

# THE PRACTICAL DUAL FUEL CONTROL MANAGEMENT SOLUTION FOR DIESEL ENGINE APPLICATIONS

**bWgas**  
Cogeneration Products Line

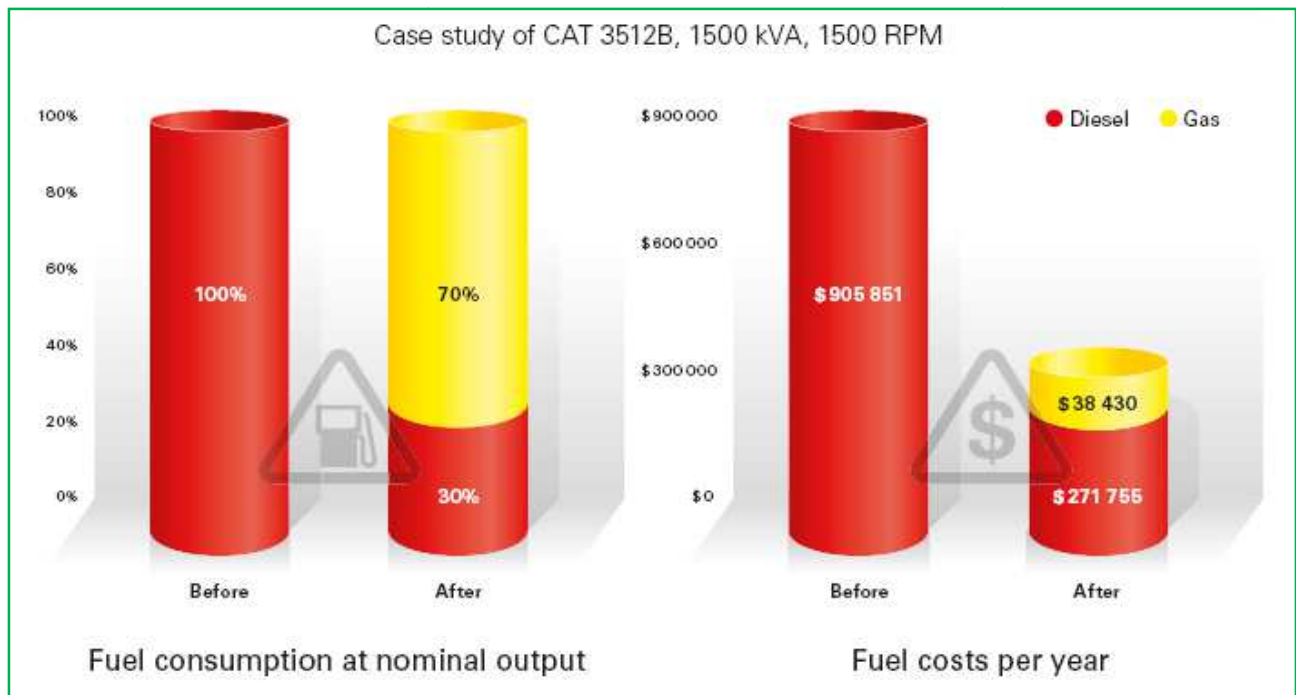


## BioWATT's Dual Fuel System

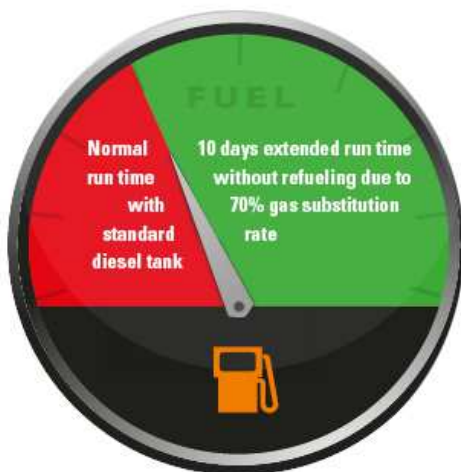
## BENEFITS

### *Substantial Fuel Savings & Operational costs*

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



### *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*

BioWATT Dual Fuel is a more environmentally friendly solution for Diesel engines

Emission reductions possible:

