



HydrogenPlus

# A powerful and proven way to reduce fuel costs and emissions in diesel engines



Reduce fuel usage by 10-30%+ depending on application



Certified + verified by 3rd party testing



Generates Carbon Credits

## Introducing the i-Phi™ Gen 2

The i-Phi™ (Incremental - Partial Hydrogen Injection) Gen 2 System is a patented, hydrogen-on-demand technology for diesel engines that improves engine performance, while also dramatically reducing both fuel costs and carbon emissions. Hydrogen Plus is the Canadian company with international rights to the i-Phi™ technology.

The i-Phi™ technology was developed by Innovative Hydrogen Solutions (IHS). Extensive third-party testing, proving both the performance and environmental merits of the technology, has resulted in 6 patents. An ISO 14064 Part 2 Carbon Plan has also been completed, which allows a Green Print Assessment to be done, verifying the carbon credits earned on each installation.

Together, Hydrogen Plus and IHS have over 300 million kilometres of on-road experience with hydrogen injection technology.

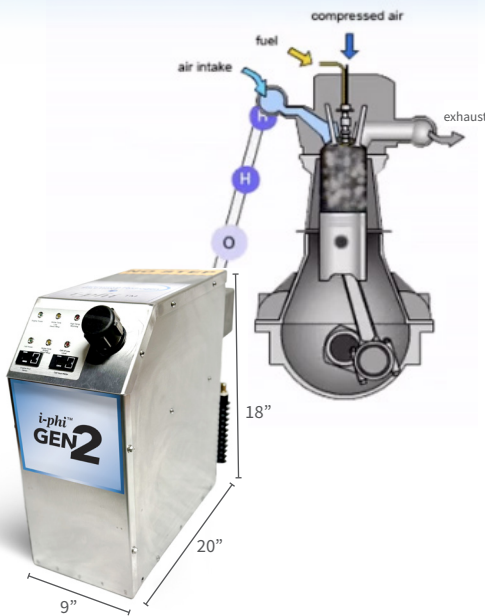


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## How the i-Phi™ System Works

The i-Phi™ unit produces hydrogen and oxygen gases “on-demand” from the controlled electrolysis of distilled water. These gases are then delivered to the engine’s air intake where they improve overall engine efficiency by aiding in a more complete and faster combustion of the air-fuel mixture. This increases engine power and torque, allows the engine to run longer on the same amount of fuel and reduces greenhouse gas emissions.

The company has received letters from major engine manufacturers that the technology does not affect engine OEM warranties.

## i-phi Gen 2 Advantage

The Gen 2 was developed to be able to install in even more applications. It is more compact than the earlier model. The water reservoir which was remote before is now self-contained in the i-Phi unit itself. No need to have the water reservoir under the bunk, between the seats or taking up room inside the generator. It was also designed with ease of installation in mind. Install time takes about half as long as before. Now 3-4 hours vs 6-8 before.

### PROVEN TECHNOLOGY

i-Phi™ is the only hydrogen injection system that has been proven to reduce diesel fuel consumption by injecting the correct amounts of hydrogen and oxygen into the engine air intake to maximize combustion and minimize emissions.

### EASY INSTALLATION

The i-Phi™ unit is now the size of a computer tower and can be easily installed on almost any new or existing diesel engine. Multiple i-Phi™ units can be linked together for larger engines.

### LOW MAINTENANCE

It requires no maintenance, other than adding small amounts of distilled water (about 6 litres every 128 operational hours).

### SAFE

i-Phi™ is very safe since no hydrogen is stored in the unit and it only operates when the diesel engine is running.

### EXTENSIVE THIRD-PARTY TESTING

The i-Phi™ has undergone extensive third-party testing with impressive results (see example below). These tests show that the i-Phi™ is safer than storing hydrogen in an on-board tank, and more cost-effective than other hydrogen on demand technologies (including processing methane/methanol to produce hydrogen).

