

BBL DX TECHNICAL REPORTS SUMMARY

1. Introduction

This technical documentation brings together the results of three independent tests conducted by **Brazilian Biocombustíveis Ltda (BBL)**, with the objective of proving the **technical feasibility, operational performance and environmental benefits of the patented BBL DX biofuel**, under real conditions of use.

BBL DX technology is the result of an innovative process for the production of alternative fuels based on vegetable oils, used oils and higher alcohols, developed and protected under patent **BR 11 2022 011447-8 A2**, validated nationally and internationally. Unlike traditional biodiesel (produced by transesterification), BBL DX adopts a method of direct combination with vegetable oils/alcohols, without generation of by-products such as glycerin, without the need for aggressive chemical steps or removal of residues, resulting in a **cleaner, more stable, economical and energy-efficient fuel**.

Based on this technological differential, the tests reported here aim to evaluate the behavior of BBL DX in three distinct contexts, representing strategic sectors for the energy transition:



- **Road transport:** prolonged use of BBL B50 in a **SsangYong Kyron 2.0 4x4** vehicle, subjected to more than 7,000 km in varying load and terrain conditions;
- **Maritime transport:** use on a **COOPA II vessel**, equipped with a Mercedes 447 engine, operating exclusively with BBL B50 in navigation for four continuous hours;



- **Stationary power generation:** use in **Vonder GDV 5500 generator**, with a single-cylinder 4-stroke engine, in continuous operation for approximately **1,000 hours** with BBL B100 (100% BBL DX biofuel).

All tests were monitored by a professional registered with CREA, and involved mechanical inspections, operational observations and indirect measurements of performance and emission. The reports point to consistent results, without any type of failure, loss of power or internal wear of the tested engines.

In addition, empirical and laboratory evidence of significant **reduction in particulate emissions and exhaust gas opacity were observed**, reinforcing the potential of BBL DX as a **new generation fuel**, compatible with the strictest environmental requirements and with the existing vehicle infrastructure.

This series of reports contributes decisively to consolidating the credibility of BBL technology, providing practical data for investors, logistics operators, environmental authorities and engine manufacturers, while reinforcing the company's leading role in the sustainable biofuels scenario.

TECHNICAL REPORT SSANGYONG VEHICLE

1. GOAL

Verification of the wear and tear of the engine of a SsangYong Kyron 2.0 4x4 Chassis KTPOB1KSAPC73099 vehicle, after using B50 biofuel (*B-Diesel*).

2. TECHNICAL SPECIFICATIONS OF THE VEHICLE

GENERAL INFORMATION	
Manufacturer	SsangYong
Model	Kyron GL
Year/Model	2010
ENGINE INFORMATION	
Motorization	2.0
Fuel	Diesel
Power (hp)	141
Torque (kgf.m)	31,61
Exchange	6-speed automatic
Traction	4x4
Direction	hydraulics

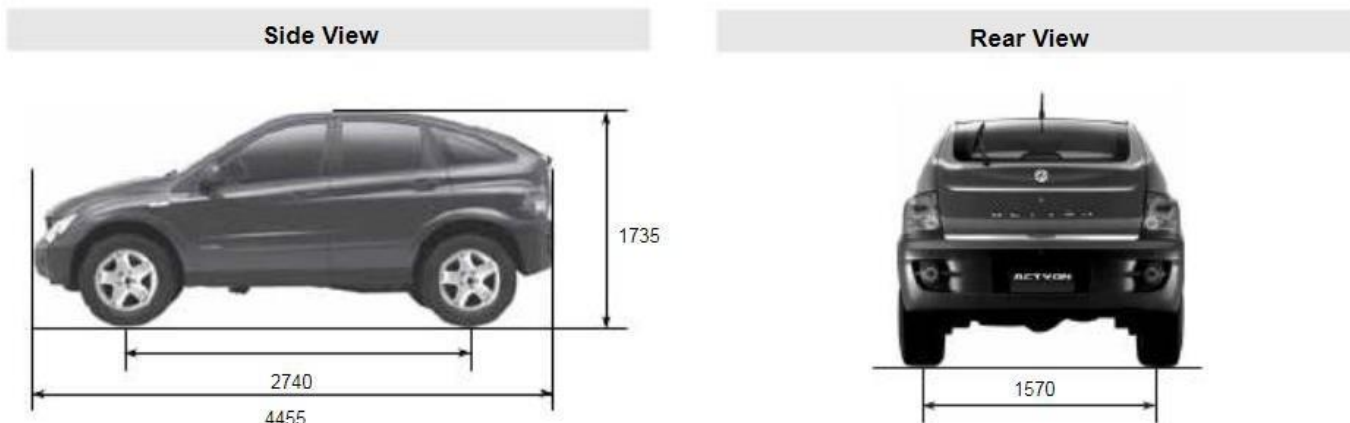


Figure 1. SsangYong Kyron 2.0 4x4 Diesel.

