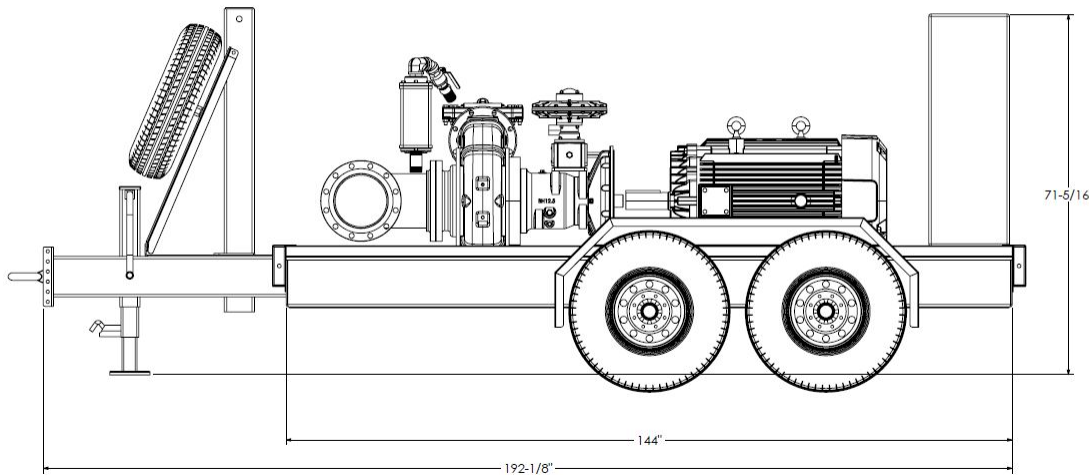




Green Pumping Technologies` `

Option 1: Electric Pumps



Pros:

- ✓ Emissions Free
- ✓ Quiet Operation
- ✓ Variable Speed Control and Automation

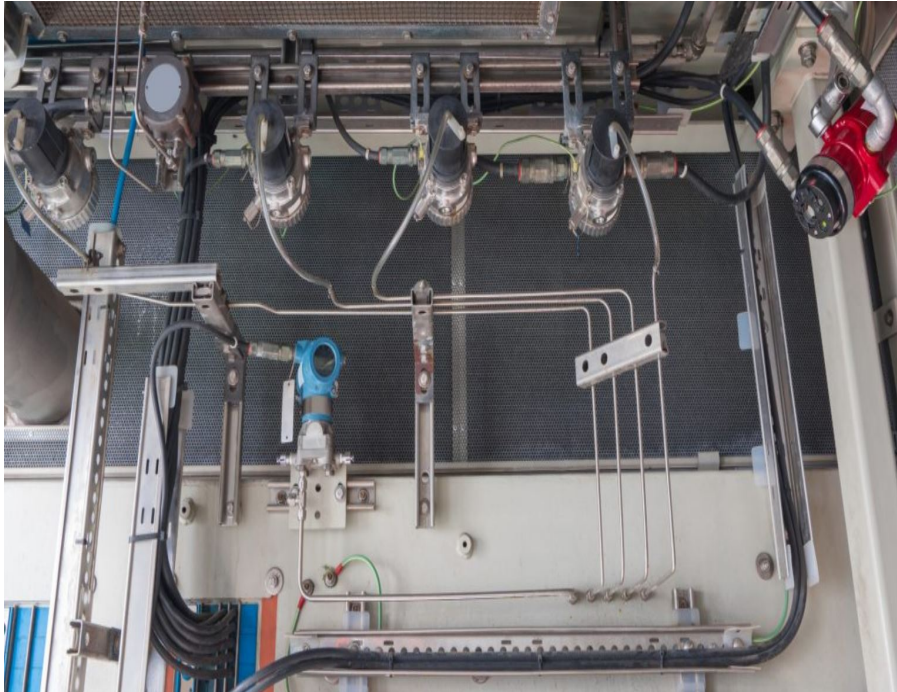
Cons:

