

COMAP **BI-FUEL** (DUAL FUEL) HIGH-SPEED ENGINES



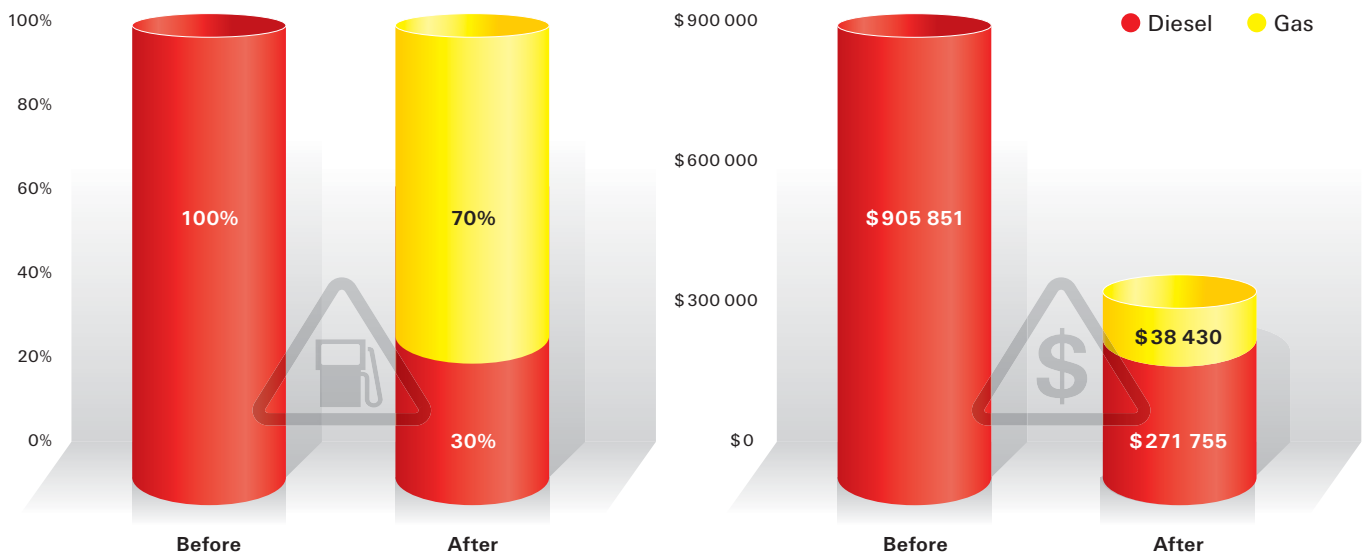
Benefits



Substantial Fuel Savings & Operational costs

- ▶ Substitute up to 70 % of your diesel consumption with gas
- ▶ Reduce your operational costs substantially

Case study of CAT 3512B, 1500 kVA, 1500 RPM

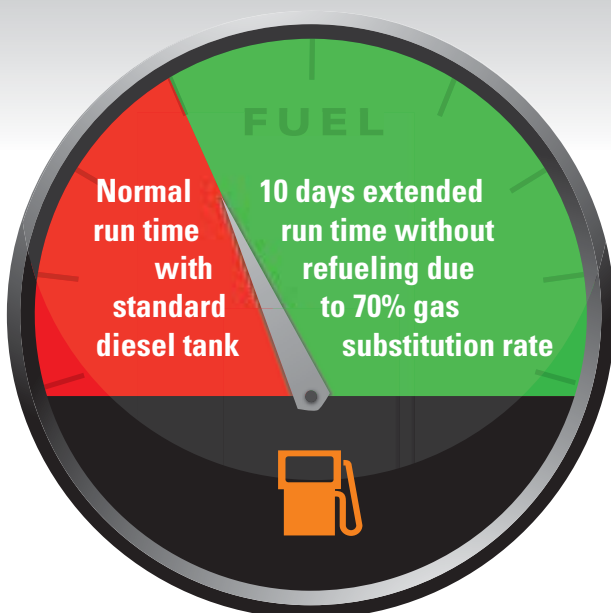


Fuel consumption at nominal output

Fuel costs per year



Extended Run Times without refueling



- ▶ Manufacturing & production factories
- ▶ On shore/off shore drilling rigs and operations
- ▶ Data centers
- ▶ Shopping complexes
- ▶ Municipal systems
- ▶ Wastewater treatment
- ▶ Financial institutions
- ▶ Healthcare facilities
- ▶ Other critical installations