Test Report Reductions	Fuel	CO	CO2	PM	NOx	THC
	Highway Driving	31.0%	38.2%	30.8%	86.1%	23.8%
City Driving	13.1%	37.6%	12.7%	16.1%	8.6%	16.9%

Source: Test Report prepared by Clean Air Technologies International Inc. (CATI)

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## The Financial Value Proposition For Your Business

Based on third party testing and customer experience, the i-Phi™ unit can be expected to provide the following financial benefits:

- 8% to 30% fuel savings
- Lower DEF usage
- 30% to 50% reduction in maintenance savings (fewer oil, filter, and fluid changes)
- 5% to 15% longer engine life
- Extended DPF filter life

**These savings add up to typical cost savings of about 20%-30% overall.**

## Improved Environmental Performance

**Your company can significantly improve its ESG (Environmental, Social and Governance) rating** because the i-Phi™ systems delivers the following emission reductions:

- 8% to 30% decrease in CO<sub>2</sub> levels
- 11% to 23% decrease in NOx levels
- 22% to 86% decrease in particulate matter (PM)
- 10% to 20% decrease in Total Hydrocarbon (THC)

These reductions lead to even **more financial savings** as they are **eligible for Carbon Credits**, which have been quantified through our Green Print Assessment.

**This 65,000 litre tank represents**

**THE AMOUNT OF FUEL SAVED IN JUST 6 MONTHS**

**+ \$110,000 in Cost Savings**

DATA PROVIDED BY ALBERTA AGGREGATES FOR ONE GENERATOR WITH THE I-PHI GEN 1 INSTALLED IN FALL 2021



## A Compelling Return on Investment

The price of an i-Phi™ system varies depending on engine size, configuration, location, and application. In most cases the installed cost will be **fully re-couped in 6-9 months** (some as low as 2 months). This an excellent return on investment that is getting even better as diesel prices rise. Installing the I-PHI™ system is a very good way to hedge against fuel price increases.



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## CUSTOMER TESTIMONIALS



*“The I-PHI™ units have stood up very well quality wise. We are running 31 units on our equipment from transport trucks to John Deere power units and John Deere Tractors and have found fuel savings on every application.”*

**Shane VanVeen**  
President, Wessuc Inc.



*“Since the I-PHI™ system was installed in August we are seeing around a 22-25% decrease in fuel usage.”*

**Richard Smith**  
Owner, Alberta Aggregates

## RESULTS SUMMARY (FOR SELECTED CUSTOMERS)

CUSTOMER	ENGINE SPECIFICATIONS	RESULTS
Wessuc Transport	A variety of 13-15 litre engines in fleet: MACK CXU613, Volvo VNL 64T, Kenworth T800, Western Star Vac Trucks	>20% fuel savings (average of 24%) 50% fewer oil changes
Shah Transport	Detroit Diesel CASCADIA 14.8 litre	17.6% diesel fuel savings 50% fewer DEF and regen filter replacements
Searcy Trucking	Volvo D13TC, 13 litre	12-15% diesel fuel savings
Schroeder Freight	Volvo D11, 11 litre	14-21% diesel fuel savings Extended oil use by 30%
Stewardship Ontario (Plein Disposal Inc. & Turtle Island Recycling)	Curbside Recycling Trucks; Plein – International GDT225, 7.6 litre; Turtle Island - Fanotech F175HT3V, 7.2 litre	7.3% diesel fuel savings 30% NOx reduction 38% PM reduction
Danish Marine Authority	CAT 3412E	10-26.5% diesel savings (depending on RPM level) 20% NOx reduction
Aga Khan University	CAT 3406; 375 – 465 HP; 14.6 litre	>20% diesel fuel savings Noticeable reduction in black smoke
Daudson’s Armoury	Cummins NTA855-G1B (250KVA); 14 litre and Cummins NT833-GA (320 KVA); 14 litre	21% diesel fuel savings + 12.5% diesel fuel savings Noticeable reduction in black smoke
Alberta Aggregates	Cummins 23 litre	22-25% diesel fuel savings Black smoke eliminated Oil change interval extended



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