- Need External Power Source

Fleet:

- ✓ 10x8s17
- ✓ 8NHG22
- ✓ 8x6c18
- ✓ 6x6s12

Option 2: Bi-Fuel



Pros:

- ✓ Up to 70% Diesel Reduction
- ✓ Lower levels of Nox, SOx, Reactive HC, PM-10 and opacity

Cons:

- Logistics of plumbing in gas – tough to do at every pump location
- Gas Conditioning, metering, and Pressure Reducing equipment can be necessary
- High Capital Cost
- Technical, Time intensive Installation
- THC and CO emissions increase over diesel alone

Bi-Fuel Emissions

1. Nox: 10% - 30% decrease
2. HC (reactive): 20% - 80% decrease
3. PM-10: 20% - 50% decrease
4. Opacity: 30% - 50% decrease
5. Sox: 50% - 70% decrease.
6. CO – Increase
7. THC (Total Hydrocarbon) - Increase



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Option 3:

The word cloud features the brand name 'ecogen' in large, bold letters. 'eco' is green, and 'gen' is red. A logo of a green leaf with a flame is positioned above the 'o' and 'g'. Below 'ecogen' is the text 'ecogen pumping system' in green. The word 'by Specialty Pump & Power Inc' is written in small black text below 'ecogen pumping system'. The word cloud includes terms such as: temperature, smoke, water, nitrogen, flow, cleaner burn, Co2, fuel, environment, energy, pollution, hydrogen, diesel, fossil, combustion, toxic, nox, ozone, emmissions, vapour, hydrocarbon, burn, control, green, ratio, harmful, ppm, climate, carbon, volatile, and greenhouse gas.



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SPP's Ecogen Pumping System® combines a centrifugal pump with Empire Hydrogen technology which splits water into Hydrogen (H₂)Oxygen (O₂) molecules. A small amounts (200_{ppm}) of these gases flow through the air intake of a diesel pump engine. Hydrogen burns ten times faster than diesel and acts as an accelerant, causing the fuel to burn faster, cleaner and more completely.





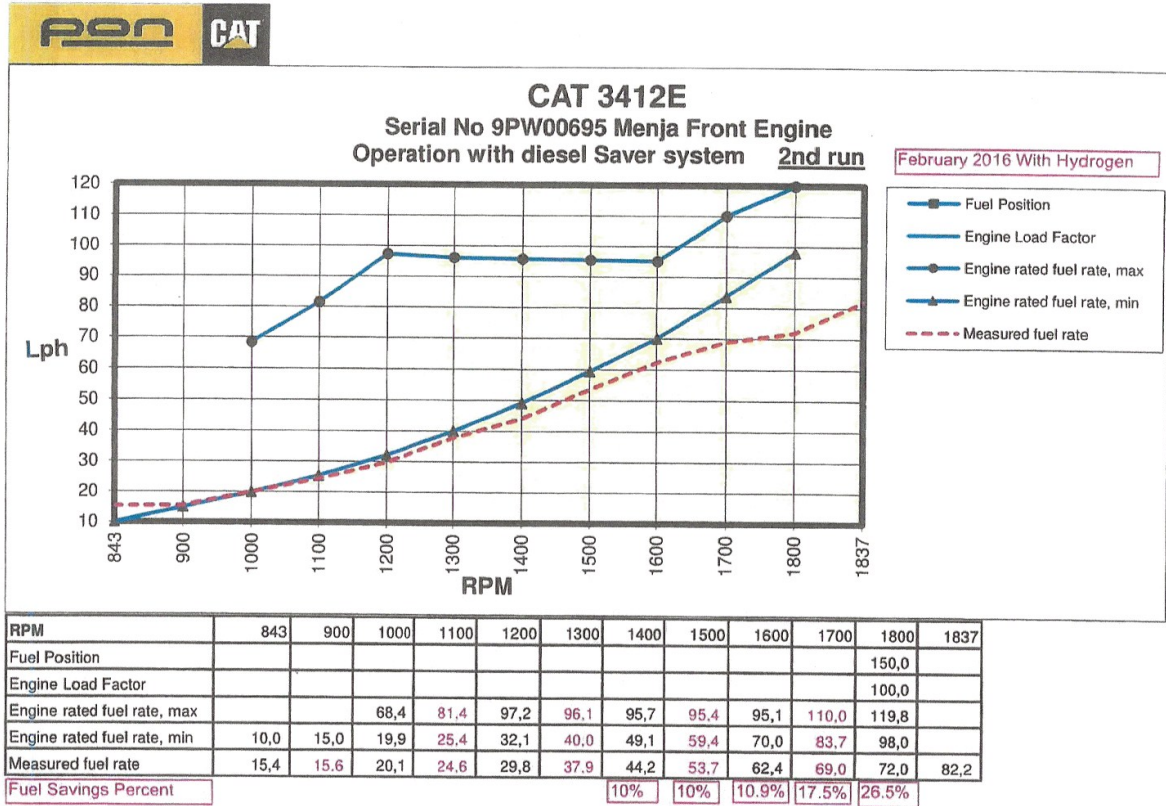
The improved combustion leads to 47% more power, up to 30% less fuel consumption and greenhouse gases, 60% less NOx and up to 95% reduction in diesel particulates, DPF regen cycles and cleaning.

