



EMPIRE
HYDROGEN
ENERGY SYSTEMS INC

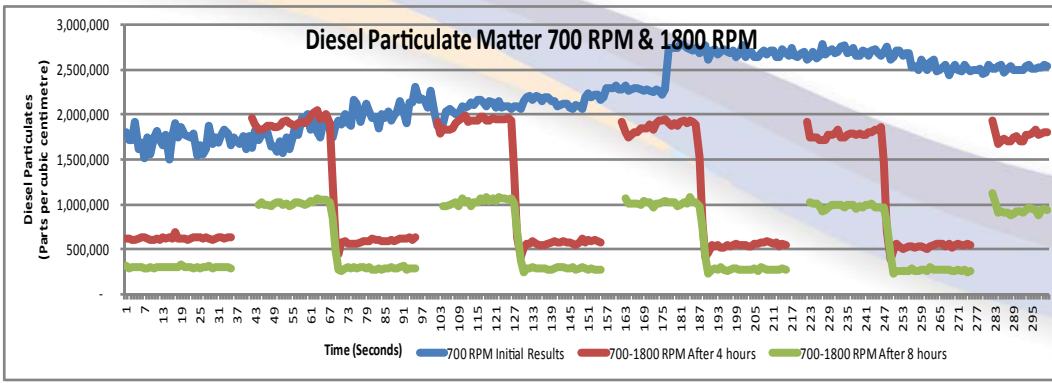
REDUCTIONS IN EMISSIONS AND FUEL CONSUMPTION



Protecting the environment from greenhouse gas and smog causing emissions is vitally important. The Empire Hydrogen Fuel Enhancement System actually saves diesel engine operators fuel and money while increasing horsepower AND dramatically reducing harmful emissions.

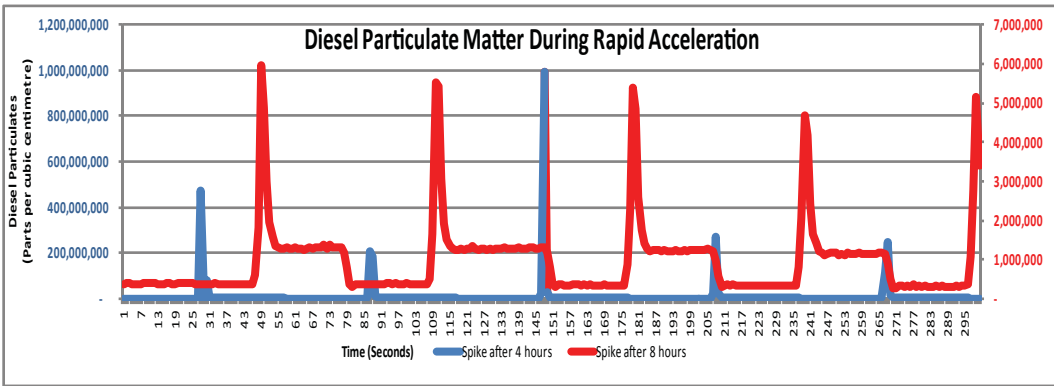
The Fuel Enhancement System splits distilled water into Hydrogen (H₂) and Oxygen (O₂) molecules through electrolysis. These accelerant gases flow through the air intake of any diesel engine and cause the fuel to burn faster, cleaner and more completely leading to 10%-25% improved fuel economy while reducing diesel particulate, CO₂ and NO_x emissions.



