

Setting The Record Straight

EGR VS. UREA-BASED SCR...FACT VS. FICTION

FICTION

Navistar will not meet 2010 emissions compliance because we can't meet 0.20 grams of NOx.

FACT

We can and will meet 0.20 grams NOx. As a step along the way, because we had the foresight and capability to leverage the EPA's credit program successfully, we will be certified and fully compliant in 2010 at 0.50 grams NOx.

FICTION

Urea-based SCR systems will not impact medium-duty and vocational trucks with bodies.

FACT

Unlike urea-based SCR, Advanced EGR eliminates NOx inside the engine, eliminating the need to package 200-300 pounds of extra equipment. Applications that require clean CA will continue to have clean CAs with Advanced EGR technology.

FICTION

All manufacturers have selected urea-based SCR except Navistar, so we assume Navistar had trouble delivering SCR, thus defaulted to EGR.

FACT

Navistar chose Advanced EGR because it eliminates all hassle for the customer. Because we have been proactive over the last decade in staying ahead of the government emissions standard, we have generated credits, an "emissions bank account" so to speak, which give us more flexibility to improve emissions technology. Our competitors, who have not generated sufficient credits to pursue other options, chose to refine an existing NOx-reducing technology (urea-based SCR) because it was easier to take their existing and cumbersome after-treatment system from European platforms and apply it to North American trucks.

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FICTION

Urea-based SCR technology provides a meaningful fuel economy advantage over EGR.

FACT

To date, competitive fuel economy claims have been based solely on class 8 on-highway applications under optimum operating conditions.

Our business dictates we look at the range of performance across all key vocational segments, and we are currently doing so. We are finding that fuel economy is equal to or better than current performance of current products.

For some vocational medium-range diesel-powered trucks, we see applications where our fuel economy will improve, for example V8 bus and light pick-up and delivery. For our on-highway class 8 tractor business, we expect our fuel economy performance to **equal** our competitors' urea-based SCR solutions.

How? The fuel economy of the engine itself is just one many factors that influence overall truck fuel economy, and it's only 35-40 percent of the equation. We're approaching our Advanced EGR solution as a total truck solution that compensates for any fuel economy losses in the engine through efficiency improvements to the other parts of the truck.

Specifically:

- Improvement made to the fuel, air, and control systems to run cleaner and more efficient combustion.
- A 50 percent increase in capacity of our after-treatment systems, reducing the need for regeneration. This improved after-treatment formulation not only has a higher capacity for soot, it also burns off the soot more efficiently.
- Truck effects, like improvement in the aerodynamic co-efficient of drag and rolling resistance that make up the other 2/3 of the fuel economy equation.
- Completely avoiding the cost of urea (DEF). DEF currently costs more per gallon than diesel fuel, and requires a dose of approximately 2 to 3 gallons for every 100 gallons of diesel fuel. This adds a cost factor of at least 2-3 percent, meaning that the actual operating cost differential between Advanced EGR and urea-based SCR is small to non-existent.

FICTION

Urea-based SCR systems effectively eliminate NOx 100% of the time.

FACT

Unlike Advanced EGR, urea-based SCR systems do not ensure compliance 100 percent of the time. The EPA's own report in 2001 stated that urea-based

SCR was not likely to be able to achieve low enough NOx levels because it relies on owners/drivers for compliance, incentivizing them not to comply in four ways:

- More frequent scheduled maintenance
- Urea must be replenished at these more frequent maintenance events
- A financial incentive exists to avoid urea replacement
- The system can be tampered with without special tools or expertise

In some cases, trucks with urea-based SCR can go up to 1,000 miles before the warning system disables the truck, and during this time the emissions benefit is all but negated. And worse than that, the exhaust will most likely be dirtier than allowed by 2007 benchmarks.

THE EPA IS ALLOWING SCR SYSTEMS TO EMIT MORE NOx THAN THE STANDARD ALLOWS IN CERTAIN SITUATIONS

Regulation/Violation	Euro 6 Allowance	EPA 2010 Allowance
Lack of urea	30 miles	<ul style="list-style-type: none"> • 500 miles • 1000 miles with perf. inhibit
Tampering	Must be tamper-proof	Could allow non-functioning or tampered system to operate without emissions control up to 2000 miles before requiring a performance inhibit
Vehicle performance inhibit	30 MPH max	25% torque derate; no max speed limit
Cold ambient dosing capability	< 20 min @ 5° F	No dosing needed up to 70 min @ 12° F

FICTION

The penalties for non-compliance with EPA standards are equally stringent to those in Europe.