3. ESSAY

The SsangYong Kyron 2.0 4x4 Chassis KTPOB1KSAPC73099 vehicle, has been using only B50 biofuel (*Bio-Oil*) for more than 60 days, covering a total mileage of approximately 7,000 km, in different types of terrain and speeds, without presenting any type of malfunction, or internal wear of the engine. as can be seen in the images in Figure 02.



Figure 2. Images of the injector nozzle of the SsangYong Kyron 2.0 4x4 Diesel engine.

It is also reported that during the entire period of use of biofuel (*B-Diesel*) B50, no loss of vehicle power was observed, when compared to using conventional diesel fuel, as well as variation in its consumption.

Macaíba, November 1, 2018.

Francisco Wendell Bezerra Lopes

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TECHNICAL REPORT BARCO COOPA II

1. GOAL

Verification of the wear and tear of the engine of a COOPA II boat, belonging to the company Recanto do Mar Transportes Marítimos Ltda. (CNPJ: 08.220.947/0001-10), after using biofuel (*B-Diesel*) B50.

2. TECHNICAL SPECIFICATIONS OF THE BOAT

GENERAL INFORMATION	
Manufacturer	Estalbras
Year/Model	2010
ENGINE INFORMATION	
Model	Mercedes 447
Fuel	Diesel
Power (hp)	410 HP / 2,200 RPM
Cylinders	06



Figure 1. COOPA II boat.

3. ESSAY

The COOPA II boat did a four-hour test using only B50 biofuel (*B-Diesel*), consuming a total of two hundred liters of fuel, at different speeds, without presenting any type of malfunction or apparent engine wear.

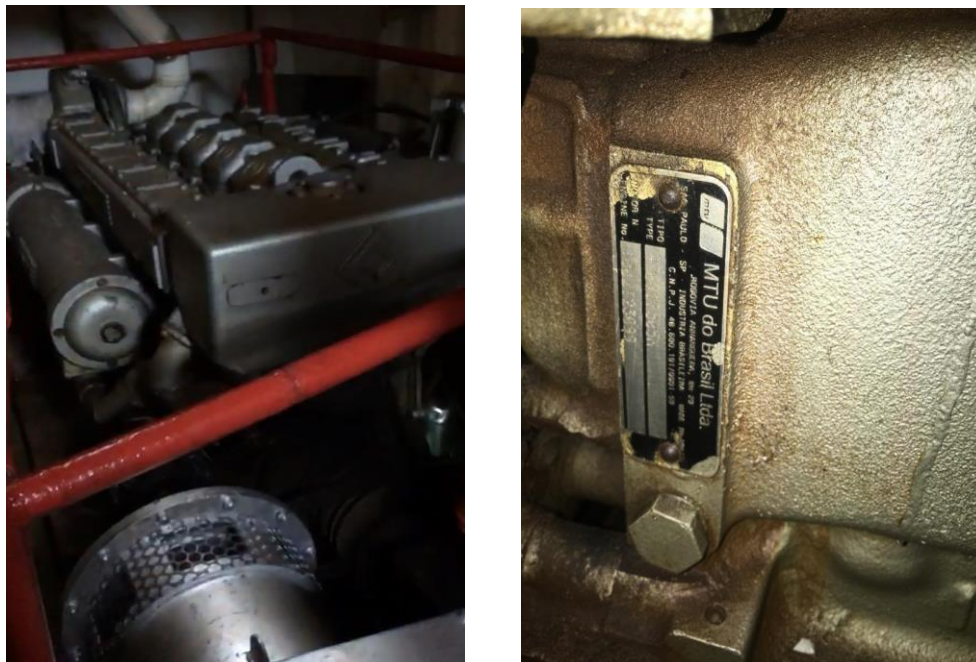


Figure 2. Images of the engine of the COOPA II boat.

It is also reported that during the entire period of use of biofuel (*B-Diesel*) B50, no loss of vehicle power was observed, when compared to using conventional diesel fuel, as well as variation in its consumption, in addition to the visual perception of the absence of particulate emissions throughout the route.

Macaíba, November 27, 2018.

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TECHNICAL REPORT GENERATOR VONDER GDV

1. GOAL

Verification of the wear and tear of the engine of a diesel generator after using *B100* bio-oil.

