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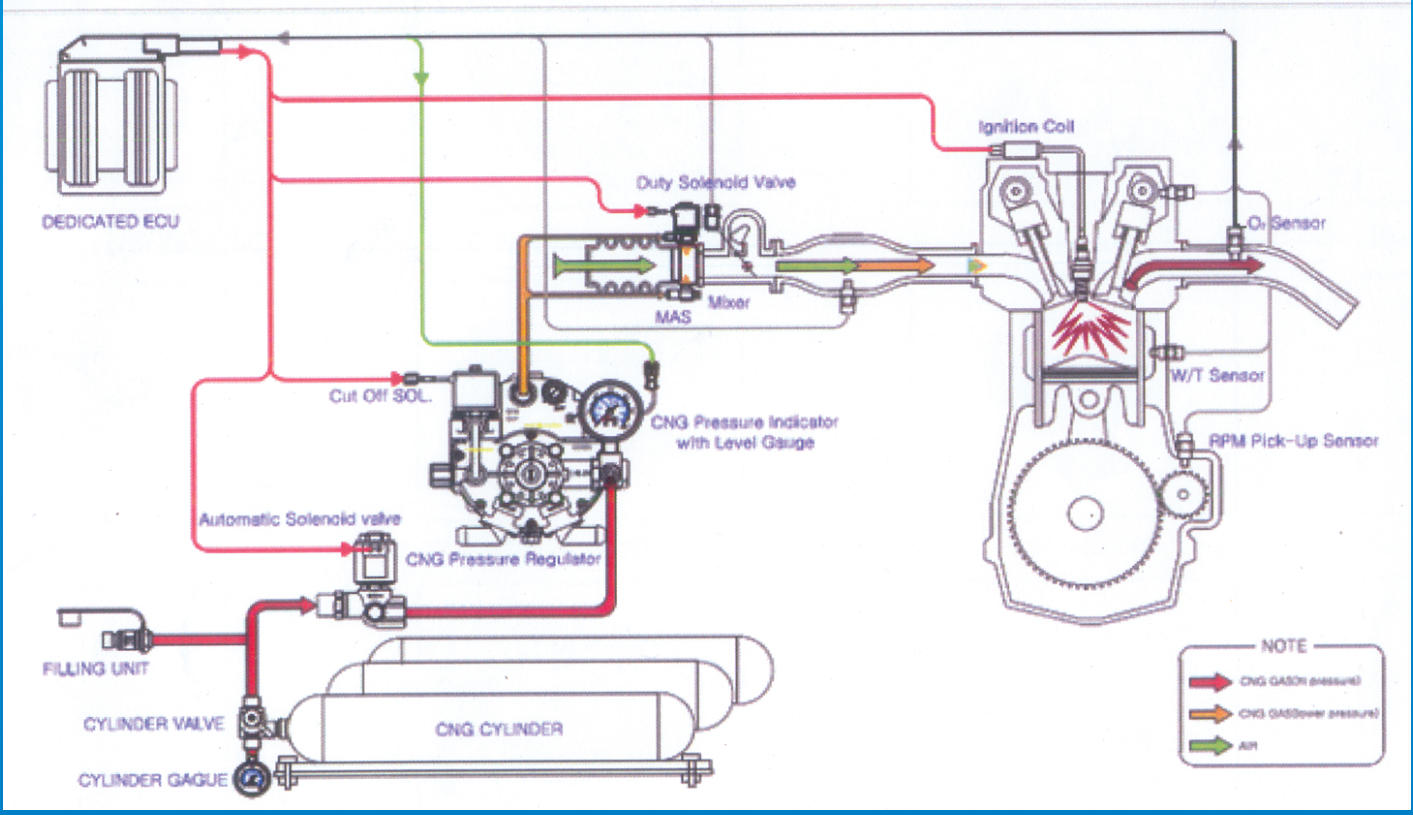
ISO 9001:2015 Company