Finally, any excess carbon build-up in the internal combustion engine will be burnt off, and the diesel engine will run much cleaner, leading to dramatically increased engine life and pump up-time.





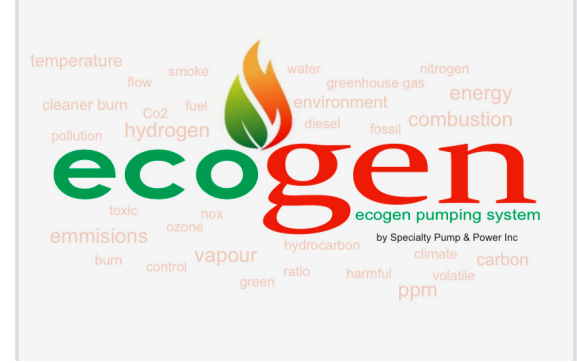
Fuel Savings up to 30%



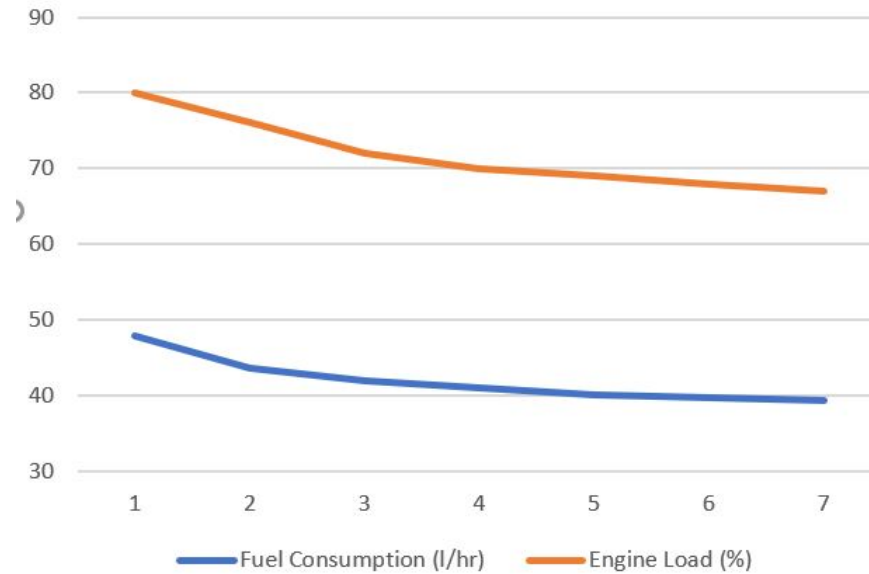
Ecogen works throughout the operating range of the diesel engine, with maximum fuel savings at high, steady loads – exactly where we design our pumping systems to run.