- ✓ Continuous operation
- ✓ Prime Power applications
- ✓ Standby power
- ✓ Peak shaving & Peak saving



Greener Energy

- ▶ ComAp Bi-Fuel is a more environmentally friendly solution for Diesel engines
- ▶ Emission reductions possible:
 - Reduction of CO₂ – 5% to 20%
 - Reduction of NO_x – 30% to 40%
 - Reduction of SO_x – 70% to 100%
 - Reduction of Particulate emissions (PM) – up to 50%
- ▶ Together with the option of the fitment of a catalytic convertor, significant reduction of CO can also be expected (please enquire at ComAp Systems).



Other important benefits and features

- ▶ Fuel flexibility
- ▶ Maintenance savings – longer oil life and increased periods between required maintenance intervals
- ▶ No de-rating of engine power output or performance – ideal for transient loads
- ▶ Fully automatic and dynamic solution which will maximize the substituted gas
- ▶ All engine parameters kept within limits specified by the engine manufacturer:
 - Engine boost air and exhaust temperatures measurement, monitoring/protection
 - Minimum & Maximum Gas pressure measurement, monitoring/protection
 - Comprehensive Knocking detection system – Frequency sensors fitted to every cylinder
 - Diesel portion mapping and measurement
 - Actual Load measurement
 - Minimum Load gas protection
- ▶ Smooth transition between diesel and bi-fuel operations at any time
- ▶ Non intrusive solution – no change of any engine parts required
- ▶ Gas/diesel ratio display
- ▶ Full history files recording
- ▶ Remote monitoring, control and configuration via PC or via internet





How it works

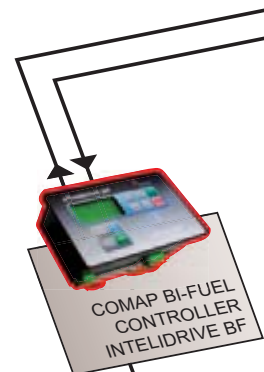
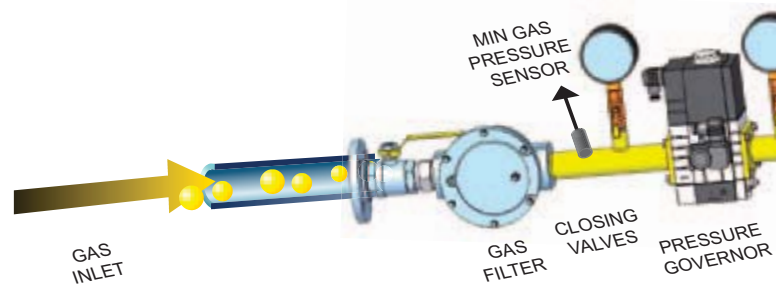
ComAp Bi-fuel is a fully automatic (modulating/dynamic) solution fitted with a gas throttle actuator, the solution will increase and decrease the gas amount dynamically across the engine loading range automatically without any manual or regular adjustment required from the operator in order to maximize the gas usage safely.

The Bi-Fuel solution has a fully independent and stand alone control system ensuring that 100% diesel operation is always possible at any time.

In order to avoid knocking of the engine, ComAp knocking detector/controller DENOX is installed, thus enabling engine operation at the most efficient gas/diesel ratio possible.

The integrated Bi-Fuel solution independently monitors the vital engine parameters automatically whilst operating in Bi-Fuel mode and does not interfere with operation of the original equipment manufacturers existing safety shutdown protections or control of the engine/generator.

