Project Report 2025
100 KVA Tier 3 Gensets

Speedy Hire Emissions Data Analysis

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1.0 Introduction

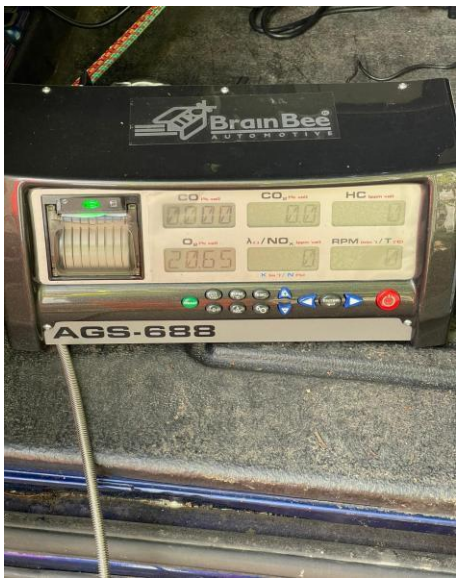
In May 2025 CFCS Analytical Services Ltd & Speedy Hire Ltd conducted emissions analysis on 2 x Speedy Hire Tier 3 Generators, one running on EN590 and the other on HVO (Hydrotreated Vegetable Oil), both generators were identical in make and model with identical power output.

The objective of the report was to gather data before and after adding the fuel additive HC24™. Regular reading were taken and documented to form the basis of this report to measure the effects on exhaust gas emissions.

The test equipment used was an AGS-688 with SGD-010 Diesel Emission Upgrade which was used to establish the exhaust gas missions for carbon monoxide (CO), carbon dioxide (CO2), oxygen (O2) and nitrous oxide compounds (NOx).

Serial No:181130000140 (2019) - calibration test certificate can be seen on request.

Fig. 1: AGS-688 Gas Analyser



The tests were conducted on site at the Speedy Depot in Tamworth and all fuel and fuel additive replenishments were supervised by a Speedy Hire employee. Full test result print outs can be provided upon request.

Generator 1- HVO	
Make	Pramac
Model	GRW115P
Speedy Asset No	MA1389038
Power	100KVA/80KW
Fuel Tank	530L HVO

Generator 2- EN590	
Make	Pramac
Model	GRW115P
Speedy Asset No	MA1406777
Power	100KVA/80KW
Fuel Tank	530L EN590

Untreated baseline emissions readings:

Untreated readings were obtained to establish baseline figures at per below.

Tests were then conducted with the addition of HC24™ at a 70% load on both generators for the duration of the trial.

Generator 1 HVO untreated baseline readings					
Load (KW)	LOAD (%)	O2 %	CO ppm	CO2 % KG/	NOX ppm
0	0	17.90	62.00	5.30	77.60
16	20%	15.60	76.50	6.45	141.00
23	30%	14.50	70.00	6.46	162.75
31.6	40%	13.69	64.00	6.40	203.60
40	50%	13.00	59.00	6.58	237.50
47	60%	12.10	51.00	6.73	286.05
54	70%	11.72	45.50	6.69	327.85
63	80%	10.90	46.00	6.88	408.45
70	90%	10.21	47.00	7.35	485.00

Generator 2 EN590 untreated baseline readings					
Load (KW)	LOAD (%)	O2 %	CO ppm	CO2 % KG/	NOX ppm
0	0	17.90	74.00	5.01	78.90
16	20%	15.55	84.00	6.75	138.05
23	30%	14.50	79.50	6.67	170.00
31.6	40%	13.70	72.00	6.63	211.65
40	50%	13.01	64.50	6.75	247.15
47	60%	12.30	57.00	6.94	285.10
54	70%	11.84	50.00	6.67	343.10
63	80%	11.20	48.00	6.94	420.65
70	90%	10.60	45.00	7.40	488.30

2.0 Regulatory Standards for NRMM

For regulatory purposes, NRMM is defined as "any mobile machine, transportable industrial equipment or vehicle with or without body work, not intended for the use of passenger or goods transport on the road, in which an internal combustion engine is installed" (European Commission, 1997)[1].

Pollutant emissions from combustion engines installed in NRMM significantly contribute to air pollution by emitting carbon monoxide (CO), carbon dioxide (CO2), oxygen (O2), nitrous oxide compounds (NOx) and particulate matter (PM). Emissions from the engines are stipulated in Regulation (EU) 2016/1628 of the European Parliament. The regulation defines emission limits for engines with different power ranges and applications. It also stipulates the procedure that engine manufacturers must follow to obtain type approval for their engines.