BENEFITS OF CONVERSION OF DIESEL VEHICLES TO CNG

	DIESEL	CNG
AVERAGE MILEAGE	16 Kmpl.	18 Km/Kg.
500 Km. Pr. Day	1700/- PD. (12 Hour)	1100/- PM.
1000 Km. Pr. Day	3400/- PD. (12 Hour)	2200/- PM.
1500 Km. Pr. Day	5000/- PD. (12 Hour)	3500/- PM.
2000 Km. Pr. Day	6700/- PD. (12 Hour)	Not Feasible

Conversion Of Vehicles

It would probably be cost prohibitive to convert a diesel to CNG as opposed to a gas engine. There are too many. systems not present on a diesel that are required to run a CNG setup. I also doubt that you' d have adequate means to, get controllable diesel effect ignition with CNG vice diesel. If your application permits, the gas engine swap with, CNG conversion is the best way to get you on the gas. There are several conversion kits out there with broad application listings.

Benefits of Conversion of Diesel Vehicles CNG

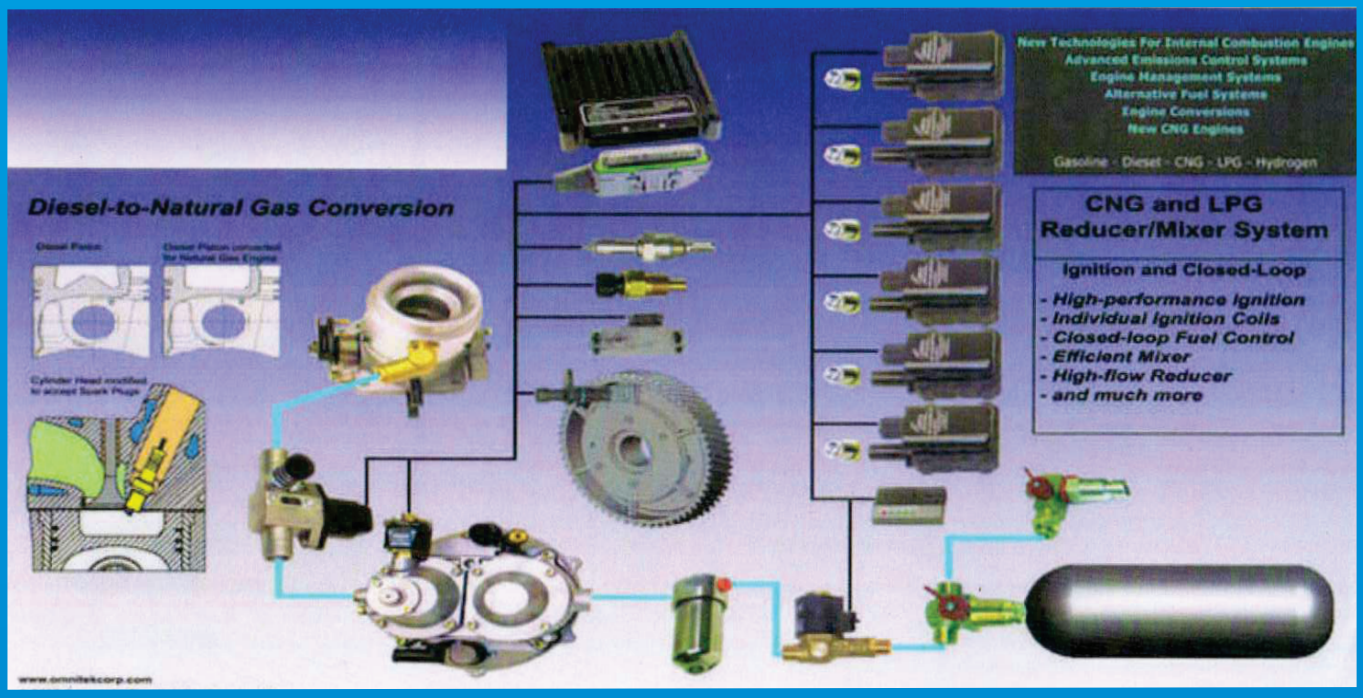
Substitution of diesel fuel by CNG in urban buses (and tricks) is particulary advantageous these vehicles, on one hand have high specific fuel consumption and high mileage, and on the other hand, need only few centrally, located filling stations in view of their limited range of operation, The economic and ecological benefits of CNG , driven urban buses are illustrated by the following examples : The conversion of one diesel bus to CNG saves about 145 barrels of petroleum annually at average operation, conditions. Given a petroleum price of US$ 20 per barrel, this results in foreign exchange of USS 2,900

