Transport Topics

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EGR vs. SCR Battle Also Rages In Truck Classes 3-7 for 2010

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Diesel emission standards change again in January 2010, but unlike the previous modifications when all manufacturers used essentially the same emission-controlling technology, medium-duty truck buyers next year will have a choice of competing systems.

MEDIUM-DUTY ENGINES

In 2010, truck buyers will be able to choose either an expanded version of the current exhaust gas recirculation process, available on International trucks and MaxxForce-brand engines built by Navistar Inc., or a process called selective catalytic reduction, which all other commercial truck and diesel engine suppliers will use.

The target for all truck makers is to reduce emissions of nitrogen oxide to 0.2 gram per brake horsepower-hour, or about 90% of pre-2004 levels. How they do that is up to them.

Executives from Navistar and the truck makers planning to use SCR have engaged in a war of words over the past year, with representatives on each side accusing the other of fostering misleading

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Buyers Face SCR-EGR Choice

Diesel Exhaust Fluid Suppliers Offer Storage Systems

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information while also seeking to explain why its own technological strategy is better.

SCR proponents say their system makes it easier to reach the Environmental Protection Agency's tougher emissions standards by removing NOx in the exhaust pipe rather than expanding EGR on the engine, as Navistar will do.

Even 2010-compliant trucks using SCR will have EGR systems but at a lower exhaust recirculation rate, which may mean slight changes in the hardware and EGR performance.

Navistar contends its process not only will cause less disruption because it is a familiar system, but EGR also will cost less over the life cycle of the truck.

The SCR Process

SCR works by injecting a urea/water mixture, which truck and engine makers are calling diesel exhaust fluid, into the exhaust stream just before it enters a catalytic converter.

The DEF enables the converter to break down the NOx, yielding nitrogen and water.

Because SCR needs the exhaust fluid to function, EPA will require 2010-compliant models to ensure there is a consequence for running out of the urea/water mixture. Trucks will have signals and/or gauges to alert drivers when the DEF is running low.

They also will have controls to deter drivers from operating the trucks without DEF, ranging from reducing engine power so the truck can operate only in a slow, "limp" mode, to preventing the truck from starting after it has stopped, if the DEF is not refilled.

SCR-equipped trucks also will require some training for drivers and technicians, such as the meaning of the warning signals and how and when to fill the containers. SCR proponents contend these will be minor issues for medium-duty truck users.

"Light- and medium-duty truck owners are going to have a wide choice of access to DEF, and I can't see anyone having trouble getting it," LaBrie said.

Engine and truck makers will distribute the fluid in various container sizes through their dealerships. DEF also will be sold at some truck stops and probably by convenience stores and local retail outlets, proponents told TRANSPORT TOPICS.

Cummins Inc.

Cummins will sell diesel exhaust fluid under its Fleetguard brand in quantities ranging from 1 gallon (left) to 275 gallons (right).

"Since most Class 7 and smaller trucks come home each night, mechanics can look at DEF levels the same [way] they do with any fluids," said Alex LaBrie, principal of AirBlueFluids, a Brea, Calif., DEF distribution company. AirBlueFluids is one of six DEF distribution companies that have committed to distributing DEF nationwide.

DEF will be readily available, SCR proponents say.

Storage Issues

Unlike petrochemical products that can be stored or transported in aluminum, steel or other metal containers, DEF is slightly corrosive, so it can be stored only in stainless steel or plastic containers.

Companies that build the storage and transport containers, as well as the pump-dispensing equipment, said they have designed and tested models for all sizes of containers and are ready to go.

DEF works best in moderate temperatures. Fleets operating in extreme temperatures or with outside storage systems may have to monitor the fluid.

"You have to have a temperature-controlled system for outside containers, since it freezes at 12 degrees Fahrenheit and can degrade over a long period, six months or more, if stored over 80 degrees," said Dave Polak, president of BlueIUSA, Duluth, Ga. BlueIUSA's sister company, Easy Fuel and Tank Solutions, builds both aboveground and underground fleet fueling systems.

Jim Spooner, vice president and general manager of Colonial Chemical Co., a DEF supplier in Tabernacle, N.J., said DEF stored indoors will have a minimum one-year storage life, "though we've left it out for two years and used it with no deterioration."

DEF will be available in sizes ranging from one gallon to 250 gallons, and producers will put manufacturing dates on their containers. Indoor bulk containers won't need temperature controls.

Because DEF turns slushy and will not flow at 12 degrees Fahrenheit and below, truck makers will include a method to warm the solution on the truck, such as a heat exchanger in the DEF tank.

DEF will flow into the exhaust stream at rates controlled by onboard sensors and computers. The dosing rate will relate to engine size and activity, but the consensus from several SCR engine representatives is that the rate of DEF use will be about 1½% to 2% of diesel fuel use.