Almost all new NRMM engines will be subject to emission limits. The latest regulation encompasses more stringent emissions standards known as Stage V, like the Euro 6 Standard for HGV's and buses.

NRMM emission standards apply to new engines when first placed on the market but there is a considerable number of older plant and equipment which have higher emission values. This could be due to there being less stringent regulations at the time of equipment manufacture or there were no emission standards at that time.

3.0 HC24™

HC24™ is a family of compounds which are ash less, non-metallic and totally organic, developed for use as fuel components for all liquid combustible fuels. The use of the unique formula reduces emissions, increases drive ability and improves efficiency. HC24™ does this by delivering the fuel to the engine in a state which allows for a more complete combustion. Engine testing at major laboratories has shown it substantially reduces total unburned hydrocarbons (HC), Carbon Monoxide (CO), Nitrous Oxide compounds (NO_x), Carbon Dioxide (CO_2), Smoke and Particulates in diesel.

The fuel additive HC24™ was added to each machines fuel tank following baseline readings, consisting of a corrective dose (double the maintenance dose), at a ratio of 1:350 (1L additive to 350L fuel).

The emissions testing data analysis continued for 2 weeks with the generators running 24hrs a day at 70% load. A corrective dose was used for the whole trial due to the compressed period of trial.

4.0 Results & Summary

The emissions testing data analysis continued for 2 weeks with the generators running 24hrs a day at 70% load.

Fuel and Efficiency Statement via Engine management (ECU data)

Before we started the emissions study, it was decided to compare an untreated diesel generator to a treated generator for possible fuel consumption comparisons and efficiency changes.
Untreated diesel Vs additivised diesel outcome.
Gen 1 Asset MA1389021(untreated) operated at 54Kwh load and had a fuel consumption reading of 15.7 Lph, this equates to a generator efficiency of 48.0%
Gen 2 Asset MA1406777T (additivised) operated at 54Kwh utilising the same load bank and had a fuel consumption reading of 15.3 Lph; this equates to a 4.6% increased generator efficiency to 50.3% and an improved fuel consumption of 2.55%

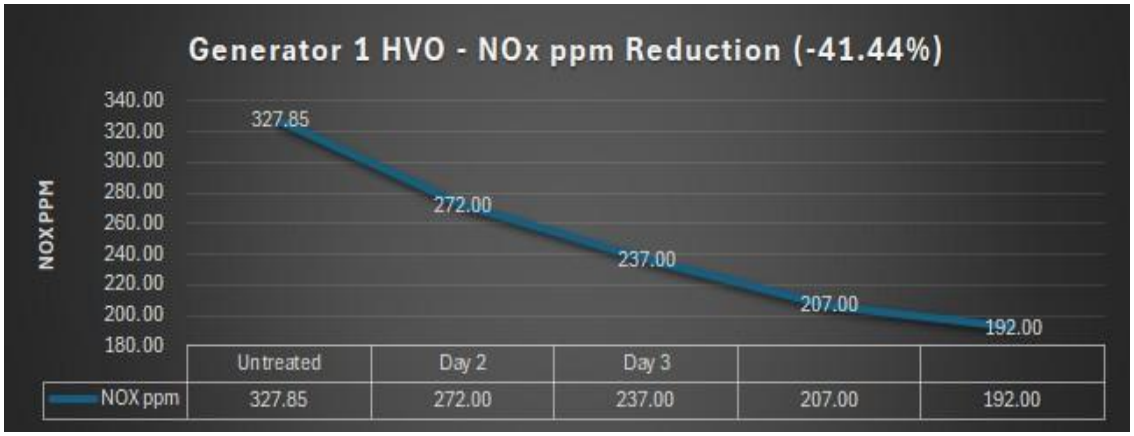
**Co2 reduction based on 0.4Lph improved fuel efficiency equates to 1,072g of Co2 reduction per hour.
**1 litre of Diesel produces 2.68Kg of CO2 or 2,680g Co2

