



FUEL EFFICIENCY CASE STUDY

Vehicle: Caterpillar D9H Bulldozer

Engine: Caterpillar 6 cylinder D353
410 Horsepower



BACKGROUND

Biotechnix installed the Biotechnix Fuel System on this D9H Caterpillar Bulldozer on 6th February 2012.

The truck is powered by a Caterpillar D353, 6 cylinder diesel engine. The machine is exclusively used for coal train loading at the Jondaryan Loop for the Acland Coal Mine.

OBJECTIVES

- To compare the improvement in diesel fuel consumption after installing the Biotechnix Fuel System with the 3 months prior to installing the Biotechnix Fuel System.

RESULTS

- At the end of the project the overall fuel saving across 250 operational hours was 11%. **This equates to 11,275 litres of fuel saved per year.**
- Using a fuel cost of \$1.40 per litre this translates into a **projected saving of \$15,786 per year or \$31,572 over a 2 year period.**
- Carbon emissions were reduced by 2.5 tonnes per month or approximately 29.8 tonnes per year.

VEHICLE

Model: Caterpillar D9H
Engine: CAT D353 (24.2Lt)
Fleet #: 119
Av. Hrs/yr: 2,500 hrs p.a.

WORK PROFILE

Profile: Stockpiling at Coal Train Loading Facilities

PROJECT RESULTS

BEFORE INSTALL

(885 hour history prior to installation of BFS)

51.6

L/Hour

FINAL RESULTS

(performance at project completion)

45.7

L/Hour

11%

IMPROVEMENT

CARBON FOOTPRINT

Reduced by
2.5t per month
29.8t per year

\$ SAVING

@ \$1.40 / litre
\$1,315 per month
\$15,786 per year

FUEL SAVING

Reduced by
939.6 litres per month
11,275 litres per year

PROJECT VEHICLE

This Caterpillar D9H bulldozer is one of the machines used for stockpiling at the Jondaryan Coal Loading facility. A Biotechnix Fuel System (BFS) was fitted to this bulldozer on 6th February 2012. The fitting was made by clamping the BFS directly to the outside of the fuel line.

In order to monitor the machine's performance, 885 operational hours of fuel data prior to installation of the system was collected and processed to determine the fuel efficiency of the engine without the BFS installed. This was the baseline from which the improvement in performance was calculated. The baseline measurement for this machine was 51.6L/hour.



Figure 1 – Caterpillar D9H Bulldozer

FUEL SAVING RESULTS

The positive response to the fitting of the BFS was noticeable almost instantly and reached a 10% improvement within the first 100 hours of operation after fitting.

At the end of the project (250 operational hours), a total improvement of 11% was achieved. Fuel efficiency had reached 45.7L per hour.

FUEL SAVINGS TRANSLATED INTO DOLLAR SAVINGS

In dollar terms the 11% improvement over the project is the equivalent ongoing saving of \$1,315 per month (based on fuel cost of \$1.40 per litre). It is expected that approximately \$15,786 would be saved on an annual basis.

Over a two year period (the standard warranty period of the BFS) on this one vehicle the BFS can save over 8,770 litres with an estimated saving of \$31,572.

NB: This is a conservative estimate as it does not factor in a rise of diesel costs over the next 2 years.

REDUCTION OF GREENHOUSE GAS (GHG) EMISSIONS

The reduction in fuel consumption results in a corresponding reduction in carbon emissions. For every litre of fuel that is saved by using the Biotechnix Fuel System, carbon emissions from this vehicle are reduced by 2.695 Kg. [Reference for Kg of CO₂: "Carbon Emissions from New Australian Vehicles 2013" prepared by National Transport Commission - ISBN: 978 1 921604 07 2]

Using the fuel saving calculated over the period of the project, carbon emissions for this vehicle were reduced by 2.5 tonnes per month or 29.8 tonnes per year.

RETURN ON INVESTMENT (ROI)

In this instance the BFS would be paid for in full by the related cost savings within 2 months of purchase. Over a period of 2 years this system on this vehicle alone would generate an additional \$29,184 profit in fuel savings.

THE TECHNOLOGY

The Biotechnix Fuel System is an electronic device that produces a series of engineered frequencies which, when applied to the fuel line, changes the molecular structure of the fuel causing the fuel to combust faster and therefore more completely.

This is a new approach to improving engine efficiency; it is not an additive and is not magnetic.



INCREASE TORQUE:

Each combustion cycle in an engine lasts for only a fraction of a second. Because the BFS reduces the time needed to combust the fuel, more of it burns prior to the fuel being expelled from the engine. This increases torque as more of the fuel is used to power the engine and less partially burned fuel is sent out the exhaust.

REDUCE FUEL:

Because the engine is able to produce more power from the same amount of fuel, it can run at lower RPM to do the same work. When the engine runs at lower RPM it uses less fuel and thus reduces fuel costs.

REDUCE EMISSIONS:

Reduced fuel consumption also means reduced carbon emissions. For example, if fuel consumption is reduced by 5% then there is a corresponding 5% reduction in carbon emissions. In real terms, a 5% saving for a typical truck equates to a fuel saving of about 500L per month. Which at 2.695kg of CO₂ per litre would give this this vehicle a reduced carbon footprint of 16.2 tonnes per year. In addition to the carbon emission reduction, DT-80 vehicle emissions testing has shown a reduction in smoke opacity (soot) of over 55%.

NON-INVASIVE AND SAFE FOR YOUR ENGINE:

The Biotechnix Fuel System is completely safe for your engine. Because it is non-invasive, it will not void engine warranties and will continue to produce fuel savings for the life of the system.

