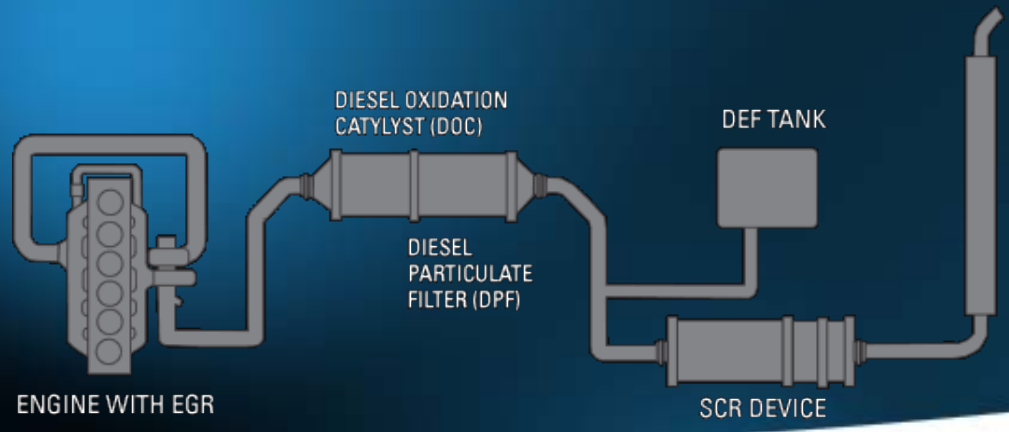

SCR
&
2010
Emissions

SCR

Selective Catalytic Reduction

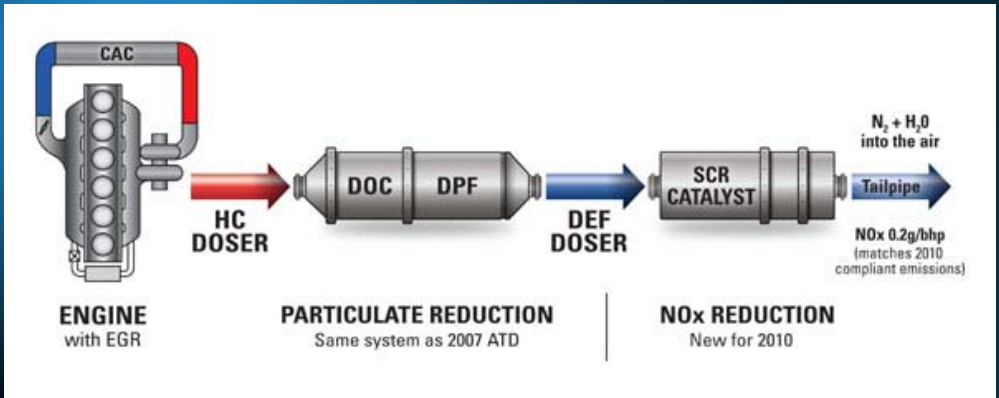
A technology to reduce diesel emissions and increase fuel efficiency



SCR

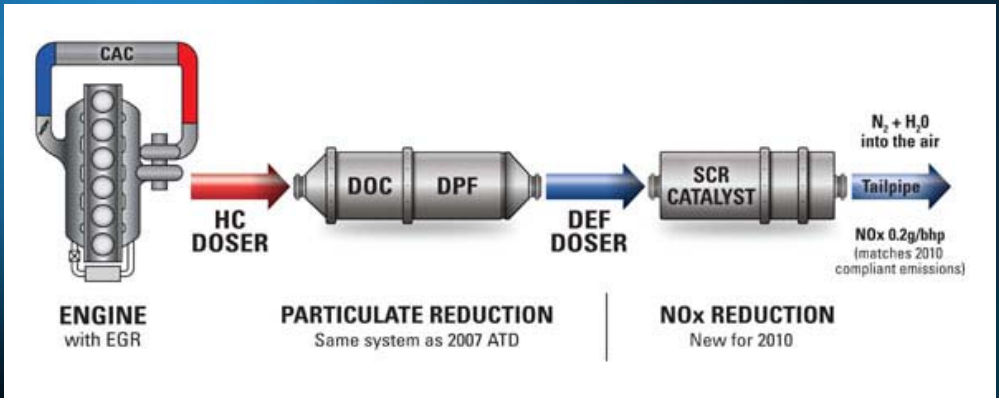
- Allows nitrogen oxide (NOx) reduction reactions to take place in an oxidizing atmosphere

- “Selective" because it reduces levels of NOx using ammonia as a reductant within a catalyst system.