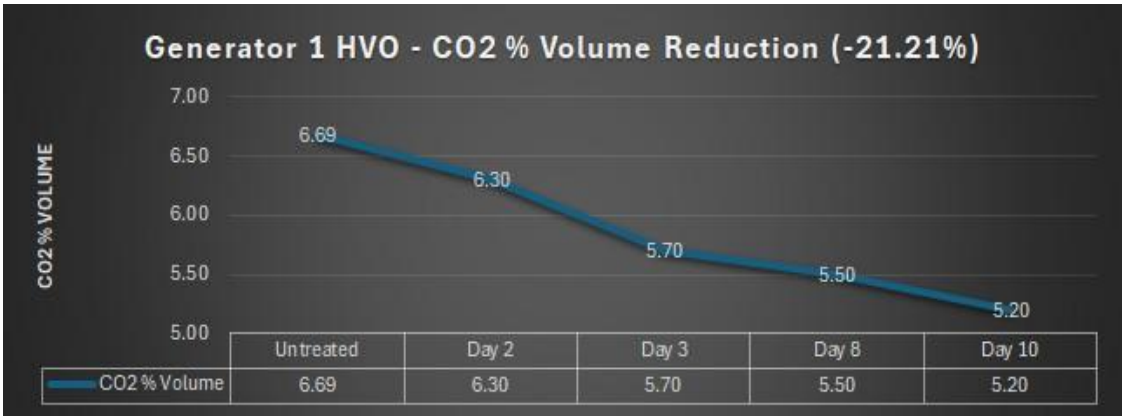
Generator 1 HVO - Treated Emissions Results

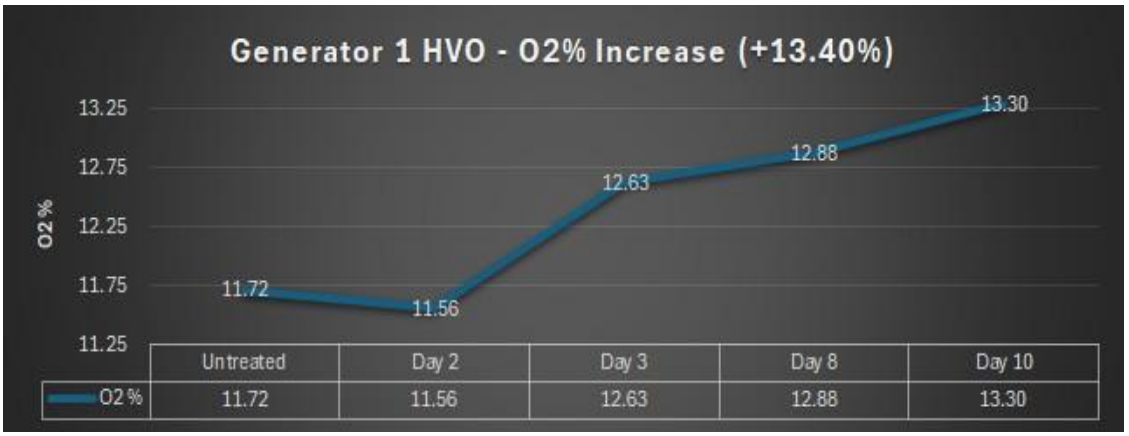
Day	LOAD (%)	Load KW)	O2 %	O2 Change %	CO2 % KG/L	CO2 Change %	NOX ppm	Nox Change %	Total % change
Untreated	0	0	17.90	4.75	5.30	-73.58	77.60	-32.99	-106.57
Day 10	0	0	18.75		1.40		52.00		
Untreated	20	16	15.60	8.97	6.45	-58.14	141.00	-40.43	-98.57
Day 10	20	16	17.00		2.70		84.00		
Untreated	30	23	14.50	9.38	6.46	-47.33	162.75	-39.78	-87.11
Day 10	30	23	15.86		3.40		98.00		
Untreated	40	31.6	13.69	11.91	6.40	-39.01	203.60	-41.55	-80.57
Day 10	40	31.6	15.32		3.90		119.00		
Untreated	50	40	13.00	11.85	6.58	-34.60	237.50	-41.05	-75.65
Day 10	50	40	14.54		4.30		140.00		
Untreated	60	47	12.10	13.97	6.73	-28.68	286.05	-40.57	-69.25
Day 10	60	47	13.79		4.80		170.00		
Untreated	70	54	11.72	13.40	6.69	-22.21	327.85	-41.44	-63.65
Day 10	70	54	13.29		5.20		192.00		