How often the onboard DEF container will need a refill will vary depending on

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container size, the truck and factors such as engine hours.

For example, a Freightliner Custom Chassis walk-in van with a 10-gallon DEF container getting 10 miles per gallon, running about 15,000 miles a year with an SCR dosing rate of about 2% would require about three DEF container fill-ups a year, said Michael Stark, senior technical sales manager.

Performance and Cost

The typical light- and medium-duty truck user may or may not see some change in fuel economy from current trucks, executives said.

Christy Nycz, Cummins spokeswoman, said the fuel economy for Cummins' medium-duty engines will "remain constant with the 2007-compliant products."

Rob Cadle, product planning manager with Isuzu Commercial Truck of America, said the company expects fuel economy in Isuzu trucks to improve, but he did not estimate by how much.

Alan Treasure, director of marketing for Paccar Inc., corporate parent of Kenworth Trucks and Peterbilt Motors, said Paccar's testing indicated that fuel economy would improve over 2007-compliant engines, but he did not offer details. Paccar will use Cummins' engines and aftertreatment system in its medium-duty trucks.

Although manufacturers have offered very few specifics, they all agree that 2010-compliant trucks will cost more, regardless of which technology is used.

By press time, only Volvo Trucks North America had released a cost — $9,600 — for the SCR technology on its heavy-duty trucks.

The typical cost premiums for medium-duty trucks probably will be less, in the range of $4,000 to $6,000, said Glenn Ellis, vice president of marketing and dealer operations for Hino Motors Sales U.S.A. Inc.

DEF cost has been used for marketing leverage for both proponents and critics of SCR.

Navistar executives have made public statements that DEF could cost up to $35 a gallon, citing half-gallon container prices they said they found for Mercedes-Benz diesel automobiles.

Although the price for DEF in all its various containers has not been set, Colonial's Spooner said that the company was selling DEF in bulk for about $2 a gallon.

"If you take the rack price of diesel and see the difference with retail diesel, you'll find that the price will be no problem," he said.

Spooner conceded that the small plastic containers could go for a higher price.

"If you have to buy a gallon of antifreeze if your radiator runs low, that might cost $6," Spooner said, "but that's not what you pay when you have the radiator flushed and a new supply put in."

Maintenance will be minimal for SCR systems, suppliers said. Cummins' SCR catalytic converter, the largest component, will not require periodic cleaning, Nycz said.

Most SCR systems will have a filter for the DEF, either in or near the DEF container or near the SCR canister, and Cummins said the maintenance interval for its filter would be about 200,000 miles.

Heavy-duty trucks may run through fewer regeneration cycles of the diesel particulate filters, but midrange trucks with Cummins engines should operate the same as current models, said Ginger Lirette, Cummins' account executive for Daimler Trucks North America.

"The [regeneration] duty cycle will remain about the same between 2007 and 2010 products, as the approach on [medium duty] has been to keep the engine the same base structure. EGR will be the same in 2010 as 2007, or very close," Lirette said.

Vehicle Availability

Some 2010-compliant medium-duty models will be available later this year, but some may not show up on dealership lots until well into 2010.

The Japanese brands will be the last to arrive. Transit time from Japan for Mitsubishi Fuso trucks, for example, could take three months or more, said Michael Rumsey, vice president of sales. Add time in the ports and shipping, and it could be late summer before 2010-compliant trucks show up on dealer lots.

Trucks that are produced in North America will have shorter shipping dates.

Fleets will be able to buy an International truck in 2010 that is equipped with a 2009 model engine as production of the cleaner engines is phased in over about nine months. Production of 2010-certified engines will begin in the last quarter of 2009 and ramp up through the first two quarters of 2010, said Randall Ray, manager of engine sales and marketing for Navistar Inc. Engine production in the third quarter of 2010 should be all 2010-certified.

For those buyers who want to get a jump-start, Cummins will have some production models with the SCR systems ready before Jan. 1, Lirette said.

"We will conduct limited product builds in the last quarter," she said. "If there are some customers out there who want to get an early taste of the product, we will have engines available early, toward the end of '09."

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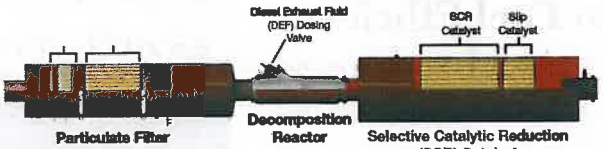

In Cummins' selective catalytic reaction process, which several midrange truck manufacturers will use, diesel exhaust fluid enters a decomposition reactor, where it is changed into ammonia. The nitrogen oxide in the exhaust mixes with the ammonia, and together they enter the SCR catalyst. A catalytic reaction turns the NOx into nitrogen gas and water vapor. Other SCR systems operate in a similar manner.

Cummins Inc.