- ✓ Reduction of CO<sub>2</sub> – 5% to 20%
- ✓ Reduction of NO<sub>x</sub> – 30% to 40%
- ✓ Reduction of SO<sub>x</sub> – 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

## *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 safety maximize the substituted gas
- ✓ All engine parameters are kept within the limits specified by the engine manufacturer:

- Engine boost air and exhaust temperatures measurement, monitoring/protection
- Minimum & Maximum Gas pressure measurement, monitoring/protection
- Smooth transition between diesel and dual fuel modes at any time
- Non intrusive solution – no change of any engine parts required
- Frequency sensors fitted to every cylinder
- Comprehensive Knocking detection system
- Diesel portion mapping and measurement
- Minimum Load gas protection
- Actual Load measurement
- Full history files recording
- Gas/diesel ratio display



- Remote monitoring, control and configuration via PC or via internet

## SOLUTION

### *How it works BioWATT's Dual Fuel System*

The Dual Fuel principle is based on adding gas to the engine (this can be also perceived as an addition of an alternative energy – e.g. the gas).

- Generator engines are typically governed and therefore must maintain the same RPM at all times, when an alternative energy (the gas) is introduced to the governed engine there is simply less energy (or power) required to be delivered by the engine's diesel governor.
- This allows PLC'S System to control precisely the amount of gas being introduced to the engine and in doing so enable lower quantities of diesel to be used to provide the power.
- The diesel engine principal does not change – the engine is still dieseling and the diesel fuel is required to provide 30% of the engine power, parts lubrication, cooling and as an ignition source for the gas.

BioWATT quality and fully automated PLC'S System solution ensures that all key engine safety parameters are met at all times.

Should any engine parameter move towards a maximum limit, the amount of gas will automatically decrease and adjust itself and should any of the engine manufacture's parameters be exceeded for any reason, gas is immediately stopped and the engine continues to operate on 100% diesel without any interruption of the power supply.

- By this principle PLC'S System achieves the highest possible gas/diesel ratio.

## *Frequently asked questions*

### **1. How much diesel can be replaced?**

Depending on the type of engine typical gas/diesel ratios after conversion are up to 70% gas/30% diesel. There are additional factors which can also affect gas/diesel ratios such as: engine condition, ambient weather conditions at the site, site load variability, and gas quality.

### **2. Is my engine suitable?**

Yes. Any 4 stroke diesel engine is generally suitable.

### **3. Will Dual Fuel affect engine performance?**

No, the engine performance will remain the same as before the conversion. The engine can still operate up to full or maximum load at any time; it should be noted that the best gas/diesel ratios are normally achieved at around 80% of nominal engine power, which is usual for a continuous operation. When the engine needs to operate above 80% of nominal engine the PLC'S System automatically decreases the amount of gas. Also the engine's response to load steps and transient loads or changes will remain exactly the same as before the conversion.

