

Frequently Asked Questions

December 2014

What does “Dual Fuel” mean?

Dual Fuel, also known as “Mixed Fuel”, can be defined as the simultaneous combustion of two fuels. In the case of APG’s Dual Fuel Technology, natural gas enters the airflow through the turbocharger to the compression chamber in conjunction with independently fuel-injected OEM diesel fuel to operate the engine. After conversion, the engine is able to operate on either 100% diesel fuel, or alternately, on a mixture of diesel fuel and natural gas. At no time is the engine able to operate on natural gas exclusively.

Is the system approved through EPA and CARB?

Under the new EPA Clean Alternative Fuel Vehicle Engine Conversion Final Rule (April 2011), APG’s Turbocharged Natural Gas® System has received EPA OUL approval on over 450 on-road engine families for six of the most popular OEM engine models and IUL approvals on over 25 on-road engine families. Additionally, APG has completed testing and is compliant under EPA Memo 1A emission guidelines for off-road applications for over 12 CAT and MTU/DD engine models. Finally, APG is in the process of completing vehicular emission testing to receive EPA IUL approvals for near-new engine model years and also CARB approvals to open dual fuel markets in California. APG’s investment in EPA emissions compliance assures the customer will not be subject to any EPA Clean Air Act anti-tampering violations.

V5000 Upgrades for On-Road Engines: Tested and Approved to EPA Emissions Standards		
Caterpillar	C11, C13, C15 C-16 C-10, C-12, C-15	2006 – 2004 2002 – 1997 2003 – 1993
Cummins	ISX, ISM, ISL, ISC N14, M11, L10, C8.3	2009 – 1998 2002 – 1991
Detroit Diesel	DD15, DD13 DD13 12.8L Series 60 14.0L Series 60 12.7L, 11.1	2009 – 2008 2009 2009 – 1999 2006 – 1987
Daimler	MBE 4000 12.8L OM457LA, OM460LA	2009 – 2004 2003 – 2000
Volvo	D11, D12, D13, D16 VE D12	2012 – 2004 2002 – 1996
Mack	MP7, MP8, MP10 E7 EM7	2012 – 2002 2006 – 1996 2002 – 1996

S4000 Upgrades for Off-Road Engines: Tested and Compliant to EPA Emission Standards					
	OEM	Model	Tier	Gas Source	
CURRENT	Cat	3508 3512C 3512CHD 3516	C-15 C-18 C-27 C-32 C-175	II	Well-head & Pipeline Quality Gas
	MTU	12V4000 16V4000 20V4000		II	Well-head & Pipeline Quality Gas
	Detroit Diesel	Series 60		II & III	Well-head & Pipeline Quality Gas
PENDING	Cat	C-11 C-13		II	
	MTU	12V2000 16V2000 18V2000		II	
	Cummins	QSK45 QSK50		II	

Note: Some engines may not have been produced in each year shown above and some horsepower ratings may not be included.

Contact APG or an authorized distributor for more details.

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Can APG's Dual Fuel System operate in California?

If the truck is licensed and plated outside of California and the base diesel engine is permitted to operate in California in its current diesel configuration, APG's Dual Fuel System can be installed on the truck and operate in California. APG's Dual Fuel Technology will NOT make a non-compliant vehicle compliant to CARB's diesel-only standards.

On which fuel does the engine start?

During initial startup, the engine operates on 100% diesel fuel. After certain permissive criteria are satisfied the APG automatic control system commences dual fuel operation. When idling, the engine operates on 100% diesel.

What happens to the engine operation, if gas supply is lost?

If the natural gas supply is lost or depleted, the APG system automatically changes over from Dual Fuel to diesel only operation. There is no range anxiety or lost time with an APG Dual Fuel System. When natural gas pressure is restored, the process seamlessly returns back to Dual Fuel operation. Engines with APG's Dual Fuel System will not run exclusively on natural gas.

Will the introduction of Natural Gas into the engine affect the horsepower?

No. Engines converted to APG's Dual Fuel System do not suffer any loss of power or torque.