per bus per year:- CNG operation of buses leads to a considerable reduced output of, in particular, visible particulate emissions (black soot) which, besides being a nuisance, is damaging to health. Depending on the specific type of conversion, reduction of up to 95 percent from approximately 80 kg to only about 4 kg per vehicle per year is possible:- Engine noise is reduced by up 5 dBa which correspond to a 50 percent reduction in noise emission. However, these potential macro-economic and ecological benefits to the national economy and the society in general can only be fully realized through a large - scale conversion programme based on micro - economic advantage fot the bus operator. This means that for a successful CNG programme, the conversion of diesel buses to CNG has to be attaractive, i.e. profitable, to the operator. to create such favourable conditions, the following policy guidelines should be pursued:

(1) The price of CNG has to be considerably lower that of diesel

in comparison with diesel driven vehicles, CNG buses might, depending on the conversion concept had the condition of the vehicle, have a higher fuel consumption (normally), however, one litre of diesel can be replaced by approximately one cubic metre of gas and may require higher maintenance expenses (although it is likely to be slightly lower, e.g. in terms of lubricating oil, due to lower wear of gas engines. In any case, however additional investment for CNG cylinders and CNG conversion equipment is system - immanent. In order to compensate for this, the price of CNG has to be considerably lower than that of diesel fuel. When diesel prices(due to low tax rates or even subsidies) are low, i.e. in the range of Usc 15-30 per litre, the maximum prices for CNG should not exceed 50-60 percent of the diesel price. Only if diesel prices are high (e.g. in Europe), CNG prices up to 75 or 80 percent of the diesel prices could be feasible. The lower limit for an - subsidized

CNG prices, defined through the cost for recovery and transmission/distribution plus profit margin (albeit excluding taxes), is about Usc 12-16 per cubic metre depending on the conditions in a specific country. This requires a minimum diesel price of Usc/ 20-27 per litre for a successful CNG programme.



(2)Taxes on CNG have to be comparative to those on diesel

In most countries of the world, fuel prices are either directly regulated by governments or considerably by import duties or other taxes. The level of taxation is based on certain policy considerations. In several countries of the ESCAP regior for example. taxes on diesel, essentially the fuel for the transport industry, are much lower than on gasoline which is mostl used b private cars. The objective is to support the national economy through low transport prices. Since natural gas as yet us only marginaly used in road transport, exiting taxation, based on other considerations, is in many cases higher than on diesel oil. To achieve the necessary price differential between CNG and diesel (as described above), taxes on CNG diesel. This would have little or no consequence to the national budget because diesel is merely substituted by CNG. However have to be comparative to those on diesel. Thus reflecting the generally lower production cos of natural gas as compared to diesel. This would have little or no consequence to the national budget because diesel is merely substituted by CNG. However if taxes have to be increased on diesel to provide a price advantage for CNG, the additional revenues could provide the funds for a CNG incentive package

(3) Conversion of diesel vehicles to CNG should preferably be to vehicles up to
the age of three years
An efficient conversion is possible only with buses good technical condition. Therefore conversion programmes should preferably be confined to vehicles up to the age of three years. In case of older buses in technically unsatisfactory condition, a considerably higher consumption of gas (as well as poor benefits to the environment) could be expected. The conversion cost may, therefore never be recovered of only after an unattractive period of time.

