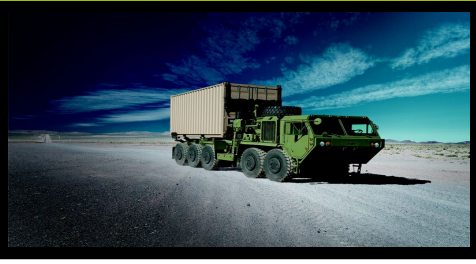
decarbX
the path toward decarbonization

THE PATH TOWARD DECARBONIZATION

HC PM NO_x N_2O SO_2 CO CH_4 CO_2



INDUSTRIAL ENGINE
decarb catalyst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Why does an Engine Control Unit (ECU) only "estimate" fuel consumption?

Manufacturers use electronic modules on diesel engines to regulate fuel injection timing, air-fuel mixture, turbocharger boost pressure, and exhaust gas recirculation to optimize performance and minimize emissions. Additionally, the ECU detects and diagnoses potential issues, enabling prompt maintenance and repairs.

While an Engine Control Unit (ECU) can offer valuable information for monitoring and regulating engine performance, it is not a reliable tool for accurately measuring fuel consumption. Relying solely on an ECU for this purpose may lead to inaccurate results. It's important to use more precise methods, such as direct fuel measurement or fuel flow sensors, to obtain accurate data on fuel consumption. Overall, investing in more accurate fuel consumption measurement can add significant value to a company that operates heavy diesel assets.

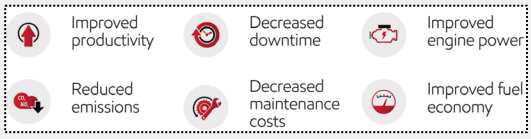
Why accurate fuel consumption measurement is paramount?

The accurate measurement of fuel consumption is extremely important for companies that use heavy diesel equipment, as fuel costs make up a significant portion of their operating expenses. By using advanced fuel monitoring systems and technologies, companies can get valuable insights into their fuel usage patterns, identify areas of inefficiency, and make data-driven decisions to improve fuel consumption and cut costs.

Accurate fuel consumption measurement allows for real-time tracking and monitoring of fuel usage. Analyzing precise data can identify trends, anomalies, and inefficiencies, helping companies implement strategies to reduce fuel waste and save money.

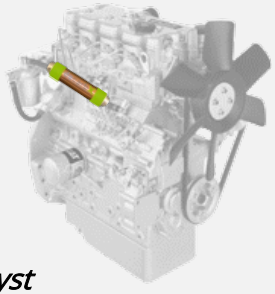
Fuel efficiency is crucial to operations.

Using the decarbX Fuel Catalyst enhances fuel efficiency reduces costs, decreases pollution, promotes sustainability, enhances performance, prolongs lifecycle, boosts economy, and reduces dependency on oil:



Report reductions in carbon footprint.

Reducing carbon footprint is a strategic decision for companies, bringing cost savings, regulatory compliance, improved reputation, risk management, employee engagement, and competitive advantage. Real-time reporting is crucial for stakeholders.



decarbX™ Catalyst

Various models for engines ranging from single cylinder to over 3,700 horsepower are available to meet current and future requirements in construction, mining, material handling, agriculture, and power generation markets.

Measuring the Performance

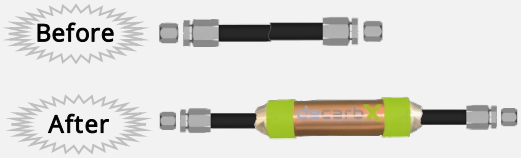
A proof of concept is essential to validate the effectiveness and feasibility of fuel efficiency products before allocating resources to widespread implementation.