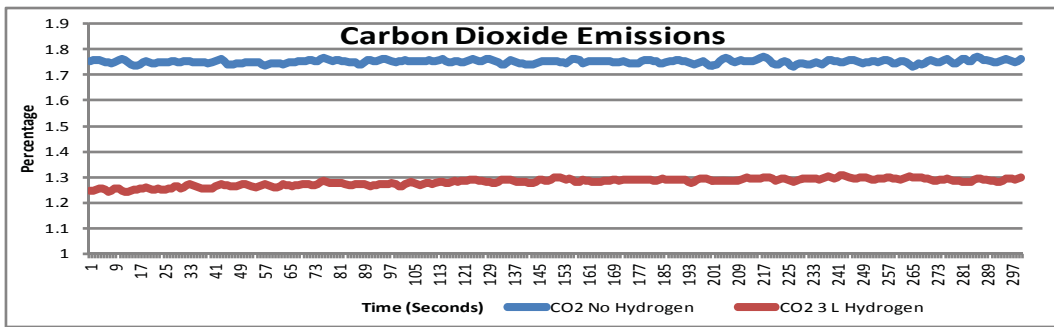


California Air Resources Board:
 It is estimated that about 70% of total known cancer risk related to air toxics in California is attributable to **Diesel Particulate Matter**. Non-cancer health effects include **Cardiopulmonary Death, Cardiovascular Hospitalization, Respiratory Hospitalization & Emergency room visits.**

Testing at the British Columbia Institute of Technology shows a dramatic drop in diesel particulates after 4 and 8 hours of operation at 700 RPM and 1800 RPM with H₂, O₂ injection. This coincides with how Empire's Fuel Enhancement System is known to burn diesel fuel more completely and remove existing carbon build up on pistons and cylinders. Notable is the 95% decrease in diesel particulate spikes (plumes of black smoke) during rapid acceleration from 700 RPM to 1800 RPM.



World Health Organization:
"The scientific evidence was compelling and the Working Group's conclusion was unanimous: diesel engine exhaust causes lung cancer in humans. Given the additional health impacts from diesel particulates, exposure to this mixture of chemicals should be reduced worldwide."



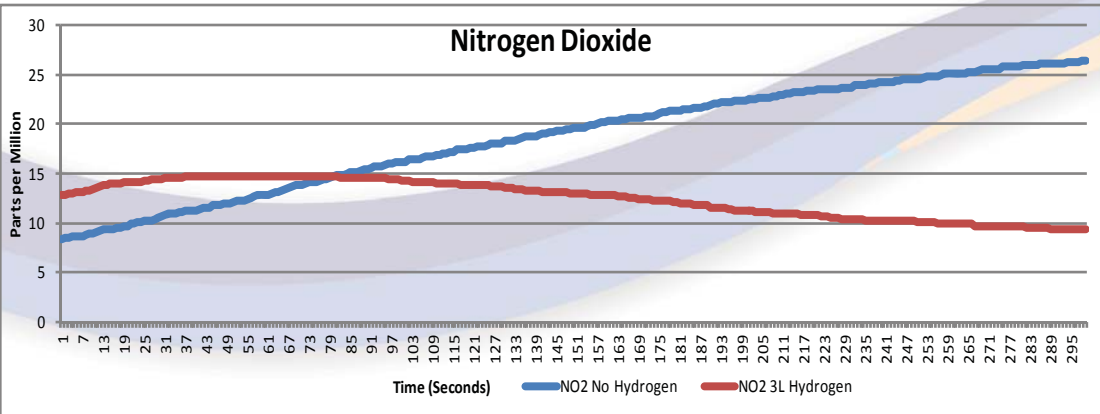
U.S. Environmental Protection Agency:
 The transportation sector generates the largest share of greenhouse gas emissions (nearly 28.5 percent of 2016 greenhouse gas emissions.) Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.

With 3 litres of H₂, O₂ accelerant gas flow per minute, the Empire Hydrogen Fuel Enhancement System is shown to reduce CO₂ greenhouse gas emissions by 27% during testing on a 15 litre generator at BCIT.