SCR

• Reducing agent reacts with NOx to convert the pollutants into nitrogen, water and tiny amounts of carbon dioxide (CO2) - natural elements common to the air we breathe every day.



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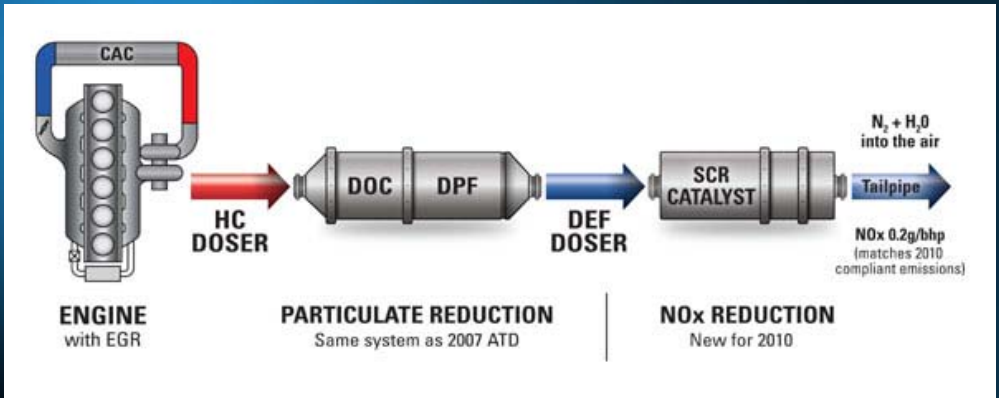
• Reductant source is usually automotive-grade urea, otherwise known as Diesel Exhaust Fluid, which can be rapidly hydrolyzed to produce the oxidizing ammonia in the exhaust stream.



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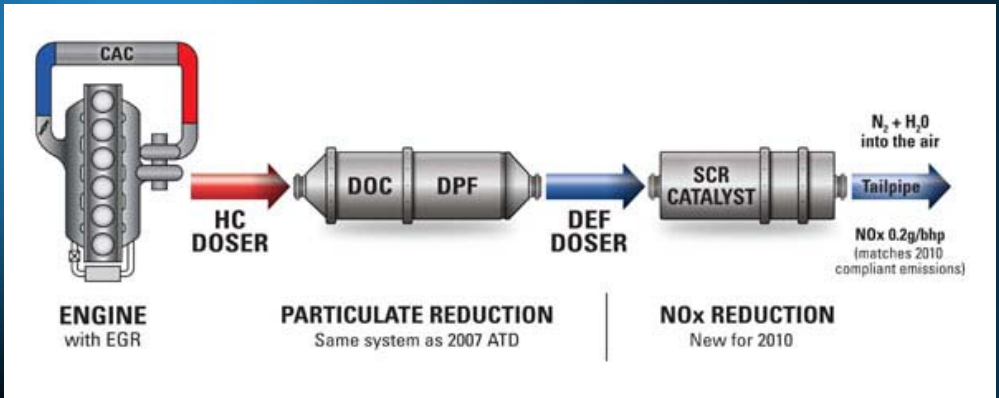
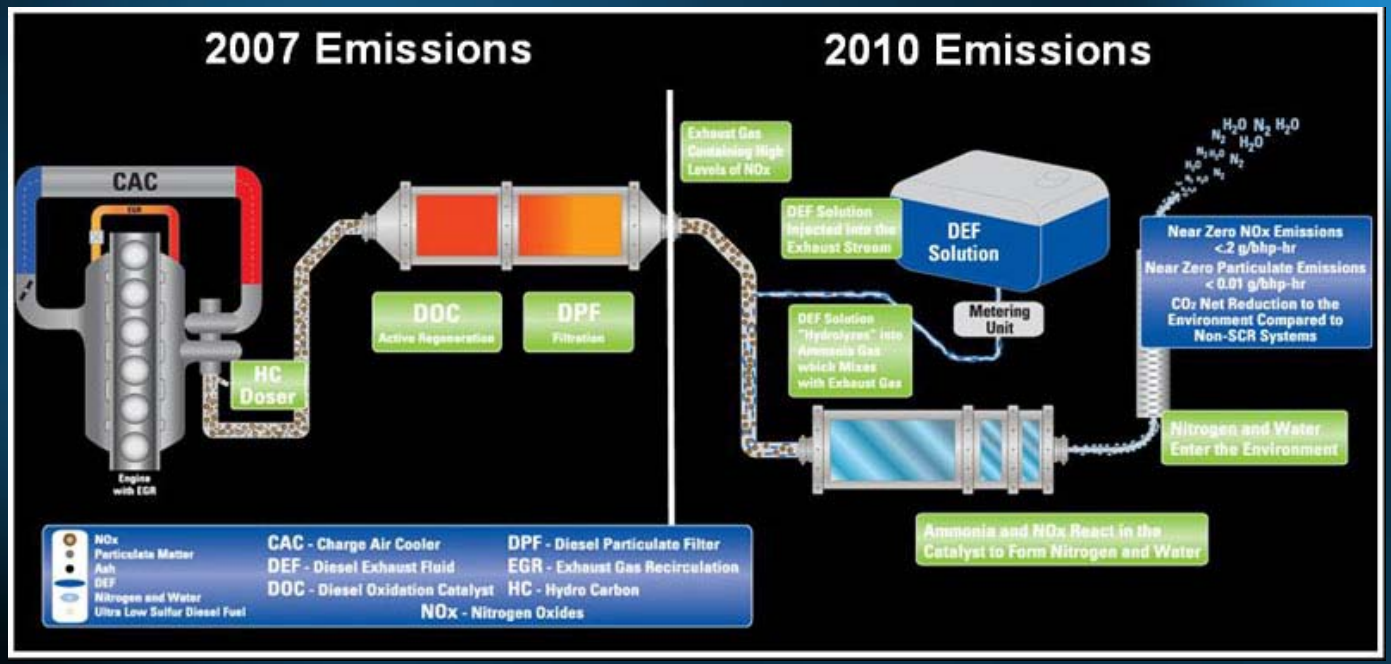
- SCR technology can achieve NOx reductions in excess of 90%.