(4) As a first step, conversion should be carried out in dual fuel technology
From the overrall economic and ecological points of view, optimum benefits could be achieved with new vehicles equipped with ex-factory CNG engines. However, despite lower diesel substitution rate and, accordingly, reduced environmentel benefits, as a first step, the conversion of existing buses to dual fuel technology, preferable with electronically controlled gas supply and pilot injection of diesel, is the best alternative. The conversions of diesel ingines to dedicated single fuel engines, although more favourable in principle, is associated with some technical problems which may required higher skills to overcome than usually available.

(5) Country specific CNG demonstration projects should be initiated and and supported by the Government
The success of a CNG programme depends primarily on the widespread acceptance of the programme by potential, operators who need to be convinced of the advantages of CNG operation. For this purpose, the government should, initiate and support projects to creat awareness of the programme and to demonstrate that the operation of CNG, buses is technically reliable and economically attractive. Such demonstration projects could also address apecific
conditions in individual countries which could not be included in these general recommendations.

DIESEL TO CNG CONVERSION KIT

OXYGEN SENSOR

AIR LOW PRESSURE SENSOR

TEMPRATURE SENSOR

TEETH GEAR SENSOR

ELECTRONIC FUEL INJECTOR

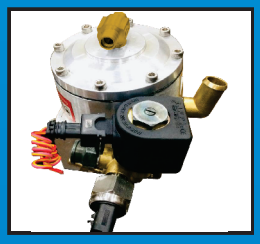
RPM SENSOR

TIMING SENSOR

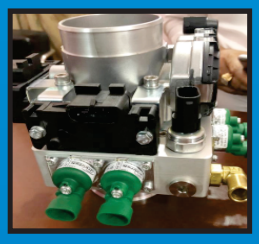
MAP SENSOR

ELECTRONIC THROTTLE PEDAL

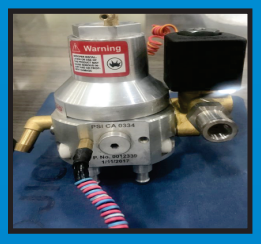
ECM 4/6/8 CYLINDER ENGINE



HIGH PRESSURE CNG & LNG REGULATOR / REDUCER



ELECTRONIC THROTTLE BODY & INJECTOR 4/6/8 CYLINDER ENGINE

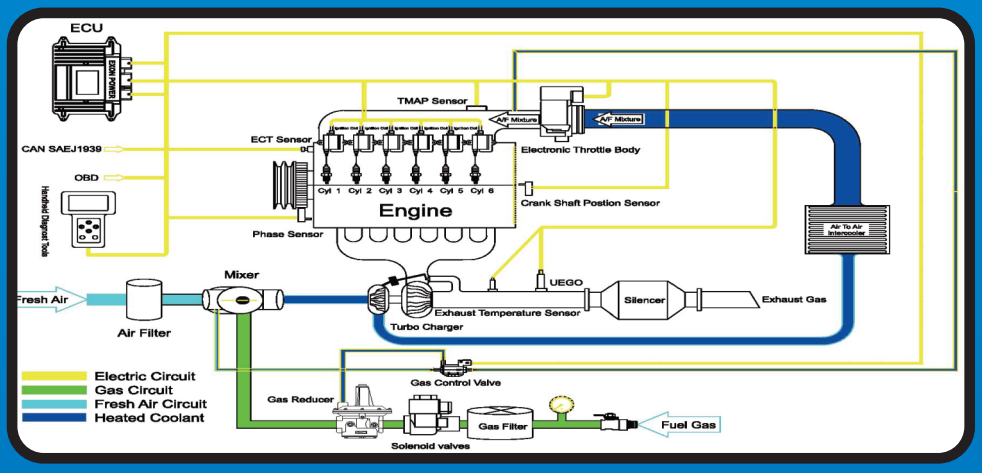


CNG HIGH PRESSURE REGULATOR

COMBINED NOZZLE (FILLING VALVE)

LNG ECM 4&6&8 CYLINDER

HIGH PRESSURE FILTER



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