational view as well as engine maintenance

FUEL COSTS

Most companies maintain fuel consumption costs against kilometres travelled for individual trucks. After installation of the ECO-GAS H2 System comparison fuel costs can be made on a before & after basis to verify savings have been achieved.

EMISSION REDUCTIONS

Using a 5 Gas Analyser, it can be determined that the common greenhouse gas emissions of a truck (NOx, SO2, CO, CO2, CH4) are reduced whilst the ECO-GAS H2 unit is operating. The ECO-GAS H2 unit can simply be turned off & the emissions recorded for operation with only diesel combustion. More comprehensive testing of emissions can be conducted by Ford or Vipac in Victoria, Diesel Test Australia in NSW or various agencies throughout Australia if required.

SAFETY

Qualified technicians will fit the ECO-GAS H2 System, ECU to each truck. At the end of the designated trial period, normally 1-2 months, the engine can be examined to verify that wear & tear & carbon build-up has reduced.

Q: Can the engine run on HYDROGEN only?

No, your engine will always run on its original fuel either in combination with HYDROGEN or without when the engine is either idling.

Q: What types of engines will it work with?

The Eco-Gas H2 System will work with almost all engines types.

Q: How long will the conversion take?

Usually 1 day. The first vehicle may take a little longer in order to setup routine & optimise performance.

Q: After fitment of the ECO-GAS H2 System does the engine require special servicing?

No, the vehicle & engine will be serviced as it was prior to fitting the ECO-GAS H2 System.

Q: What happens if there is a fault in the ECO-GAS H2 System or water has depleted?

The ECO-GAS H2 System shuts down & the engine reverts back to the standard operation. This cut-over is automatic and seamless.

Q: If the Hydrogen System is filled again after running dry, will the system automatically function?

Yes, the System will automatically turn back on after refuelling without any driver intervention.

Q: Will the addition of Hydrogen affect engine life?

The ECO-GAS System can improve engine life by reducing engine oil contaminants & reducing carbon build up on combustion chambers, valves & exhaust systems and by making the engine more efficient. The ECO-GAS H2 System also reduces “diesel knock” & this is often discernable by a smoother, quieter running engine. Both of these effects are achieved because of the cleaner & more efficient combustion process of the diesel & hydrogen mix.

Q: Can the ECO-GAS System be moved to my next truck.

Yes, the System is common across similar truck platforms. The settings in the ECU module may not even need to be re tuned for the new truck engine.

Q: Will my converted engine suffer a loss of performance?

No, the ECO-GAS System will be programmed to keep with manufacturer’s peak power & torque specifications. The engine may be more responsive at lower revs resulting in less gear changes & improved ability to pull loads up hills.

Q: How and why does it work?

Hydrogen burns more rapidly than hydrocarbon fuels because it is smaller and enters combustion reactions at higher velocity, has lower activation energy, and incurs more molecular collisions than heavier molecules. It therefore can suitable act as a combustion stimulate.

HYDROGEN FACTS

- **Hydrogen is non-toxic.**

It is a naturally occurring, basically benign element found freely in the atmosphere. By comparison, petroleum fuels are extremely toxic.

- **Hydrogen is less flammable than gasoline or diesel.**

The auto-ignition temperature of hydrogen is 500 degrees Celsius. Compare that to gasoline's auto-ignition temperature of 246 degrees Celsius and diesel's auto-ignition temperature of 210 degrees Celsius (auto-ignition temperature is the minimum temperature at which a fuel will ignite without a spark or flame). Yes, it's actually easier for gasoline and diesel to spontaneously combust.

- **Hydrogen disperses quickly in the atmosphere.**

Because hydrogen is so light (about 15 times lighter than air) it easily dissipates and if a leak or spill does occur, the hydrogen becomes rapidly sparse and difficult to ignite. And even if it does catch fire, it burns itself out very quickly. By contrast, heavier fuels such as diesel oil, gasoline and LPG do not rapidly dissipate and remain a fire threat for a longer period of time.

- **Hydrogen is clean.**

The single emission from burned hydrogen is water vapour—that's it. Compare that to particulate matter (soot), NOx, CO, CO2 and—among other toxic emissions—from burned petroleum fuels.

For more information, or to book a trial, contact:

ECO-GAS PTY LTD

1800 78 48 82

email: sales@eco-gas.com.au

International: +61 405 304030

Fax: +61 2 8765 8585