SCR

2007 versus 2010

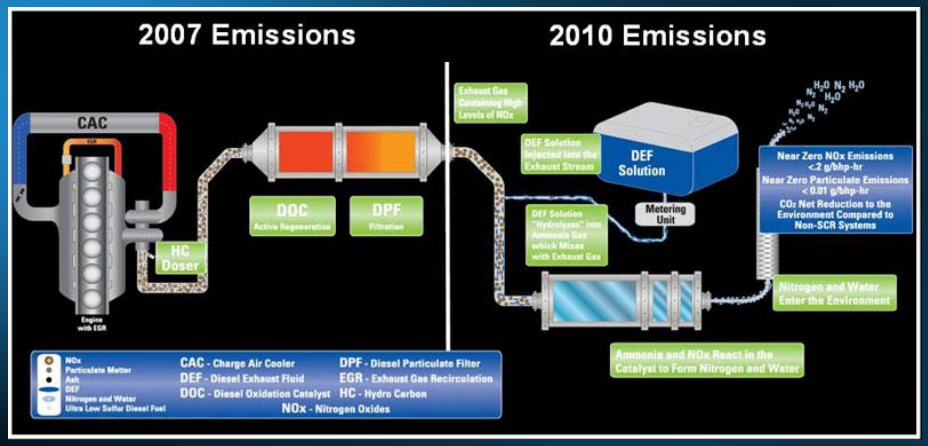


2010 engines with SCR will have the components shown on both sides of this slide

SCR

The three main components of the SCR system are:

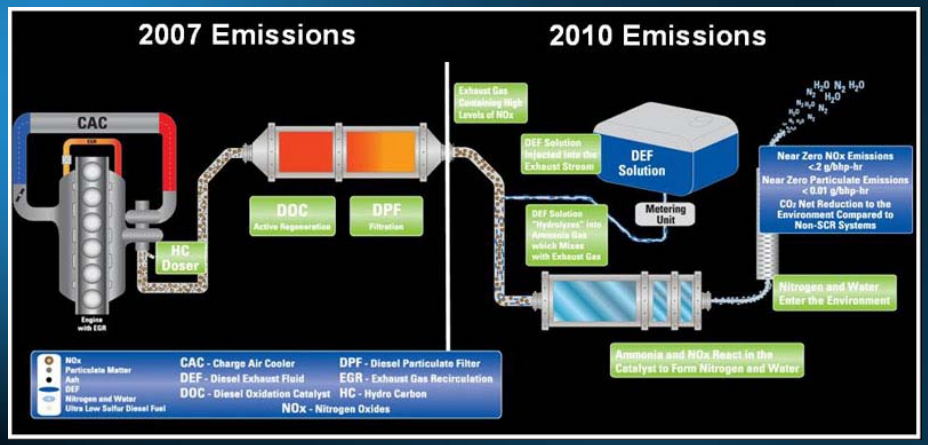
- **Diesel Exhaust Fluid** (a solution of 32.5% urea and purified water)
- **Hot exhaust**
- **Catalytic converter**



