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ENVIRONMENTAL TECHNOLOGY VERIFICATION (ETV)

VERIFICATION STATEMENT

TECHNOLOGY TYPE: **Fuel Saving Device**

APPLICATION: **Gasoline/Diesel Engines**

TECHNOLOGY NAME: ***Clean Turbo***
(ETV 17-011)

COMPANY: **Engine Ecology**

DATE: **April 2018**

Disclaimer

This ETV Statement is the result of an impartial, consensus-based approach to evaluating innovative environmental technology in accordance with the ETV Technical Protocol. The data presented are believed accurate and the analyses credible. The statements made and conclusions drawn regarding the product evaluated do not, however, amount to an endorsement or approval of the product in general or for any particular application nor a warranty to the performance of the technology that it will always operate as verified.

This ETV Statement is based from an evaluation activity supported by the DOST-ITDI ETV Group, the Panel of Experts and Engine Ecology.

Mention of commercial product name does not imply endorsement.

This ETV Statement is a summary of the ETV Report of the *Clean Turbo (ETV 17-011)*.

ETV TEST DESCRIPTION

The ETV Panel of Experts and the *Engine Ecology* agreed to validate the claims on the *Clean Turbo*; that it reduces fuel consumption, reduces exhaust emissions and increases engine performance.

This ETV verified the performance of *Clean Turbo* in spark (gasoline) and compression (diesel) ignition engines. The effect of the technology on the engine stability and any other technology-engine interactions/reactions are beyond the scope of this ETV.

TECHNOLOGY DESCRIPTION

The description given below is based on the technical information supplied by Engine Ecology and does not represent verified information:

> *Clean Turbo is a single piece device to be installed at the air inlet or within the air stream to create a second air stream that will rotate around the first air stream in a captive situation where the air flow will be used to carry along or work with a liquid, and that liquid needs to be vaporized in order to work better. The use may be in better blending for combustion, painting or other uses. The device will include a percentage of blade surfaces in a circumference inside of the air stream to be so effected and the size of the blades will depend upon the size of the orifice involved and may include a number of different mounting systems depending on application. The end result will be that the liquid inserted in the air stream will vaporize with little-to-no globules of liquid left in the air stream.*
>
> *The Clean Turbo can be install on both gasoline and any type of diesel engines 6 liters and smaller, however at this time gasoline engines must be manufactured in the year 2010 or before only.*

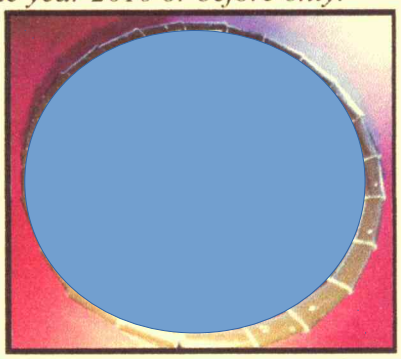

Figure 1. The Clean Turbo

VERIFICATION OF PERFORMANCE

Claim on the Reduction in Fuel Consumption

The results of the fuel economy test runs conducted for both the Kia K2700 and Rusi 100cc Motorcycle are summarized in Table. 1.

Based on the results, an increase in fuel efficiency rating of about 5.417% was attained for the Kia K2700 (diesel engine) while the fuel efficiency of RUSI 100cc motorcycle (gasoline engine) had increased by 17.172% after the Clean Turbo was installed.

Table 1. Results of fuel economy test runs

Test Units	Average Fuel Economy, km/L		Average Percent Change, %
	Without Clean Turbo	With Clean Turbo	
Kia K2700	11.056	11.655	**5.417**
RUSI 100cc Motorcycle	53.050	62.160	**17.172**

Claim on the Reduction in Exhaust Emission

Based on the results of exhaust emission tests conducted before and after the installation of *Clean Turbo* the average hydrocarbon (HC), carbon monoxide (CO) and opacity values and the corresponding percent changes are shown in table below.

Emission test results for the diesel-fueled vehicle showed that opacity was reduced by 75.862%. For the motorcycle, CO decreased by 17.391% while the HC emissions decreased by 65.834% after the installation of the *Clean Turbo*.

Table 2. Exhaust Emissions Test Results

Parameter	Without *Clean Turbo*	With *Clean Turbo*	% Change
RUSI 100cc Motorcycle (gasoline-fueled)			
HC, ppm	1642	561	**(65.834)**
CO, %	0.230	0.190	**(17.391)**
Kia K2700 (diesel-fueled)			
Opacity or light absorption coefficient (k), m^{-1}	1.16	0.28	**(75.862)**

Claim on the increase in engine performance

Based on the results of chassis dynamometer test (Table 3) conducted, the Kia K2700 showed a very small difference between without and with Clean Turbo where the difference ranged from an increase of 0.510% to 6.440%.

Table 3. Power at different throttle position

Kia, K2700 Power, hp			
	Wide Open Throttle	**75% Open Throttle**	**50% Open Throttle**
Without Clean Turbo	54.91	31.83	26.83
With Clean Turbo	55.19	33.88	27.19
Percent Change, %	**0.510**	**6.440**	**1.342**

Based on the average of the data obtained, the claims of Engine Ecology on the merits of Clean Turbo has been verified as follows:

On the fuel consumption:

- **Installation of Clean Turbo to the diesel-fueled vehicle resulted to an average increase of 5.417% in fuel economy during an on-road fuel economy run.**
- **Fuel economy of the motorcycle with Clean Turbo resulted to an average increase of 17.172% in fuel economy during an on-road fuel economy run.**

On the exhaust emissions:

- **Emission tests conducted for the diesel-fueled engine showed that opacity decreased by an average of 75.862% after installation of the Clean Turbo.**
- **For the motorcycle with Clean Turbo, emission test showed an average of 17.391% decrease in CO and 65.834% decrease in HC.**

On the engine performance:

- **The test vehicle (Kia K2700) fueled with diesel showed an increase in engine power by 0.510%, 6.440% and 1.342% at wide open throttle, 75% open throttle and 50% open throttle, respectively.**