Proof-of-Concept (POC) Protocol

After installing the fuel flow sensors, it is crucial to follow these steps to accurately measure performance changes resulting from using the decarbX Catalyst:

Protocol

1. Calibrate the newly installed fuel flow meters to ensure accurate measurement of fuel consumption on the diesel engine.
2. Use maximum data frequency to record baseline fuel consumption without the decarbX Catalyst. Duration: **300 hours**
3. Install the decarbX Catalyst on the diesel engine by removing existing fuel line and then connecting new fuel line to the catalyst:



4. Monitor and record fuel consumption with the decarbX in operation using the newly installed fuel flow meters. Duration: **450 hours**[1]
5. Analyze the collected data to assess the impact of the decarbX Catalyst on the overall fuel efficiency of the diesel engine.

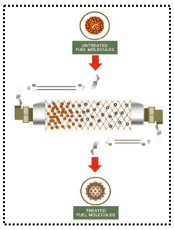
[1] Fuel efficiency begins to stabilize approximately 150 hours after installation.

The decarbX Catalyst Technology

The patented decarbX Catalyst technology was developed in the United States as part of a university-sponsored research project funded by the inventors. It aimed to tackle the increasing health issues of air pollution caused by diesel equipment.

Researchers discovered that within a typical diesel engine combustion, fuel molecules tend to cluster together, which hinders them from being completely exposed to oxygen during the burning process. As a consequence, nearly 50% of the molecules remain unburned and are emitted as waste in the form of CO, CO_2, SO_X, NO_X, N_2O, and particulate matter (PM).

Catalysis changes proportions of alkanes to aromatics and decreases vapor density for more ei cient combustion.



The decarbX Catalyst uses a unique blend of rare earth elements and precision-manufactured metal components. This blend facilitates a catalytic process that conditions the fuel, breaking apart clustered molecules and enabling better mixing with oxygen. As a result, the fuel is able to undergo a more thorough burn at the point of combustion.

Installation of the decarbX Catalyst on Diesel Equipment

Modern diesel systems utilize a common rail fuel design that provides high pressure either near the fuel injectors or immediately past the filters outside the engine. The decarbX Catalyst leverages specific thermodynamic and fluid properties of the fuel at lower pressure.

As a result, each installation occurs on the fuel supply line after the filters and before the high-pressure parts of the common-rail system. This allows for easy installation without interfering with the engine's internal components.

Due to its standardized form factor and placement in the fuel supply line to the engine, there is no interference with the engine's operation, ensuring no issues with the OEM warranty.

The decarbX Catalyst Works on Biodiesel

The decarbX Catalyst improves combustion processes for all fossil fuels, including biodiesel, by helping to convert pollutants into less harmful substances.

When burning fossil fuels, including biodiesel, they produce pollutants like CO, NOx, and unburned hydrocarbons (HC). Even though biodiesel is made up of fatty acid methyl esters (FAMEs) which are chemically different from conventional diesel fuel, the basic combustion principles are still similar.

The Model EX1 decarbX™ Catalyst

under 100 hp

Features

- Optimized for low and high-pressure injection
- Simple installation
- No moving parts or electrical connections
- Works on all biodiesel fuels

The Model EX1 catalyst works on all makes and models of 1 to 4 cylinder diesel engines up to 100 horsepower. It utilizes the same patented technology as our other catalysts and works on any diesel or biodiesel less than B100. Certified alternative fuels, including Hydrotreated Vegetable Oil (HVO), Renewable Diesel (RD), and Hydrotreated Renewable Diesel (HRD) that meet EN 15940 or ASTM D975, can be used with EN 590 diesel. With no moving parts or additives, there is zero maintenance and a long operating life.

Continuous flow

Copper mesh screens with an opening size of 1.52 mm are RoHS 3 (2015/863/EU) Compliant and have nonsparking and nonmagnetic properties

Technical Specifications

Mechanical Data

Copper Type-K and milled aluminum #6061 housing	
Copper mesh screens offer 1.52 mm pathway for easy flow	
Size without fittings:	108 x 32 mm
Weight:	0.23 kg
Connection (female):	1/8" JIC6
Torque:	75N·m

Environmental Data

Temp. range (operating)	-40 to 118°C
Working pressure:	up to 34 bar (internal)
Max. flow rates:	19 liters per minute
Working pressure:	Up to 34 bar (internal)
Fluid Compatibility:	#2 diesel, biodiesel (<B100)