

# **Numerical Evaluation of the Performance of a Compression Ignition CNG Engine for Heavy Duty Trucks with an Optimum Speed Power Turbine**

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## **Abstract**

The turbocharged direct injection lean burn Diesel engine is the most efficient engine now in production for transport applications. CNG is an alternative fuel with a better carbon to hydrogen ratio therefore permitting reduced carbon dioxide emissions. It is injected in gaseous form for a much cleaner combustion almost cancelling some of the emissions of the Diesel and it permits a much better energy security within Australia. The paper discusses the best options currently available to convert Diesel engine platforms to CNG, with particular emphasis to the use of these CNG engines within Australia where the refuelling network is scarce. This option is determined in the dual fuel operation with a double injector design that couples a second CNG injector to the Diesel injector. This configuration permits the operation Diesel only or Diesel pilot and CNG main depending on the availability of refuelling stations where the vehicle operates. Results of engine performance simulations are performed for a straight six cylinder 13 litres truck engine with a novel power turbine connected to the crankshaft through a constant variable transmission that may be by-passed when non helpful to increase the fuel economy of the vehicle or when damaging the performances of the after treatment system.

**Keywords:** alternative fuels, power turbine, dual fuel engines

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