SCR

The vaporized Diesel Exhaust Fluid is injected into the exhaust stream of a diesel engine. When the hot exhaust combines with the Diesel Exhaust Fluid within the SCR catalyst, it is broken down into two natural components of the air we breathe:

- **Pure nitrogen** and **water vapor**



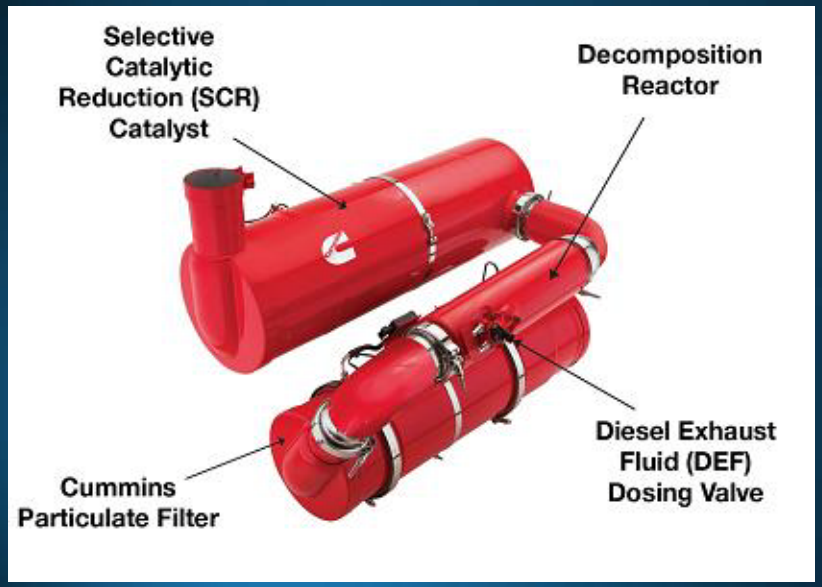
SCR

These components are then expelled through the vehicle tailpipe. Using SCR as a diesel emissions control technology results in:

- Up to **90% reduction** in levels of **nitrogen oxide (NOx)**, one of the criteria pollutants that will be stringently controlled by the EPA beginning with passenger cars in the 2009 model year and continuing with Class 8 heavy duty trucks in 2010.
- **3-5% reduction** in **carbon dioxide (CO2)** emitted from Class 8 trucks due to reduced fuel consumption
- **30-50% reduction** of **black carbon** levels (otherwise known as particulate matter or PM when SCR technology is combined with diesel particulate filter technologies introduced in 2007)

SCR

Cummins Aftertreatment System



How the Cummins Aftertreatment System works:

- **Cummins Particulate Filter**
Collects and oxidizes carbon to remove PM by more than 90%

- **Diesel Exhaust Fluid (DEF) Dosing Valve**
Allows a fine mist of DEF to be sprayed into the exhaust stream of the Decomposition Reactor

- **Decomposition Reactor**
Converts DEF into ammonia through hydrolysis

- **Selective Catalytic Reduction (SCR) Catalyst**
Significantly reduces NOx to near-zero levels by converting it into harmless nitrogen gas and water vapor

- **Electronic Controls**
Single Electronic Control Module consistently adjusts engine and aftertreatment operations for peak performance and emissions control

Note the size of the SCR catalyst is nearly the same as the DPF

2010 Emissions

SCR Recap

- **Requires a DEF tank to extract NOx.**
- **Requires a 5-10 gallon tank to store urea**
- **A 2010 engine will use approximately one $5 to $10 gallon of urea per 50 gallons of diesel**
- **In addition to the Diesel Particulate Filter, there is also a Decomposition Reactor and the SCR Catalyst you will have to service and maintain and a Urea tank to fill**
- **Depending on the type of apparatus, the SCR Catalyst can potentially take up valuable compartment space**