2. GENERATOR TECHNICAL SPECIFICATIONS

GENERAL INFORMATION	
Manufacturer	Vonder
Model	GDV 5500
Tension	110 V~ / 220 V~
ENGINE INFORMATION	
Engine Type	4 strokes
Quantity of cylinders	Single cylinder
Cooling Type	Air cooling
Power	10.0 hp
Engine	418 cm ³ (cc)
Motor shaft rotation	3,600 rpm
Ignition Mode	compression
Fuel	Common diesel
Capacity (fuel)	11.5 L
Compression ratio	20 : 1
Starting System	manual retractable / electric
Cylinder (bore x stroke)	86 mm x 72 mm
GENERATOR INFORMATION	
Maximum power	5.5 kVA / 5,500 W
Rated power	5.0 kVA / 5,000 W
Frequency	60 Hz
Rated current	22.8 A
DC output	12 V / 8.3 A
Phase	Phase



Figure 1. Diesel Generator GDV 5500 Vonder.

3. ESSAY

Vonder's GDV 5500 generator was in uninterrupted operation until the total consumption (11.5L) of the volume of biofuel (*Bio-Oil*) B100 for several repetitions, totaling a time of approximately 1000 hours without presenting any type of malfunction or internal wear of the engine, as can be seen in the images in Figure 02.



Figure 2. Images of the injector nozzle of the GDV 5500 Vonder Diesel Generator engine.

It was also observed that there was almost no emission of particulate matter, as evidenced by a test carried out by specialized technicians by the Center for Gas Technologies and Renewable Energies (CTGAS-ER), as shown in Figure 3.

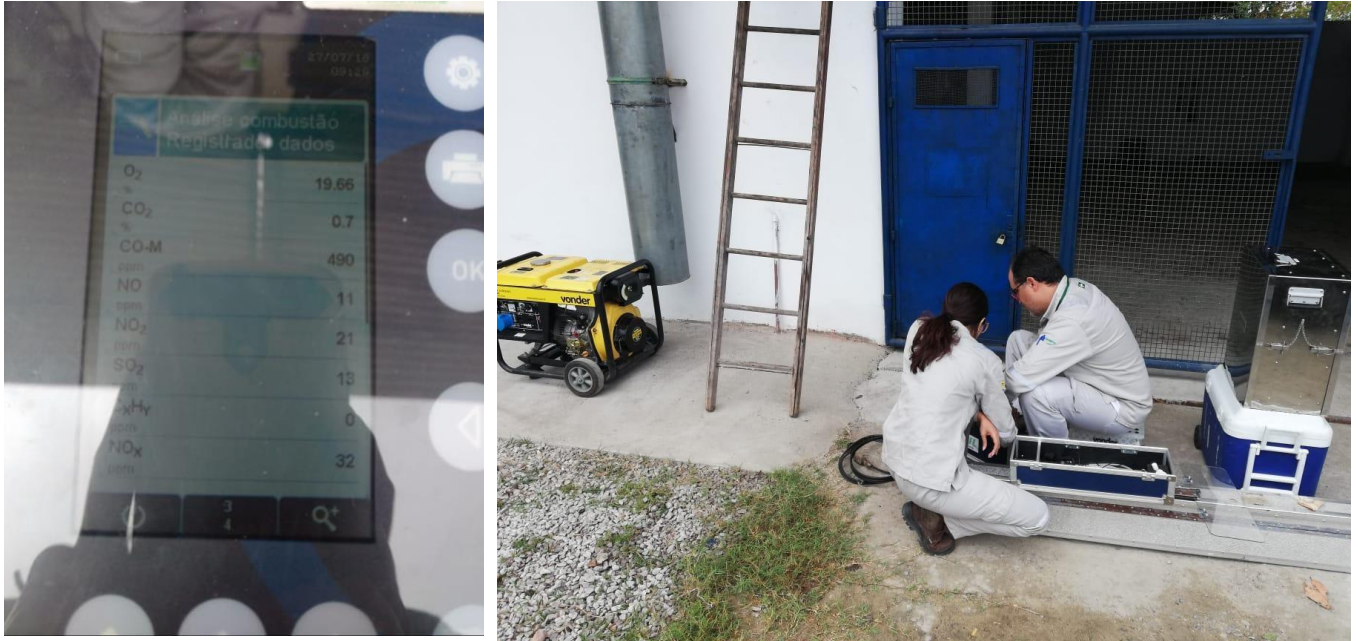


Figure 3. Emissions test of the engine of the Vonder GDV 5500 Diesel Generator (CTGAS technicians)

Macaíba, September 9, 2018.

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