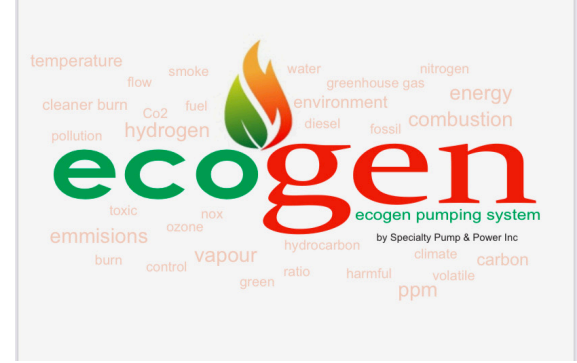


Ecogen 7 Hour Pump Test 18% Diesel Fuel Saving 13% Power Improvement



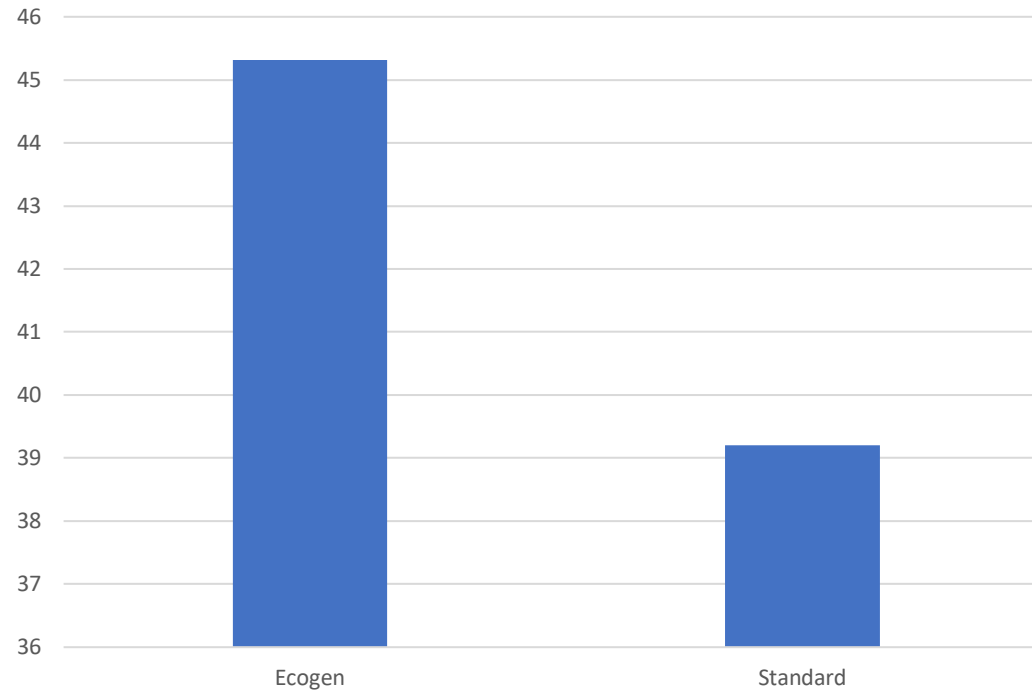
10x8S17 JD6090 325HP
1800 RPM

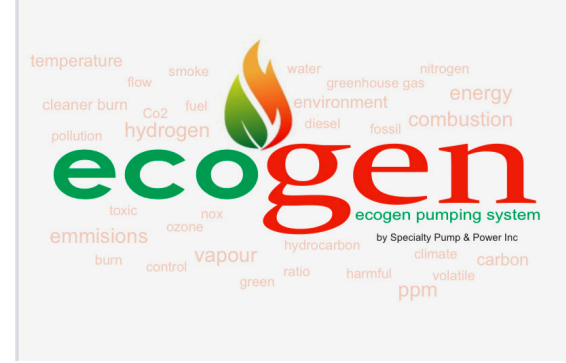




Ecogen 31 Litre Pump Test

Run Time (min) on 31 Litres of Diesel
Pioneer 10x8S17 JD 6090 325HP 1800RPM





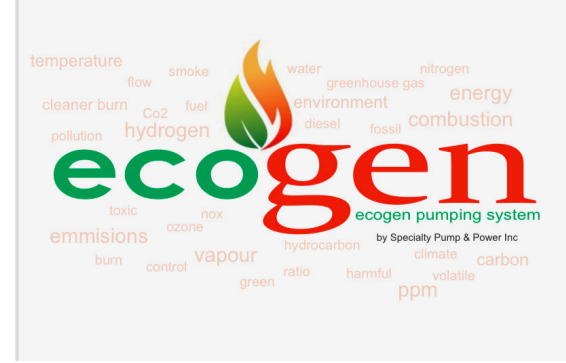
Projected Savings at 75% Load

Model	HP	l/hr	75% load	l/day	Cost of Diesel	Diesel cost per day	fuel savings/day
6x6s12	85	14	10.43	\$ 250	\$ 1	\$ 250	\$ 50
8x8s12	85	26	19.50	\$ 468	\$ 1	\$ 468	\$ 94
8x6s17	226	35	26.25	\$ 630	\$ 1	\$ 630	\$ 126
8x6c21	525	98	73.50	\$ 1,764	\$ 1	\$ 1,764	\$ 353
10x8S17	430	55	41.25	\$ 990	\$ 1	\$ 990	\$ 198



Power Boost Regardless of Load

	25% Load Pre Ecogen	25% Load W/ Ecogen	50% Load Pre Ecogen	50% Load W/ Ecogen	75% Load Pre Ecogen	75% Load W/ Ecogen
Tico TC Pro-Spotter Torque Improvement	299 ft-lbs	204 ft-lbs 46%	770 ft-lbs	595 ft-lbs 29%	995 ft-lbs	896 ft-lbs 11%
Volvo VNL 600 Torque Improvement	844 ft-lbs	573 ft-lbs 47%	2,234 ft-lbs	1,720 ft-lbs 30%	3,211 ft- lbs	2,694 ft-lbs 19%



Increase Service intervals up to 3X

Diesel Particulate Matter is burned by the H₂O₂ gas, creating more power, and reducing DPF emissions by up to 95%.

Thus seepage of DPM is past the piston rings, and into the oil reservoir and lubrication system is drastically reduced.