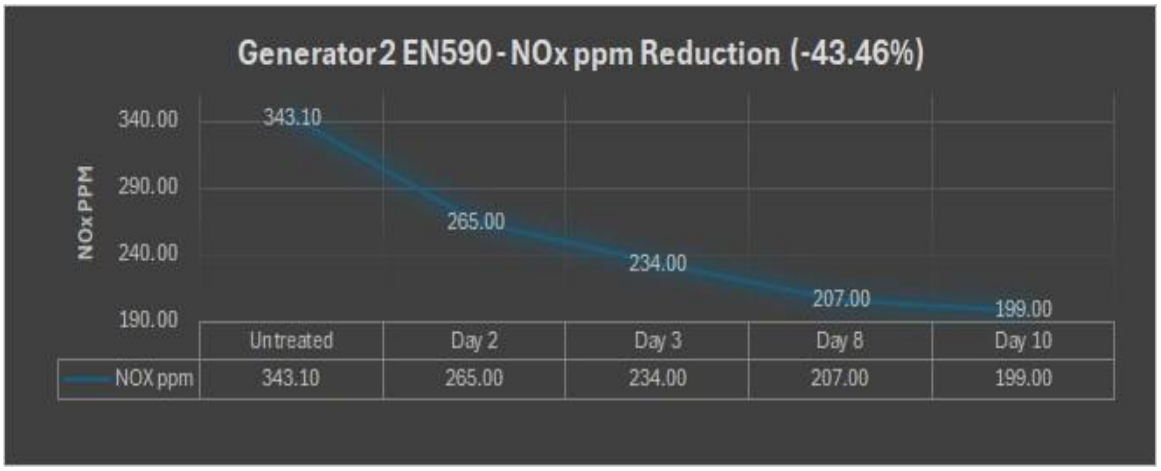
Generator 2 EN590 - Treated Emissions Results

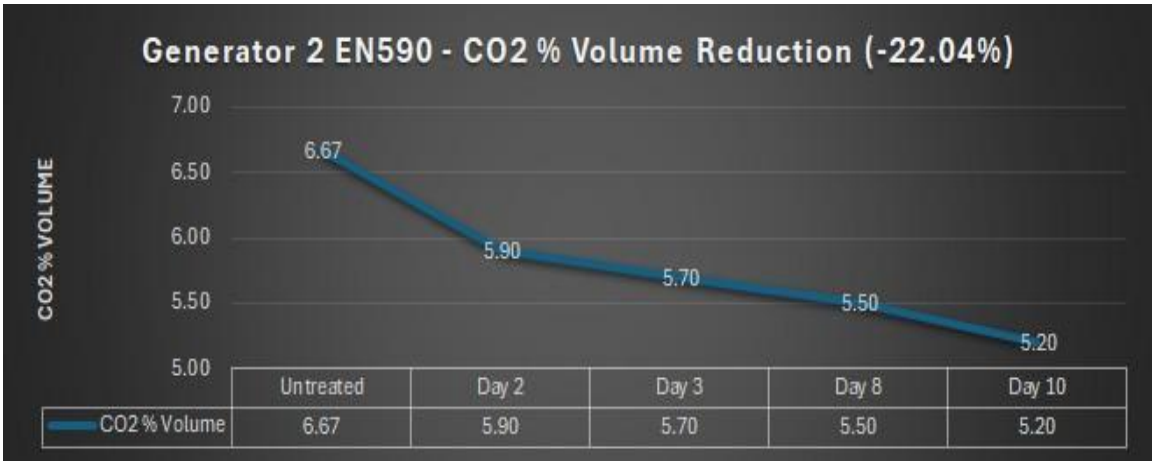
Day	LOAD (%)	Load KW)	O2 %	O2 Change %	CO2 % KG/L	CO2 Change %	NOX ppm	Nox Change %	Total % change
Untreated	0	-	17.90	4.08	5.01	-68.06	78.90	-41.70	-109.76
Day 10	0	-	18.63		1.60		46.00		
Untreated	20	16.0	15.55	8.36	6.75	-55.56	138.05	-35.53	-91.09
Day 10	20	16.0	16.85		3.00		89.00		
Untreated	30	23.0	14.50	10.90	6.67	-47.53	170.00	-38.82	-86.35
Day 10	30	23.0	16.08		3.50		104.00		
Untreated	40	31.6	13.70	9.97	6.63	-36.65	211.65	-38.11	-74.76
Day 10	40	31.6	15.06		4.20		131.00		
Untreated	50	40.0	13.01	10.42	6.75	-31.85	247.15	-37.69	-69.54
Day 10	50	40.0	14.36		4.60		154.00		
Untreated	60	47.0	12.30	10.49	6.94	-25.07	285.10	-34.76	-59.83
Day 10	60	47.0	13.59		5.20		186.00		
Untreated	70	54.0	11.84	12.29	6.67	-22.04	343.10	-43.46	-65.50
Day 10	70	54.0	13.29		5.20		194.00		