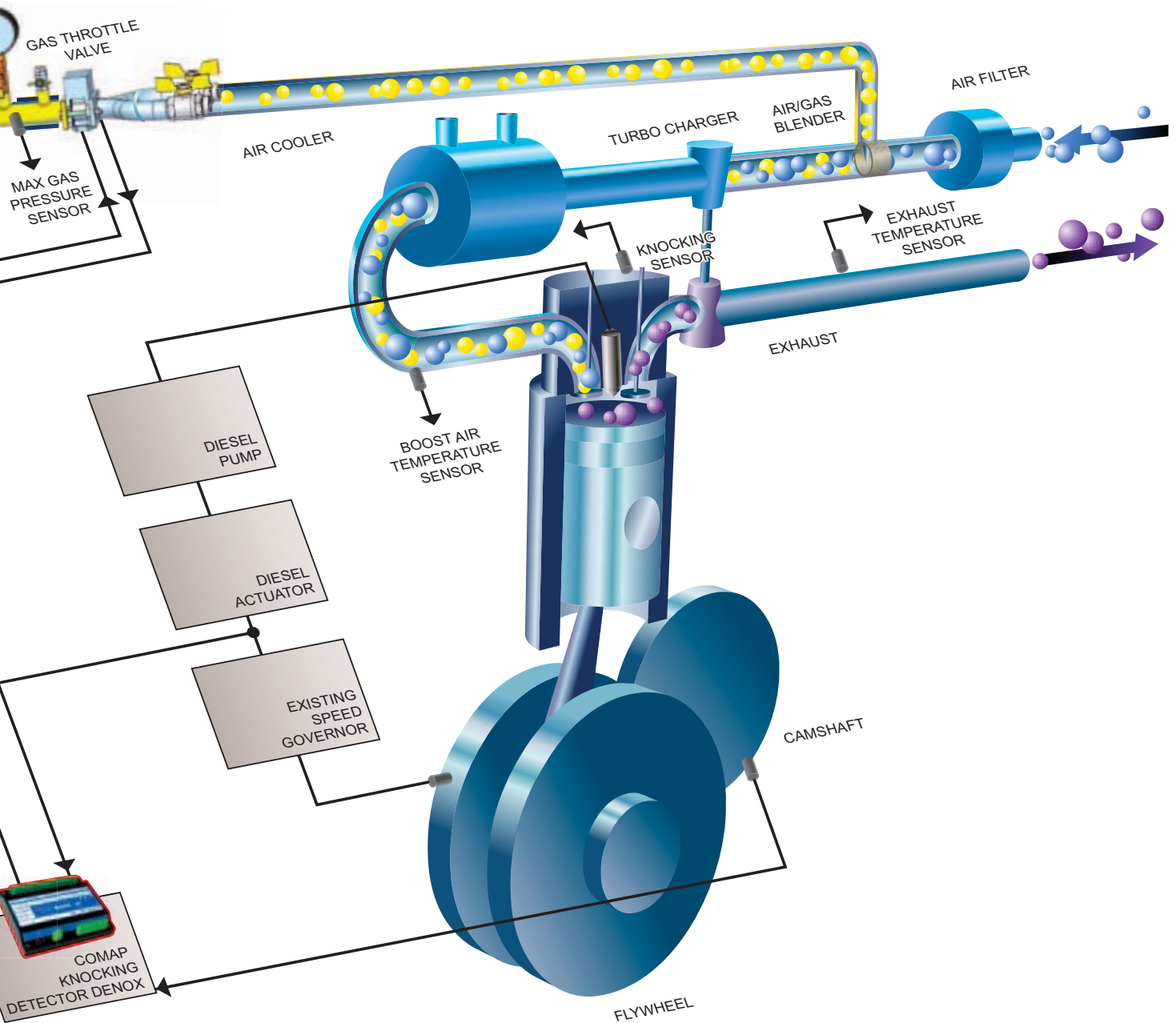
The Bi-Fuel solution is mainly concerned with engine safety and the safe control and modulation (increase/decrease) of the gas quantity.



