





## The Clean Diesel Difference

Established in 1994, Clean Diesel Technologies, Inc. (NASDAQ: CDTI) is a cleantech company that develops, designs, markets and licenses sustainable solutions to reduce emissions, increase energy efficiency and lower the carbon intensity of on- and off-road engine applications. In addition to reducing carbon dioxide (CO<sub>2</sub>) emissions, a key greenhouse gas associated with global warming, our innovative solutions significantly reduce four principal harmful emissions formed by the combustion of fossil fuels and bio-fuels without increasing secondary emissions such as NO<sub>2</sub>:

- *Particulate matter (PM)*
- *Hydrocarbons (HC)*
- *Nitrogen oxides (NO<sub>x</sub>)*
- *Carbon monoxide (CO)*

With headquarters in the United States and international operations served from the United Kingdom, we have a unique perspective on global solutions for emissions reduction. Backed with regulatory verifications and approvals such as those of EPA and VERT, Clean Diesel has created a suite of products that are cost-effective, sustainable and used with proven success in new equipment and retrofit applications including the following markets:

- *On-road heavy-, medium- and light-duty*
- *Agriculture*
- *Construction*
- *Power generation*
- *Mining*
- *Locomotive*
- *Marine*
- *Port systems*



## Meeting Global Air Quality Standards

Deteriorating air quality and concerns about climate change are driving global regulations for control of harmful combustion emissions. In addition to its health hazards, soot (black carbon) is recognized as a major contributor to climate change, compounding the effects of CO<sub>2</sub>. Oxides of nitrogen, including NO<sub>2</sub>, contribute to respiratory illness, smog and ground-level ozone issues together with secondary climate change effects. Clean Diesel provides solutions that are effective for:

- *Original equipment manufacturers (OEM) and Tier 1 suppliers seeking the latest emissions technologies*
- *Businesses entering the emissions control market and looking for complete solutions and know-how*
- *Operators requiring compliant emissions solutions*
- *Regulators creating policy*

## Clean Diesel Value

<b>Emissions reduction</b>	Meet mandatory or contractual air quality compliance requirements to reduce levels of harmful PM, NO <sub>x</sub> , CO and HC from diesel or bio-fuel applications
<b>Energy efficiency</b>	Enhance energy efficiency through more complete combustion, system-wide catalyst synergy, reduced back-pressure/mechanical system losses and more efficient emissions control operations
<b>Carbon reduction</b>	Support sustainability agendas with reduced carbon impact from the transportation and power generation sectors with lower primary and secondary greenhouse gases and soot emissions
<b>Maintenance reduction</b>	Expand the range of particulate filter applications with lower regeneration temperatures, fewer work stoppages and reduced unscheduled maintenance requirements
<b>Overhead cost reduction</b>	Provide a substantial reduction of precious metals used to produce catalyzed filters and oxidation catalysts, lowering the initial capital costs of vehicle and stationary systems and ongoing operating costs

**Intellectual property developed from original concept to full-scale commercial**



## Foundation Built on Technology

The global expertise Clean Diesel possesses creates an unprecedented perspective on forward-thinking emissions reduction technologies. With a wide-ranging intellectual property portfolio of more than 250 issued and pending patents, we have achieved broad market coverage through licensing to strategic partners for worldwide manufacturing, product distribution, sales and service with partners who provide a range of products including:

- *Airless injection and Selective Catalytic Reduction (SCR) systems to eliminate NO<sub>x</sub>*
- *Patented combination of SCR and Exhaust Gas Recirculation (EGR) to maximize NO<sub>x</sub> reduction and optimize fuel efficiency*
- *HC injection for emissions control applications*
- *Fuel Borne Catalyst (FBC) formulations for fuel economy and after treatment device synergy*
- *Wire Mesh Filter (WMF) particulate filter technologies*