Does the APG technology change anything on the engine?

APG does not interfere with the engine integrity or normal governor operation. The conversion technology has been designed to allow for in-field retrofit of diesel engines without the need to change or modify the design of the base OEM engine. The conversion hardware is mounted externally and does not require modification of the base engine.

Does APG's Dual Fuel technology affect the lube oil?

Where dedicated natural gas engines require special high-temp oil formulation and maintenance cycles, APG's dual fuel system allows the engine to operate with standard diesel engine oil formulations and maintenance cycles.



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Why can't the engine use 100% natural gas?

Dedicated natural gas engines have very high operating temperatures (approximately 650 C), which require high-temp parts and are well above the operating temperatures of a diesel engine. To preserve the freedom of choice of operating in either a dual fuel mode or a diesel only mode, the maximum amount of natural gas needs to be carefully monitored and controlled to operate within OEM temperature and pressure specifications.

Can I use LPG instead of methane gases?

No. APG's Dual Fuel System does not operate on LPG because the BTU content is too high to efficiently run in a dual fuel application.

Will my engine run hotter on Dual Fuel?

The Dual Fuel technology has been designed to maintain OEM specifications of all engine temperatures including engine coolant temperature, oil temperature, exhaust gas temperature and intake air temperature. The Dual Fuel System replaces diesel fuel normally consumed by the engine with an equivalent quantity of natural gas, relative to the heat value of each fuel. As such, engine air-fuel ratios during Dual Fuel operation remain largely equivalent to 100% diesel operation, resulting in normal peak exhaust gas temperatures and associated peak engine thermal loads.

What effect will the APG Dual Fuel System have on the durability of my engine?

Operation in Dual Fuel mode has no negative effects on engine wear rates and durability. Engine thermal loads are equivalent to 100% diesel operation, no excess wear of combustion chamber components (pistons, rings, valves, injectors, etc.) occurs.

What does all this do to manufacturer's warranties?

APG does not change the base diesel engine design and warrants the Dual Fuel System components for one year after installation. Industry documentation and regulations cite the following in regards to the effects of an approved aftermarket technology on OEM warranties:

- Magnuson-Moss Warranty Act of 1975 says the consumer has the freedom to choose aftermarket parts and upgrades without having the OEM warranty voided
- The Federal Trade Commission (FTC) issued a Consumer Alert in January 2011 confirming that it is in fact



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illegal to void warranties or deny coverage for the use of an aftermarket part.

<http://www.consumer.ftc.gov/articles/0138-auto-warranties-routine-maintenance>

- Specifically in the EPA Alternate Fuel Conversions final rule published on April 8, 2011

<http://www.gpo.gov/fdsys/pkg/FR-2011-04-08/pdf/2011-7910.pdf>

“... the clean alternative fuel conversion manufacturer would normally be held accountable for fixing problems that occur as the result of conversion...”

“... the OEM would generally retain any parts or systems that retain their original function following conversion and are unaffected by the conversion...”

What happens to maintenance and engine life?

General maintenance and service cycles remain the same as the base diesel engine.

What are the economic benefits to operating on Dual Fuel?

Annual fuel savings resulting from operating in an APG Dual Fuel mode range from 10% to 40% and will vary according to the respective cost of each of the natural gas fuel source (ie: LNG, CNG, pipeline, well-head). Other economic benefits include competitive advantages such as utilization of sequestered natural gas, low cost of ownership, and freedom to hedge against future unknown risks of the price of diesel versus natural gas.

Can APG's Dual Fuel Technology be transferred to another engine?

Yes. APG's Dual Fuel Technology can be transferred to another engine within APG's current listing of engine families that are compliant with EPA Memo 1A or EPA CAFC regulations. Once the hardware of the Dual Fuel System is re-installed, APG's ECU will need to be re-flashed by an APG Certified Installer in order to have the appropriate software installed. The original unit is then able to operate on 100% diesel just as it was before the Dual Fuel upgrade occurred.