So the oil maintains its viscosity and lubricity longer



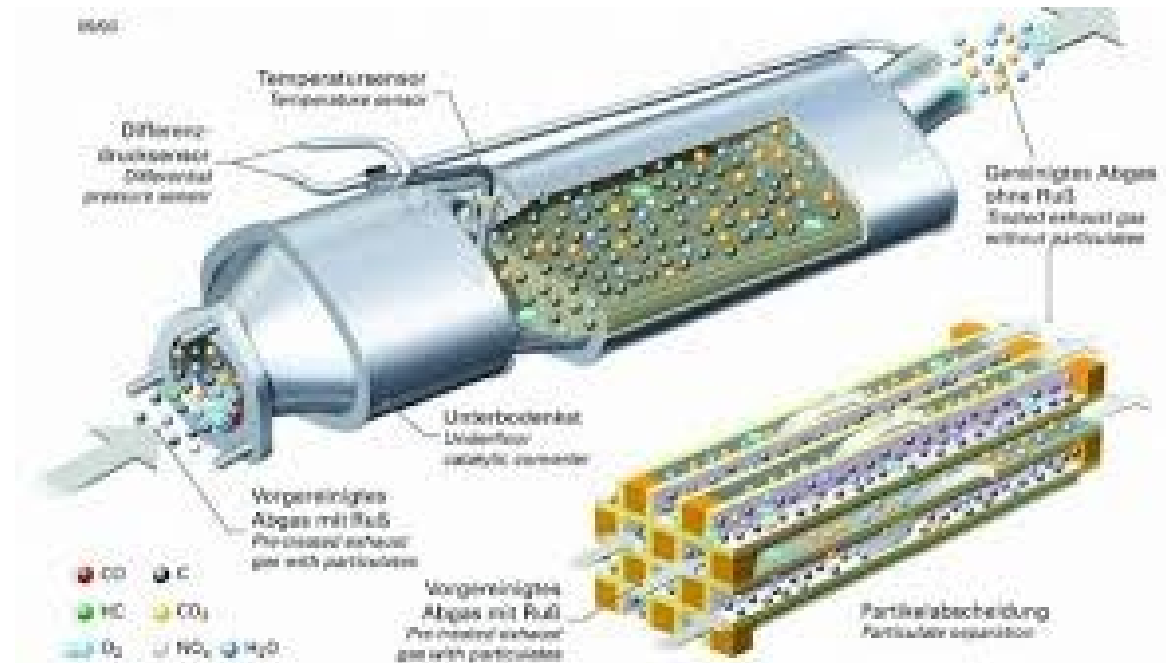


Tier 4: Extended DPF Life

H₂O₂ gas burns 10x faster than diesel, creating more power and reducing total DPM.

Therefore, the need to regen can be reduced by up to 40%, thereby mitigating the risk of engine derate

All this leads to Extended life of Diesel Particulate Filters and cleaner burning Diesel Oxidation Catalyst.





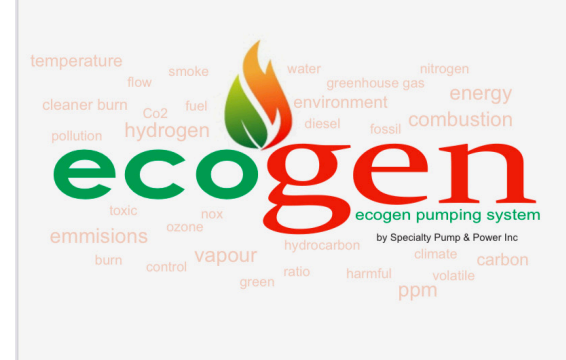
Increased Engine Life

Extended Life of Turbo

Extend Life of Piston Rings

Extend the Life of Engine Bearings





Diesel Pump Operating Issues

Smog Causing Emissions at Light Engine Loads:

Diesel hydrocarbon and particulate matter emissions occur mainly at light engine loads. This is a result of lean air-fuel mixing where the flame speed is too low for complete combustion. Unburned hydrocarbons flow out the exhaust as smog causing particulate matter, nitric oxide (NOx) and greenhouse gases (CO).

Ecogen Solution:

The Ecogen Pumping System introduces a small amount of Hydrogen (H₂) and Oxygen (O₂) gases into the engine during the induction stroke. As the piston compresses, the Hydrogen gas ignites at the initiation of the power stroke with a dramatically expanded flame front which leads to up to 95% reduction of Diesel Particulates at low loads.



Diesel Pump Operating Issues

Fuel Economy & Horse Power at High Engine Loads:

Diesel engine efficiency drops above 60% engine load, but for optimal pump efficiency, we like to run between 60%-80%.

Diesel Engine efficiency drops with increasing load because the volume of air intake is fixed while the fuel intake increases with throttle pressure. The imbalance of oxygen-to-diesel results in unburned diesel, a reduction in fuel economy and engine efficiency.