Elements of the complete system

- ▶ Fully integrated Bi-fuel control panel
- ▶ Comprehensive knocking detection system
- ▶ Diesel monitoring system
- ▶ Approved gas train made to required local and site standards
- ▶ Gas actuator
- ▶ Complete gas feed and air manifold vacuum feed back hoses
- ▶ Gas/Air blender/s
- ▶ All wiring harnesses and sensors
- ▶ All required Bolts and fittings
- ▶ Standard kit documentation





▷ Gas train



▷ Fully integrated Bi-fuel control panel



Customer feedback



“Our company has installed over 20 ComAp Bi-Fuel kits last year to many different types of engines. The ComAp Bi-Fuel solution technologies are without doubt the safest, most reliable and efficient systems in the world.

Our company is proud to promote a high quality product like ComAp Bi-Fuel equipment and we have no hesitation to recommend this solution for Bi-Fuel operation!”

Alex Hintz

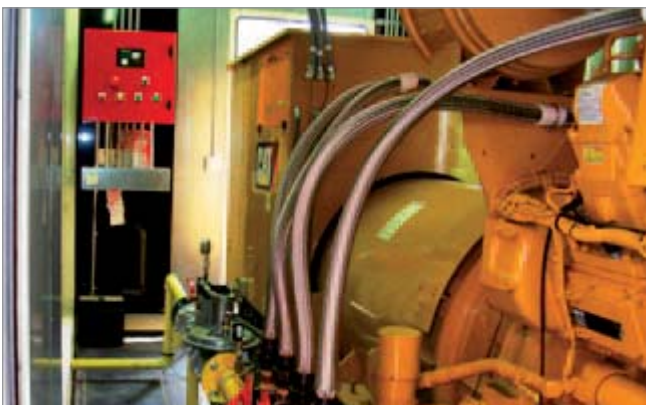


Examples of converted high speed engines

Brand	Type	DG set Output
Caterpillar	3300 series	150 kW - 220 kW
Caterpillar	3400 series	200 kW - 650 kW
Caterpillar	3500 series	700 kW - 2000 kW
Caterpillar	C18 series	400 kW - 500 kW
Cummins	KTA series	400 kW - 1200 kW
Cummins	QSK series	1100 kW - 1800 kW
Cummins	QST series	650 kW - 800 kW
Cummins	VTA series	500 kW - 600 kW
Deutz	TBD series	all outputs
MAN	D2842LE201	400 kW
Mercedes	OM444LA/12183TB83	440 kW
Perkins	3012TAG2A	580 kW
SCANIA	DC series	225 kW - 520 kW
Volvo	TD series	all outputs

▶ For Low and Middle speed conversion systems – see ComAp Bi-Fuel (Dual Fuel) Low & Middle speed engines brochure





Projects



Indonesia | Savings



- ▶ **P.T. Rinnai**
- ▶ 3x Mitsubishi S12R 1285 kW
- ▶ Prime power operation
- ▶ Natural Gas

Rinnai



USA | Extended Run Times



- ▶ **Yancey CAT Power USA**
- ▶ CAT 3516B 1825 kW
- ▶ Standby power in Diagnostic lab.
- ▶ Natural gas

YANCEY CAT

Czech Republic | Green Energy



▷ Phoenix Zeppelin Czech Republic



- ▷ CAT C15, BOOMEL®250 DUAL
- ▷ CHP power plant – Prime power operation
- ▷ Bio Diesel + Bio Gas/ Natural Gas

Russia | Extreme Climatic Conditions



▷ ADD



- ▷ 3x Perkins 4006-23TAG3A
- ▷ Prime power operation
- ▷ Natural Gas
- ▷ Extreme conditions - Siberia



About ComAp



“ComAp is a dynamic international company with a solid reputation for delivering innovative solutions to our customers and the power generation market. By working closely with our customers and providing state-of-the-art quality products, ComAp has built a name as a dependable supplier delivering quality, reliability, localised service and good value.”

Libor Mertl, Managing Director

ComAp was founded in 1991 in Prague. Since then ComAp has specialized in engine and gen-set electronics developing several lines of gen-set control systems, anti-knocking detectors, misfiring detectors, gas injection controllers, engine management systems etc.