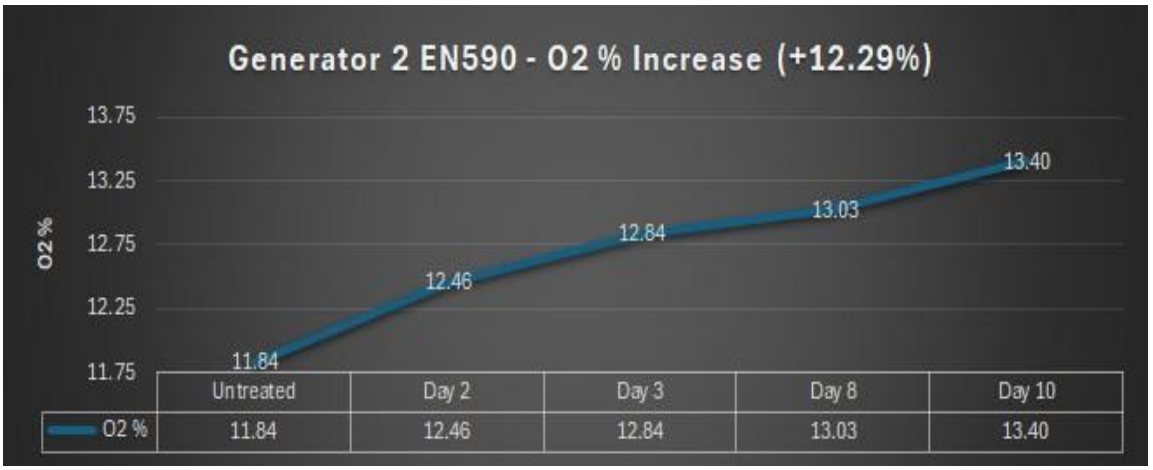

Generator 1 HVO - NOx ppm Reduction (-41.44%)
NOX PPM
340.00
320.00
300.00
280.00
260.00
240.00
220.00
200.00
180.00
327.85
272.00
237.00
207.00
192.00
Untreated
Day 2
Day 3
NOX ppm
327.85
272.00
237.00
207.00
192.00


Generator 1 HVO - CO2 % Volume Reduction (-21.21%)
CO2 % VOLUME
7.00
6.50
6.00
5.50
5.00
6.69
6.30
5.70
5.50
5.20
Untreated
Day 2
Day 3
Day 8
Day 10
CO2 % Volume
6.69
6.30
5.70
5.50
5.20


Generator 1 HVO - O2% Increase (+13.40%)
O2 %
13.25
12.75
12.25
11.75
11.25
11.72
11.56
12.63
12.88
13.30
Untreated
Day 2
Day 3
Day 8
Day 10
O2 %
11.72
11.56
12.63
12.88
13.30


Generator 2 EN590 - NOx ppm Reduction (-43.46%)
NOx PPM
340.00
290.00
240.00
190.00
343.10
265.00
234.00
207.00
199.00
Untreated
Day 2
Day 3
Day 8
Day 10
NOX ppm
343.10
265.00
234.00
207.00
199.00


Generator 2 EN590 - CO2 % Volume Reduction (-22.04%)
CO2 % VOLUME
7.00
6.50
6.00
5.50
5.00
6.67
5.90
5.70
5.50
5.20
Untreated
Day 2
Day 3
Day 8
Day 10
CO2 % Volume
6.67
5.90
5.70
5.50
5.20


Generator 2 EN590 - O2 % Increase (+12.29%)
O2 %
13.75
13.25
12.75
12.25
11.75
11.84
12.46
12.84
13.03
13.40
Untreated
Day 2
Day 3
Day 8
Day 10
O2 %
11.84
12.46
12.84
13.03
13.40