Ecogen Solution:

The Ecogen Pumping System introduces both Hydrogen (H₂) and Oxygen (O₂) gases into the ignition process. The added Oxygen significantly improves the fuel burn, resulting in up to 30% improvement in fuel efficiency and a 3% increase in horse power.

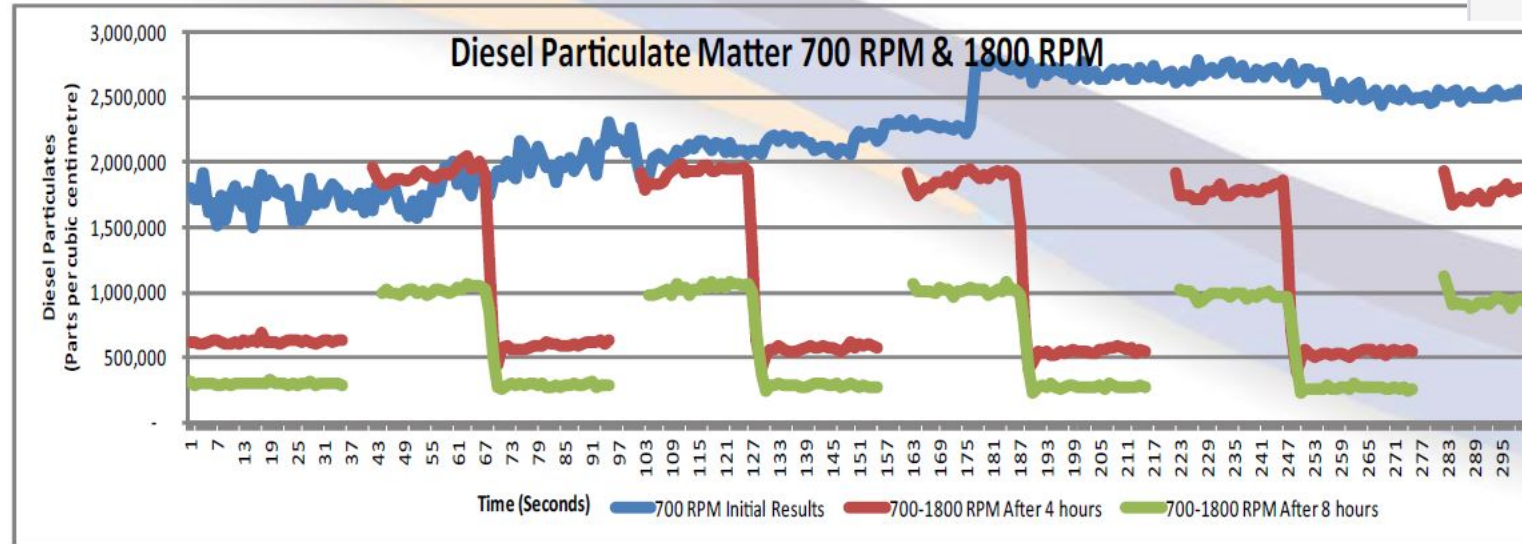




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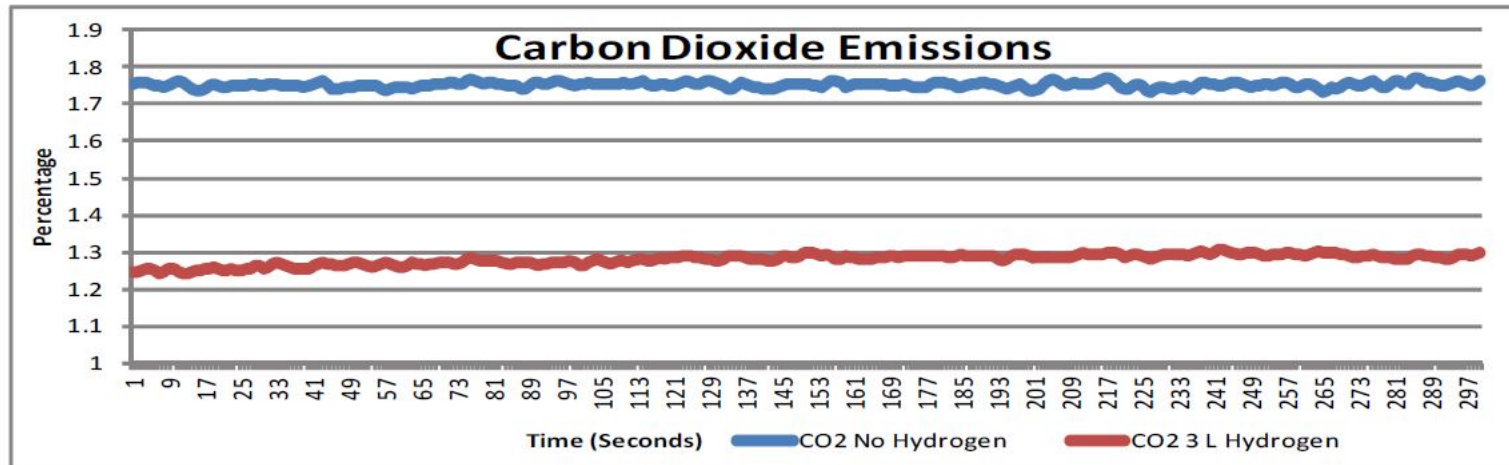
95% DPM Reduction



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 process that Ecogen burns diesel fuel more completely and removes 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.



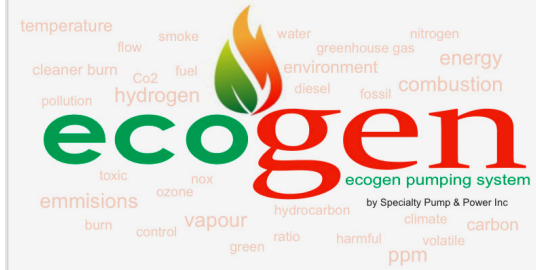
CO2 Emissions



With 3 litres of H₂O₂ accelerant gas flow per minute, the system is shown to reduce CO₂ greenhouse gas emissions by 27% during testing on a 15 litre generator at BCIT.



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Greenhouse & Noxious Gas Emissions Reductio

Vehicle	CO₂	DPM	NO_x
2008 Ford F350 6.4L Diesel	-21%	-62%	-60%
2007 Dodge 5.9L Cummins DI	-25%	-75%	-38%
2007 GMC W5500 5.5L Diesel	-11%	-73%	-61%
1994 Detroit Diesel 60 Series	-31%	-86%	-24%

Safety Features

1. Enabler wire system insures that H2O2 is only produced when engine is running
2. Hydrogen is produced slowly at 200PPM, and is instantly injected pre-turbo. It is never stored.
3. Patented dryer/blowback preventor performs two tasks:
 - The cannister optimizes moisture content in the H2O2 gases
 - In the event of backfire, ceramic beads arrest any H2O2 gas from moving backward in the system
4. System automatically stops when Positive air shut off is activated.
5. Multiple internal heaters to prevent freezing





Which Technology is right for your application?

	Electric	Bi-Fuel	Ecogen				
Portability	Need Power Source	Need Gas Supply and aux equipment, gas must be plumbed in.	100% Portable				
Fuel Economy	Power Cost Only	Fuel savings relative to engine load <table border="1" data-bbox="1144 675 1398 751"> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>					Up to 30% Reduction of Diesel
Emissions	Generator only	Greenhouse gas increase Noxious gas decrease	Greenhouse and Noxious gasses decrease				
Capital Cost	Moderately higher than diesel	Double pump cost	Moderately higher than diesel				
Installation	Must be built Electric	complex & Time consuming	Simple Conversion				
Maintenance	Low	Has negative effect on Engine	Increases engine life				
Carbon Credits	YES	NO	YES				



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Questions?