The first Bi-fuel conversions of diesel engines took place in 1995, on slow speed ŠKODA (CKD) engines. Since then ComAp continues to serve customers throughout the world delivering products that offer a proven and reliable solution.

Within the last decade ComAp has become recognized as the leader in many of its core areas and is now the world's largest supplier of turn-key bi-fuel solutions and bi-fuel conversion components.



ComAp's key advantage is our flexibility, experience, knowledge and enthusiasm in all of our three product lines:

- ▶ Electronic products for the power generation industry
- ▶ Turn key electronic and electric solutions for power generation industry
- ▶ Bi-fuel conversion solutions

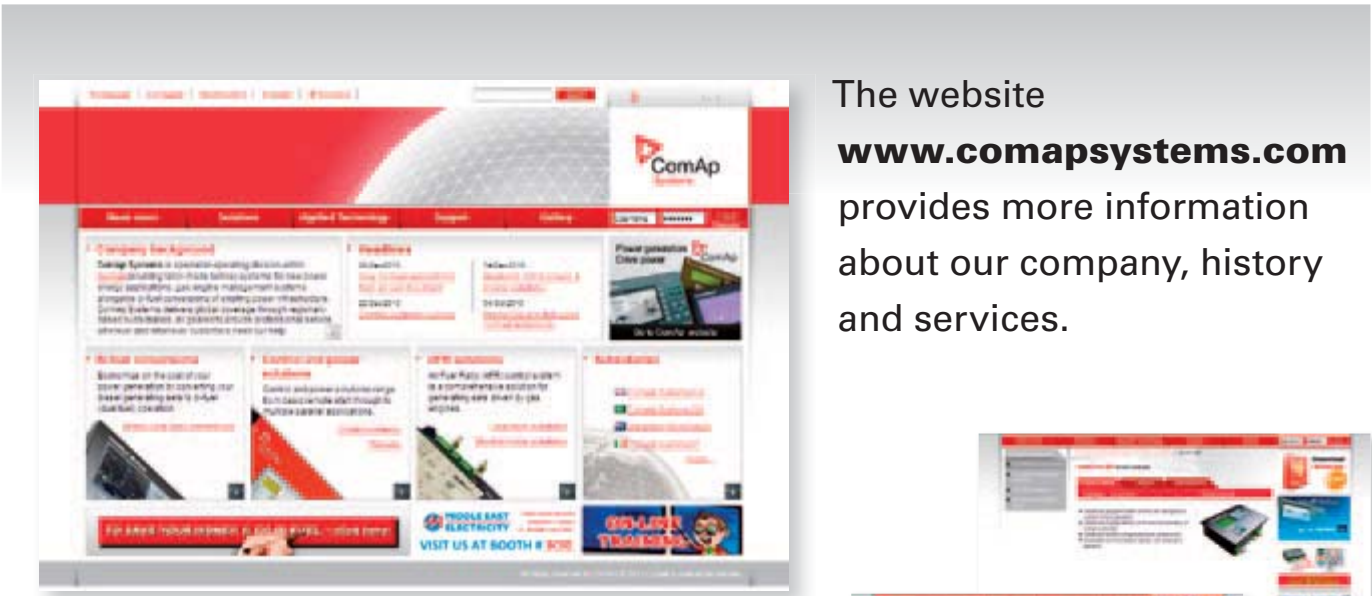


The managements task is to keep and strengthen this advantage by helping our customers solve their problems and in doing so keep our customers fully satisfied with excellent service.

Within our company we work towards establishing a pleasant and friendly atmosphere designed to support the creativeness, dynamics and courage in finding new opportunities, projects, solutions and technologies.

We will always deal honestly and fairly with our customers and personnel.

On-line



The website www.comapsystems.com provides more information about our company, history and services.

It is also the best place to visit for up-to-date news on existing product development, new product launches and free software downloads.

The easiest way to stay informed is to join the ComAp Systems Members Club, which you can do by simply completing the registration page on our website.





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