## Core Products and Solutions

Product	Benefits	PM	NO <sub>x</sub> Reduction	CO <sub>2</sub>
<b>Purifier™ family of highly efficient PM control systems</b>				
Purifier™ e4	<ul style="list-style-type: none"> <li>• Diesel Particulate Filter (DPF)-based emission control system providing the highest level of PM reduction without an increase in NO<sub>2</sub></li> <li>• Reduced DPF regeneration temperature expands the applications in which a passive DPF can be employed</li> <li>• Minimize unscheduled maintenance and lowers overall operating costs</li> </ul>	99%+	9%	5-12%*
Purifier™ e3	<ul style="list-style-type: none"> <li>• Partial filter emission control system based on our Catalyzed Wire Mesh Filter (CWMF)</li> <li>• Best Available Control Technology for low-temperature applications where a DPF is not feasible</li> <li>• Low NO<sub>x</sub> solution with no NO<sub>2</sub> increase</li> <li>• Passive solution with low maintenance requirements</li> </ul>	76%	9%	5-12%*
Purifier™ e2	<ul style="list-style-type: none"> <li>• For high soot applications where neither DPFs nor partial filter solutions are applicable</li> <li>• Higher PM reduction than traditional diesel oxidation catalyst (DOC) with no increase in NO<sub>2</sub></li> </ul>	50%	5%	5-12%*
<b>Partial Filter Systems</b>				
Wire Mesh Filter	<ul style="list-style-type: none"> <li>• Durable, low cost options for controlling diesel PM</li> <li>• Catalyzed and uncatalyzed WMF versions available</li> <li>• Filters can be used with or without Platinum Plus FBC</li> <li>• Ideal for markets with varying fuel quality</li> </ul>	60%	9%	—
<b>Fuel-Borne Catalysts</b>				
Platinum Plus®	<ul style="list-style-type: none"> <li>• Improves completeness of fuel combustion to reduce emissions (PM, NO<sub>x</sub>, CO, HC) and enhances the performance to increase fuel efficiency and lower CO<sub>2</sub> emissions</li> <li>• Platinum Plus can also act as a problem solver for DPFs or partial filters to increase reliability and cost effectiveness of PM emission control systems</li> </ul>	15-25%	—	5-12%*
<b>NO<sub>x</sub> Reduction Systems</b>				
Advanced Reagent Injector System (ARIS®)	<ul style="list-style-type: none"> <li>• Patented systems and technologies for the injection and control of reagents in applications such as SCR and lean NO<sub>x</sub> traps, as well as NO<sub>x</sub> absorber catalysts and active DPF regeneration systems</li> <li>• Single fluid is used for both NO<sub>x</sub> reduction and injector cooling, so compressed air is not required for SCR operation</li> <li>• Applicable for reduction of NO<sub>x</sub> from all types of combustion engines</li> </ul>	—	100%	—

\*Typical in field fuel economy improvement and carbon reduction of 5-12% depending on fuel quality, engine type and application.

## Approvals and Verifications

Central to successful emissions reduction is deployment of systems that have undergone certification, verification and registration by regulatory bodies around the world. Clean Diesel, on our own and with our partners, has received verification and registration approvals required for emissions reduction sales in the US from the EPA and in Europe from VERT. These standards are honored by most countries around the world including Asia and the Americas.

Clean Diesel also has a number of local approvals, including certification by Transport for London, the Scottish Emissions Reduction Register, MSHA acceptance for mining applications and expands its available credentials through ongoing programs with leading groups such as the California Air Resources Board and the US EPA.

## Looking Toward the Future

Going forward, stricter regulations are expected to be implemented in markets worldwide. These regulations will focus not only on commercial and light vehicles, such as passenger cars, but also on two-wheeled and off-road vehicles, locomotives and marine transportation, and stationary power.

Meeting these requirements can be a difficult and costly challenge for users of diesel engines and OEM providers. Advances in engine design and new generations of filters have helped to meet more stringent requirements. However, with regulations becoming more rigorous, further advances will depend on innovative thinking and breakthrough solutions. These needs inspire Clean Diesel's ongoing commitment to deliver dynamic, cost-effective technology to leading OEMs, Tier 1 and Tier 2 suppliers, retrofit system providers and fleet owners every day.



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OEM | Retrofit | On-Road | Off-Road | Light, Medium & Heavy-Duty | Passenger Car  
Construction | Farming | Mining | Marine | Locomotive | Stationary Engines