UREA SELECTIVE CATALYTIC REDUCTION AND DIESEL PARTICULATE FILTER SYSTEM FOR DIESEL SPORT UTILITY VEHICLE MEETING TIER II BIN 5

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Ford Motor Company is participating in the U.S. Department of Energy's (DOE) Ultra-Clean Transportation Fuels Program with the goal of developing an innovative emission control system for diesel sport utility vehicles. This program focuses on diesel vehicles because they currently offer 40-percent better volumetric fuel economy and 20-percent lower CO_2 emissions than comparable gasoline vehicles. We chose a selective catalytic reduction (SCR) catalyst that uses aqueous urea as the NO_x reductant and a catalyzed diesel particulate filter (DPF) for this program. We plan to demonstrate more than 90-percent reduction in particulate matter (PM) and NO_x emissions. We use very low sulfur diesel fuel (less than 15 ppm) to enable low PM emissions, to reduce the fuel economy penalty due to the emission control system, and to enhance long-term durability of the system. The end result will allow vehicles with diesel engines to be Tier II - emissions certified at a minimum cost to the consumer.

In the first year of the program, we have scaled up the exhaust system --which has an oxidation catalyst, urea SCR and a catalyzed DPF -- from a passenger car to a light-duty truck. We have achieved excellent mixing of the injected urea with the truck exhaust gas and 85-percent NO_x conversion on the Federal Test Procedure as predicted by modeling. We have also begun exploring rapid-warming procedures to increase NO_x conversion when exhaust temperatures are too low and modeling ammonia storage to maximize NO_x conversion while minimizing ammonia emissions. We have begun improving exhaust gas NO_x and ammonia sensors for more accurate control of reductant injection and on-board diagnostics. Finally, we have tested the on-road durability of the aqueous urea SCR system on a 2.4-liter transit van for 25,000 miles and separately improved the durability of both the urea SCR and DPF systems.