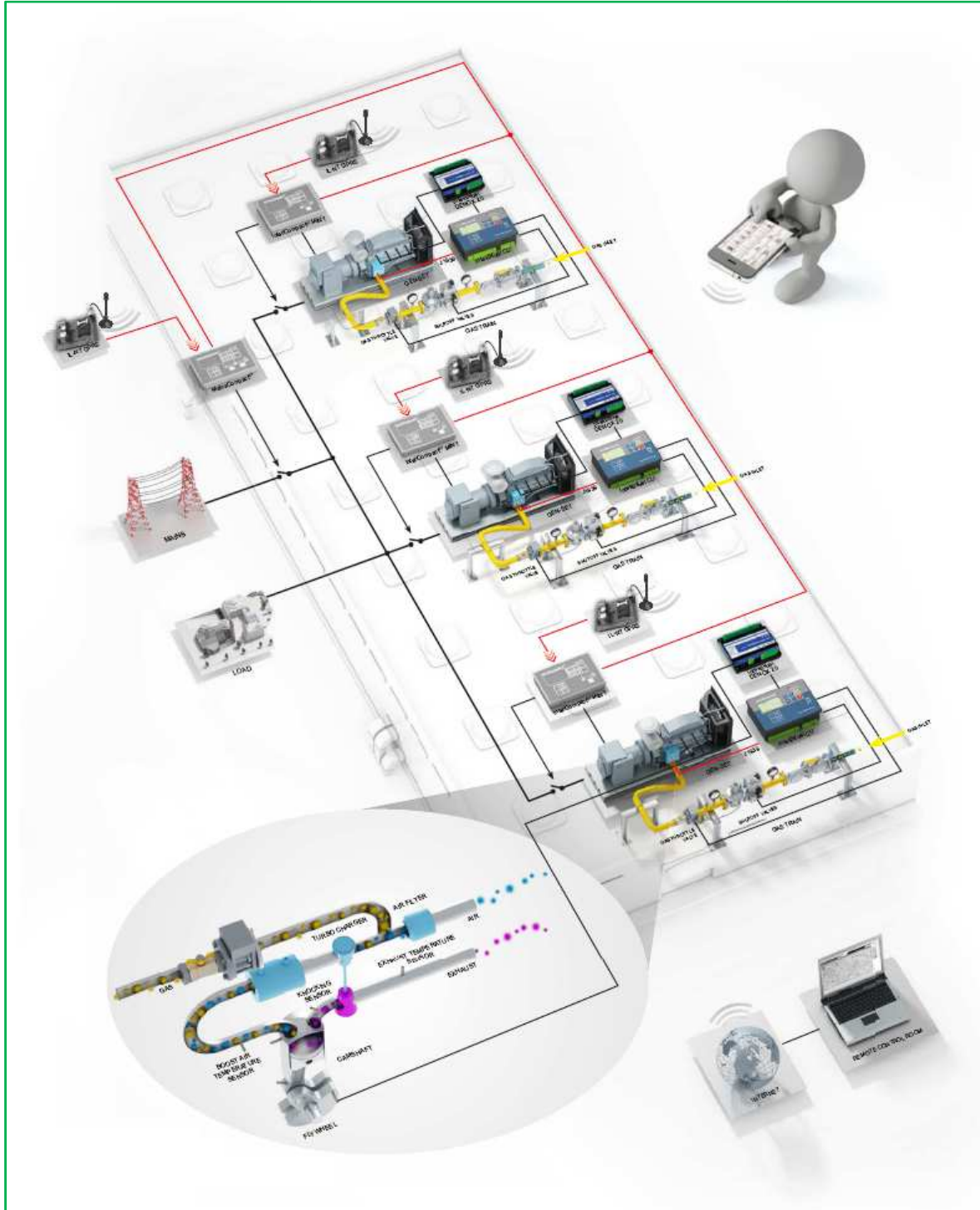
### **4. Does PLC'S System interfere with the existing control system on my engine?**

No, PLC'S System does not interfere with the existing engine control system nor does it control the engine in any way or stop the engine at any time. PLC'S System is mainly concerned with the precise control of the gas and protection of the engine when operating in Dual fuel mode. Gas is only introduced to the engine once the engine has already started and is running on 100% diesel.

### **6. What types of gases can be used?**

BioWATT's Dual Fuel System will safely maximize the use of any available combustible gas, i.e. natural gas, well gas, bio gas, landfill gas, propane gas, coal gas, CNG, LNG.

# LAYOUT



## REFERENCES

### Romania | Oil & Gas Environment



Caterpillar 3512B 1200 kW gensets  
Remote location – oil platform,  
Black sea  
Prime power operation  
Natural gas

### Russia | Extreme Climatic Conditions



Cummins KTA50 gensets  
Cummins QSK60 gensets  
Prime power operation  
Natural Gas  
Extreme conditions – Siberia

## 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	C15 series	500 kW
Caterpillar	C18 series	400 kW–500 kW
Caterpillar	C27 series	800 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	M444LA/12183TB83	440 kW
Mitsubishi	SR6-PTA	440 kW–600 kW
Mitsubishi	S12R-PTA	1285 kW
MTU	18V2000	1000 kW
MTU	20V4000	2200 kW
Perkins	2206D-13TAG3	400 kW
Perkins	2306C E14 TAG1A	280 kW
Perkins	2506C E15TAG3	450 kW
Perkins	2806C-E18TAG3	600 kW
Perkins	2806A-E18TAG2	560 kW
Perkins	3012TAG2A	580 kW
Perkins	4006-23TAG3A	600 kW
Perkins	4012-46TAG2	1200 kW
SCANIA	DC series	225 kW–520 kW
Volvo	TD series	all outputs