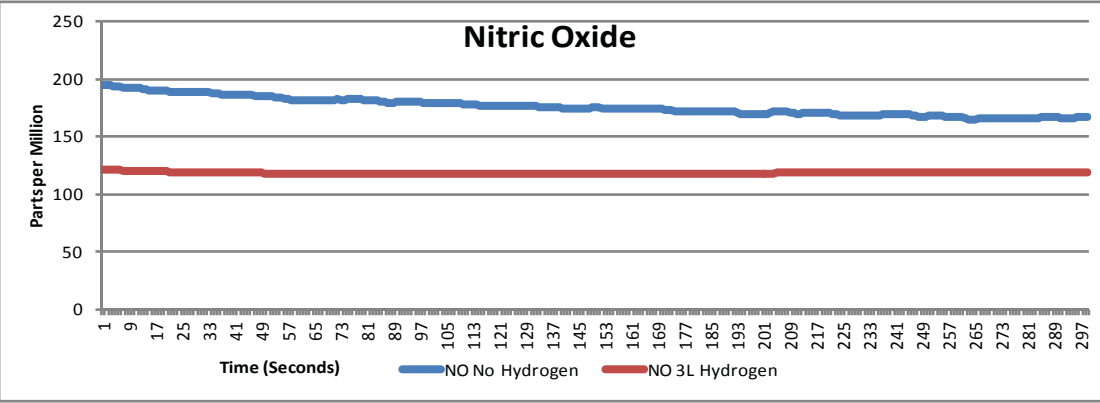
Chris Hutchins, Friesen Bros. Transport - 2002 Kenworth C12
 "When I'm following a lot of these big trucks with the dual stacks they're just creaming out the black smoke, and as you can tell ... I get white smoke out of mine, and that's about it."

Brian Dearden, Fernhill Freight and Storage
 "We have also noticed an increase in time between regen cycles on the sytem's emissions unit. It has gone from an average of 300km to 360km, depending on the driving conditions."

Peter Friesen, Friesen Bros. Transport
 "When the system is on you can smell it. It has a totally different smell, a sweet smell... as compared to a choking diesel smell. The driver reported less black smoke."



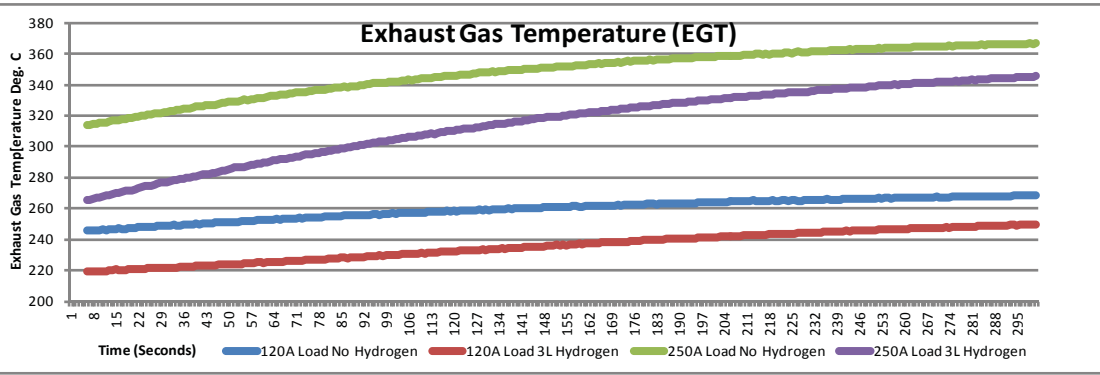
Effect of Water Induction on the Performance and Exhaust Emissions in a Diesel Engine. Youngtaig Oh et al: Department of Mechanical Engineering Chonbuk National University: The formation of NOx was significantly suppressed by decreasing the gas peak temperature during the initial combustion process because the water played a role as a heat sink during evaporation in the combustion chamber.



Empire Hydrogen's patented blow-back and dryer unit allows measured amounts of moisture to pass through to the engine combustion chamber, acting as a heat sink and reducing harmful Nitrogen Dioxide (NO₂) and Nitric Oxide (NO). Simultaneously, the unit prevents any possible spark from traveling back to the water storage tanks. Emissions testing on a 15 litre generator at BCIT shows dramatic reductions in NO₂ and NO.