FACT

As you can see in the previous chart, EPA's 2009 urea-based SCR guidance is far more lenient than the Euro 6 allowances. We believe these new loopholes diminish the benefit of the original EPA mandate and provide urea-based SCR manufacturers with permission to pollute.



FICTION

The use of emissions credits by Navistar is bad for the environment.

FACT

We have been able to pursue Advanced EGR because our engines have been below the emissions target significantly since 2007, enabling us to bank credits and apply them to 2010 standards. We invested in our technology, and are now being rewarded for it. And since we can use only 80% of the credits we bank, our emissions are actually lower over the time frame than if we did not use credits.

FICTION

The financial impact of 2010 emissions comes only at acquisition for both urea-based SCR and Advanced EGR.

FACT

Unlike urea-based SCR, our emissions expense will **ONLY** be at acquisition. All other OEMs will have ongoing operating costs including urea purchase, urea storage, maintenance, repair and loss of payload capacity due to SCR equipment. As for acquisition costs, Navistar will increase pricing \$6,000-\$8,000, depending on the engine. Volvo is the only large competitor who has declared their urea-based SCR pricing to-date at \$9,600.

FICTION

Urea-based SCR trucks will have higher resale value.

FACT

While this is all speculation, we think the opposite will occur. Why? In the last 6 months, several companies have unveiled non-liquid urea technologies, evidencing the demand for an alternative to liquid urea. We think it's just a matter of time before urea-based SCR becomes outdated technology, thus negatively influencing the value of the trucks carrying such heavy and costly urea-based SCR equipment.

FICTION

The Advanced EGR system runs hotter than a urea-based SCR system and will result in reduced engine life.

FACT

Engine combustion temperatures are actually lower in our Advanced Combustion EGR solution, which is the very reason for lower NOx formation. The engine bulk temperatures are very much the same as previous engines and the incremental cooling is simply from the incremental exhaust gas that is cooled. Our vehicle cooling systems were designed specifically to handle this incremental amount of cooling and our engines run at the same coolant temperatures as previous. Engine life and serviceability will be unchanged from previous products.

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FICTION

The infrastructure for liquid urea is strong and developed.

FACT

Customers will be able to buy liquid urea (commonly known as DEF—Diesel Exhaust Fluid), but it will not be broadly established with proper fueling equipment for quite some time. Knoxville-based Pilot will only install DEF tanks and pumps in 100 of its over 300 locations by second quarter 2010. All of their locations will offer 1.5 and 2.5 gallon containers of the substance. The containers will be the most expensive form of urea.

FICTION

Urea is a safe fluid unaffected by ambient temperature.

FACT

Urea freezes at 12°F, and it gasifies (forms ammonia gas) at 122°F. Our customers regularly drive in conditions that create these temperatures under the hood.

Furthermore, a urea system requires exhaust temperatures to be above 225°C to achieve chemical reaction. In cold climates and in stop-and-go driving conditions such as pick-up/delivery and school buses, 225°C will not likely be reached in a typical day. It is entirely conceivable, and perhaps probable, that in Northern/Midwestern states the emissions control system may not function for several weeks in winter. The impact on the environment will be severe.

Finally, there is plenty of marketing spin about the safety and non-threatening nature of urea. However, the ISO standards body has published several lengthy standards manuals on the handling, storing, and testing of DEF (ISO 22241-1,-2,-3). Companies like urea manufacturer Terra are offering hazardous material handling training for all their drivers.

THE LAST WORD...

FOR A TRULY GREEN SOLUTION, NAVISTAR IS THE ANSWER

Navistar has always been at the forefront of environmental protection, and we are consistently one of the earliest to market with green solutions. We worked hard to make sure we found an emissions solution to meet the strict EPA standards as they were originally written, and we have invested a significant amount of time and money to assure we continue to meet and exceed standards in the years to come.

This dedication to providing the right technology—technology that takes the burden of compliance off the customer—positions us well for the future. We are growing our market share in Class 8 vehicles, and our development of Advanced EGR is a tremendous advantage to our medium-duty and severe service customers, where urea-based SCR packaging is a huge issue.

We feel that we have abided by the rules—even more than met them—and for the EPA to change them now and create loopholes in favor of urea-based SCR, especially when they have known for years of its severe limitations, is simply poor public policy, bad for the environment, and bad for the trucking industry. The EPA should either close the new loopholes, or change the law.

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