Dual-Fuel™ Technology
Best of Both worlds

Founded in 1991, Clean Air Power has continually developed innovative technologies that allow clean natural gas to be the primary fuel source for heavy duty diesel engines.

Dual-Fuel™ technology enables a heavy duty diesel engine to operate on a high proportion of natural (or bio) gas. The diesel engine is unchanged and operates according to the diesel cycle, using a small “pilot” injection to ignite a controlled mixture of gas and air.

Reduce your costs and emissions

Dual-Fuel™ technology uses the diesel fuel as a “liquid sparkplug” and natural gas as the primary fuel source.

Dual-Fuel™ engines feature an Engine Control Unit (ECU) developed by Clean Air Power, and the diesel Electronic Control Module (ECM) to precisely control diesel, natural gas and air mixtures to optimise combustion, performance and emissions.

Reduction of Greenhouse Gas (GHG), Particulate Matter (PM) and Nitrogen Oxide (NOx) emissions are achievable, along with reduced fleet operating costs using Dual-Fuel™ technology.

Dual-Fuel™ Product Options

- Genesis – Europe: Volvo FM & FH 13, Renault Magnum 13litre 480 Euro 5, Mercedes & DAF Euro 3
- Interfaced – Australia & S America: C-15/C-12, Volvo MethaneDiesel

Genesis
- Delivers GHG & fuel cost savings
- Beats diesel NOx & PM
- Average gas substitution 60%
- Retro-fit only by CAP or approved installer
- No OEM involvement

Interfaced
- Diesel and Dual-Fuel™ control system software is interfaced
- Average gas substitution 75% to 85%
- Low emissions capability and Cert.
- Requires OEM support
- Retro-fit by OEM/CAP or OEM line-build
Dual-Fuel™ customers are fully supported through a comprehensive aftersales service backed up with diagnostic tools and product manuals. Training, literature, spare parts, service and warranty are available through participating dealers and Clean Air Power product support representatives.

**Dual-Fuel advantages**

- Offers similar power and torque to an equivalent diesel engine
- Up to 15% reduction in CO\textsubscript{2} emissions
- Up to 85% natural gas substitution
- Up to 20% reduction in fuel cost
- Proven engine reliability and performance
- Full diesel driveability if natural gas becomes unavailable
- Liquefied or compressed natural gas on-vehicle storage
- Full electronic diagnostic capability
- Service and warranty support provided through a participating dealer

**Case Studies**

**Eddie Stobart**

Eddie Stobart’s partnership with Nestle UK which focuses on driving down carbon emissions from its supply chain has earned the sustainable distribution award at IGD. Nestlé and Eddie Stobart have been working together to field test European trucks in real life work scenarios incorporating Clean Air Power technology.

**Sainsbury’s**

Sainsbury’s is one of the largest supermarkets in the UK, a household name and an opinion forming leader in logistics operations. Sainsbury’s successful “Running on Rubbish” trial saw 5 trucks run in its fleet fuelled by bio-methane gas which has been generated by landfill waste provided by Gasrec. As a result of the successful trial, during which Sainsbury’s validated the system’s emissions reductions, fuel savings and operational acceptability, Sainsbury’s ordered a further 49 systems in 2012.
Genesis technology enables a rapid start-up of natural gas operation of commercial vehicle fleets. Genesis is available on Euro 5 Volvo FH/FM13 460, Renault 13 litre 480 Euro 5 and Euro 3 Mercedes Axor vehicles. Genesis is an after-market retro-fit product that delivers a robust and pragmatic first step to operate commercial diesels on natural or bio gas.

The Genesis electronic control system communicates with the vehicle control system, giving control of diesel fuelling and retaining all OEM vehicle features such as SCR (AdBlue), cruise control, traction control, electronic gear-shifting, EBS, PTO’s and other electronic-controlled vehicle systems. As Genesis operates on a unique patented process on the vehicle’s own digital data network, the system delivers the robustness of OEM vehicle systems whilst allowing complex control sophistication to communicate with OEM vehicle systems. Genesis is currently operating in the UK and is available for operation in Europe and other regions where aftermarket systems are acceptable.

Interfaced Dual-Fuel™ Technology

Interfaced Dual-Fuel™ technology is delivered in partnership with the engine OEM. The Dual-Fuel™ control system is interfaced seamlessly with the OEM’s engine controller, giving ultimate control of the engine to the Dual-Fuel™ system. This level of control delivers the highest levels of performance and gas substitution, with the lowest levels of certified emissions.

Today, Clean Air Power offers US EPA 1998-2002 certified Caterpillar engines in Australia and South America with Interfaced Dual-Fuel™. Engine availability includes the C-12 and C-15, with ratings from 400 to 500 horsepower. These engines are available to EPA 2002 Certification.
Recent developments

Research project with Brunel University
March 2013
The research project is aimed at developing the next generation of advanced Dual-Fuel combustion systems using natural gas and diesel. The project is to be carried out on a modern research heavy duty engine at Brunel University’s Centre for Advanced Powertrains and Fuels.

Niche Vehicle Systems R&D Funding Award
January 2013
Clean Air Power has been awarded R&D funding by the Niche Vehicle Network’s collaborative research and development programme. The project will deliver prototype after-treatment packaging for use on Euro 6 compliant dual-fuel heavy duty vehicles, expected to be completed in Q1 2013.

European logistics operator order 80 of the latest Genesis-EDGE product for Renault Magnum
November 2012
Clean Air Power launched a new Renault Magnum compatible Genesis-EDGE Dual-Fuel™ retrofit system earlier this year and received an order for a further 30 systems. This is in addition to an order previously received for 50 systems from the same Spanish customer announced in April.

Sainsbury’s order for 49 Dual-Fuel™ installations
February 2012
This order follows a three year successful trial of Clean Air Power’s Genesis-EDGE Dual-Fuel™ system by the retailer which has enabled 5 trucks to operate using bio-methane gas which has been produced from landfill waste. The order is worth £1.3m.

UK major logistics company order for 27 Dual-Fuel™ installations
January 2012
Following a successful trial of Clean Air Power’s Genesis-EDGE Dual-Fuel™ system, a major logistics company has ordered 27 units, worth around £0.7m.