Best Environmental Technologies: On Road Testing:

	Measured Emissions Reduction In:		
	CO ₂	NOx	Diesel Particulates
2008 Ford F350 Super Duty 6.4L Turbo Diesel:	21%	59.9%	62.5%
2007 Dodge 5.9L Turbo Diesel:	25%	37.5%	74.8%
2007 GMC W5500 5.2L Diesel:	11%	61.3%	73.7%
1994 Detroit Diesel 60 Series	31%	23.8%	85.5%



Effect of cooling the recirculated exhaust gases on diesel engine emissions. Nidal H. Abu-Hamdeh Jordan University: Combustion is one of the major causes of air pollution. It was found that decreasing the temperature of recirculated exhaust gases resulted in reductions in oxides of nitrogen and carbon dioxide.

The Empire Hydrogen Fuel Enhancement System is shown to reduce engine exhaust temperature at 120 Amp and 250 Amp loads on a 15 litre generator in testing at BCIT.



Testing on Fuel Economy:

Artana Solutions: Laboratory (dynamometer) Testing Performed at BCIT:

- 2016: Taylor DX33 dynamometer: Fuel reductions up to 13.1% at 1400 rpm.
- 2017: Taylor DX34 dynamometer: Fuel reductions up to 11.9% at 1200 rpm.

Best Environmental Technologies: On Road Testing:

- 2008 Ford F350 6.4L Turbo Diesel: 20.3% reduced fuel consumption
- 2007 Dodge 5.9L Turbo Diesel: 24.05% reduced fuel consumption
- 2007 GMC W5500 5.2L Diesel: 16.17% reduced fuel consumption

Customer reported results:

- 2003 Kenworth, 15L ISX Cummins: 24.41% reduction in fuel consumption
- 1997 Kenworth: 14.6L Cat: 20.18% reduction in fuel consumption
- 1997 Kenworth: 12.6L Detroit Diesel: 19.33% reduction in fuel consumption
- 2012 Kenworth: 15L SX Cummins: 15.51% reduction in fuel consumption
- 2011 Freightliner: 15L Detroit Diesel: 22.22% reduction in fuel consumption

	Average Savings	Highest Savings	Lowest Savings
• Caterpillar 14.6 L	16.9%	30.2%	7.5%
• Mack 12.0 L	21.7%	29.7%	16.7%
• Cummins 15.0 L	17.6%	21.8%	16.8%

Effect of Hydroxy (H₂O₂) Gas Addition on the performance of a Diesel Engine. M.R. Dahake, AISSMS College of Engineering
 "When the hydroxy gas is mixed with air in a diesel engine, the thermal efficiency for compression ratio 18 increases by 9.25% and the specific fuel consumption is reduced by 15% at full load condition"

Chris Hutchins, Friesen Bros. Transport - 2002 Kenworth C12

"My Kenworth chip truck is used on a haul that normally used 420 litres of fuel per day. After the hydrogen injection system was installed we recorded a reduction of 40 to 50 litres per day (9.5%-11.5% savings) using the same driver and the same weight load."

Ron Basi, JenCan Transport - 2003 Kenworth 15 L Cummins

"In the city we're picking up about half a mile per gallon, but on the highway it's gone up - I've picked up a whole mile per gallon on a few trips. We were averaging in town between high 3's and 4 mpg. Sometimes we'd hit a 4 1/2, depending on traffic. Now I'm hitting 5's."

Glen Burns, Vihar Construction - John Deere 12.5 L Generator

"This generator is used 9 months a year, 24 hours a day, 6 days a week. We have always monitored the fuel consumption and knew that it burned 78.74 litres per hour. Under the same conditions the plant now consumes 63.78 litres; saving \$13.47 an hour."

Nick Jawanda, Target Pacific Coast Transport

"I have a 2012 Kenworth ISX Cummins 15L 500 hp fitted with an Empire system in February. My January average mileage was 5.2 mpg. February average mileage was 6.06 mpg. I am happy with what I'm seeing."



Empire Hydrogen Energy Systems
 Suite 7 - 10189 McDonald Park Rd.
 Sidney, BC, Canada, V8L 5X5
 +1.778.426.0911
 Admin@EmpireHydrogen.com